Risk Factors for Suicide in Adults Aged 30-49: a Psychological Autopsy Study in Hong Kong

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Abstract

The suicide rate in Hong Kong has been increasing since 1997, and the suicide rate among the 30-49-year-olds has increased from 294 in 1996, to 484 in 2003, surging about 65% since 1996. Despite the fact that an increasing trend had been observed, the characteristics of suicides among this age group were not known because no empirical research had been conducted among this age group in Hong Kong. The present study is the first psychological autopsy study conducted on the 30-49 age group in a Chinese society. The aims of this study were to identify and examine the magnitude of the risk factors of middle-aged suicide among the Hong Kong citizens, to determine the similarities and applicability of Western findings into local situation, and to recommend culturally specific evidence-based preventive and intervention strategies. Using a case-control psychological autopsy methodology, 85 individuals who committed suicide and 85 age-and-gender matched control subjects were compared. Based on the information from spouses/live-in partners and death records, psychiatric, psychological, sociological, family history and life events variables were studied. Multiple logistic regression analysis identified the following risk factors that were common in middle-aged suicides in Hong Kong: presence of at least one psychiatric disorder (OR=37.5, 95% CI 11.5-121.9), indebtedness (OR= 9.4, 95% CI 2.2-40.8), lived alone (OR=3.9, 95% CI 1.2-13.4), unemployment (OR=4.8, 95% CI 1.3-17.5), and never married (OR=4.2, 95% CI 1.1-16.3). These findings suggest that there are more commonalities than differences in risk factors for suicide found in other psychological autopsy studies; however, the magnitude of some of these identified risk factors were inconsistent with suicide research conducted in other countries. Given the multi-faceted and distinctive nature of middle-age suicide in Hong Kong, a public health approach of suicide prevention strategy, which targets both individuals and the population, is considered to be appropriate than the clinical approach in order to reduce larger population developing greater suicidal risk.

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Chapter 1

Introduction

Suicide has been called the leading cause of unnecessary and premature death and has become an urgent problem worldwide (World Health Organization [WHO], 2003a). Suicide resulted in one million deaths worldwide in 2000, and 1 264 deaths in 2003 in Hong Kong. It is also estimated that more than 7 000 people make nonfatal suicide attempts annually (Centre for Suicide Research and Prevention, The University of Hong Kong [CSRP HKU], 2005). The suicide rate has been increasing at an alarming pace, from 12.1 deaths per 100 000 in 1997 to 18.6 deaths per 100 000 in 2003, which was 28% higher than the world average of 14.5 (WHO, 2003a).

The epidemiology of suicide in Hong Kong can be reflected by official statistics collected from the Coroner's Office and the Census and Statistics Department (C&SD, 2004). Suicide was the sixth leading cause of death in the population as a whole in Hong Kong in 2003, ranking even higher than natural deaths from infectious and parasitic disease; endocrine, nutritional and metabolic diseases, and traffic accidents. Moreover, suicide is the leading cause of death among 15-24-year-olds and the suicide rate among older people (60 or above) in Hong Kong is the highest among other age groups with a suicide rate of 28.4 per 100 000 in 2003 (CSRP HKU, 2005). Since 1997, the suicide rate among middle-aged

(30-49-year-olds) population has been increasing rapidly (CSRP HKU, 2005). The suicide rates among the 30-49-year-olds have surged about 65%, from 294 in 1996 to 484 in 2003. Comparing these three age groups, the suicide rate among middle-aged recorded the largest increase in the given period, and yet, it is the least studied age group in Hong Kong. Consequently, there is an urgent need to investigate and identify the characteristics of middle-aged suicides in Hong Kong in order to prevent these tragic deaths at present and in the future.

Official suicide statistics are useful to monitor the impact of change in legislation, treatment policies, and socio-economical change, and to compare suicides across regions; however, official statistics are inadequate in the provision of an in-depth exploration of significant risk factors of suicide (Maris, Berman, & Silverman, 2000). Information including personality characteristics, undetected psychopathology, and history of suicide attempts that did not require medical attention cannot be obtained from official statistics. Consequently, different data sources that include clinical interviews, experiments, suicide notes, and psychological autopsies are essential for the understanding of suicidal behaviour and its prevention (Institute of Medicine [IOM], 2002).

Among the many data sources of suicide, the psychological autopsy method offers the most direct technique currently available for determining the relationship between particular

risk factors and suicide (Cavanagh, Carson, Sharpe et al., 2003). The psychological autopsy method aims to reconstruct a detailed picture of the psychological state of individuals who committed suicide, including psychiatric symptomatology, behaviour, and life circumstances during the weeks, months, or even years before death. The methodology includes interviewing knowledgeable informants, reviewing available clinical records, and comprehensive case formulation by mental health professionals with expertise in post-mortem studies (Beskow, Runeson, & Asgard, 1990). This intensive research approach not only provides direct information about risk factors of suicide, but also aids the interpretation of studies employing other techniques (Hawton & van Heeringen, 2000). Equally important, psychological autopsy study is useful to institute preventive strategies or therapeutic practices to reduce these tragic deaths (Runeson & Beskow, 1991).

There are two generations of psychological autopsy studies. The first generation of studies was uncontrolled descriptive studies of consecutive suicide cases but had some methodological limitations, e.g., lack of generalisability to the general population (Arato, Demeter, Rihmer, & Somogyi, 1988; Chynoweth, Tong, & Armstrong, 1980). Hence, a second generation of psychological autopsies had emerged two decades ago. The present study will adopt a case-control psychological autopsy research design in order to investigate and identify risk factors for middle-aged suicide in Hong Kong.

Risk factors for suicide are suggested to be universal (Maris, 2002). A *meta-analysis* on 22 case-controlled psychological autopsy studies, mainly from Western countries, suggested that the findings of these studies were mostly congruent across different countries (Cavanagh et al., 2003). In particular, the findings revealed that psychiatric disorders (86-97%), stressful life events in last year (29-93%), physical illnesses (29-48%), communication of suicide intent (24-85%), social isolation (22-68%), living alone (22-68%), and history of suicidal behaviour (16-68%) were predictors of suicide across cultures. However, Zhang et al. (2004) pointed out that although risk factors of suicide are universal, cultural factors play a significant role in suicidal behaviour that some risk factors for suicide are more or less potent in different cultures (Zhang et al., 2004).

Indeed, it has been hypothesized that there is a base rate of deaths from suicide in all communities, which is determined by biological and psychological factors, and that where suicide rates diverge from this base rate, racial, ethnic, and cultural factors (including marcosocial and cultural factors) are likely to be important (Goldney, 2003). For instances, suicide is almost non-existent among the Tiv of Nigeria in central Africa, the Irish Roman Catholics, and the black females in the United States (Maris et al., 2000). “Race” is defined as a division of a species that differs from other divisions by the frequency with which certain inherited physical characteristics. “Ethnicity” refers to any group that can be set off by race, religion, or national origin. A “culture” is a total of socially acquired lifestyle of a particular

of a particular group of people (Harris, 1971). Lenski et al. (1995) stated that “culture includes a group’s total perception reality: its ideas about what is real, true, important, possible, good, beautiful, etc. Because every society has a unique past, every culture is unique (p.38)”. Accordingly, a panel of international suicide experts suggested that because most studies have been conducted in developed nations, one should not automatically implied these findings in other non-Western nations; and many issues facing underresourced developing nations have not been addressed and future studies specifically focused on suicide prevention in these non-Western countries are required (Mann, et al., 2005).

Compared with Western countries, there are limited studies in non-Western countries. Moreover, the findings of these suicide studies were less congruent. Similar to Western suicide studies, Cheng et al. (2000) reported that presence of psychiatric disorder was the most robust risk factor for adult suicide (aged 25-59) in Taiwan. Also, a psychological autopsy study conducted on late-life suicide (aged 60 or above) in Hong Kong reported that the characteristics of older people suicides were similar to those being reported in the West, suggesting that depressive disorders and a past history of suicide attempt were the most robust risk factors of late-life suicide in the Hong Kong Chinese population (Chiu et al., 2004). Although Chiu et al’s (2004) study focused on elderly suicide, their study provided empirical evidence that cultural factors may play a significant role in suicide in terms of the magnitude of risk factors for suicide.

On the contrary, three psychological autopsy studies conducted in China and India found that psychosocial factors played a stronger role in suicide as compared with Western's findings. To illustrate, findings from a large scale Chinese study reported that although presence of psychiatric disorder was a risk factor for suicide, there was a relatively low prevalence of mental illness (about 60%) among the mainland Chinese suicides (Philips et al., 2002). This study, in comparison, highlighted the relative importance of psychosocial stressors and life events to suicidal behaviour in mainland China. In addition, Bhatia et al. (1987) found that, besides a high preference of presence of psychiatric disorder among suicides in India, humiliation, shame, economic hardship, and family disputes were, instead, the greatest risk factors for suicide in India. Gururaj et al. (2004) also found that although mental illness was a robust risk factor for suicide in Bangalore, India, emotional abuse, physical abuse, and lack of social support were the more robust risk factors for suicide in their culture. In sum, mixed findings in terms of the magnitude of risk factors for suicide were reported among non-Western countries. Despite the urgent need to understand and prevent middle-aged suicides in Hong Kong, there is also a need to understand the distinctiveness of suicide in Hong Kong in order to plan and implement cultural specific and empirically based suicide prevention strategies.

Given the limited knowledge on middle-aged suicides in Hong Kong, mixed findings in terms of the magnitude of risk factors of suicide among Western and non-Western countries,

as well as a lack of official plan for suicide prevention in Hong Kong, the present study has four objectives:

(1) to explore multi-dimensional factors including psychiatric, psychological, and social risk factors of suicide among the 30-49-year-olds of Hong Kong Chinese population using a psychological autopsy methodology;

(2) to determine whether the risk factors of suicide found in other countries, mostly Western countries, are applicable in Hong Kong;

(3) to determine the magnitude of these suicide risk factors among Hong Kong middle-aged population; and

(4) to suggest empirical-based preventive or intervention strategies based on the findings of this study.

In order to achieve these aims, five chapters will be developed. Chapter 2, the literature review, will describe the suicide phenomenon in Hong Kong, give a brief overview of suicidal behaviours and theories of suicide, review findings of empirical psychological autopsy studies on completed suicide, and discuss the rationale and hypotheses of this study.

In Chapter 3, the recruitment of subjects, measures, and procedures of the study will be discussed. In Chapter 4, descriptive statistics, socio-demographics and familial

characteristics, and psychiatric and psychological characteristics of the subjects will be discussed. Moreover, all of the significant risk factors identified by binary logistic regression analyses will be selected and further analysed by a multivariate logistic regression analysis in order to identify risk factors that are most likely associated with middle-aged suicides among Hong Kong Chinese population.

In Chapter 5, discussions of the identified risk factors, limitations of the study, and implications for intervention will be examined. This chapter will conclude with suggestions for adopting a public health approach for suicide prevention in the future of Hong Kong. This approach will target not only the high-risk individuals but will also reduce the larger population developing greater suicidal risk.

Chapter 2

Literature Review

There are three major sections in this literature review. This literature review will initially introduce the phenomenon of suicide in Hong Kong and discuss the rationale for studying middle-aged suicide of Hong Kong citizens. Then, an overview of suicidal behaviour, which includes the definitions of suicidal behaviours and theories of suicide, will be discussed and critiqued. Among the reviewed theories of suicide, an integrative approach of suicide, will be adapted as a theoretical framework of the study. Finally, an overview of empirically identified suicide risk factors will be reviewed. Based on the reviewed risk factors of suicide, the hypotheses of the study will be developed at the end of this chapter.

Epidemiology of Suicide in Hong Kong

The suicide rates have been increasing at an alarming pace since 1997. This section of the literature review will discuss the collection of suicide statistics, overall increasing trend of suicide by age, gender, and method from 1981-2003 in Hong Kong, and analysis on *Year of Life Lost* (YLL) due to suicide. This section will close with a rationale for the need to study middle-aged suicide in Hong Kong.

Definition of Suicide and Data Collection

All unnatural deaths are to be investigated by a Coroner system in most of the developed countries (WHO, 2003b). In Hong Kong, formerly a British Colony and a special administrative region under Chinese Sovereignty, there is no exception. A suspected suicide has to satisfy the *beyond reasonable doubt* criterion, judged by the Coroner, in order to be classified as suicide and be coded as X60–X84 under the Tenth International Classification of Disease (ICD-10) of the World Health Organization (WHO, 1999). For those deaths who do not satisfy the beyond reasonable doubt criterion, the death would be classified to have an *undetermined cause* (Cui, Yip, & Chau, 2004).

All suicide deaths in Hong Kong examined by the Coroner's Court relies on death investigations carried out by the Police Force, and Coroners will then determine the cause of death and consider whether an inquest is needed for further investigation. A police investigation report includes statements from relatives and family members, medical report, psychiatric report, toxicological report, and autopsy report. While the Coroner is concerned with preventing suicide deaths in the future, the Census and Statistics Department (C&SD) is responsible for providing the suicide figures to the WHO and external organizations. All figures that will be presented below are collected from the Coroner's Court and are further analysed by the Centre for Suicide Research and Prevention of the University of Hong Kong (CSRP HKU).

Overall Trends of Suicide in Hong Kong

The number of suicides in Hong Kong have been increasing since 1997 and reached its historical high in 2003. The total number of suicide deaths increased from 501 in 1981, to 1 264 in 2003, a 252% increased in about two decades. Specifically, there was a sharp upward slope of the suicide trend started in 1997, from 9.6 deaths per 100 000 in 1997 to 18.6 deaths per 100 000 in 2003. The elderly suicide rate was the highest compared with other age group in the past two decades. Suicide rates of females and males had shown a relatively stable pattern from 1981 to 1996; however, the rates have been increasing since 1997. It is noteworthy that there was a sudden increase of suicide deaths from 1982 to 1985; however, the increase was short-lived and the suicide rates stabilized until 1997. This section will discuss the epidemiology of suicide in Hong Kong from 1981 to 2003.

Figure 1 presents the overall trend in suicide rates in Hong Kong from 1981 to 2003. The suicide rate was relatively stable with a mildly escalating trend from 1984 (10.4 per 100 000) to 1996 (11.2 per 100 000). Since 1997, however, the trend has abruptly increased at an alarming pace. The suicide rate has increased from 12.1 per 100 000 in 1997 to 18.6 per 100,000 in 2003. It is speculated that this abrupt increase was due to the economic crisis in 1997 and the widespread of using charcoal burning as a means of committing suicide since 1998 (Lee et al., 2002, 2004).

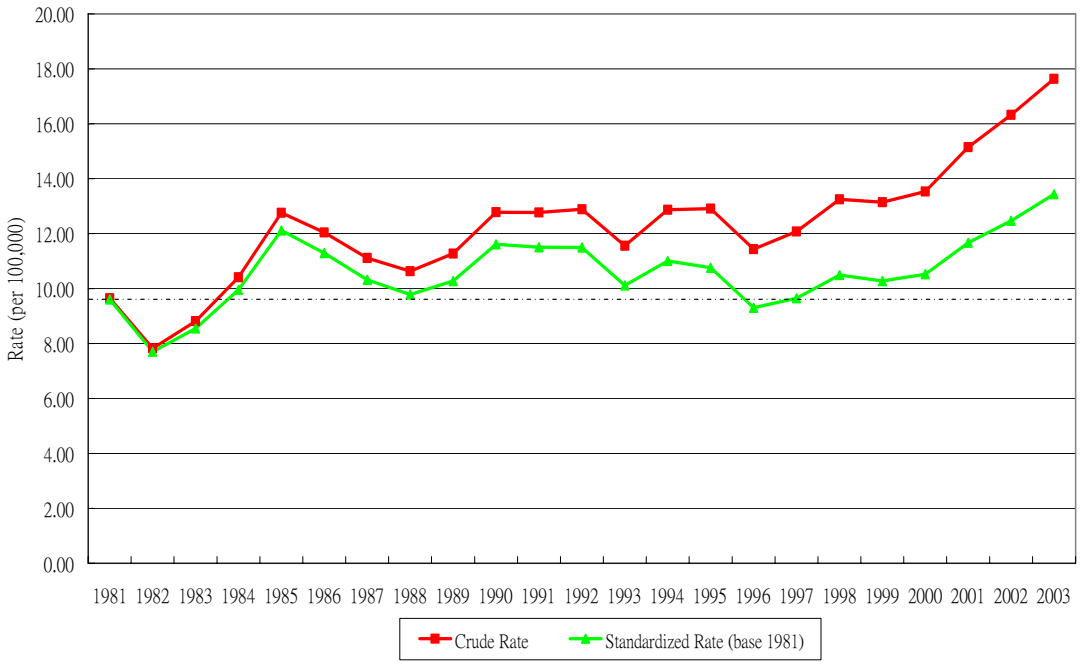

Figure 1. Suicide rates, total population, 1981–2003 in Hong Kong (CSRP HKU, 2005).

In 23 November 1998, a 35-year-old Hong Kong woman burnt charcoal in a barbeque grill within her sealed and cramped apartment. This swiftly generated a lethal level of carbon monoxide that brought about her death and charcoal burning suicides had been portrayed as an easy, effective, non-disfiguring and painless way of suicide. This highly lethal method increased rapidly from the proportion of suicide deaths from 3% in 1997 to more than 25% in 2003, and has replaced hanging as the second most common method of suicide and 91% of all suicide pacts (n = 22) in 2002 and 2003 used charcoal burning as a suicide means (CSRP HKU, 2005). After this pictorially portrayed suicide case appeared in the local news headlines in early 1998, the pattern of suicide in Hong Kong has been changing since.

Gender and suicide. Figure 2 presents the suicide rate in Hong Kong by gender from 1981-2003. Suicide rates of females and males had shown a relatively stable pattern from 1981 to 1996; however, the rates have been increasing since 1997. The male rate of suicide in 2003 was 25.2 deaths per 100 000, compared with 15.3 deaths per 100 000 in 1996. In contrast, the rate for females has remained relatively static (Yip et al., 2003), 8.7 deaths per 100 000 in 1996, and 12.3 deaths per 100 000 in 2003. The gender ratio of suicide in 2003 was about 2.1:1 (M:F).

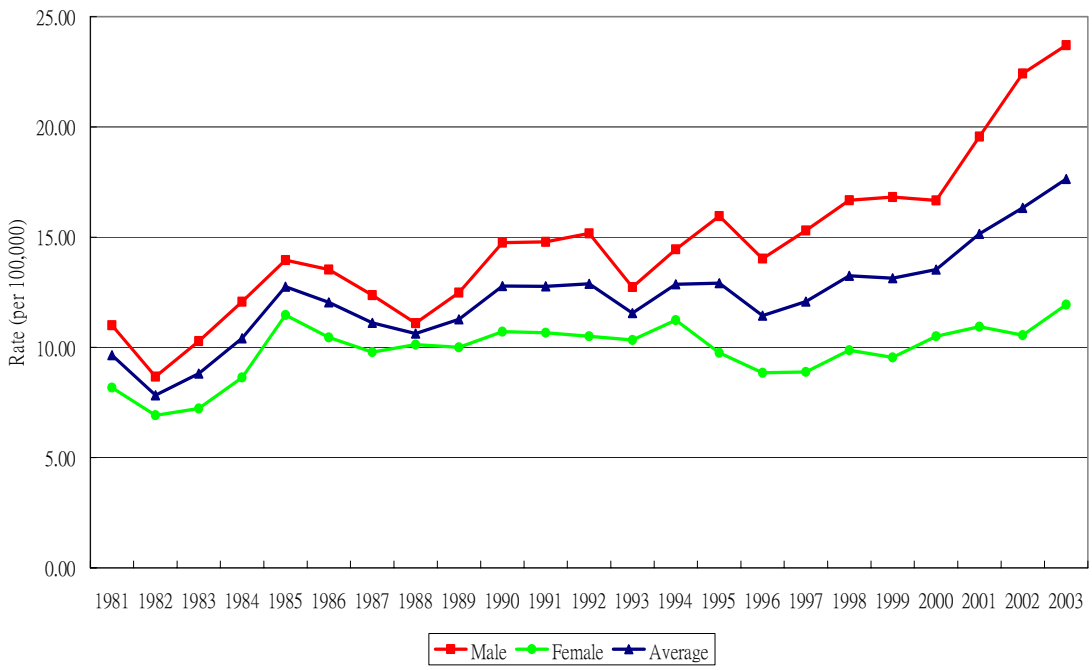

Figure 2. Suicide rates in Hong Kong by gender from 1981-2003 (CSRP HKU, 2005).

A male-outnumbered-female suicide pattern is also observed in many other countries. Specifically, in many Western countries such as Australia, New Zealand, the United Kingdom, and the United States, male suicides outnumbered female suicides three- to five-fold (WHO,

1999). The global average gender ratio of suicide (males over females) was 3.9:1 in 2000 (WHO, 2001). This gender gap is narrower in Asian countries, where the differences tend to be less than two-fold. China is singular in this regard, with more females than males committing suicide, although this gap has narrowed in recent years (Cantor, 2000, Qin et al., 2000, WHO, 2001).

There is no consensual explanation to help explain the gender differences in suicide (Centres for Disease Control [CDC], 1998, 2003). Brent and colleagues (1999) suggested that there are at least three reasons to help explain this phenomenon. First, females are more likely to engage in suicidal behaviour using potentially reversible or lower lethal methods, such as overdose, so that less number of women completed the act of suicide. Second, females are less likely to use alcohol during a suicidal act. Third, alcohol intoxication in the context of a suicide increases the likelihood of the use of a gun or highly lethal suicide means for completion of suicide. Although a male-outnumbered-female suicide pattern is observed, a narrowing trend of gender differences in suicide has been observed recently because more women, in particular among adolescents, participate in risk-taking behaviour, aggressive behaviour, and substance misuse behaviour (Beautrais, 1998, 1999b, 2000a)

Age and suicide. Suicide rate increases with age. Figure 3 shows the time trends in age-specific suicide rates for the 23-year period from 1981-2003. The rate of older people

suicide (aged 60 or above) was the highest compared with other age groups within the observed period. The rate of adult suicide (aged 25-59) was lower than the rate of older people suicide and was relatively stable from 1981-1995, then followed by an abrupt increase in 1997. In addition, the rate of older people suicide decreased from 1996 to 2002, but appeared to have had a sudden increase in 2003. The youth suicide (aged 15-24) rate was comparatively stable but had also increased since 1999. Similar to the international trend (Clark, 1993), there is a clear tendency for suicide rate to increase with age in Hong Kong. However, the trend of middle-aged suicide rate is increasing towards older people suicide rate.

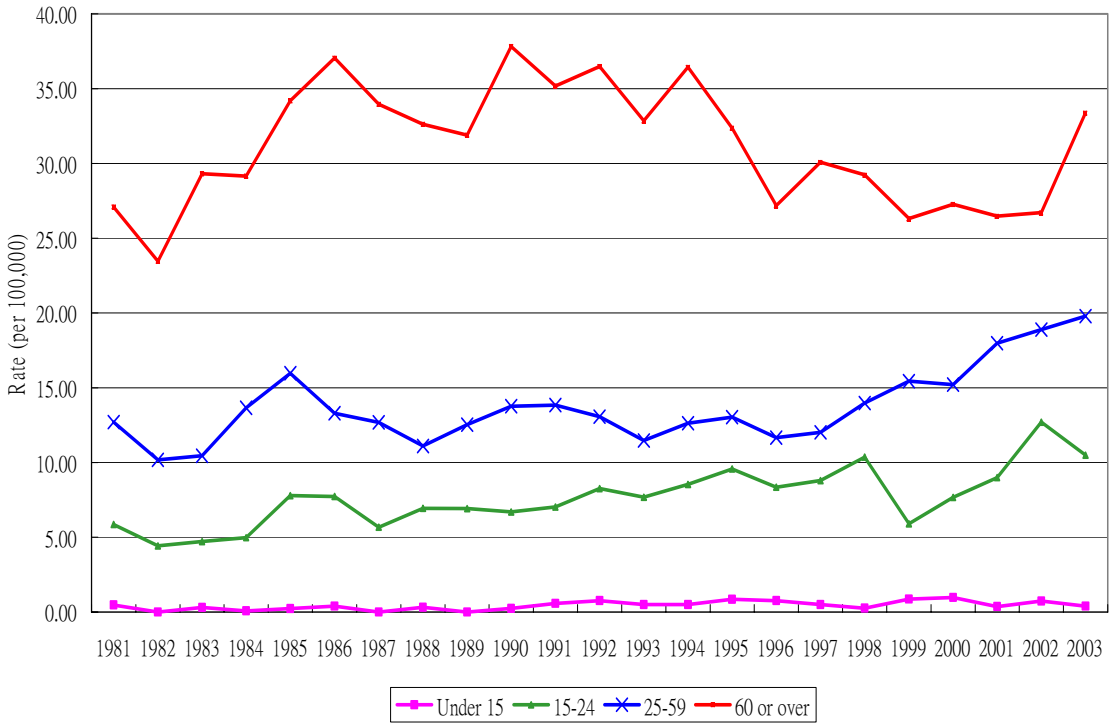

Figure 3. Suicide rates in Hong Kong by age group from 1981-2003, (CSRP HKU, 2005).

Trends in methods of suicide. The trend of methods of suicide was stable until the introduction of carbon-monoxide (CO) poisoning by burning charcoal in 1998. Before 1998, the commonly used methods of suicide in Hong Kong were jumping from a height and hanging. Poisoning by CO using burning charcoal was nonexistent before the first publicized case of charcoal burning suicide case in a sealed room in 1998 (Chan et al., 2005). Since then, CO poisoning suicide cases increased abruptly and became the second most common method of suicide after jumping and followed by hanging in 2001. The use of charcoal burning has increased mostly among middle-aged group. Figure 4 presents the trend of method used for suicide from 1981 to 2003.

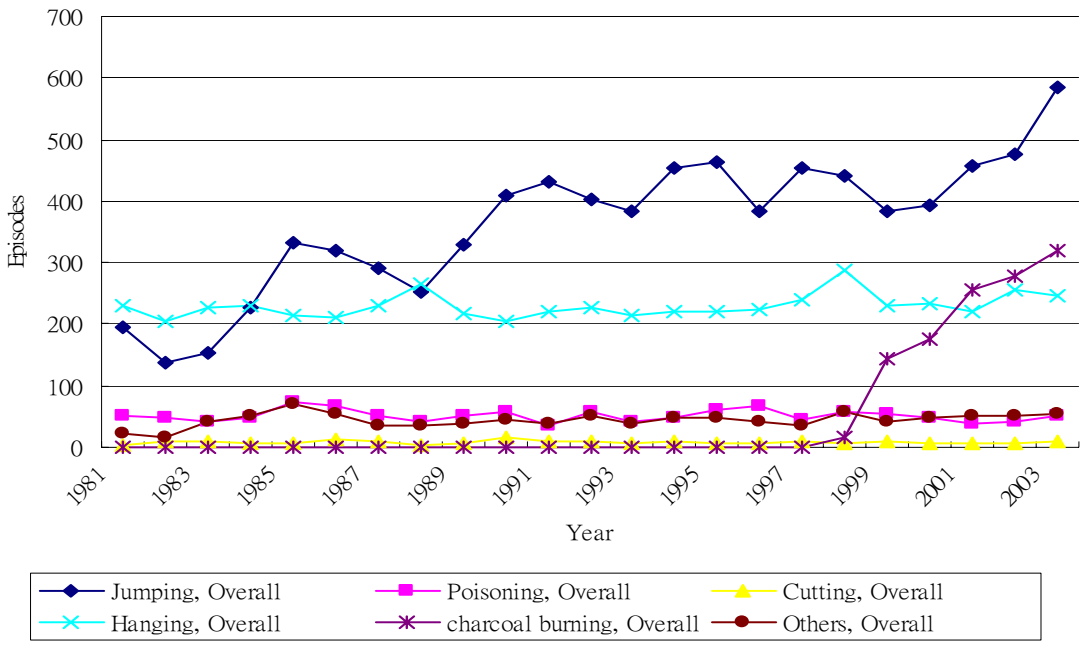

Figure 4. Trends in major methods of male suicide, 1981-2003 (percentage of total suicides, CSRP HKU, 2005)

Males and method. In Hong Kong, the commonly used methods of suicide have not varied with gender. For males, the most frequently used methods are jumping, poisoning (mostly by carbon monoxide, since 1998), and hanging. Figure 5a shows the time trends in these major methods of suicide for males of all ages from 1981 to 2003. Looking at the data in 2003, the upper line represents jumping, the second line represents poisoning, the third line represents hanging, the forth line represents others, and the bottom line is cutting. It was evident that since the introduction of CO poisoning suicide in 1998, there was a substantial increase in the use of carbon monoxide as a means of suicide onwards. Moreover, the overall trend of suicide of males has also increased.

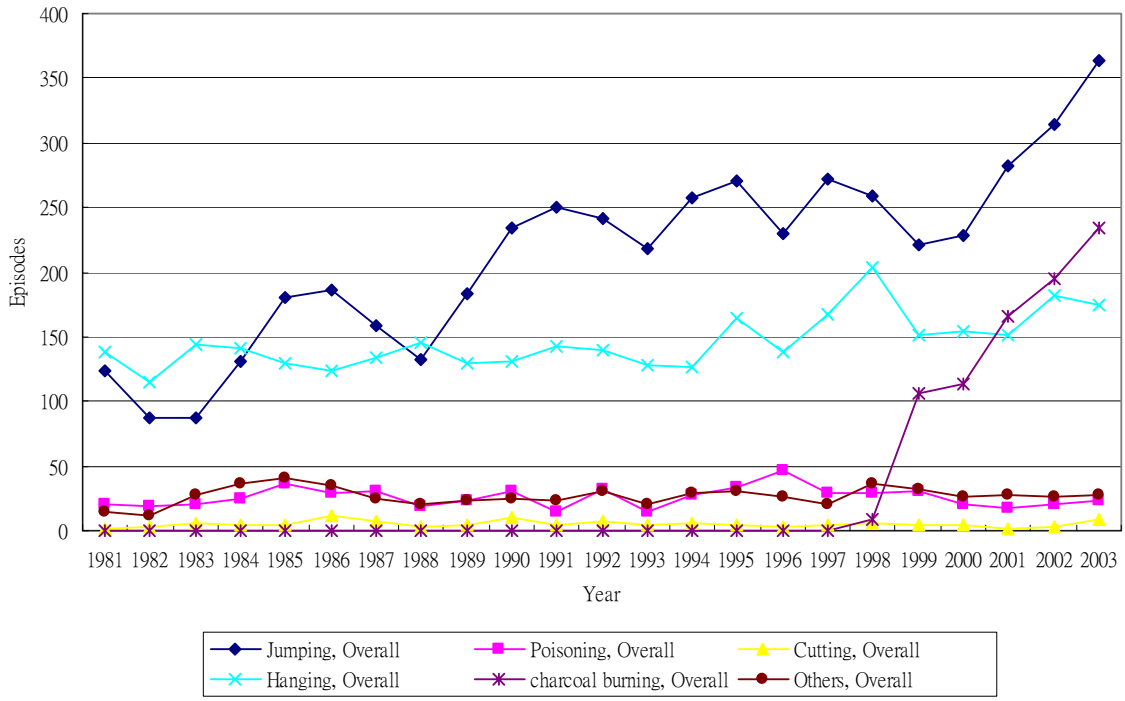

Figure 5a. Trends in major methods of male suicide, 1981-2003 (episodes of suicides, CSRP HKU, 2005)

Females and method. The pattern of most commonly used methods of suicide for females is identical to the male pattern from 1981-2003. Figure 5b shows time trends in rates of suicide for these common methods for females of all ages. There was also a major change in female methods of suicide in 2001, as poisoning (but mostly carbon monoxide) became the second most common method of suicide. Both Figures 5a and 5b show a clear increase in suicides by charcoal burning for both males and females (Yip et al., 2003).

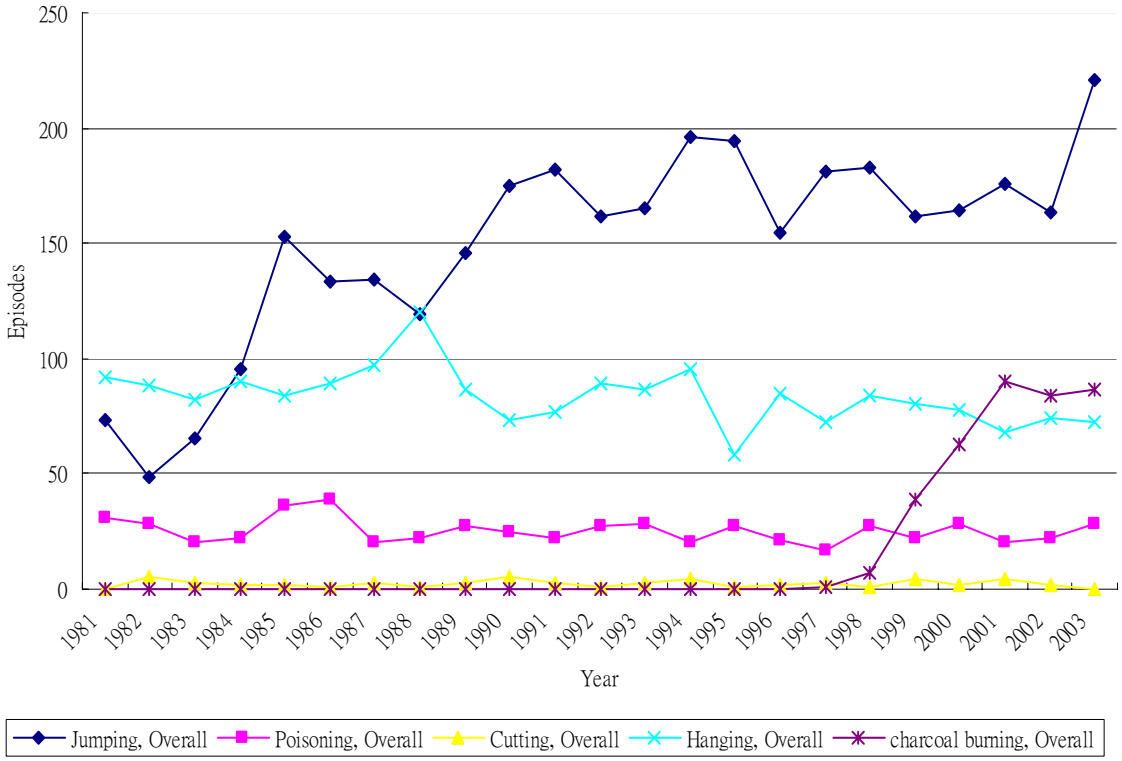

Figure 5b. Trends in major methods of female suicide, 1981-2003 (episodes of suicides, CSRP HKU, 2005)

From a preventive perspective, research into methods of suicide appears to be promising because it has repeatedly shown that limiting the availability and accessibility of suicide

means would reduce suicide rate (e.g., Chuang & Huang, 1996; Hawton et al., 1998). It is also suggested that psychological and cultural factors play a role in the choice of suicide method (Gould et al., 2003). These factors include the user's knowledge, experience, and familiarity with the means; the meaning, symbolism, and cultural significance of the means; suggestion, contagion, or modelling factors (Daigle, 2005).

Locally, it has been argued that there is a close relationship between the recent increased suicide rate and the contagion effect of using CO poisoning as a suicide method. Lee et al. (2004) suggested that using charcoal burning as a suicide means have attracted a new cohort who may not have committed suicide by any other suicide means. This contagion effect is suspected because, according to a group of interviewed suicide attempters, charcoal burning suicide was a more "comfortable" way to end one's life (Chan et al., 2005; Lee, Chan, Lee et al., 2002). More alarmingly, using charcoal burning as a suicide method seems to have "infected" the surrounding cities of Hong Kong, such as Taiwan, Macau, Shenzhen and Japan (Yip et al., 2003).

Years of life lost in 1981, 1991, and 2001 due to suicide. Studying the trends of suicide is an important step to monitor the patterns of this phenomenon; however, measuring the cost of suicide onto the society is equally important for generating treatment and preventive policies. Yip et al. (2003) adopted a *Year of Life Lost* (YLL) methodology to estimate the

burden of suicide onto the economy of Hong Kong. YLL for suicide is measured by the number of YLL per death at each age, multiplied by the number of deaths at each age, and then summed across all ages.

The increase in rank of YLL due to suicide increased from eighth in 1981, to fifth in 1991, and fourth in 2001 (as presented in Table 1). The total number of YLL due to suicide increased by 96.0% from about 9 900 in 1981 to 19 400 in 2001, whereas the total number of YLL due to other causes decreased by 14.0%, from 274 600 to 236 700 during the same period as a result of overall improvement of health care and reduction of mortality (Yip et al., 2003). It is obvious that suicide has increased in importance as a cause of death, in terms of YLL, in Hong Kong.

Table 1

Ten Leading Causes of Death in Terms of Years of Life Lost in Hong Kong, 1981, 1991, and 2001

Rank	1981	Rank	1991	Rank	2001
1	Neoplasm	1	Neoplasm	1	Neoplasm
2	Diseases of the circulatory system	2	Diseases of the circulatory system	2	Diseases of the circulatory system
3	Diseases of the respiratory system	3	Diseases of the respiratory system	3	Diseases of the respiratory system
4	Injury and poisoning (excludes suicide)	4	Injury and poisoning (excludes suicide)	4	Suicide
5	Certain conditions originating in the perinatal period	5	Suicide	5	Injury and poisoning (excludes suicide)
6	Diseases of the digestive system	6	Diseases of the digestive system	6	Diseases of the digestive system
7	Diseases of the genitourinary system	7	Diseases of the genitourinary system	7	Diseases of the genitourinary system
8	Suicide	8	Certain conditions originating in the perinatal period	8	Infectious and parasitic diseases
9	Infectious and parasitic diseases	9	Infectious and parasitic diseases	9	Diseases of blood and blood-forming organs
10	Congenital anomalies	10	Congenital anomalies	10	Diseases of the nervous system and sense organs

These findings of YLL due to suicide have important implications in terms of the cost to society. Despite the emotional cost of suicide for family and friends of suicides, there is an additional economic cost that society incurs with each unnatural death. The economic cost of suicide encompasses four factors: (1) Medical expenses of emergency intervention and non-emergency treatment for suicidality that are not borne by the health care industry alone,

but by all of society through higher health care costs that are ultimately passed on to workers and taxpayers; (2) the lost and/or reduced productivity of people suffering from any forms of suicidal behaviour; (3) the lost productivity of the loved ones' grieving a suicide; and (4) the lost wages of those completing suicide, with the greatest absolute numbers of suicides occurring before retirement (Palmer, Revicki, Halpern et al., 1995; IOM, 2002). In Hong Kong, even if the analysis of the cost of suicide to society is restricted to the estimate of lost wages of suicides, it is estimated that the lost of productivity was about $1.4 billion (equivalent to AUD 2.2 billion) in 2003 (P.S.F. Yip, personal communication, July 30, 2005).

Rationale for Studying Middle-aged Suicide in Hong Kong

Despite the fact that an increasing trend of middle-aged suicide has been observed, no in-depth research has been conducted in order to understand this phenomenon. Over the past twenty years, there have been clear changes in rates and methods of suicide in Hong Kong. There is clear evidence that suicide has increased its contribution in terms of YLL from the eighth in 1981, to the fourth in 2001 and has made a significant contribution to mortality in Hong Kong.

The increasing trend of middle-aged suicide since 1997 has also been observed. Unfortunately, little has been done to investigate this increasing trend of this particular age group. Without in-depth investigation, Yip et al. (2003) speculated that the increased rate may be related to the socio-economic change since the change over of governance in 1997, the

outbreak of avian influenza and severe acute respiratory syndrome in 2003, the rapid increase of unemployment rate, the introduction of suicide by charcoal burning, and the sensational reporting of suicide since the economy crisis.

The suicide rate has increased significantly and it has been paralleled by an increasing unemployment rate since 1997. The unemployment rate increased from about 3.5% in 1997 to the record high of 8.3% in 2003 (C&SD, 2004). Suicide is associated with unemployment; however, their relationship is unclear (Platt & Hawton, 2000). Three explanations are possible: unemployment may confer *vulnerability* by increasing the impact of stressful life events; it may *indirectly cause* suicide by increasing the risk of factors that precipitate suicide (for example, mental illness, financial difficulties); or it may be a *non-causal association* because of confounding or selection by factors that predict both unemployment status and suicide risk (IOM, 2000). Hence, based on the international observations and speculation by Yip et al. (2003), the impact of unemployment on middle-aged suicides will be investigated in this study.

Another potential contributory factor to the rapidly increasing trend of suicide, speculated by Yip et al. (2003), was the rapid change in family structure and marital distribution in Hong Kong over the past two decades. The crude divorce rate increased from 0.4 cases per 1 000 in 1981, to 2.4 cases per 1 000 in 2002 (Yip et al., 2003). Yip (1997) also

suggested that an intact family structure provides a strong source of social support and, thereby, lowering proneness toward suicide. Accordingly, the impacts of social support and martial status on middle-aged suicides will also be investigated.

To sum up, an increasing trend of unemployment rate, socio-economic change, and an introduction of a novel suicide means among the middle-age group have been observed since 1997. More, middle-aged people in Hong Kong have significantly contributed to the increasing trend of suicide and this increasing trend is expected to persist. However, no empirical research has been conducted to investigate this increasing trend of suicide among this particular age group. The present study aims to fill this research void in identifying factors that predict the risk of death by suicide among the 30-49-year-olds in Hong Kong. This information is of great importance in developing culturally-specific suicide prevention initiatives in order to prevent middle-age suicides in the future. Once the target group of the study was decided, the next questions to ask will be “what to study” and “how to study” this target group. In the next two sections of this literature review, the *what* and *how* will be discussed respectively.

An Overview of Suicidal Behaviour

In the previous section of the literature review, the rationale for studying middle-aged suicides in Hong Kong was discussed. In this section, an overview of suicidal behaviour

including the definitions and theories of suicidal behaviours will be introduced in order to elucidate the complexity about the nomenclature, classification, and understanding of suicidal behaviours. As Leenaars et al. (1997) clearly pointed out that “research, be it quantitative or qualitative, should not be atheoretical” (p.140), the review of theories of suicide will guide the generation of hypotheses of the present study.

Definitions of Suicidal Behaviours

Suicidal behaviour is a complex behaviour and may exhibit different forms and levels of severity ranging from suicidal ideation, suicide gestures, suicide threats, suicide plans, suicide attempts, to completed suicide. Hence, it is essential to have an operational definition of what will be investigated in this study.

Suicide is “intentional self-murder” (Maris, 1981, p.3) or a “fatal wilful self-inflicted life-threatening act without apparent desire to live” (Davis, 1988, p.38, cited in Maris et al., 2000, pp.30). However, defining suicide is a complicated issue. To illustrate, a male with a physically disability who wished to kill himself but was unable to do so because of his physical disability, and begged someone to kill him. Should this be considered as a suicide or homicide? Based on Maris’s definition, because this person intended to kill himself, and thus, this *should* be a suicide case. On the other hand, Davis would argue that, although this person intended to kill himself, but the act was not inflicted by him onto himself, this *should not* be considered as an act of suicide. Therefore, an operational criterion of defining suicide is

essential in order to reduce confusions in understanding suicidal behaviour.

The lack of consensus among researchers on how suicidal behaviour should be defined has led to “misconceptions and great difficulties to compare results from different studies” (Goldston, 2000, p.15), and therefore, a consensual nomenclature of suicidal behaviour has been recommend. According to a workgroup of Centre for Disease Control (O’Carroll et al., 1996), an Operational Criteria for the Determination of Suicide (OCDS) was developed in order to overcome some of the complexities of defining suicide. Their proposed definitions have been commonly adopted in contemporary suicidology. The OCDS (p.246-247) stated that:

> *Suicide* as a death from injury, poisoning, or suffocation where there is evidence (either explicit or implicit) that the injury was self-inflicted and that the decedent intended to kill himself/herself.
>
> *Suicide attempt with injuries*: An action resulting in non-fatal injury, poisoning, or suffocation where there is evidence that the injury was self-inflicted and that he/she intended at some level to kill him/herself.
>
> *Suicide attempt without injuries*: A potentially self-injurious behaviour with a nonfatal outcome, for which there is evidence that the person intended at some level to kill him/herself.
>
> *Instrumental suicide-related behaviour*: Potentially self-injurious behaviour for which there is evidence that the person did not intend to kill him/herself and the person wished to use the appearance of intending to kill him/herself in order to attain some other end (e.g., to seek help, to punish others, or to receive attention). Instrumental suicide-related behaviour can result with or without injuries, or with fatal outcome (i.e. accidental death).
>
> *Suicide threat*: Any interpersonal action, verbal or nonverbal, stopping short of a

directly self-harmful act that a reasonable person would interpret as communicating or suggesting that a suicidal act or other suicide-related behaviour might occur in the near future.

Suicidal ideation: Any self-reported thoughts of engaging in suicide-related behaviour.

These definitions of suicidal behaviours are adopted throughout this dissertation. Furthermore, although some studies on different forms of suicidal behaviours will be referred to, the main focus of this study is on completed suicide. It is acknowledged that although suicides, suicide attempts, and suicide ideations are three overlapping populations that share common risk factors, these three categories of suicidal behaviours would, and should be studied separately, because they are distinguished from one another (Beautrais, 2001b, 2003c, 2004a).

As previously noted, research should not be atheoretical. In the following section, theories of completed suicide will be reviewed. Among these theories, an integrative approach of suicide will be adopted to provide a framework for investigating variables.

Theories of Suicide

In the last two decades, the volume of international research into suicide has increased exponentially (Maris et al., 2000). Much of this research has been developed in an empirical framework in which investigators have examined the role of likely causes and risk factors for suicidal behaviour. In contrast to this approach, suicide research in earlier times centred on a number of theoretical models. The explanatory models of suicide developed over the past

century may be broadly classified as sociocultural and psychoanalytic theories. In the latter half of the 20th century, due to advancement of statistical technologies and the influence by social and political systems, two dominant characteristics of the development of Western societies have been evolved. The first one is the centrality of the individual model and the other is a model of the production of health and the prevention of diseases based on a "bottom-up" focus on the cellular and molecular mechanisms of diseases (IOM, 2002). To provide a background for understanding current approaches to suicide research and prevention, the following sections provide a brief overview of the dominant theories and approaches to suicide prevention in the past century.

Sociocultural approach. Although accounts of suicide date from Greek and Roman times, the most well-known contemporary approach to the study of suicide began little more than a century ago with the publication of Durkheim's *Le Suicide* (1987). Durkheim was the pioneer of socio-cultural study in suicide and associated suicide with a person's involvement and identity in the social network. Durkheim attempted to explain suicide rates in terms of social conditions, and argued that the incidence of suicide varies with the extent of social integration within a given society. In his theory, an individual's relationship with society is conceptualized by two dimensions, namely *social integration* and *social regulation*. High suicide rates result when integration or regulation is too high or too low. It gives rise to his four types of suicide: when social integration is too high, *altruistic* suicides arises; when it is

too low, *egoistic* suicides are the results. When social regulation is too strong, *fatalistic* suicides take place; when it is too weak, *anomic* suicides are common (Durkheim, 1897/1951).

To support his theory, Durkheim examined variations in suicide rates across religious groups, marital statuses, presence of children, occupational categories, as well as during political upheavals, election crises, and wars. But his treatment of the empirical evidence has been criticized as not as vigorous as he had claimed (Stack, 2000a, 2000b). His interpretations on facts such as a low suicide rate in predominantly Protestant England (e.g., Taylor, 1982), the low rate among women and among Jews (e.g., Pope, 1976) were particularly contested. These are often cited as examples of Durkheim's deviation from his claim that his theory was derived and proved by empirical facts. Moreover, one criticism of sociological research into suicidal behaviour *has* been the narrow definitions of suicidal behaviours used by sociologists. Virtually all of the sociological research on suicidal behaviour focused on completed suicide that limits the sociological perspective's power in explaining other forms of suicidal behaviours (Leenaars et al., 1997).

Psychoanalytic approach. Psychoanalytic theories of suicide were developed in the last part of the 19th century and first half of the 20th century. These theories challenge the sociocultural basis of Durkhemian theory, and instead argue that suicidal behaviour arises

from individual and intrapsychic sources that are essentially invulnerable to social forces. Using psychoanalytic terminology, Freud (1917/1963) argued that fundamental patterns of behaviour are set in infancy and they are not seriously affected by social factors at all, and hence, neuroses could not be cured from a societal level. He then further explained that since men ambivalently identify with the objects of their own love, when they are frustrated, the aggressive side of the ambivalence would be directed against the internalized person. The main psychoanalytical position on suicide is that it represents unconscious hostility directed toward the introjected love object (Freud, 1917/1963).

Menninger expanded the Freudian model of suicide in his book Man Against Himself (1938), and proposed that all suicide involve fundamental dimensions: hate, depression, and guilt. He suggested that suicide, therefore, involves (1) a wish to kill - murder, (2) a wish to be killed - a murder by the self, and (3) the wish-to-die. Later on, Litman (1989) extended Freud’s theory and suggested that suicide may be caused by other intrapsychic factors besides hostility, includes rage, guilt, anxiety, dependency, helplessness and hopelessness. Although the psychoanalytic perspective on suicide was influential, it has been criticized for its failure to push the issue into the social realm. The basic reason for this failure laid in the preoccupation of psychoanalysis with therapy, that is, with the cure of mental illness (Maris et al., 2000).

Although the previous two theories of suicide were dominant in the early half of the last century, the two theories proposed by Freud (1917/1963) and Durkheim (1897/1951) had been criticized for their failure to incorporate other variables that would have lied outside the areas of their professional territory (Upanne, 1999). Instead, other theories are pertinent to an understanding of the contemporary Western conceptualization of suicide and its causation and prevention in the latter half of the past century, these are the individual approach and the public health approach. The individual approaches include psychological theories, psychiatric epidemiology, and biochemical theories. The public health approach originated from the mental health, injury prevention, and social intervention theories (Maris et al., 2000). The following sections will briefly introduce these contemporary approaches to suicide prevention.

Psychological approach. The psychological approach is similar to the psychoanalytic approach in a sense that it emphasizes suicide as an act driven by the psychological needs of an individual, but the psychological approach has taken into account of other perspectives onto one's psychological make-up (Maris, 1981).

Shneidman (1996) explained that "the essential nature of suicide is psychological… Suicide is caused by a pain, a certain kind of pain – psychological pain (psychache)" (p.4); however, he also stated that suicide is a "multi-faceted event and that biological, cultural,

sociological, interpersonal, intrapsychic, logical, conscious, unconscious, and philosophical elements are present, in various degrees, in each suicidal event" (Shneidman, 1996, p.5). In other words, the psychological approach views suicide as a multi-disciplinary issue, but with an emphasis that suicide is a fatal outcome of one's psychological pain.

Biochemical approach. While psychological approach views suicide as a problem of the mind, biochemical approach suggests a biological basis for the problem. Autopsy studies and neurobiological studies reported consistent findings of correlation between serotonergic system abnormalities and suicide. Studies in completed suicides reported impairments in serotonin receptors in the brainstem and frontal cortex (Mann et al., 1999) and abnormally low serotinergic activities in the ventral prefrontal cortex (Traskamn-Bendz & Mann, 2000). Such impairments may have caused problems in self-control and behavioural inhibition, which would indirectly cause vulnerability to suicide when faced with stressful events. There is growing evidence from twin studies to suggest the genetic heritability of suicidal behaviour. Although this research is still in its infancy, it suggests that suicidal behaviours are not simply a response to environmental adversity but also reflect individual genetically determined vulnerabilities to these behaviours. This strand of research is clearly linked to advances in technology (Hawton & van Heeringen, 2000).

Psychiatric epidemiology approach. This approach has tended to explain suicide almost

exclusively in terms of observed associations between a range of psychobiological risk factors and suicidal behaviour. In this respect, suicide research within the last few decades has followed trends in psychiatric epidemiology that have focused on the development of statistical models of individual-level risk and resilience. The major finding from psychiatric epidemiological research is the central role that current psychiatric status plays in determining suicide risk, with estimates suggesting that up to 90% of suicides can be attributed to a series of common mental disorders that span mood disorders, substance use disorders, anxiety disorders, antisocial and conduct disorders, and less common disorders such as bipolar disorder and non-affective psychosis. These studies have consistently shown that the relative contributions of social and economic factors, at the individual level, to the suicide risk of individuals are smaller than the contribution of mental illness (Cavanagh et al., 2003).

Public health approach. This approach is based on three dominant explanatory models - the mental health model, the injury prevention model, and the social intervention model. The mental health model suggests that mental illness is a necessary precursor to lethal suicide attempts in the majority of cases. In terms of the causal chain, mental illness is the key risk factor close to suicide, although the suicidal act itself may be precipitated by a stressor such as a relationship break-up. Better identification, treatment and management of mental illnesses are the primary routes to suicide prevention within this model (IOM, 2002). The injury

prevention model is based on the assumption that suicide can be conceptualized as a form of intentional injury, self-directed violence or deliberate self-harm that may be explained within an injury prevention framework. Hence, the injury prevention approach initially tended to focus on regulating access to means of suicide as a way to prevent suicide (Hawton et al., 2000). The social intervention model is based on sociological and macroeconomic theories and has led to an emphasis on population-level change in the social, economic, and related structures that are believed to foster the development of suicidal behaviours (Stack, 2000a, 2000b).

It is well known that every theory is subjected to assumptions and biases (IOM, 2002). By far, no single approach has been sufficient for explaining suicide (Maris et al., 2000). The clinical focus of suicide research has provided much information about the risk and protective factors for suicidal behaviour. Although the focus has been on the individual, there is evidence accumulating that the nature of communities and societies is also important. These broad social factors may act as wide-reaching contextual influences whose effects are largely mediated via individual psychiatric states, or they may serve as markers of other correlated risk factors. Therefore, recent developed models of suicide generally integrate risk and protective factors from individual and social perspectives. In other words, instead of focusing on simple casual relationships from an individual perspective, the integrative approach explains suicide by a systematic model which incorporates the complex causal and/or

correlation relationships of all domains onto suicidal behaviours.

Integrative approach. This approach views all domains of factors as making salient contributions to suicide risk and relies on observed patterns of association to estimate the relative contributions of these factors. These domains of factors include psychiatric morbidity, genetic and biological factors, social and demographic factors, family characteristics and childhood experiences, personality traits and cognitive styles, and environmental and contextual factors. This integrative approach allows comparison of the explanatory power of various hypotheses; allows for the influence of protective factors; and can also accommodate variation in the relative importance of different domains of influence between population groups from a social epidemiological perspective (Maris, 2000).

An integrative conceptual model proposed by Maris, Berman, and Maltsberg (1992, p.668, presented in Figure 6) was adopted in order to facilitate a visual representation of this approach. There are four rows and four columns in this model. This model assumes that the risk factors contributing to suicide can be organized into a series of domains of conceptually similar factors. These domains are psychiatric diagnoses, biology and family history of suicide, psychology and personality, and sociology and adversity in lives. There are four columns which are grouped as predisposing factors, predictor/risk factors, protective factors, and triggering factors. The four columns represent the chronology of the formation of these

risk factors and when they would be triggered by the last column, the trigger factors or the stressors.

This conceptual model illustrates that there are interactions between the four domains of risk factors. The vulnerability of a suicidal person is presented in column one which is the predisposing factors. When there is a triggering effect produced by stressors, they will then trigger the risk factors and protective factors. When the risk factors outweigh the protective factors, this imbalance will lead to completed suicide as an outcome.

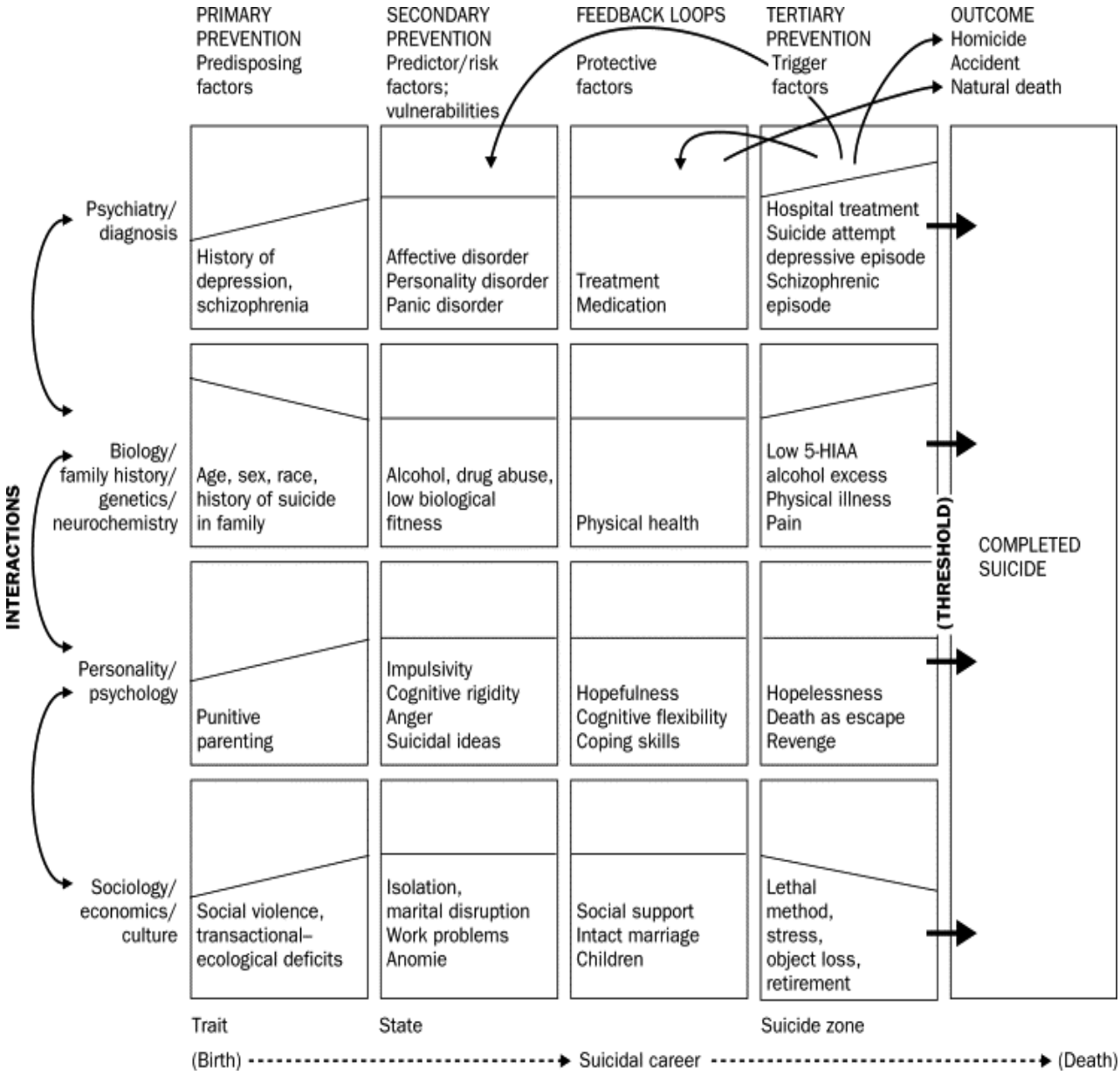

Figure 6. General multi-dimensional model of suicide (Maris, Berman, & Maltsberger, 1992, p.668).

This multi-dimensional model of suicide has been widely adopted by suicide researchers and clinicians because of its dynamic nature which helps for reframing suicidal behaviour. This reframing has a strong diversity quality that implicitly decreases an over-representativeness of a particular risk factor in explaining suicidal behaviour. It is worth

nothing that a potential criticism of this model is that it gives primacy to mental health status as the most proximal risk factor. However, given the weight of evidence that for the majority of suicides, poor mental health status is the final common pathway of influence, this criticism may not be justified. In the next section, the empirically identified risk factors of suicide will be reviewed.

Review of Suicide Risk Factors

Identifying risk factors and protective factors of different types of suicidal behaviours has become a major step towards intervention and prevention of suicide (Appleby et al., 1999, Apter et al., 1993; Atwood, Colditz, & Kawachi, 1997; Beautrais, 1999b, 2003c; Brent et al., 1993b; Caspi et al., 1996; Conwell & Brent, 1995; Conwell et al., 1990, 1991; UN/WHO, 1996). As seen in Maris et al.'s conceptual model of suicide, there were four major domains of risk factors. In the following section, these domains of risk factors will be briefly discussed. These factors will be thoroughly discussed at the end of this literature review.

Biology and family history domain. From numerous studies on suicide risk factors within this domain (IOM, 2002; Maris et al., 2000), completed suicide individuals were characterized as being male, unemployed, unmarried and socially isolated. Generally, ageing marks increase suicide risk, but an increasing trend of suicide in young adults aged 15 to 34 was noted in recent studies (e.g., Beautrais et al., 2000a; WHO, 2001). Individuals who are unemployed, divorced, separated, with family history of suicide, and childhood trauma are

more likely to commit suicide (e.g., Brent et al., 1988, 1993a, 1993b, 1994; IOM, 2002). Social support, marriage, supportive relationship with family members or caregivers, active religious affiliation and responsibility for children are suggested as protective factors for suicide (IOM, 2002).

Personality/psychological domain. Hopelessness is one of the most powerful predictors of suicide in the general population (Abramson et al., 2000; Beck et al., 1974). Other psychological risk factors of suicide include poor impulse control, irrational thinking, and cognitive rigidity (Wasserman, 2001). In contrast, proven skills in problem solving, positive survival and coping beliefs, high self-esteem, and having more reasons for living may protect people from suicide (Beautrais, 1998; Bertolote et al., 2003; Bonner, 1992; Cheng & Lee, 2000; Conner et al., 2001; Ernst et al., 2004; Gould et al., 1996; Jacobs, 1999a; Kendler, 1997; Kolter et al., 2001).

Sociology/economic/culture domain. Easy access to firearms, experience of stressful life events and loss (e.g., Adams et al., 1994; Beautrais, 2000b; Rubenstenin et al., 1989; Takahashi, 1997; Weissman et al., 1987; Zimmerman & Asnis, 1995), past suicide attempt and suicidal thought indicated high suicide risk (e.g., Pinkahana et al., 2003; Runeson, 1998; Yip et al., 2003). In contrast, easy access to clinical interventions, and restricted access to highly lethal methods of suicide might reduce suicide risk (e.g., Litman, 1996; Potter et al.,

1995).

Psychiatric diagnosis domain. Having a psychiatric illness, especially schizophrenia (Akuskai, 1995; Allebeck, Varla, & Wistedt, 1986; De Hert, McKenzie, & Peuskens, 2001; Foster et al., 1999; Goodwin et al., 2004; Harris & Barraclough, 1997; Henriksson et al., 1993; Isometsa et al., 1994; IOM, 2002; Lesage et al., 1994; Lonnqvist, 2000; Meltzer, 1999; Mortensen et al., 2000; Pompili et al., 2004; Radomsky et al., 1999; Runeson & Rich, 1992; Shaffer et al., 1996; Shafii et al., 1988) and affective disorders are powerful predictors of suicidal behaviours (Allgulander, 1994; Angst & Stassen, 1999; Appleby, 2000; Asarnow & Guthrie, 1989; Barraclough & Pallis, 1975; Beautrais, 2000c, 2001a, 2004b; Brent, 1995; Brent et al.,. 1988, 1993; Cheng, 1989, 1995; Cheng et al., 2000; Conwell, 1996, 2001, De Leo et al., 2002; Fenton, 2000; Isacsson, Bergman, & Rich, 1994; Isometsa et al., 1994; Jacobs, 1999b; Jamison, 2000; Katon et al., 1996; Lindeman et al., 1998; Montgomery, 1997; Qin, Agerbo, & Mortensen, 2002; Rao, 1994; Rudd & Joiner, 1998; Rutz et al., 1989; Suominen et al., 1998; Tanney, 2000; Waren, Rubenowitz, & Wilhelmsson, 2003; WHO, 2003b). Having problems in substances or alcoholic abuse also increase suicide risk. In contrast, absence of these risk factors, such as free from physical and mental illness, absence of depression or substance abuse, and early identification and treatment of psychiatric disorders imply lower suicide risk (Murphy, 2000; IOM, 2002). Among the factors, hopelessness, depression, and psychiatric illness are the most powerful predictors of suicide

(Abramson et al., 2000; Fergusson et al., 2003; Hawton et al., 1998; Maris et al., 2000; IOM, 2002).

In the previous sections, the phenomenon of suicide in Hong Kong, a brief overview of suicidal behaviour which included the definitions of suicidal behaviours, and a review of some influential theoretical models of suicide being proposed in the history have been discussed. Recently, given that knowledge on suicide has been accumulating, the locus of conceptualization of suicide has shifted from purely psychiatric or societal, to a biopsychosocial perspective. This shift has the benefit in organizing currently available knowledge on suicide in such a way that it served as a basis for further study and guiding concerted efforts in suicide prevention. In other words, the *why, who,* and *what to study* have been examined. In the next section, the *how to study* - case-control psychological autopsy study of suicide which has been regarded by suicidologists as a promising avenue to enhance the understanding of suicide - will be discussed along with empirical findings which will provide the basis of the hypotheses of the present study.

Review of Psychological Autopsy Studies

Among the many data sources that have been used for the study of suicide, the psychological autopsy suicide research approach is regarded as a “promising avenue to enhance our understanding of suicide” (Leenaars et al., 1997, p.140). Moreover,

psychological autopsy is probably the most direct technique currently available for determining the relationship between particular risk factors and completed suicide. This type of intensive approach not only provides direct information but also aids the interpretation of studies which employ other techniques (Hawton et al., 1998; Robins et al., 1959).

A psychological autopsy has four major aims. The phrase *psychological autopsy* refers to a research methodology for retrospectively reconstructing an individual's psychological life including the person's lifestyle and thoughts, feelings, and behaviours manifested during the weeks, months, or even years preceding death. It aims to determine why the deceased chose to take his or her own life at that specific time and place; to enable the researcher to learn better ways to assess suicidal tendencies; to treat people before their behaviours reach harmful levels; and to provide the friends and family of the deceased with explanations for the loss of their loved one (Andersson-Segesten, 1989; Apter et al., 1993; Cavanagh, 2003). The process of psychological autopsy may also serve as a therapy for the suffering and grief of the informants (Beskow et al., 1990).

There are two generations of psychological autopsy studies. The first generation of studies was uncontrolled descriptive studies of consecutive suicide cases. As such, they provided valuable first insights into the nature of fatal suicidal behaviour, but also had some methodological limitations, e.g., lack of generalisability to the general population (Arato,

Demeter, Rihmer, & Somogyi, 1988; Chynoweth, Tong, & Armstrong, 1980). Hence, a second generation of psychological autopsies had emerged during the last two decades.

The second generation of psychological autopsy studies adopted a case-control design and improves the generalisability to the general population. In its simplest form, the case-control design involves contrasting a representative sample of those exhibiting suicidal behaviours (cases) with a representative sample of those not exhibiting these behaviours (controls) on a series of risk factors. The availability of a comparison group leads to formal tests of the extent to which those exhibiting suicidal behaviours differ from those not exhibiting these behaviours (Farmer, Miller, & Lawrenson, 1996). They are sometimes called *retrospective* studies. These retrospective studies involve comparing individuals who are identified because they are known to have the disease or cases, with individuals who do not have the disease being investigated or controls.

This case-control research design had been adopted to investigate the events that happened to the suicides or cases and compared them with living individuals or controls. The commonly used term for using this case-control research design in studying completed suicide is called *case-control psychological autopsy study*. Case-control psychological autopsy studies are considered more useful to the first generation because of their generalisability to the population at large (Clark & Horton-Deutsch, 1992). Such studies

(e.g., Appleby et al., 1999; Beautrais et al., 1996a, 1997; Brent et al., 1988, 1993b, 1993b; Cheng, 1995; Foster et al., 1997; Lesage et al., 1994; Shaffer et al., 1996; Vijayakumar et al., 1999) had their control subjects drawn from a representative general population sample, and used standardized interviews to ascertain mental disorders and their co-morbidity. In this section, the methodologies of the second generation psychological autopsy will be discussed, followed by a systematic review of the findings of these psychological autopsy studies.

The Second Generation Psychological Autopsy Methodologies

In this section, a review of all empirical case-control psychological autopsy studies will be included. Among these psychological autopsy procedures, they usually consisted of two main elements: (1) extensive interviews of family members and other close intimates; and (2) collecting all possible medical, psychiatric and other relevant documents of the deceased. A typical psychological autopsy had one or two main informants, e.g., a spouse, partner, parent or adult child, or other next of kin, and often another informant representing the attending health care personnel. In addition, other informants, including other next of kin, friends, or attending personnel were also interviewed (Appleby et al., 1997; Beskow et al., 1990; Hawton et al., 1998; Reich & Earls, 1987; Wolford, Reihman, & Tars, 1991).

Interview procedures. Most of the interviews were conducted by psychiatrists, psychologists, nurses, and social workers with specific training in retrospective assessment of psychopathology among the suicides (Beksow et al., 1990; Clark, 1993). In addition, the

interviewers also required clinical experience in dealing with crisis reactions in order to handle the raw emotions of the informants during interview. Beskow et al. (1990) emphasized that the less experienced the interviewer is, the greater the need for structured forms for the interviews.

Subjects recruitment. The common approaches for the recruitments of subjects were contacting the informants through personal home visits without previous notice, sending out introductory letter only, an initial letter followed by a telephone call a week later, and home visits without waiting for answers to an introductory letter. Informants who were contacted through personal visits at home without previous notice seemed to have the lowest response rate (Beskow et al., 1990; Ebert, 1987; Younger et al., 1990).

Time interval between death and interview. Most studies found that the optimal time to conduct interviews was between two and six months after the death. However, the intervals between death and the interview varied from a few weeks to half a year or more across different studies (Rueneson & Beskow, 1991). Hawton et al. (1998) suggested that informants' emotions may have been too raw to conduct an extensive interview prior to two months after the death. Longer than six months after the death, many informants wanted closure on the suicide and were no longer willing to open up and discuss emotionally difficult topics. Therefore, it was suggested that the optimal timing between death and interview

should be within two to six months and no later than a year (Hawton et al., 1998; Isometsa, 2001).

Selection of control group. The choice of an appropriate control group has been debated during the evolution of case-control methodologies (Zilboorg, 1996). Ultimately, the type of control subject is determined by the hypotheses tested. As most researchers had been looking for risk factors for suicide as compared with the general population using a case-control design, a natural choice was age- and gender-matched control cases drawn from the general population. However, it is acknowledged that there is always a difficulty to exclude biases introduced by the fact that the cases were deceased whereas the controls were not. Therefore, in order to minimize information bias, information on living controls should be obtained from their next of kin (Hawton et al., 1998).

Reliability and validity of psychological autopsy methodology. As previously mentioned, the indirect characteristic of information obtained, the different kind of relationships between the informants and the deceased, and the necessity of therapeutic considerations during the interviews all raise methodological questions and obstacles of conducting psychological autopsy study. In many respects, the use of relatives as informants is problematic. Hawton et al. (1998) suggested two important problems might affect the validity and reliability of information obtained through interviews with relatives and friends. The first was recall bias.

The complex nature of both bereavement and memory for emotion-laden events and relationships might distort the memory of information provided by the informants. Secondly, information maybe unreliable because some information were being unaware of by the informants, such as sexual orientation, drug use behaviour and relationship difficulties (Younger, Clark, Oehmig-Lindroth et al., 1990). It is also possible that the informants would deliberate withhold information, especially when the information may cast the deceased or family in a negative light (Beskow et al., 1990).

In order to ensure the reliability and validity of psychological autopsy study in understanding suicide, several studies attempted to conduct interviews with two interviewers (Brent et al., 1988; Rudd & Joiner, 1998; Zhang et al., 2002). Beskow et al. (1990) suggested that the two interviewers could systematically alternate between the roles of interviewer and evaluator during the course of the investigation. Moreover, a joint conference or consensus meeting of experienced investigators who reviewed the forms might be of some value. However, a perfect reliability did not necessarily guarantee good validity. In other words, a repeatedly reported answer does not guarantee a correct answer. One of the major aims of the interview is to achieve a good content validity by collecting a correct picture of the subject's circumstances. Content validity relates to psychiatric conditions, symptomology, and suicidal communication and intent, and the like that could have been identified in an examination before death. In the absence of such information, collateral information from Coroner's Court

files, police reports, and medical records may be the best criterion of validity. However, the usefulness of this method was limited due to the fact that many suicide cases had no psychiatric records, or the records might not be kept officially in some countries (Philips et al., 2002).

In short, although validation research in studies of completed suicide are limited, the proxy-based data gathered by psychological autopsies have been accepted by suicide researchers to be reliable and valid (Kelly & Mann, 1997; Velting et al., 1998).

Ethical consideration. Given that there is always a possibility an additional psychological strain may impose on the informants, the *ethics* of conducting a psychological autopsy study must be seriously considered (Hawton et al., 1998). Beskow et al. (1990, 1991) and Isometsa (2001) both suggested that there are three major aspects of a psychological autopsy that deserve particular ethical considerations: the integrity of the deceased, the integrity and health of the interviewees, and the psychological strain on the interviewers.

First, the integrity of the deceased must be respected. It is often the case that there are facts about the deceased which the deceased deliberately chose to conceal from the relatives. These facts should not be revealed to the relatives. Second, interviewers must always be aware of the distress that every survivor experienced. Therefore, a refusal for participating in the study must be respected, and efforts must be made to minimize the guilt for refusing

participation from the survivors. Moreover, those who have chosen to participate must be supplied with supplementary information during the interview and helped with interpretation of the tragic incident. This information is valuable and it gives the survivors opportunities to express feelings evoked by bereavement. The interviewers should be constantly aware that negative effects of the interviews could potentially bring to the survivors. If the interviewers focus on the collection of information solely, but neglect the personal needs of the survivors, the latter might experience painful feelings such as loneliness, anger, guilt, or depression influenced by the interviews. In addition, the interviewer should provide crisis intervention for the survivors, and, if necessary, assist in contacting the community facilities.

The interview not only places potential demands on survivors, but also places demands on the interviewers. It was recommended that information on suicidology, crisis theory, and interview technique should be provided to the interviewers. Moreover, ongoing qualified supervision and debriefing sessions are important to facilitate unloading of the emotional strain accumulated, and to help the interviewers integrate the personal and professional gain inherent in the interview work (Beskow et al., 1990; Callahan, 2000; Cooper, 1998).

Empirically Identified Risk Factors of Completed Suicide by the Psychological Autopsies

After a thorough literature search, the researcher found only one systematic review of psychological autopsy studies on suicide (Cavanagh et al., 2003); eight reports on the

methodological considerations for the use of psychological autopsies (Beskow & Asgard, 1990; Brent et al., 1988; Clark, 1991; Cooper, 1999; Ebert, 1987; Hawton et al., 1998; Isometsa, 2001; Zhang et al., 2002); and twenty-six case-control psychological autopsy studies (Appleby et al., 1999; Barraclough & Pallis, 1975; Beautrais, 2001; Brent et al., 1988, 1993a, 1994; Cavanagh et al., 1999a, 1999b; Cheng, 1995; Chiu et al., 2004; Duberstein et al., 1994; Faberow et al., 1990; Foster et al., 1999; Gould et al., 1996; Heikkinen et al., 1999; Henriksson et al., 1995b; Isometsa et al., 1996; Lesage et al., 1994; Philips et al., 2002; Renaud et al., 1999; Shafii et al., 1985, 1988; Shaffer et al., 1996; Vijaykumar & Rajkumar, 1999; Wolford et al., 1991; Zhang et al., 2004). It is noteworthy that many of these suicide cases were conducted in Europe (particularly the United Kingdom and Scandinavian countries) and North America. Specifically, the total number of studied suicide cases using the psychological autopsy methodology had been relatively small (*n*=16 280), and only 867 completed suicide cases were studied from Asian countries including China, Hong Kong, India, and Taiwan (Bertolote, Fleischmann, De Leo et al., 2003).

In the next section, the commonly identified risk factors of completed suicide reported in empirical case-control psychological autopsy studies will be reviewed. These risk factors are organized into four domains as suggested by Maris et al. (1992). They are psychiatric, biology and family history, psychology and personality, and sociology and adverse life events. These groups of variables are the core components in a multi-dimensional model of

suicide.

Before reviewing these risk factors of suicide, there is a need to elaborate on the interpretations of the results of a psychological autopsy study. Case-control studies are analysed using logistic regression to estimate the odds ratio and the attendant 95 per cent confidence interval. The odds ratio is a way of comparing whether the probability of a certain event is the same for two groups. An odds ratio of one implies that the event is equally likely in both groups. An odds ratio greater than one implies that the event is more likely in the subject group. An odds ratio less than one implies that the event is less likely in the subject group (Farmer et al.,1996). The data collected in case control studies is usually extensive, covering multiple possible risk factors. Analysis of the data is therefore by means of multiple logistic regression, which allows calculation of odds ratios and confidence intervals simultaneously for several different risk factors, taking into account the fact that some risk factors are correlated.

For example, 988 subjects participated in a case-control study of completed suicide. It was found that out of the 496 cases, 332 suffered from mood disorders; on the other hand, out of 492 controls, only 230 suffered from mood disorders. The distributions of the cases and controls are presented in Table 2.

Table 2

Example of a Case-Control Study on Mood Disorder and Suicide

	Completed suicide	Control	Total
Presence of mood disorder	A = 332	B = 164	496
Absence of mood disorder	C = 230	D = 262	492
Total	562	426	988

In order to calculate the relative risk of mood disorder to completed suicide, which is the odds ratio, the odds of exposure to the risk factor in the cases and the controls are calculated independently. The odds in the cases and controls are calculated as shown below, along with a few simple algebraic simplifications to aid in the calculation:

Odds of exposure in cases = A x (A + B)/ B x (A + B) = A / B = 332 / 164 = 2.0244

Odds of exposure in controls = C x (C + D) / D x (C + D) = C / D = 230 / 262 = 0.8779

Furthermore, the OR was calculated by dividing the odds in the cases, by the odds in the controls which is shown below:

Odds ratio = 2.0244 / 0.8779 = 2.306

The odds ratio of 2.306 is interpreted that the presence of mood disorder is a risk factor of suicide and those who suffer from a mood disorder are about two more times at risk of completing suicide compared with those who have not suffered from a mood disorder. In

the following section, all of the empirical findings will be explained in terms of odds ratio.

Psychiatric aspects. Almost all Axis-I psychiatric disorders, including alcohol and substance disorders, and Axis-II personality disorders, are associated with an increased risk of suicide (e.g., Allbeck, Varla, & Wistedt, 1986; Allgulander, 1994; Angst, Angst, & Stassen, 1999; Berglund, Krantz, Lonnqvist et al., 1987; Apter et al., 1993; Caldwell, & Goyyesman, 1990; De Hart & Peuskens, 2000; Fenton, 2000; Inskip, Harris, & Barraclough, 1998; Isometsa et al., 1996; Murphy, 2000; Portsteinsson et al., 1997). From the systematic review of psychological autopsy studies, Cavanagh et al. (2003) reported that the median of suicides with at least one psychiatric disorder was 90 per cent. Depression was found in 60 per cent of those who completed suicide. Lonnqvist (2000) reported that approximately about 5 per cent were associated with schizophrenia. There were 30 per cent of suicides with a personality disorder (Isometsa et al., 1996), and 36 per cent had one or more psychiatric disorders (Cavanagh et al., 2003). The most commonly diagnosed psychiatric disorders found in the suicides were depression, schizophrenia, alcohol and drug use disorders, borderline personality disorder, and anti-social personality disorder (Akuskai, 1995; Cheng, Mann, & Chan, 1997; Canavagh et al., 2003; Isometsa et al., 1996c).

Furthermore, Ernst et al. (2004) reported that approximately 10 per cent of individuals who committed suicide without an Axis I diagnosis appeared to have sub-threshold

psychopathology, and were more similar to the suicides with an Axis I psychiatric diagnosis than a control group. In controlled studies, the ORs of psychiatric disorder in those who committed suicide range from 1.8 to 38 (Appleby et al., 1999; Beautrais, 2001b; Beautrais et al., 1996; Cavanagh et al., 1999a, 1999b; Cheng, 1995; Foster et al., 1999; Kessler et al., 1999; Lesage et al., 1994; Morano et al., 2001; Moscicki, 1997, 2001; Phillips et al., 2002; Vijayakumar & Rajkumar, 1999).

Major depressive disorder, bipolar disorder, and dysthymia are the psychiatric disorders most commonly associated with suicide. Between 25 and 90 per cent of those who die by suicide have a mood disorder, with most studies reporting strong and significantly increased risks, with OR estimates ranging from 11 to 41 (Canavagh et al., 2003). The risk of suicide is increased 20-fold for those with major depression, 15-fold for those with bipolar disorder, and 12-fold for dysthymic individuals (Harris & Barraclough, 1997). The lifetime risk of suicide for those with mood disorder is estimated at 4 per cent (IOM, 2002).

In addition, the risk of suicide depends on the severity of the depressive disorder. Suicidal ideation occurs in more than half of those with depression, and suicidal ideas, plans, and attempts increase with the increasing severity of depression. The subjective (rather than objective) severity of current depression, together with higher levels of suicidal ideation and fewer reasons for living, have been shown to distinguish psychiatrically admitted patients

who made suicide attempts from those who did not (Mann et al., 1999). The risk of suicide is increased in those with recurrent and/or chronic, compared to single-episode depression (Beautrais, 2001; Goodwin & Jamison 1990; Waern et al., 2002). Depression has been a long-established risk factor for suicide (e.g., Brent et al., 1988; Caine, Lyness, & Conwell, 1996; Rudd, 2000). The majority of the second generation psychological autopsy studies that evaluated the relation of psychiatric disorders to suicide reported major depression as the most significant diagnosis related to suicide (e.g., Beautrais, 2001b; OR = 17.6; Cheng et al., 2000, OR = 41.2; Philips et al., 2002, OR= 4.15; Suominen et al., 2002, OR = 2.9). It had also been suggested that patients with depressive disorders had a suicide risk 60% to 70% higher than the general population (Lonnqvist, 2000). It was suggested that the more severe the depression, the higher the chance of committed suicide (Maris, 2002).

As mentioned above, the risk of suicide is increased 15-fold in people with bipolar disorder (Harris & Barraclough, 1997). From 25 to 50 per cent of those with bipolar disorder make at least one suicide attempt (Goodwin & Jamison, 1990); the risk of suicide increases with increasing severity of the illness (Rutz, 1989), and appears to be higher in the first five years after diagnosis (Guze & Robins 1970; Weeke, 1979). The risk of suicide for females and males with bipolar disorder is similar (Weeke, 1979), in contrast to the higher male risk for the general population.

Psychotic disorders were the second most prevalent psychiatric disorders among the suicide subjects in this study (Canavagh et al., 2003). This finding is also consistent with other international studies. Controlled studies of suicide and attempted suicide suggest that between 6 and 19 per cent of those with suicidal behaviour have schizophrenia (Pompili et al., 2004; Radomsky et al., 1999). While schizophrenia occurs infrequently in the general population, and may not make a large contribution to total population rates of suicide, among the population of those with schizophrenia the lifetime risk of suicide is estimated to be 4 to 10 per cent (Tsuang et al., 1992), and the suicide risk is 30 to 40 times higher than the risk in the general population (Harris & Barraclough, 1997).

The risk factors for suicide in those with schizophrenia include a previous suicide attempt; significant depressive symptoms; hopelessness; alcohol or other substance abuse; male gender; command hallucinations; poor work and social functioning; social isolation; being unmarried; recent loss or rejection; a poor quality of life; and a deteriorating illness course in those with high premorbid performance (De Hert et al., 2001; Kaplan & Harrow, 1996; Meltzer & Okayli, 1995; Mortensen et al., 2000; Stack, 2000a).

Specific personality disorders have also been associated with suicide. A diagnosis of a personality disorder was found in 9% to 28% of completed suicides. Borderline personality disorder (BPD) was found to be frequently associated with suicide and was a long-established

risk factor for suicide (Beautrais et al., 1999b; Brent et al., 1993, 1993c; Broadsky et al., 1997; Cavanagh et al., 2003; Cheng, Mann, & Chan, 2000; Duberstein et al., 2000; Fruehwald et al., 2004; Harwood et al., 2001; Heikkinen et al., 1997; Isometsa et al., 1995, 1996, Linehan et al., 2000; Marttunem et al., 1993; Mehlum, 2001; Qin et al., 2003). Cheng et al. (2000) reported a four-fold increase in risk of suicide between the suicides with BPD and the controls.

Biological and family history of suicide. Suicide literature including clinical, twin, adoption, and laboratory molecular genetic studies and their data have suggested that there is a genetic component to suicidal behaviour (Brent, 1995; Maris, 2002; Runeson & Asberg, 2003; Yang & Clum, 1994). This issue is, however, complicated by determining whether suicidal behaviour is inherited or learned by modelling. However, familial suicidal behaviour is found to be a robust risk factor in young people. Gould et al. (1996) reported a five-fold elevation of suicidal behaviour in the relatives of suicide victims by comparison with controls. Runeson and Asberg (2003) also reported similar findings that a family history of suicide contributed about a twofold increase in risk, even when controlling for family psychiatric history, which was also a significant risk factor of suicide.

Psychology/personality. The psychological aspect of individuals who completed suicide seems to have received less empirical supportive evidence when compared with other aspects (Brent et al., 1994; 1999; Cole, 1989) due to the difficulty of assessing subjective feelings of

the suicide retrospectively using the psychological autopsy methodology (Conner, Duberstein, Conwell et al., 2001). From previous research on people with suicide ideation and those who attempted suicide, these suicidal individuals were hopeless (e.g., Cole, 1989, Rudd et al., 2000), perfectionistic (e.g., Conwell, 2001; Duberstein et al., 2000), and had weak reasons for living (e.g., Conwell et al., 1998; Linehen, Goodstein, Nielsen, & Chiles, 1983).

Out of these psychological variables, other than hopelessness, impulsivity is one of the personality attributes that has received a lot of attention in preventing self-destructive behaviour. Impulsivity is defined as a tendency to respond quickly to a given stimulus without deliberation and evaluation of consequences. Moreover, impulsivity is suggested to be able to measure objectively because impulsive behaviour, especially within a short period of time, prior to death can be observable. Maris (1981) found that adolescents who had completed suicide had shown higher levels of impulsivity, together with more aggressive feelings, more intense emotions, and dissatisfaction with their lives than older people suicides.

Sociology/adversity in lives. Adverse life events are common before suicide (e.g., Cheng, 1989; Chen et al., 1995; Stack, 2000b). Life event is defined as the major occurrences in people's lives that require some degree of psychological adjustment (Brown & Harris, 1989; Isometsa, et al., 1995). Life events preceding suicide found in previous

case-controlled psychological autopsy studies were usually interpersonal conflicts, forensic problems, financial problems, and medical illness (Cavanagh, Owens, & Johnstone, 1999b; Shea, 1999). Cavanagh et al., (2003) reported that 63 per cent of the suicides had at least an adverse life event within a year prior to death, suggesting that stressful life events could be identified in the clear majority of those who died by suicide. For example, Copper et al. (1998)'s study results showed that young people (under 35 years of age) in trouble with the law were at high risk of suicide in the community. Philips et al. (2002) also reported that there was a nine-fold increase in risk of suicide between the suicides and the controls. Cheng et al. (2000) reported a six-fold increase between the suicides and the controls.

Social isolation is also found to be a common risk factor of completed suicide with a median of 42 per cent of the suicide (Canavagh et al., 2003). Maris (1992) suggested that increased social support for the people with suicidal ideation and those who attempted suicide reduces the likelihood of suicide and increases the likelihood of obtaining social support after an attempted suicide. He also suggested that in a time of crisis, these at-risk individuals who are socially isolated often fail to make people aware of their suicidal ideation or plan. Thus, in addition to having fewer resources to defuse a crisis, the socially isolated person is also less likely to be rescued from a suicidal crisis.

Several studies have reported that social factors including social isolation, living alone,

having fewer friends, ‘rootlessness’ and a perceived lack of social support are risk factors for suicidal behaviour (Appleby et al., 1999; Heikkinen et al., 1995; Phillips et al., 2002; Shneidman, 1993, 1994; Stack, 1992; Trout, 1980). More generally, a number of studies have reported that individuals who lead socially isolated lives are more vulnerable to suicide than those people with strong family affiliations and social support within the community (Heikkinen et al., 1993, 1994; Magne-Ingvar et al., 1992; Trout, 1980). One plausible explanation of the relationship between lack of social support and suicidal behaviour is that those who enjoy close relationships with others cope better with various stresses, including bereavement, rape, job loss, and physical illness, and enjoy better psychological and physical health (Sarafino, 2002; Schmidtke et al., 1999).

In a broad review, increases in national unemployment rates have had a mixed influence on suicide rates. Increased unemployment in Ireland has been credited with increased suicide between 1978 and 1985 (Kelleher & Daly, 1990). On the other hand, unemployment rates did not predict suicide rates in the United States or Canada from 1950 to 1980 (Leenaars et al., 1993; Lester, 1999). In Japan from 1953 to 1972, the suicide rate for both men and women was positively correlated with unemployment. However, after 1972 and through 1986, the relationship did not hold. This change was hypothesized to reflect larger changes in the global economy as a transition from an industrial to a service economy occurred in Japan as it did in many capitalist societies (Motohashi, 1991).

History of suicide attempts among the suicides was also reported to be a robust risk factor of suicide (Hawton & Fagg, 1998; Hawton et al., 1998; Isometsa & Lonnqvist, 1998; Palmer, 1995; Runeson, 2002). Individuals who made non-fatal suicide attempts are at high risk of mortality from suicide and other causes (Beautrais, 2004b; Gibb et al., 2005; Hawton et al., 2003; Hawton & Fagg, 1988; Ostamo & Lonnqvist, 2001; Pearson et al., 1995, 1999; Runeson, 2002; Runeson et al., 1996; Shea, 1999; Zahl & Hawton, 2004). A significant proportion (between 17 and 68 per cent, median 25 per cent) of those who die by suicide have made previous suicide attempts, with OR estimates ranging from 3.6 to 31.7 (median 5.8) (Appleby et al., 1999; Beautrais, 2001b; Beautrais et al., 1996; Cavanagh et al., 1999a, 1999b; Cheng, 1995; Foster et al., 1999; Molnar, Berkman, et al., 2001; Kessler et al., 1999; Lesage et al., 1994; Phillips et al., 2002; Vijayakumar & Rajkumar, 1999). Moreover, a systematic review of 26 studies found that those who make suicide attempts have a 0.5 to 2 per cent risk of suicide within one year of their attempt, and a suicide risk in excess of 5 per cent after nine years (Canavagh et al., 2002).

Rationale and Hypotheses of the Present Study

In the previous sections, the scope of the suicide problem in Hong Kong, the theories of suicide, and the empirically identified risk factors of suicide from other case-control psychological autopsy studies were discussed. In this section, the rationale and the hypotheses of the present study will be presented.

Epidemiologically, the suicide trend in Hong Kong had been increasing alarmingly since 1997. Although older persons suicide rate is the highest compared with other age groups, the suicide rate of the middle-aged group has been rapidly increasing. Theoretically and empirically, suicide was studied and explained from a one-dimensional perspective, namely sociological or psychiatric. It is now generally agreed that suicide is a multi-dimensional issue concomitants of psychiatric diagnoses, especially mood disorders, biology, psychology and personality, and sociology and adverse life events variables.

Due to the complex nature of suicide, its infrequence, and the ethical issues, there were limited numbers of studies on completed suicide in both Western and non-Western countries. Despite the limited number of empirical studies on completed suicide, risk factors of suicide tended to be fairly consistent across cultures (Maris, 2002). However, there was a scarcity of completed suicide research within non-Western countries, especially among the Chinese cultures. Notwithstanding, the magnitude of these identified risk factors for adult suicide was found to be incongruent across Chinese cultures in mainland China and Taiwan (Cheng et al., 1995; Philips et al., 2002; Zhang et al., 2004). Could this be the case in middle-aged suicide in Hong Kong?

Hence, this psychological autopsy study of the middle-aged suicides with a Hong Kong Chinese population had four objectives:

(1) to explore the psychiatric, psychological, and socio-economic risk factors of suicide among the 30-49-years-old of the Hong Kong Chinese population using the case-control psychological autopsy methodology;

(2) to determine whether the risk factors of suicide found in other countries, mostly Western countries could be applied in Hong Kong;

(3) to determine the magnitude of effects of these risk factors of suicide among the Hong Kong middle-aged population; and

(4) to suggest evidence-based preventive or intervention strategies based on the findings of this study.

Therefore, in order to accentuate the four objectives of the study, eight hypotheses were proposed for empirical testing:

H1: Given the high percentage of studied suicide cases that suffered from psychiatric disorders (approximately 90 per cent); thus, *it was hypothesized that middle-aged individuals who committed suicide were more likely to suffer from psychiatric disorder(s)than age-and-gender matched control subjects;*

H2: A past history of attempted suicide was found to be associated with an increased risk of completed suicide; thus, *it was hypothesized that middle-aged individuals who committed*

suicide were more likely to have a history of suicidal behaviour than control subjects;

H3: As family history of suicidal behaviour was found to be a risk factor of suicide; thus, *it was hypothesized that suicide subjects were more likely to have a family member who had a history of suicidal behaviour than demographically matched control subjects;*

H4: Since impulsivity was one of the most studied psychological variables in other studies and it was found that those who completed suicide had acted impulsively prior to their death; thus, *it was hypothesised that suicide cases were more likely to have shown impulsive behaviour a week prior to death than control subjects a week prior to interview;*

H5: As social isolation was found to be a robust risk factor of completed suicide; thus, *it was hypothesized that middle-aged suicide cases were more likely to be socially isolated than control subjects;*

H6: From the epidemiological data in Hong Kong , unemployment was also found to be highly prevalent to suicide; thus, *it was hypothesized that suicide subjects were more likely to be unemployed at the time of death compared with the control subjects at the time of interview;*

H7: It was found that suicide was associated with life events in the last year prior to suicide death, and in particular in the last three months of life; thus, *it was hypothesized that*

the suicide subjects were more likely to have experienced more adverse life events in the previous year than control subjects; and

H8: Financial hardship was found to be a risk factor of suicide in other studies; however, its magnitude was mild. Having said that, indebtedness had always been identified as a major adverse life event of the suicide in Hong Kong; thus, *it was hypothesized that suicide subjects were more likely to have affected by financial difficulty than control subjects.*

Chapter 3

Method

A case-control psychological autopsy research design was employed to investigate suicides amongst those with an ethnic Chinese background and aged 30 to 49 during the period from 2002 to 2004 in Hong Kong. Suicide risk and protective factors were investigated. These factors included various socio-demographic factors, life events, and clinical and psychological conditions. This study was approved by the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster (HKU/HA HKW IRB), the Ethics Committee of the Department of Health, Hong Kong SAR, and the Bond University Human Research Ethics Committee (BUHREC)

Subjects

Suicide cases. Cases of suicides were identified from the deaths registered as *suicide* by the Coroner. The suicide cases for this study were limited to people aged 30-49-year-olds who committed suicide from August 2002 to December 2004. Next-of-kin of suicide cases for psychological autopsy interviews were recruited by two methods: firstly through the Forensic Pathology Service and secondly through the Coroner's Court. A total number of 85 cases were carefully examined by a case-control psychological autopsy research design (described below). Specifically, 29 suicide cases were recruited from the Forensic Pathology Service,

and 56 cases were recruited through the Coroner's Court. To be included, each case had at least one knowledgeable informant who consented to participate in the study.

As previously mentioned, the majority of unnatural deaths including suicide are transported to the public mortuaries in Hong Kong (operated under the Department of Health), where family members are interviewed and formal body identification is held with a forensic pathologist. Family members of all suspected suicide cases (*N*=120) were introduced to the study by forensic pathologists. From this pathway, 120 suicides' families were approached. Among these 120 approached cases, the next-of-kin of 70 cases were contacted by phone, and 29 agreed to participate. The next-of-kin of the suicides were invited to an interview following the incident usually *no less than six weeks* to allow bereavement and *no more than 12 months* to avoid recall limitations. The successful rate using this first recruitment pathway via the Forensic Pathology Service thus was 41.9% (29/70). Among these approached relatives, the most common reasons for not participating in the interview included reluctance to talk about the deceased or the death incident and a lack of time.

At the same time, the Coroner's office sent out letters about the study to the next-of-kin of suicides in the study period. During the study period, 549 death cases reached a verdict of suicide and the relatives of which were mailed. Out of the 549 eligible cases, 465 next-of-kin did not reply, 28 contacted the researcher but refused to participate, and 56 next-of-kin agreed

and consented to participate in the study. Therefore, this recruitment method generated a response rate of about 11%. The flowchart of the recruitment of suicide cases is presented in Figure 7.

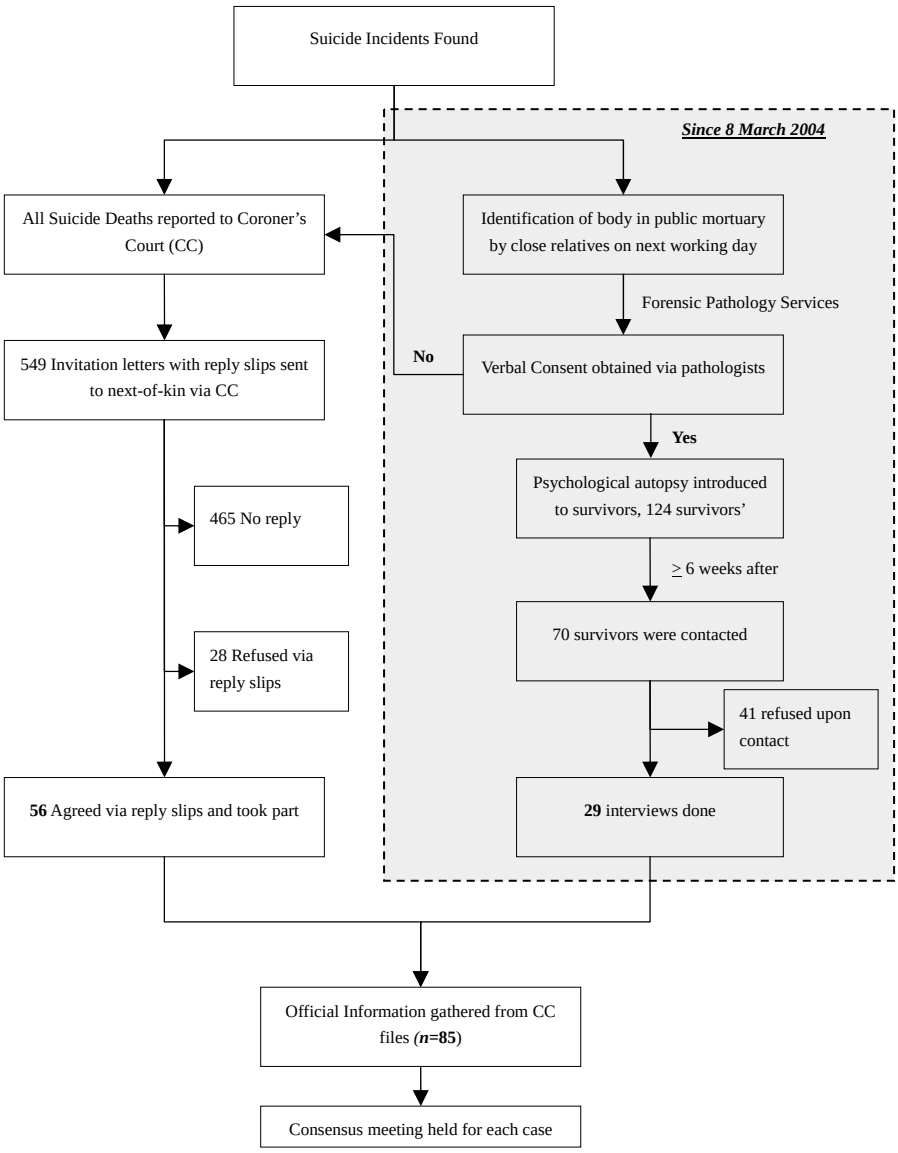

Figure 7. Deceased case recruitment procedures through the Coroner's Court and the referrals from forensic pathologists at public mortuaries (*n*=85).

Control cases. Information on a one-to-one matched community sample of controls was collected to compare with that from the suicide sample. The sample pool for the control group consisted of 2 219 individuals randomly selected from 4.8 million people of age 15-59 in Hong Kong to participate in another epidemiologic study on suicidal ideation and suicide attempt. All individuals who participated in the community study were invited to participate in this study. 440 individuals verbally consented to the interviewers of the community study to be contacted by the researcher of this study. Among these 440 individuals, eight-five control subjects, matched for age and gender with that of the suicide cases were recruited in the study. The closest relative of the subjects were invited to participate in the interviews to give proxy information on the same set of questions (excluding the circumstances of death and bereavement sections) as used with the informants of the suicide cases. The flowchart of control cases recruitment is presented in Figure 8.

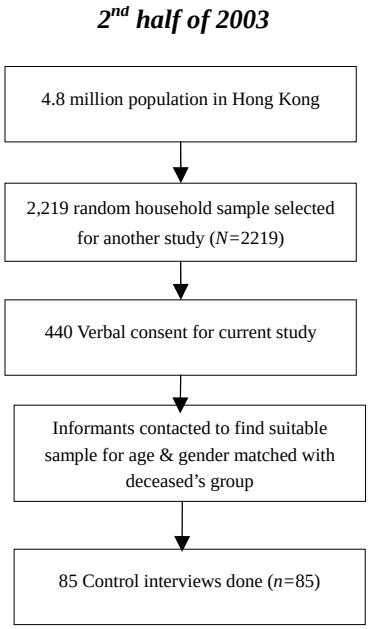

Figure 8. Control case recruitment procedure through a community representative sample (*n*=85).

Measures

The researcher classified the examined factors into four domains: psychiatric, biology and family history factors, psychological factors, and social and life events variables. This classification system followed the conceptual model proposed by Maris et al. (1992), which was previously described in Chapter 2. Moreover, parts of the measurements were selected from three psychological autopsy studies conducted by Cain et al. (1996) in Rochester, the United States, Hawton et al. (1998) in Oxford, the United Kingdom, and Philips et al. (2002) in Beijing, China, for cross-cultural comparison reason. Furthermore, all adapted measurements were back-translated and tested in a pilot study for their readability. Six next-of-kin of suicide cases participated in the pilot study. All measurements were orally

administrated in Cantonese.

Psychiatric Factors

Psychiatric factors investigated including presence of psychiatric disorders at the time of death, previous psychiatric treatment, previous suicide attempts, presence of chronic illnesses and physical disability.

Structured clinical interview for Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition - Text Revision - Axis-I disorders (SCID-I DSM-IV-TR). The major instrument in the protocol of the study was the SCID-I, which took up about half of the time of an interview. The SCID-I is the standard measurement of psychiatric disorders in psychological autopsy study (Brown, 2000). A back-translated Structured Clinical Interview for DSM-IV-TR Axis-I Disorders (SCID-I) for DSM-IV-TR was used to best-estimate the psychiatric conditions of the subjects and to generate DSM-IV-TR diagnoses (American Psychiatric Association, 2000) of Axis-I psychiatric disorders. The SCID-I is a semi-structured interview designed to assist in determining DSM-IV Axis I diagnoses (First, Gibbon, Spitzer, & Williams, 1996), assesses the quantity of symptoms and disorders, and the ability of the interviewee to describe problems succinctly.

There are nine diagnostic modules focusing on both current (usually defined as the past month) and lifetime assessment of diagnostic criteria: Mood Episodes, Psychotic Symptoms,

Psychotic Disorders, Mood Disorders, Substance Use Disorders, Anxiety Disorders, Somatoform Disorders, Eating Disorders, and Adjustment Disorders. An optional module covers Acute Stress Disorder, Minor Depressive Disorder, Mixed Anxiety Depressive Disorder, and symptomatic details of past Major Depressive/Manic episodes. Each page of the modules contains questions, reprinted DSM-IV-TR criteria, ratings, and instructions for continuation. The ratings are based not on the question response, but on fulfilment of DSM-IV-TR criteria which are provided alongside the questions. Each criterion is rated as one of the following: ? = inadequate information, 1 = symptom clearly absent or criteria not met, 2 = subthreshold condition that almost meets criteria, and, 3 = threshold for criteria met (First et al., 1996).

Following the interview, the researcher was provided with concise summary scoring sheets to indicate the lifetime and current presence of each disorder. As a prerequisite for the SCID-I, the interviewer must possess adequate clinical experience and knowledge of psychopathology and diagnostic issues. Notwithstanding, the researcher was trained by a psychiatrist (who received training from the authors of the SCID) before he administrated the SCID-I in the study.

The Chinese version of the SCID- I was reported to be reliable in measuring bipolar disorders (*kappa*=0.84), major depressive disorders (*kappa*=0.76), schizophrenia

(*kappa*=0.75), alcohol and substance use disorders (*kappa*=0.93), anxiety disorders (*kappa*=0.81), and adjustment disorders (*kappa*=0.64) in psychiatric patients (So et al., 2003a, 2003b). Moreover, two additional Axis I disorders, namely pathological gambling and intermittent explosive disorder, were included in order to investigate the culturally specific impulsive control disorders. Apart from the SCID-I, presence of psychiatric illnesses was also identified by any diagnoses, recorded on the Coroner's files, which could be made by psychiatrists, general practitioners, psychologists, or other qualified mental health professionals attended by the subjects before death.

Due to the absence of a locally validated and structured instrument in assessing Axis-II personality disorders, in particular Borderline Personality Disorder (BPD) and Antisocial Personality Disorder (ASPD), the researcher adapted the symptoms lists of these two personality disorders from the DSM-IV-TR (American Psychological Association, 2000) to assess the life-time presence of the two personality disorders.

Further, whether the subjects had ever attended an emotional treatment and/or psychiatric treatment was also investigated. Emotional treatments were defined as any treatments, including but not limited to hotline services, counselling, and clinical sessions, received from a professional or semi-professional in the health care or social welfare setting by the subjects for emotional disturbances ever in their life time. Psychiatric treatment

included both in-patient and out-patient sessions attended by a registered psychiatrist.

The presence of physical illness and chronic illnesses were assessed and based on the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM, WHO, 2001). Seventeen types of major physical illnesses could be identified based on the ICD-9-CM. They are Diseases of the Nervous System, Diseases of the Circulatory System, Diseases of the Respiratory System, Neoplasms, Endocrine Diseases, Nutritional Diseases, Metabolic Diseases, Diseases of the Digestive System, Genitourinary System Diseases, Hematological Diseases, Diseases of the Eye, Diseases of the Ear, Nose, and Throat, Musculoskeletal System and Connective Tissue Diseases, Diseases of the Skin, Congenital Malformations, Deformations, and Chromosomal Abnormalities, Diseases of Pregnancy, Childbirth, and the Puerperium, and Infectious Diseases. A physical illness was defined as the presence of at least one chronic or physical illness with which the subjects had sought medical attention. History of suicidal behaviours of the subjects was asked to assess their past attempt history.

Biological and Familial Characteristics

Socio-demographics characteristics. Socio-demographics characteristics investigated in this study included marital status, educational status, ethnicity, living arrangement, employment status, and income. Marital status was classified as follows: married, cohabited,

separated, divorced, widowed or never married. Educational level was classified as above or below secondary 3 (equivalent to Grade 9) level which corresponded to the completion of the 9 years of mandated education in Hong Kong. Place of birth of the subjects were classified as local-born or immigrants. Living arrangement was defined by the number of people in the household. Employment status include currently employed, unemployed (including underemployed), and economic inactive. Lastly, monthly income was classified as either above or below the medium (HKD$7 000 or AUD$1 150) of the total sample. Indebtedness was defined by the presence of unmanageable debts (excluding mortgages), where the total amount of debts was greater than the difference of monthly income and basic expenses for 48 months, a period equivalent to the automatic discharge from a bankruptcy (Official Receiver's Office, 2005).

The circumstances of death included the methods, the location, and the date of the suicide; the time interval between the suicidal thought and the fatal act; the presence of suicide notes; and the communication of suicidal intent. The methods of suicide along with the age-gender distribution of the sample was compared to that of all suicide cases aged 30-49 in 2003 in order to assess the representativeness of the sample.

Psychological Conditions

Psychological conditions investigated included impulsivity, healthy living styles, and

problem-solving ability.

Impulsivity rating scale (IRS). There were not many rating scales for assessing impulsivity (Lecrubier, Braconnier, Saod et al., 1995). The IRS was one of the first scales specifically designed to assess impulsivity (IRS, Lecrubier et al., 1995). The IRS has taken into account the heterogeneity of impulsivity and different common behaviours involved in impulsivity. Seven items included in the scale are: irritability, patience-impatience, time needed for decision, capacity to pursue an activity, aggressivity, control of response, capacity for delay. For each item, examples of usual life situations are given to make the assessment easier and more standardized. The behaviours assessed by the scale refer to the current behaviour (last week): 0 means a “normal” behaviour; 1 is mild impulsivity not interfering with normal activities and 3 means severe impulsivity that is impairing, and -1 means hypercontrol. A total score of 0 (no impulsive behaviour within a week before death) to 21 (very impulsive) was generated. Lecrubier et al. (1995) reported that the IRS had good construct validity (r=.79), good concurrent validity, good inter-rater reliability (*kappa*=0.87) and sensitivity to change.

Social problem-solving inventory (SPSI). The SPSI has been regarded as a promising measure of adult problem-solving skills and motivation because of its strong theoretical background. Eight items of the SPSI (D’Zurilla & Nezu, 1990; D’Zurilla & Sheedy, 1991)

were extracted to measure four constructs of social problem-solving abilities of the subjects ranged from a scale of 8 (very poor) to 40 (very skilful). The constructs are problem orientation, generation of alternative solutions, decision making, and solution implementation and solution verification. D'Zurilla et al. (1997) conducted a series of validation studies on the SPSI, which demonstrated that it is a reliable and valid assessment instrument for research and clinical purposes. In four samples of different age groups, the SPSI-R consistently demonstrated high internal consistency (r=.69 to .95), and adequate to high test–retest reliability (r=.68 to .91) (D'Zurilla & Nezu, 1990).

Lastly, a culturally specific scale on healthy living styles was developed to measure five aspects of healthy living: healthy diet, physical activities, emotional expressions, interests and habits, and continual learning.

Sociology and Life Events Variables

Sociology and adverse life events variables investigated included social isolation, level of expressed emotions within the family, and many culturally specific adverse life events.

Social support. Social support was defined as the availability of support which is accessible to an individual through social ties to other individuals, groups and the larger community (Sarafino, 2002). Social support was evaluated by three aspects: the size of social support network, the frequency of social activities within the past month, and social support

content. First, the size of social support was indicated by the number of close family members, extensive relatives, and friends whom the subjects were able to rely on when encountering life problems. Secondly, frequency of social activities of the subjects in the past month was recorded. Thirdly, four contents of social support, including emotional, instrumental, informational, and appraisal support, were assessed by scenario-based questions and quantified to evaluate the accessibility of support within a social network. All of the questions on social support were generated by the researcher.

Level of expressed emotions (LEE). Level of expressed emotions within the families of the subjects was measured by the Level of Expressed Emotions (LEE). It is worth nothing that the most widely used assessment tool to study expressed emotions is the Camberwell Family Interview (CFI) developed by Brown and Rutter (1966). However, the administration of the CFI takes 90 to 180 minutes, and it has to be administrated by a well-trained person. Given the time limitation of the study, the level of expressed emotions was measured by the LEE. The LEE is a 60-item instrument designed to measure perceived emotional climate in a person's influential relationships. Sixteen items of the LEE were selected to measure the four constructs of expressed emotions. They were intrusiveness, emotional response, attitude towards the subjects, and tolerance/expectation on the subjects by their influential family members at home. This modified LEE has excellent internal consistency with a *KR-20* coefficient for the overall scale of 0.95 (Cole & Kazarian, 1988, 1993).

Life events. Life events that were present in the past year were identified and their negative impacts on the subjects were evaluated. In particular, acute life events referred to those events that happened within a month of the death. A checklist consisting of forty-three culturally specific negative events was constructed to evaluate five life situations: relationship, family, work and school, physical health, and legal issues. The overall psychological impact of the five life situations were quantified as in Phillips et al.'s (2002) study. These life events items were asked spread though the interview rather than using the most-commonly used single scale method to improve the velvetiness of interviews. For each life event that occurred in the year and a month before death, and its negative impact on the subjects (from none to very severe, coded as 0 to -3) were measured. To quantify the psychological impact of negative life events, the researcher used the product of duration in months (for chronic events) and in days (for the acute) and the severity of the psychological effect, and summed for the categories respectively.

Data Collection

Interview procedures. The next-of-kin of the suicide deceased were invited to an interview following the incident usually no less than six weeks to allow bereavement and no more than 12 months to avoid recall limitations. The psychological autopsy interviews of the 85 cases were carried out at an average of 7.3 (*SD*=4.0) months after the death incident. During the interview, a semi-structured interview schedule was administered by the

researcher. After obtaining information on the decedents, the informants' responses to bereavement were also collected. The interviews lasted from 1.5 hours to 6 hours (with an average of 3.4 hours).

Places for interviews. The present researcher encouraged informants to be interviewed at the Centre for Suicide Research and Prevention, the University of Hong Kong (CSRP HKU). However, when the informants insisted, the researchers interviewed the informants at their homes. The major advantage to have the interview at the CSRP HKU was that if crisis occurred during the interview (i.e., emotional outburst issue, suicide threat), support from other staff at the centre was markedly accessible. Out of 85 interviews, 60 were conducted at the CSRP, 19 were conducted at the informants' homes, and six were conducted in other places include churches, schools, hospitals, and restaurants.

Emergency protocol. Grieving informants could be uniquely anguished or angry, an emergency protocol was prepared if the safety of the informants or researchers were threatened (Hawton et al., 1998). Thus, an emergency light switch at the interview room was installed in the interviewing room in order to provide help and support for interviewers during emergency situation. When an informant was observed or reported to be severely distressed during and/or after the interview, brief counselling was provided by the researcher. Moreover, when necessary, distressed informants were referred for psychological and psychiatric

interventions. Out of the 85 informants of the suicide cases and 85 informants of the controls were interviewed, nine informants from the suicide group were provided brief counselling and referral information, and none from the control group required any counselling services from the researcher.

Review of Coroner's files. Coroner's files were reviewed to supplement and validate the information provided by the informants. The files generally contain demographic and background information such as age, gender, marital status, education, and vocation; circumstances of the death including the method used, and suicidal communication before the act; life situations including financial problems, relationship break-ups, and legal problems; autopsy and toxicology reports; witness statements; police investigation records; medical and psychiatric reports; suicide notes; and insurance policies.

The researcher acknowledged that discrepant information might result because multiple sources of information were used. A strategy was formed as suggested by Conwell et al. (1996) in order to deal with discrepant information. There are three approaches in this strategy. For dimensional rating scales, such as the Impulsivity Rating Scale (IRS), average responses across informants and the Coroner's files were used. For dichotomous ratings of symptom presence or absence, which diagnoses were derived from, could not be averaged, the *no discrepancy* method was utilized. In other words, the researcher and the psychiatrists

accepted a symptom as present if reported by any informant, or mentioned in a psychiatric report. All decisions about issues related to psychiatric diagnosis were reviewed and consented at the consensus meetings. Finally, when demographic information, such as date of death was discrepant between informant and the Coroner's file, the researcher relied on the legalized documents. This strategy allowed the most valid and reliable findings of this study.

Consensus meeting. Detailed case discussions also took place to ensure the validity of information and to provide optimal interpretation of potentially ambiguous information. These discussions were led by two psychiatrists. In particular, symptoms of psychiatric illnesses were discussed in details and subsequently, the researcher and the psychiatrists reached for consensus of a diagnosis. When demographic information, such as date of death, was discrepant between informants and the Coroner's files, the researcher relied on the legal documents.

Chapter 4

Results

SPSS-PC software version 12.0 was used for statistical analyses. Before investigating the individual factors of suicide, the age and gender distributions and the means of suicide between the suicide cases (n=85) and all suicide victims aged 30-49 in 2003 (N=484) were compared in order to assess the representativeness of the sample. Moreover, the demographic characteristics of the suicide samples and controls were compared. Furthermore, the descriptive statistics of the principle instruments were compared between the suicide samples and control groups.

Since the suicide sample and controls were age and gender matched, logistic regression was applied for data analysis. Binary logistic regression analyses were first employed to obtain the unadjusted odds ratios and their 95% confidence intervals for each independent variable. In other words, these models were performed to assess individual effect of demographic variables, sociological variables, impacts of negative life events, and psychiatric and psychological factors on the risk of suicide. Significant variables (with p<.001) were then entered into a multivariate logistic regression model to investigate the more robust risk factors of suicide.

Multivariate regression analysis was carried out to examine the independent effects of

all the significant psychosocial factors and psychiatric disorders. A forward and backward stepwise elimination method was used in order to identify a stable model. The problem of multi-collinearity of the final model was also tested but was found to be insignificant: the minimum tolerance statistic for the independent variables in the final model was 0.85 and variance inflation factors (VIF) was small, with a maximum of 1.18, while a tolerance value below 0.10 and a VIF above 10 denote high collinearity among variables (Tabachnick & Fidell, 1989).

Descriptive Statistics

Description of sample. Age and gender distributions and the circumstances of death of this sample (n = 85) were compared to all suicides aged 30-49 (N=484) in Hong Kong in 2003. There were no significant differences on age (p=0.42) and gender (p=0.39) between the sample and all suicides aged 30-49 in 2003. It could then be argued that the suicide sample was representative of all middle-aged suicides in Hong Kong.

Of the 85 suicide deaths aged 30-49 in the study period, 53 were males and 32 were females. There was no significant difference in the age distributions between the sample and all suicides aged 30-49 in 2003, either in males (M=38.68; SD=5.39; p=0.06) and in females (M=40.88; SD=5.94; p=0.27). The male to female ratio in the sample was 1.66 whereas that in all suicides aged 30-49 in 2003 was 2.04. The age and gender distributions of the suicide

sample and the middle-aged suicide cases in 2003 are presented in Table 3.

Table 3

Age and Gender Distributions in the Sample and All Suicides Aged 30-49 in Hong Kong, 2003

	Sample (*n*=85)		All suicide victims aged 30-49, 2003 (*N*=484) [a]	
	Women	Men	Women	Men
Age				
Mean (SD)	40.88(5.94)	38.68(5.39)	38.54(5.21)	42.19(5.44)
Gender (%)	32(37.65)	53(62.24)	159(32.85)	325(67.71)

[a] Data from the Coroner's Court, Hong Kong Special Administrative Region

Circumstances of death. To further sustain the representativeness of the suicide sample of the study, the circumstance of death was also compared between the suicide sample and all middle-aged suicides. In the 85 deceased cases, the three most common methods of suicide used were charcoal burning in 40 (47.1%) cases, jumping from height in 33 (38.8%) cases, and hanging in 10 (11.8%) cases as presented in Table 4. Because of the coding system in death records, the researcher extracted only the principle method of suicide leading to death for all suicides aged 30-49; comparing the most common principle methods used in the deceased group and in all suicides aged 30-49, no significant difference was found in those died by jumping (p=0.95), charcoal burning (p=0.42), and hanging (p=0.51). However, the proportion of females who committed suicide by charcoal burning in the deceased group was lower than the suicide cases in 2003. The majority (69, 81.2%) of the victims died at home, six (7.1%) in a public area, four (4.7%) at a relative or friend's residence, three (3.5%)

at workplace, and three (3.5%) at other locations. Thirteen (15.3%) of the suicide victims chose to commit suicide on a special day, i.e. anniversaries, birthdays, or festivals.

Table 4

Methods of Suicide Used in the Deceased Group and All Suicides Aged 30-49 in Hong Kong, 2003

	Sample		30-49 population in Hong Kong [a]	
	Women (%)	Men (%)	Women (%)	Men (%)
Jumping from height	13 (40.6)	20 (37.7)	70 (44.0)	116 (35.7)
Charcoal burning	14 (43.8)	26 (49.1)	58 (36.5)	136 (41.8)
Hanging	3 (9.4)	7 (9.6)	11 (6.9)	59 (18.2)
Drug overdose	2 (6.3)	5 (9.4)	8 (5.0)	3 (0.9)
Drowning	0	0 (0.0)	6 (3.8)	5 (1.5)
Cutting wrist or stabbing	1 (3.1)	1 (1.9)	0 (0.0)	1 (0.3)
Others	1 (3.1)	1 (1.9)	6 (3.8)	5 (1.5)
Total [b]	35 (106.3)	60 (109.6)	159 (100.0)	325 (100.0)

[a] Coroner's Court, HKSAR; total number might not be conclusive due to delay in death investigation

[b] The total exceeds 100% indicates multiple methods used in some cases; % reported within gender group

Moreover, the demographic characteristics which included marital status, educational status, ethnicity, living arrangement, employment status, and income among the suicide sample and control subjects were compared and presented in Table 5.

Table 5

Demographic Characteristics of the Suicide and Control Groups

	Suicide (%) (*n*=85)	Control (%) (*n*=85)
Marital Status		
Single (never married)	26 (30.6)	10 (11.8)
Separated	8 (9.4)	9 (10.6)
Currently married	50 (58.8)	67 (57.3)
Educational Level		
Above Form 3	36 (42.4)	51 (60)
Below Form 3	49 (57.6)	34 (40)
Living Arrangement		
Lived alone	49 (57.6)	24 (28.2)
Lived with someone	36 (42.4)	61 (71.8)
Employment Status		
Unemployed	37 (44)	3 (3.7)
Full-time employed	26 (31)	59 (72.8)
Part-time employed	3 (3.6)	8 (9.9)
Monthly Income		
Below HKD$7000	48 (60.0)	18 (22.8)
Above HKD$7000	32 (40.0)	61 (77.2)
Indebtedness		
Indebted	34 (41.0)	6 (7.1)
No debt	49 (59.0)	78 (92.9)

Suicidal ideation and communication of intent. According to the informants, 13 (15.2%) of the victims completed the death within 24 hours of their initial suicidal thoughts, 12 (14.2%) from one to seven days, eight (9.4%) within a week and a month, seven (8.2%) from one to two months, and 22 (25.9%) thought about committing suicide two months or more before the actual act. The informants of 23 (27.1%) cases were not able to provide this information. Thirty-four (40.0%) out of 85 cases left at least one suicide note in the form of message, letter, or diary, and 39 (45.9%) of them either implicitly or explicitly expressed their suicidal plan.

Description of principle instruments. Means, standard deviations, and ranges for the Impulsivity Rating Scale (IRS), Level of Expressed Emotions (LEE), Social Problem Solving Inventory (SPSI), size and frequency of Social Support among the suicide samples and controls were presented in Table 6.

Table 6

Means and Standard Deviations for the Principle Instruments

	Suicide		Control	
Measures	Mean	Standard Deviation	Mean	Standard Deviation
IRS	4.59	4.37	1.25	1.5
LEE	19.9	3.97	17.8	2.42
SPSI	20.6	8.4	27.1	5.9
Size of Social Support	3.9	3	7.3	2.7
Frequency of Social Support	7.2	5.2	8.5	3.9

Binary Logistic Regression Analyses

Binary logistic regression models were employed to obtain the unadjusted odds ratios and their 95% confidence intervals for each independent variable. In other words, these models were performed to assess individual effect of demographic variables, sociological variables, impacts of negative life events, and psychiatric and psychological factors on the risk of suicide. As mentioned before, an odds ratio (OR) is interpreted as the comparison of the percentage of individuals who are exposed to suspected cause and suffered from the specific disease (Farmer, Miller, & Lawerson, 1996). All of the significant variables found

from the binary logistic regression analyse were then further analysed by a multivariate logistic regression to find the most robust factors related to suicide.

Socio-demographics and familial characteristics. Table 7 shows the differences between the suicide and control groups on various socio-demographics, and familial characteristics, controlled for age and gender. Compared to the life subjects, those who committed suicide were more likely to be unemployed or underemployed, indebted, lived alone, made less than $7 000 a month, and had family members who had a history of suicidal behaviour. Out of these variables, never married, living alone, earned below $7 000, indebtedness, and unemployment were found to be statistically significant related to completed suicide ($p<.001$).

Table 7

Parameter Estimates of Socio-demographics and Familial Characteristics in Binary Logistic Regression Models on Suicide Deaths and the General Population in Hong Kong

	O.R.	Sig.	95% CI	
			Lower	Upper
Socio-demographics Conditions				
Marital Status [1]				
Separated	1.507	0.430	0.543	4.182
Never married	3.484**	0.000	1.540	7.880
Educational Level [2]				
Form 3 or below	2.042	0.022	1.108	3.762
Living Arrangement [3]				
Living alone	3.459**	0.000	1.826	6.553
Employment Status [4]				
Unemployed or underemployed	6.818**	0.000	3.234	14.375
Economically inactive	3.939	0.063	0.926	16.758
Monthly Income [5]				
Below $7K	5.083**	0.000	2.549	10.137
Presence of Unmanageable Debt	9.020**	0.000	3.529	23.059
Familial characteristics				
Family history of suicide [6]	1.872	0.120	0.850	4.124

[a] The parameter estimates for each socio-demographic condition is controlled by age and gender.

[b] Reference categories: [1] Currently married or cohabited, [2] above Form 3, [3] living with others, [4] currently employed, [5] $7000 or more, and [6] no family history of suicide

Note .**Coefficient significant at p<.001

Sociology and acute and chronic adverse life events. The perceptions on some negative life events in the past month and in the past year were found not to be statistically significant related to completed suicide as illustrated in Table 8. Some significant sociological variables were found to be related to completed suicide (p<.001). Compared with the control group, the suicides had experienced high expressed emotions at home. In contrast, social support

including a wider social network and more accessible support within the network would likely to be protective from committing suicide (p<.001).

Table 8

Parameter Estimates [a] of Negative Life Events and Sociological Variables in Binary Logistic Regression Models on Suicide Deaths and the General Population in HK

	O.R.	Sig.	95% CI	
			Lower	Upper
Negative Life Events				
Severity of Acute Negative Life Events [b]				
Relationship	3.653	0.118	0.721	18.520
Family	0.922	0.556	0.702	1.209
Work and school	0.728	0.244	0.427	1.242
Physical health	50.127	0.191	0.142	17684.069
Legal issues	2.753	1.000	0.000	
Severity of Chronic Negative Life Events [c]				
Relationship	1.292	0.165	0.900	1.855
Family	1.027	0.802	0.834	1.264
Work and school	1.445	0.062	0.981	2.129
Physical health	1.125	0.466	0.820	1.544
Legal issues	4.1E+17	0.993	0.000	
Sociological variables				
Family Relationships				
Level of expressed emotions	2.057**	0.000	1.411	2.999
Extra-marital affairs	3.023	0.213	0.530	17.234
Interpersonal Relationships				
Size of social support network	0.217	0.112	0.033	1.427
Frequency of social support	0.754	0.106	0.536	1.062
Social Support Content	0.296**	0.000	0.163	0.535

[a] The parameter estimates for each negative life event is controlled by age and gender.

[b] Acute life events happened within 30 days prior death.

[c] Chronic life events happened from a month to a year prior death.

Note .**Coefficient significant at p<.001

Psychiatric and psychological variables. Table 9 shows the parameter estimates of various psychiatric and psychological variables between the suicides and life subjects. Of those who committed suicide, 69 (81.2%) were retrospectively diagnosed at least one psychiatric illness, while there were only 10 (11.8%) in the control subjects. Compared to the life subjects, those who died from suicide were 32.3 times more likely to have suffered from a psychiatric illness. The suicide and control groups also differed significantly in various psychiatric and psychological conditions. The victims were more likely to have received emotional and psychiatric treatments before, and have a chronic physical health problem than the control.

Those who committed suicide were also more likely to be experiencing an impulsive state in the last week prior death and have a compulsive buying behaviour. All of these variables, except presence of physical illness, were found to be significantly related to completed suicide ($p<.001$). Contrastingly, those who had acquired social problem solving skills and led a healthy lifestyle were 55% and 62%, respectively, less risk of suicide ($p<.001$).

Table 9

Parameter Estimates [a] of Psychiatric and Psychological Conditions in Binary Logistic Regression Models on Suicide Deaths and the General Population in HK [b]

	O.R.	Sig.	95% CI	
			Lower	Upper
Psychiatric Conditions				
Psychiatric diagnosis [1]	32.344**	0.000	13.754	76.057
Mood disorders	7.679**	0.000	3.502	16.834
Depression Score	91.445**	0.000	12.2	686.7
Ever received some kind of emotional treatment [2]	16.522**	0.000	5.542	49.250
Ever received psychiatric treatment [3]	30.433**	0.000	6.979	132.717
Presence of chronic physical illness [4]	2.996	0.011	1.287	6.975
Psychological Conditions				
Impulsivity	5.311**	0.000	2.684	10.508
Social problem solving skills	0.381**	0.000	0.260	0.559
Healthy living styles	0.451**	0.000	0.313	0.648

[a] The parameter estimates for each clinical or psychological condition is controlled by age and gender.

[b] Reference categories: [1] no psychiatric diagnosis, [2] never received emotional treatment, [3] never received psychiatric treatment, [4] no chronic physical illness, and [5] not a compulsive buyer.

Note .**Coefficient significant at $p<.0001$

Prevalence of psychiatric illnesses. Psychiatric illnesses were more frequent in the suicide group. Mood disorders were the most prevalent, presented one in two of the suicides and one in ten of the control subjects. Psychotic disorders were the second most prevalent psychiatric disorders experienced by the suicide group. Prevalence of other psychiatric disorders is presented in Table 10. Comorbidities of psychiatric disorders were found in 26 (30.6%) suicides but in one (1.2%) control subject only. Previous attempt was found in 43 (50.6%) suicide victims but none of the control subjects.

Table 10

Prevalence in Psychiatric Illnesses in the Suicide and Control Groups

Psychiatric Disorders	Control group			Suicide Group		
	Male (%)	Female (%)	Total (%)	Male (%)	Female (%)	Total (%)
Mood	5 (9.4)	5 (15.6)	10 (11.8)	23 (43.4)	20 (62.5)	43 (50.6)
Psychotic	0 (0.0)	0 (0.0)	0 (0.0)	7 (13.2)	11 (34.4)	18 (21.2)
Substance Use	0 (0.0)	0 (0.0)	0 (0.0)	2 (3.8)	4 (12.5)	6 (7.1)
Anxiety	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.9)	3 (9.4)	4 (4.7)
Somatoform	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.9)	1 (3.1)	2 (2.4)
Eating	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.1)	1 (1.9)	2 (2.4)
Adjustment	0 (0.0)	0 (0.0)	0 (0.0)	5 (9.4)	2 (6.3)	7 (8.2)
Pathological Gambling	0 (0.0)	0 (0.0)	0 (0.0)	6 (11.3)	6 (18.8)	12 (14.1)
Intermittent Explosive	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.9)	0 (0.0)	1 (1.2)
Borderline Personality Disorder	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (9.4)	3 (3.5)
Antisocial Personality Disorder	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.9)	0 (0.0)	1 (1.2)
Comorbidity	0 (0.0)	1 (3.1)	1 (1.2)	10 (18.9%)	16 (50.0)	26 (30.6%)

Multivariate Logistic Regression Analysis

According to Tabachnick and Fidell (1989), multivariate logistic regression analysis was judged to be the most appropriate method for a case-control study as it provided an evaluation of each independent variable it terms of its unique contribution to the prediction of the dependent variable.

Table 11 presents the multivariate estimates on five factors that were significantly

associated with the risk of middle-aged suicide. Psychiatric illness, presence of unmanageable debts, currently unemployed or underemployed, never married, and living alone were the best estimated predictors of suicidal risk ($p<.05$). The final model strongly explains the proportion of the variance in predictive outcomes (*Nagelkerke R Square*=0.714). Together, these risk factors accounted for 71.4% of the variance of completed suicide. Among those with none of the above five risk factors, all (40/40) were control subjects. Furthermore, 66.7% (30/45) of those with one risk factor, 36.4% (12/33) of those with two risk factors, 8.8% (3/34) of those with three or more risk factors were control subjects. On the other hand, 100% (18/18) of those with four or more risk factors, 91.2% (31/34) of those with three risk factors, 63.6% (21/33) of those with two risk factors, and 33.3% (15/45) of those with one risk factor died by suicide.

Table 11

Multivariate Model of Risk Factors for Suicide Comparing Suicide Deaths and Living Controls

	Adjusted O.R.	Sig.	95% CI	
			Lower	Upper
Psychiatric Diagnosis				
No diagnosis	1.0			
At least 1 diagnosis	37.545***	0.000	11.568	121.849
Presence of Unmanageable Debts				
No debt	1.0			
Indebted	9.424**	0.003	2.175	40.838
Employment Status				
Currently employed	1.0			
Unemployed or underemployed	4.812*	0.017	1.324	17.480
Marital Status				
Currently married or cohabited	1.0			
Never married	4.193*	0.038	1.079	16.288
Living Arrangement				
Living with someone	1.0			
Living alone	3.929*	0.028	1.156	13.357

The parameter estimates were controlled by the same factors as stated in Table 9.

[b] Reference Categories: [1] No diagnosis, [2] no attempt history, [3] no debt, [4] currently employed, and [5] currently married or cohabited.

[c] ***p<0.001; **p<0.01.; *p<0.05

Chapter 5

Discussion

Findings from the current psychological autopsy study of suicide supported the eight hypotheses of this study and provided significance data to achieve the four major objectives. Firstly, middle-aged suicide in Hong Kong was found to be a multi-faceted problem which involves psychiatric, psychological, familial, and socio-economical risk factors. Secondly, the risk factors for middle-aged suicide found in this study are in line with the patterns of suicide in other cultures. Thirdly, although the findings of this study are congruent to other suicide studies in terms of the types of risk factors, the magnitude of some of these identified risk factors were not consistent with findings in other psychological autopsy studies. In particular, among the five risk factors for middle-aged suicide identified by the multivariate logistic regression analysis, unemployment (OR=4.8, 95% CI 1.3-17.5) and indebtedness (OR= 9.4, 95% CI 2.2-40.8) were found to be more prevalent among the studied middle-aged suicides than findings reported in other Western cultures. Fourthly, prioritized suicide prevention strategies will be discussed at the end of this chapter in order to focus and tackle middle-aged suicide in Hong Kong. Furthermore, the clinical implications, limitations of the study, and areas for future research will also be discussed.

Eight hypotheses were formulated to address these objectives and were by the results of

the study. The findings provided supporting evidence that suicide is a multi-dimensional public health issue which requires multi-disciplinary efforts for its intervention and prevention. Suicides occur due to a complex interplay of social, economic, cultural, psychological, and psychiatric factors.

Factors Associated with Suicide

Psychiatric illness. The first hypothesis proposed that middle-aged individuals who committed suicide were more likely to suffer from psychiatric disorder than age-and-gender matched control subjects. Eighty one per cent (69/85) of the suicides suffered from psychiatric disorder(s) prior to their deaths; whereas, only 12.7% of the control subjects (10/85) suffered had a psychiatric history. As in most studies on completed suicide, the foremost predictor of suicidal behaviour is psychiatric illness (Canavagh et al., 2003). Based on the multivariate analysis, the OR of presence of psychiatric disorder was 37.50 ($p<.05$; 95% CI 11.5-121.8), which was interpreted that those who suffer from psychiatric disorder were at 37.5 times increased risk for committing suicide.

Based on the multivariate logistic regression analysis, presence of psychiatric disorder was found to be the most robust risk factor of suicide compared with other significant risk factors entered into the analysis. This study showed that 81% of the Hong Kong middle-aged suicides had been diagnosed with at least one psychiatric disorder. The occurrence of

psychiatric illness among Hong Kong Chinese suicides found in this study was almost as high as expected in the West. Further, mood disorders were found to be the most prevalent disorders among the suicides (50.6%), which was at the higher end within the 29%-88% range reported in other psychological autopsy studies (Canavagh et al., 2003).

The findings of this study were consistent with findings in other earlier psychological autopsy studies conducted in Western countries. However, these findings were not consistent with the study conducted in China where the presence of psychiatric disorder was not found to be the greatest risk factor for suicide. Philip et al. (2002) found that the OR of presence of psychiatric disorder at the time of suicide death among their subjects was 10.5, which was much lower than other ORs being reported from the Western countries. Philips and colleagues explained that their lower percentage of mental disorders among the suicides in China was due to the fact that the informants of the deceased were unwilling to report psychiatric symptoms in the deceased as this was seen as a disrespectful way for the deaths. They also argued that many suicides in their study were impulsive acts by people who did not have a mental illness. Thus, the importance of acute stress and triggering life events in their final regression model were more significant than other studies.

Previous suicidal behaviour. The second hypothesis proposed that middle-aged individuals who committed suicide were more likely to have a history of suicidal behaviour

than control subjects. Fifty one per cent (43/85) of the suicides had a history of suicide attempt; whereas, none of the control subjects reported any suicide attempt history. This finding was also consistent with earlier psychological autopsy studies which reported a range from 16-68% (Canavagh et al., 2003). In addition to higher rates of subsequent mortality and suicide attempt behaviour, those who made suicide attempts had significantly and consistently higher rates of psychiatric morbidity and an elevated risk of poor psychosocial outcomes, after an index suicide attempt (Beautrais et al., 2000). These findings suggested that those who are admitted to hospital following a suicide attempt are a population at high and enduring risk for further suicidal behaviour. Two general conclusions can be drawn from these findings. First, recurrent suicide attempt is common and suicide rate among the attempters is high. Second, prediction of either suicide attempt or suicide is poor (IOM, 2002).

Family history of suicidal behaviour. The third hypothesis proposed that suicide subjects were more likely to have a family member who had a history of suicidal behaviour than demographically matched control subjects. Twenty three per cent (20/85) of the suicides had a family history of suicide; whereas, only 12% of the control subjects (12/85) had family members who had suicidal behaviour. However, based on the binary regression analysis, family history of suicide was not found to be a statistically significant risk factor of suicide. The OR of family history of suicide 1.87 (p>0.05), which can be interpreted that family

history of suicide was not found to be a statistically significant risk factor. However, those who have a family who committed suicide were at 1.87 times increased risk for committing suicide. This finding was slightly inconsistent with earlier psychological autopsy studies which reported a range from 38-84.4% (Maris et al., 2000).

Family history of suicidal behaviour was found to be a risk factor for suicide in other psychological autopsy studies (Canavagh et al., 2003). Attempted and completed suicides among first-degree relatives of suicide victims have been described in several retrospective studies of adolescents and young adults who committed suicide (Brent & Mann, 2005; Brent et al., 1996; Runeson et al., 1996). Rates of suicide attempt are elevated in the family members of those who die by suicide, and in the families of those who make suicide attempts, after mental disorders being taken into account (Qin et al., 2002). For instance, Runeson et al. (1996) found that 38% of young suicide victims in their study had a parent or sibling who attempted suicide. They also reported that suicide in family members appeared to be a predisposing factor for suicide irrespective of psychopathology. Runeson et al. (1996) suggested that suicidal behaviour is transmitted within families, independently of psychiatric disorders.

Despite the genetic explanations of family history of suicidal behaviour (as mentioned in the literature review), there are other non-genetic explanations. It was suggested that suicidal

behaviour in a relative can serve as a behavioural model for a family member, making imitation more likely to occur in subsequent generations (Fu et al., 2002). It was also suggested that there may be other familial factors that increase the likelihood of suicide such as parental psychopathology, lack of support, discord, and even abuse (Brent et al., 1996; Kaplan et al., 1997; Renaud et al., 1999). At this stage, little is known how genetics and environmental factors interact in their influence on suicide (IOM, 2002; Stein, Hollander, & Liebowitz, 1993).

Impulsivity. The fourth hypothesis proposed that suicide cases were more likely to have shown impulsive behaviour a week prior to death than in control subjects. Twenty seven per cent (18/66; 19 informants were unable to provide information about past week behaviour of the deceased because they had no contact with them in that particular week) of the valid suicide cases had exhibited overt impulsive behaviour; whereas, only 1.1% of the control subjects (1/85) exhibited overt impulsive behaviour a week prior to interview. Moreover, based on the binary multivariate logistic regression analysis, state-impulsivity was found to be a statistically significant risk factor for suicide. The OR of state-impulsivity is 5.30 (p<.001; CI 11.5-121.8), which can be interpreted that those who exhibited state-impulsive behaviour were at 5.30 times increased odds for committing suicide.

As found in earlier studies, impulsive and/or aggressive behaviour have been found to be

associated with suicide and in both youth and adults (e.g., Apter et al., 1995; Brent et al., 1994; Kotler et al., 2001; Stein et al., 1993). Individuals with aggressive and impulsive temperaments are at increased risk of suicide (Fergusson et al., 2000; Verona & Patrick, 2000). In these individuals, suicidal behaviour may occur in the absence of a mood disorder (Apter et al., 1995) and may be associated with antisocial behaviours and conduct disorder, alcohol and substance abuse, impulsive behaviour, high scores on measures of novelty-seeking, and histories of childhood adversity (Fergusson et al., 2000; Verona & Patrick, 2000).

Social isolation. The fifth hypothesis proposed that middle-aged suicide cases were more likely to be socially isolated than control subjects. This hypothesis was proposed based on the assumption that those who lived alone and/or those who were never married were more likely to be socially isolated. These two factors were found to be significant risk factors for suicide in the multivariate regression model. Firstly, 58 per cent (49/85) of the suicides were living alone when they committed suicide, whereas, only 28.2% of the control subjects (24/85) lived alone at the time of interview. More specifically, living alone was found to be one of the five robust risk factors of suicide compared with other significant risk factors entered into the multivariate analysis. The OR of living alone was 3.92 ($p<.05$; CI 1.15-13.36), which can be interpreted that those who lived alone were at 3.92 times increased risk for committing suicide. This finding was consistent to earlier psychological autopsy studies that social isolation ranged from 22-68% in their suicide subjects (Canavagh et al., 2003). Further, this

finding was in line with other psychological autopsy studies in terms of OR (e.g., Beautrais 2003a, OR=4.0; Cheng et al., 2000, OR=4.0; Gururaj et al., 2004, OR=3.04)

Secondly, 31 per cent (26/85) of the suicides had never married when they committed suicide; whereas, only 11.8% of the control subjects (10/85) reported that they had never married at the time of interview. Moreover, never married was also found to be one of the five robust risk factors of suicide. The odds ratio of never married is 4.19 ($p<.05$; CI 1.08-16.29), which can be interpreted that those who never married were at 4.19 times increased risk for committing suicide.

These findings were consistent with earlier studies which found that social isolation, living alone, and a perceived lack of social support were risk factors for suicidal behaviour. Evidence have been suggesting that there are different mechanisms of social support. Social support sometimes represents part of a protective process that increases self-efficacy and thereby reduces suicidal behaviour. At other times social support directly reduces suicidal behaviour via reducing psychological distress (Sarafino, 2002). Furthermore, family and friendship support appear to play somewhat different roles in protecting against suicidal behaviour (Rubenstein et al., 1989). Men and women may differ in use and types of social support. It was suggested that men tended to utilize instrumental social support and women were more likely to utilize emotional focused social support (Heikkinen et al., 1994).

Data from many places about relationship status confirms that being single, divorced or widowed is associated with a higher suicide rate both for men and women (Heikkinen et al., 1995; Kposowa, 2000; Luoma, 2002). However, many studies that have examined the association between marital status and suicide have been conducted at an aggregate level and have failed to take into account the extent to which other factors, such as mental illness, may contribute to marital status.

Unemployment. The sixth hypothesis proposed that suicide subjects were more likely to be unemployed at the time of death compared with the control subjects at the time of interview. Fifty four per cent (45/85) of the suicides were either unemployed or underemployed at the time of death; whereas, only 16% of the control subjects (13/85) were either unemployed or underemployed. Moreover, based on the multivariate logistic regression analysis, unemployment or underemployment was found to be one of the five robust risk factors of suicide. The OR of unemployment or underemployment is 4.81 ($p<.05$; CI 1.32-17.4), which can be interpreted that those who are unemployed or underemployed were at 4.81 times increased odds for committing suicide.

Unemployment, although it has been identified as a risk factor for suicide in other studies, the finding of the study was significantly higher than other Western studies have reported. In previous psychological autopsy studies conducted in Western societies, the ORs

for unemployment in suicides ranged from 1.9 to 3.4 (Platt & Hawton, 2000). Further, a recent study in the United States, based on National Longitudinal Mortality Study (Kposowa, 2001), revealed ‘only’ a 2-fold increase in risk of suicide among the unemployed; a New Zealand case-control study of serious attempts found an unadjusted OR of 4.2, reducing to 1.95 after control for current mental disorder and further reducing to 1.7 after additional control for childhood and family factors (Beautrais et al., 1998a, 1998b).

Notwithstanding, unemployment has always been reported as a significant risk factor for suicide in other Chinese or Asian communities (e.g., Cheng et al., OR=3.50; Gururaj et al., 2004, OR=6.15; Philips et al., 2002, OR=3.60). There seems to be a major cultural difference in regards to the impact of unemployment on one’s mental health between Eastern and Western societies. Comparatively, welfare support for the unemployed in Hong Kong and other Asian communities often is not sufficient for maintaining a basic living standard. Receiving unemployment benefits could also prove to be very difficult in a Chinese community and the unemployed may find it shameful and embarrassed.

Three explanations are proposed in regards to the association of suicide and unemployment: unemployment may confer vulnerability by increasing the impact of stressful life events; it may indirectly cause suicide by increasing the risk of factors that precipitate suicide (for example, psychiatric illness, financial difficulties); or it may be a non-causal

association because of confounding or selection by factors that predict both unemployment or selection by factors that predict both unemployment status and suicide risk (Beautrais et al., 1998a, 1998b). It remains unclear of how unemployment is associated with suicide. It has been suggested that there is a need for more large population studies using sophisticated statistical analyses to explore the nature of the association between unemployment and suicide (Fergusson, 2001). However, in Hong Kong, it appears that unemployment confers vulnerability by increasing the impact of stressful life events because, as found in another study conducted by the CSRP HKU, weak associations were found among unemployment, financial difficulties, and presence of psychiatric disorders (CSRP HKU, 2005).

Adverse life events. The seventh hypothesis proposed that the suicide subjects were more likely to have experienced more adverse life events in the previous year than control subjects. There are five domains of life events: relationship, family, work, physical health, and legal issues. Life events that were present in the past year were identified and the severities of their negative impacts on the subjects were evaluated. In particular, acute life events referred to those events that happened within a month of the death. Out of these five domains of life events, only the legal and physical domains were found to be different between the suicide and control groups. Six suicides perceived to be stressed by illegal issues within the past year prior to death (but none reported by the controls) and 22 suicides suffered from physical illness and only nine control samples reported that they suffered from physical illness.

Although there were no statistical significant differences among the suicides and controls in regards to the number of life events of family, work, and relationship issues, out of the 85 suicide cases, 15 suffered from family issues, 25 suffered from work-related issues, and 17 had relationship problems (note: one suicide case could experience multiple life evens within the past year prior to death). Having said that, strikingly, only one specific life event was found to be a robust risk factor for suicide, which is indebtedness. This links to the eighth hypothesis.

Indebtedness. The last hypothesis proposed that suicide subjects were more likely to have affected by financial difficulty than control subjects. Forty one per cent (34/85) of the suicides were indebted compared with only 7% of the control subjects (7/85) had debt issues. Moreover, based on the multivariate logistic regression analysis, indebtedness was found to be second most robust risk factor of suicide compared with other significant risk factors entered into the analysis. The OR of indebtedness is 9.42 ($p<.05$; CI 2.18-40.84), which can be interpreted that those who are indebted were at 9.42 times increased risk for committing suicide.

Compared with other known risk factors, indebtedness was the least studied risk factor for suicide. There were few in-depth studies that emphasized financial debt as an independent risk factor for suicide. Nevertheless, Chan et al. (2005) found that some of the debts in suicide

cases were related to gambling, overspending, and/or mismanagement of the individual's financial situation. Dyer (1996) suggested that during the worsening farm crisis in the United States in the 1980s, suicide was a leading cause of death among farmers due to financial stress. Heikkinen et al. (1995) studied the association between debt and suicidal behaviour among the Finnish general population and concluded that difficulties in repaying debts were an independent factor associated with suicidal ideation. Evidence from Graham and Burvill (1992) and Blaszczynski and Farrell (1998) showed that suffering debt burdens is one of the related factors in suicides. This study was the first study that reported "indebtedness", as a unique risk factor of suicide in a multivariate logistic regression model.

In sum, the results of this study supported the eight hypotheses, and found that these multi-dimensional risk factors were related to suicide based on the adjusted ORs with multivariate logistic regression or higher prevalence among the suicide group compared with the control group. Multivariate analysis showed that presence of at least one psychiatric disorder (OR=37.5, 95% CI 11.5-121.9), indebtedness (OR= 9.4, 95% CI 2.2-40.8), lived alone (OR=3.9, 95% CI 1.2-13.4), unemployment (OR=4.8, 95% CI 1.3-17.5), and never married (OR=4.2, 95% CI 1.1-16.3) were found to be the most robust risk factors of suicide among the 30-49-year-olds suicide cases in this study. Moreover, these five risk factors were found to account for 71.4% of the variance of suicide.

It is noteworthy that although these five risk factors are also identified by other psychological autopsy studies as significant risk factors for suicide, other than psychiatric disorders, the magnitude of unemployment and indebtedness as risk factors for suicide, especially, were found to be more significant than those reported in other studies. The researcher concluded that although there are more similarities than differences with regard to risk factors suicide in Hong Kong and Western countries, there is a distinctiveness of middle-aged suicide in Hong Kong. This finding is deemed important because it suggests that promising suicide prevention strategies that being implemented and evaluated in other countries can be adopted in Hong Kong; however, future local suicide prevention strategy should prioritise its preventive and intervention schemes in order to tackle the distinctive suicide phenomenon in Hong Kong.

Implications

Given that suicide has been found as a multi-faceted problem, approaches to prevention of suicide must be multi-pronged, by macro- and micro-level initiates that aim at individual, family, and societal levels. In recent years, increasing and widespread concern about suicide as a public health problem has generated a dramatic increase in the volume of research about the causes and risk factors for suicidal behaviour (Jenkins, 2002; Jenkins et al., 2000; Knox et al., 2004; Lewis, Hawton, & Jones, 1997). Accordingly, in 1996, the

United Nations published guidelines to assist and stimulate countries to develop national strategies aimed at reducing morbidity, mortality, and other consequences of suicidal behaviour based on a public health approach.

A public health approach to suicide prevention focuses on identifying broader patterns of suicide and suicidal behaviour throughout a group or population. This suicide prevention approach is also reflected in an organized five-step process that has been developed for ensuring the effectiveness of preventive efforts. These organized five steps are 1) defining the problem by collecting information about the rates of suicidal behaviours through a comprehensive surveillance and monitoring system; 2) identifying risk and protective factors for suicide through vigorous research; 3) developing and testing interventions that they are safe, ethical, and feasible and aim to maximize success of the program prior to implementation; 4) Implementing designed and tested interventions; and 5) evaluating effectiveness of the implemented programs. Evaluation can help determine for whom a particular suicide prevention strategy is best fitted or how it should be modified in order to achieve maximum effectiveness.

Moreover, in order to provide a framework for the public health approach in suicide prevention, Marzek and Hagerty (1994) proposed a prevailing prevention model of *universal*, *selective*, and *indicated* (USI) interventions. This USI model focuses attention on defined populations – from everyone in the population, to specific at-risk groups, to specific

high-risk individuals – i.e., three population groups for whom the designed interventions are deemed optimal for achieving the unique goals of each intervention type. Within this model, universal programs are those that address the general population regardless of risk status, selective programs address high-risk sub-groups with the population, and indicated programs address high-risk individuals within the population.

Many countries have developed or have been developing their national suicide strategies based on a public health approach using the USI model. According to a review of worldwide suicide prevention policies by De Leo and Evans (2004), they found that nine countries had comprehensive national strategies for suicide prevention. These countries were Australia, Finland, New Zealand, Norway, England, the United States, Denmark, Germany, and Sweden. Most of these guidelines emphasised the need for multi-disciplinary approaches, and continued evaluation and review. Despite differences in target populations of these national strategies, the themes covered in the various countries strategies have considerable similarities and all countries incorporate the following USI suicide prevention intervention model (De Leo & Evans, 2004, p.81):

- *reducing access to lethal means* (universal);
- *improved reporting of suicide in the media* (universal);
- *school-based programs* (universal and/or selective);
- *enhanced access to mental health services* (universal);
- *training for professional* (universal);

- *improved detection and treatment of mental illness as a core feature of their strategies, with a particular emphasis on depression* (selective);
- *improved assessment and intervention of patients with suicidal gestures* (indicated); and
- *providing crisis intervention* (indicated).

Universal programs broadly blanketing a school or community have been shown to be effective in reducing suicide rates (IOM, 2002). For instance, reducing the availability of paracetamol results in a decline in suicide in the United Kingdom (Hawton et al., 2000). Education of the media regarding appropriate reporting of suicides reduced railway suicides in Vienna (IOM, 2002). Such changes seem to reduce suicide in certain contexts but the data are limited (De Leo & Evans, 2004; Maris et al., 2000).

Selective prevention measures have also been shown to be promising. Screening programs, gatekeeper training programs, support/skills training groups, and school-based crisis response teams can create a coordinated effort that identifies youth at suicide-risk and provides individual follow-up. Indicated interventions directed toward individuals at high risk for suicide include medical and psychosocial approaches. Controlling the underlying mental illness through pharmacology and psychotherapy is an important indicated suicide prevention approach. Pharmacotherapy and psychotherapy provides a necessary therapeutic relationship that reduces the risk of suicide. Cognitive-behavioural approaches that include problem-solving therapy appear to reduce suicidal ideation and attempts (Hawton et al.,

2002).

The suicide problem in Hong Kong is not less severe than many other countries; unfortunately, there is as yet no suicide prevention strategy in place for Hong Kong. Therefore, based on the findings of this study and the international experiences, the researcher recommends the following prioritised preventive strategies that can be implemented in Hong Kong and hopes that many preventable and premature deaths can be saved. These prioritized preventive strategies include improving the prevention, detection, treatment, and management of psychiatric disorders in Hong Kong, fostering good mental health skills to promote resiliency, and address the psychosocial needs of non-psychiatric but at-risk individuals exposed to stress and adversity, and limiting the availability of charcoal in cities of Hong Kong.

Firstly, as found in this study, mental health problem, in particular, depression, by far is the largest contribution to suicide. This finding implied that a major plank of any pragmatic, empirical-based suicide prevention strategy must involve universal, selective, and indicated approaches that aim to improve the prevention, detection, treatment, and management of psychiatric disorders in Hong Kong. This can be achieved by 1) universal programs that reducing stigma and discrimination of mental illnesses; 2) selective programs that enhancing identification of those at risk for suicide by family physicians; and 3) indicated program

improving the fragmented organization of mental health services in Hong Kong by employing a case-management model for those who are at high-risk of suicide.

Stigma towards mental illness is pervasive in Hong Kong (Lee, 1999). The stigma of mental illness is one of the foremost barriers deterring people, who need treatment from seeking it, and thereby, in turn, leads to their under-treatment and thus increases their likelihood of suicide. Stigma also leads the public to discriminate against people with mental illness in employment. Moreover, stigma inhibits help-seeking individuals from bringing up their mental health concern to primary care providers. Patients may instead report more somatic symptoms of mental illness, such as dizziness and stomach disturbances, because these are more culturally acceptable (Lee, 2000). Furthermore, even if patients begin treatment for mental illness, stigma can deter them from staying in treatment. Accordingly, universal programs that encourage positive mental health, improved public understanding of mental illness, and enhanced access to mental health services are essential.

Primary care has become a critical setting for detection of depression and anxiety disorders because primary care setting is most likely the first medical setting where individuals may seek for help. In Canavagh et al.'s review article (2003), the majority (approximately 75%) of those who die by suicide had contacted with primary-care providers in the year prior to their death. These findings suggested that primary-care providers are

potentially well placed to detect and assist a substantial fraction of those with mood disorders and suicidal behaviours. However, it is also well established that a large proportion of suicide individuals were not detected in primary care in the days before suicide (Bertolote et al., 2003).

Many reasons contribute to the large proportion of undetected psychiatric symptoms and suicidal ideation in primary care settings. According to Rutz et al. (1989), professionals at primary care settings were reluctant to question patients' suicidal ideation because these physicians concerned that asking patients about suicide will trigger suicidal behaviour (Rutz et al., 1989). Whether professionals at primary care settings in Hong Kong share this concern is unknown. If that is the case, training on suicide prevention which knowledge on myths and facts of suicide are recommended. Another reason for physician reticence comes from the lack of suicide screening tool in Hong Kong. Moreover, considering the rarity of suicides that happen in primary care, physicians have little incentive to take active steps to become skilled in suicide assessment or treatment, nor do professional guidelines recommend routine screening of asymptomatic patients. Therefore, it is recommended that universal and selective programs that include development of guidelines and screening tools for primary care settings, providing routine screening for depression and suicidal ideation, and more training on suicide assessment and treatment are necessary in order to enhancing identification of those at risk for suicide in primary care settings.

The fragmented organization of mental health services has been repeatedly recognized as a serious barrier to obtaining treatment (Maris et al., 2000). Linkages between different settings are critical for early detection and treatment of mental disorders and suicidal tendency. They include linkages between primary care and specialty mental health care; emergency department care and mental health care; substance abuse and mental health care; and, for adolescents, school-based programs with mental health or substance abuse care. The transition from inpatient care to community-based care is an especially critical period for suicidality in light of studies finding that a large proportion of completed suicides come after recent inpatient discharge, often before the first outpatient appointment (Appleby et al., 1999; Beautrais et al., 2000).

This fragmented organization of mental health services has also been observed in Hong Kong. Lee (1999) stated that people with mental illness frequently reported their frustrations and waiting times as they navigated through a maze of disorganized services in Hong Kong. Therefore, it is recommended that improvement on linkages between different mental health settings is a crucial suicide prevention component which needs to be implemented in Hong Kong. This indicated program can be achieved by providing better follow-up services for at-risk individuals who are in the transition from inpatient care to community-based care.

Although population-based and improved mental health system initiatives may help

improving detection and treatment for those who suffer from mental illness, findings of this study revealed that some individuals committed suicide did not suffer from psychiatric illness. Those who did not suffer from psychiatric illness were individuals who were unemployed, indebted, or socially isolated. Hence, suicide prevention initiates should also target non-psychiatric at-risk individuals. Programs that prevent individuals from developing psychiatric illnesses are likely to be the most effective (IOM, 2002; Knox et al., 2004; Maris, 2002).

This target can be achieved by a number of universal and selective strategies including population-based programs designed to reduce social inequity and social discrimination of those who are unemployed, in-debted, or socially isolated. Such programs may make an effective contribution to suicide prevention by providing an equitable social environment in which other, more targeted, approaches to suicide prevention would have their best chance of success. Another universal approach focuses on the development of general mental health programmes, which aim to foster good mental health skills to promote resiliency, address the psychosocial needs of those exposed to stress and adversity, and raise awareness of the positive role of social support. A further approach of universal and selective strategies may include community-based competency-promoting and stress-reducing programmes to reduce the risks of mental disorders and behaviours with which suicidal behaviour is associated.

Restriction of suicide means is a major population-based universal initiative of many national suicide prevention strategies. However, there is limited scope for the restriction of access to means of suicide to play a substantial role in Hong Kong suicide prevention, in particular many people committed suicide by jumping from a height and hanging. Despite that, CO poisoning by burning charcoal was the second most common method of suicide among the overall suicide deaths and the suicide subjects within this study. Specifically, most of these CO poisoning suicide happened in the homes of the deceased which were located mainly in cities. Therefore, there may be a possibility if charcoal can be made less accessible and available to the public in cities, suicide by CO poisoning can be reduced.

Charcoal has always been used for recreational purpose like outdoor barbeque, rather than “survival” purpose in Hong Kong. However, the sales of charcoal are available in every supermarket and store in Hong Kong. If the choice of suicide method is determined by physical availability and easy access of a means, then, logically, reducing the availability or the accessibility of charcoal seems to be an effective method to tackle charcoal-burning suicides. This target can be achieved by removing sales of charcoal in cities that limits the availability of charcoal in cities. Moreover, in order to further reduce the demand of purchasing charcoal in cities, installing charcoal vending machines and electric barbeques at parks may eventually lowering the availability of charcoal in cities.

Clinical implications. Although it appears likely that public health approaches will dominate the area of suicide prevention, there is, nonetheless, a case for more specific individual and indicated interventions for the identifiable high-risk population. These high-risk groups may include people with psychiatric illnesses and history of suicide attempt as found in this study. Psychiatric treatment with medications and intensive psychological treatments are the most common indicated initiatives target at high-risk individuals.

Many at-risk individuals receive medications for their psychiatric illnesses. While these medications often reduce the symptoms of disorders, the effectiveness of such medications to decrease the risk of suicide in unknown (Maris et al., 2000). Moreover, medications can take over a month to take effect, and finding the right combination and doses to best treat an individual can take some months. During this time people experience often unpleasant side-effects, the stigma of mental disorders, and changes in life-circumstances secondary to the disorders in some cases. Therefore, it is recommended that medications are best delivered in the context of a therapeutic relationship an on-going and appropriate psychotherapy, conscientious follow-up, and an overall flexible treatment plan that considers the socio-cultural context of patients (Rudd et al., 2002; Rutz et al., 1989).

Psychotherapeutic interventions target very different variables than do psychotropic drugs. There are several types of psychotherapies which include behavioural therapy,

psychodynamic therapy, cognitive therapy, and supportive therapy have been used with suicidal individuals. Psychotherapy often focuses on changing long-term social-cognitive suicide risk factors such as hopelessness, low self-esteem, low self-efficacy, interpersonal problem-solving deficits, and socio-environmental risks such as family violence and parenting style. According to a review of 23 studies on all randomized controlled trials targeting suicide attempters by Hawton et al. (2002), the only psychotherapy that has been shown to reduce repeat attempts is dialectical behaviour therapy (DBT), a 12-month cognitive-behavioural therapy (CBT) designed for adults with borderline personality disorders (Linehan et al., 1991). This study found that adults assigned to DBT engaged in fewer and less suicidal attempts post-treatment than patients assigned to treatment-as-usual (TAU).

In sum, among many short-termed psychotherapies, cognitive behavioural intervention seems to be an effective psychotherapy for people with suicidal behaviour. At present, cognitive behavioural therapy is practised by very few skilled mental health professionals in Hong Kong. This could be an area of practice for mental health professionals and cognitive behavioural therapy could be more aggressively integrated into their role. However, they must receive special training in order to use it effectively. Moreover, client’s cultural values and beliefs have to be taken into account when implementing CBT, and research needs to be conducted to enrich the body of suicide

prevention knowledge related to the implementation of CBT in preventing suicide. Although CBT appears more effective in reducing suicide risk than others, mental health research has suggested that the most critical component of therapeutic treatment is the quality of the therapeutic relationship rather than the type of psychotherapy (Rudd et al., 2002).

Limitations

The retrospective nature of a psychological autopsy study is the major limitation of the study. Studying completed suicides must rely on the information about the suicides. However, since the researcher was unable to interview the deceased and, thus, was forced to employ auxiliary research method. The indirectness raises methodological questions and obstacles which may include the different kinds of relationships between the informants and the deceased, the accuracy of information, and the necessity of therapeutic considerations during the interviews.

Despite the contribution of Axis I psychiatric disorders to suicidal behaviour, Axis II disorders are also reported as risk factors for suicide. Due to the absence of a locally validated and structured instrument in assessing Axis-II personality disorders, the researcher only screened for borderline and antisocial personality disorder but did not systematically assess other Axis II disorders that might be important risk factors for suicide. Further investigation

of the role of Axis II disorders in middle-aged suicides are needed in future studies.

Conclusion

As an attempt to fill a void in the body of research on middle-aged suicide in Hong Kong, the current study accentuated that further studies were necessary to shed more light on the deteriorating situation of middle-age suicides, surging 65% in the past seven years. Despite this dramatic increase and the fact that nearly all of these tragic deaths are premature and preventable (Maris et al., 2000), research on middle-aged suicide in Hong Kong was nonetheless non-existent at this age.

The cultural difference in suicide risk factors between the West and Hong Kong, as highlighted in the current study, heightened the urgency for local suicide prevention policy-makers to develop culturally specific prevention strategies. It is unfortunate to find that there is yet no such culturally specific public health suicide prevention strategy in place for Hong Kong. The study only identified an array of multi-dimensional risk factors for middle-aged suicide, it also found out among the five major risk factors, the magnitude of unemployment and indebtedness as risk factors were higher than other worldwide suicide studies. The various risks factors identified, i.e. psychiatric diagnoses, especially mood disorders, indebtedness, unemployment, martial status (never married and being single), and being living alone, have varying degrees of importance in middle-aged suicides in Hong

Kong vis-à-vis studies in the West. In order to prevent suicide effectively, suicide prevention strategies should be prioritized and specific to the distinctiveness of the suicide phenomenon within a particular culture. Many developed countries, including Australia, Canada, Finland, the United States and the United Kingdom, have e either developed or have been developing culturally specific national suicide prevention strategies based on a public health approach. It is recommended that Hong Kong's suicide prevention institutions and policy-makers should consider this public health approach geared towards Hong Kong's specific cultural needs.

Accordingly, the researcher suggests culturally sensitive and empirical-based universal, selective, and indicated public health preventive interventions to focus and tackle the most potent risk factors for middle-aged suicide. Among psychiatric disorders, depression was found to be the most robust risk factor for suicide in this study. The best approaches in preventing middle-aged suicide appear to be raising public awareness of depression, enhancing the mechanism to detect early signs of depression, and improving treatment and management of depression. This can be achieved by universal programs that reduce stigma and discrimination against depression and tighten the fragmented organization of mental health services in Hong Kong; selective programs that enhance identification of those at risk for suicide by family physicians; and indicated programs that treat high-risk psychiatric patients and suicide attempters with evidence-based psychiatric and psychological

treatments.

Moreover, findings of this study revealed that other than those who suffered from psychiatric illness, individuals who were unemployed, indebted, or socially isolated were at high risk of suicide. These high-risk individuals could be helped by universal population-based programs designed to reduce social inequity and social discrimination against those who are unemployed, indebted, or socially isolated; and selective interventions which aim to foster good mental health skills to promote resiliency, and address the psychosocial needs of those exposed to stress and adversity.

Limiting the availability and accessibility of a prevalent suicide means have been found to be the most effective suicide prevention initiative in other countries, e.g., Vienna and the United Kingdom. Concern and pressure to do something about the problem of charcoal burning suicide in sealed apartments was building up in Hong Kong during the early 2002. If we can make the charcoal less available to distressed people, there could give us more time for intervention, i.e. suicidal people may have more time to think twice and then seek help. Their friends may have more time to provide the necessary support and care. Several other possible approaches to this problem can be considered. A ban on charcoal was never considered because it is not an “illegal substance” at all, and its use is usually associated with outdoor barbeques. Installing charcoal vending machines at country parks can be considered.

The recommendation is based on the assumption that if charcoal is made easily accessible in country parks, individuals need not to purchase charcoal in cities; and when charcoal is less demanded in cities, recommendation to stop selling charcoal in supermarkets in cities can be made. Secondly, warning signs and helplines information on packages of charcoal regarding excessive carbon monoxide level in a sealed area can be lethal.

There are also limitations to this study. The psychological autopsy approach, although providing a wealth of information, is most vulnerable to the retrospective reports of informants who may be biased by knowledge of the type of death of the subject of the inquiry. This method is also limited with regard to providing information on the deceased's private self-perceptions, coping, or cognitive distortions. By interviewing persons who have survived a suicide attempt, such information can be obtained in future studies.

It is noteworthy that suicide prevention is likely to be more successful when professional help and social support are both available to suicidal patients. Edwin Shneidman (1996) clearly points out, "suicide prevention is everybody's business (p.5)". While professionals play crucial roles in risk assessment, emergency services, short- and long-term treatments and research, it should be noticed that suicidal individuals are more likely to initially seek help from their families, friends, and co-workers. Therefore, everyone can help preventing suicide by extending care and empathy to those around us. Most suicidal people can be helped in

getting through their moment of crisis if they have someone who will take them seriously, listen, provide undivided attention in a non-critical manner without trying to advise or intrude, and help them talk about their thoughts and feelings offer empathetic and unconditional emotional support. Fostering closer relationships with people around us can help make a difference.

References

Abramson, L.Y., Alloy, L.B., Hogan, M.E., et al. (2000). The hopelessness theory of suicidality. In T.E. Joiner, & M.D. Rudd (Eds.), *Suicide science: Expanding the boundaries* (pp.17-31). Norwell, MA: Kluwer Academic Publishers.

Adams, D.M., Overholser, J.C., & Spirito, A. (1994). Stressful life events associated with adolescent suicide attempts. *Canadian Journal of Psychiatry, 39*, 43-48.

Akuskai, N. (1995). Suicide and mental disorder. *Psychiatry and Clinical Neurosciences, 49*, 91-97.

Allebeck, P., Varla, A., & Wistedt, B. (1986). Suicide and violent death among patients with schizophrenia. *Acta Psychiatrica Scandinavica, 74*, 43-49.

Allgulander, C. (1994). Suicide and mortality patterns in anxiety neurosis and depressive neurosis. *Archives of General Psychiatry, 51*, 708-712.

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorder (4th ed., Text revision, DSM-IV-TR)*. Washington, DC: Author.

Andersson-Segesten, K. (1989). The last period of life of the very old. A pilot study evaluating the psychological autopsy method. *Scandinavian Journal of the Caring Sciences, 3*, 177-181.

Angst, J., Angst, F., & Stassen, H.H. (1999). Suicide risk in patients with major depressive disorder. *Journal of Clinical Psychiatry, 60*, 57-62.

Appleby, L. (2000). Prevention of suicide in psychiatric patients. In K. Hawton, & K. van Heeringen (Eds.), *The international handbook of suicide and attempted suicide.* (pp.617-630). Chichester, UK: John Wiley and Sons.

Appleby, L., Cooper, J., Amos, T., et al. (1999). Psychological autopsy study of suicides by people aged under 35. *British Journal of Psychiatry, 175,* 168-174.

Appleby, L., Dennehy, J.A., Thomas, C.S., et al. (1999). Aftercare and clinical characteristics of people with mental illness who commit suicide: a case-control study. *Lancet, 353,* 1397-1400.

Appleby, L., & Shaw, J. (1999). Suicide within 12 months of contact with mental health services: national clinical survey. *British Medical Journal, 318,* 1235-1239.

Apter, A., Bleich, A., King, R. A., et al. (1993). Death without warning? A clinical post-mortem study of suicide in 43 Israeli adolescent males. *Archives of General Psychiatry, 50,* 138-142.

Arato, M., Demeter, E., Rihmer, Z. et al. (1988). Retrospective psychiatric assessment of 200 suicides in Budapest. *Acta Psychiatrica Scandinavica, 77,* 454-456.

Asarnow, J.R., & Guthrie, D. (1989). Suicidal behaviour, depression, and hopelessness in child psychiatric inpatients: a replication and extension. *Journal of Clinical Child Psychology, 18,* 129-136.

Asberg, M., Nordstrom, P., & Traskman-Bendz, L. (1986). Cerebrospinal fluid studies. In J.J. Mann, & M. Stanley (Eds.), *Psychobiology of suicidal behaviour*. New York: New York Academy of Sciences.

Asgard, U. (1990). A psychiatric study of suicide among urban Swedish women. *Acta Psychiatrica Scandinavica, 82,* 115-124.

Atwood, K., Colditz, G.A., & Kawachi, I. (1997). From public health science to prevention policy: Placing science in its social and political contexts. *American Journal of Public Health, 87,* 1603-1605.

Bailley, S.E., Kral, M., & Dunham, K. (1999). Survivors of suicide do grieve differently: Empirical support for a common sense proposition. *Suicide and Life-Threatening Behaviour, 29,* 256-271.

Barraclough, B.M., Bunch, J., Nelson, B., et al. (1974). A hundred cases of suicide: Clinical aspects. *British Journal of Psychiatry, 125,* 355-373.

Barraclough, B.M., & Pallis, D. J. (1975). Depression followed by suicide: a comparison of depressed suicides with living depressives. *Psychological Medicine, 5,* 55-61.

Baud, P. (2005). Personality traits as intermediary phenotypes in suicidal behaviour: genetic issues. *American Journal of Medical Genetics, 133,* 34-42.

Beautrais, A.L. (1998). Risk factors for serious suicide attempts among young people: a case control study. In R. Hassan (Ed.), *Suicide prevention: The global context* (pp. 167-181). New York: Plenum Press.

Beautrais, A.L. (1999a). *Methods of suicide in New Zealand 1977–1996.* Wellington: Ministry of Health.

Beautrais, A.L. (1999b). Risk factors for suicide and attempted suicide among young people. *Commonwealth department of health and aged care, national youth suicide prevention strategy: Setting the evidence-based research agenda for Australia (A literature review)* (pp.113-278). Canberra: Commonwealth of Australia.

Beautrais, A.L. (2000a). Methods of youth suicide in New Zealand: trends and implications for prevention. *Australian and New Zealand Journal of Psychiatry, 34*, 413-419.

Beautrais, A.L. (2000b). *Restricting access to means of suicide in New Zealand: A report prepared for the Ministry of Health on methods of suicide in New Zealand 1997-1996*. Wellington: Ministry of Health.

Beautrais, A.L. (2000c). Risk factors for suicide and attempted suicide amongst young people. *Australian and New Zealand Journal of Psychiatry, 34*, 420-436.

Beautrais, A.L. (2001a). Child and young adolescent suicide in New Zealand. *Australian and New Zealand Journal of Psychiatry, 35*, 647-653.

Beautrais, A.L. (2001b). Suicides and serious suicide attempts: two populations or one? *Psychological Medicine, 31*, 837-845.

Beautrais, A.L. (2002). Gender issues in youth suicidal behaviour. *Emergency Medicine, 14*, 35-42.

Beautrais, A.L. (2003a). Life course factors associated with suicidal behaviours in young people. *American Behavioural Scientist, 46*, 1137-1156.

Beautrais, A.L. (2003b). Subsequent mortality in medically serious suicide attempts: A 5 year follow-up. *Australian and New Zealand Journal of Psychiatry, 37*, 595-599.

Beautrais, A.L. (2003c). Suicide and serious suicide attempts in young people: a multiple group case control study. *American Journal of Psychiatry, 160*, 1093-1039.

Beautrais, A.L. (2004a). Further suicidal behaviour amongst medically serious suicide attempters. *Suicide and Life-Threatening Behaviour, 34*, 1-11.

Beautrais, A.L. (2004b). Subsequent mortality in medically serious suicide attempts: a 5 year follow-up. *Australian and New Zealand Journal of Psychiatry, 37*, 595-599.

Beautrais, A.L., Coggan, C.A., Fergusson, D.M., et al. (1997). *The prevention, recognition and management of young people at risk of suicide: Development of guidelines for schools*. Wellington: New Zealand Ministry of Education.

Beautrais, A.L., Joyce, P.R., & Mulder, R.T. (1996a). Risk factors for serious suicide attempts among youth aged 13-24. *Journal of the American Academy of Child and Adolescent Psychiatry, 35,* 1174-1182.

Beautrais, A.L., Joyce, P.R., & Mulder, R.T. (1996b). Access to firearms and the risk of suicide: A case control study. *Australian and New Zealand Journal of Psychiatry, 30,* 741-748.

Beautrais, A.L., 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 American Academy of Child and Adolescent Psychiatry, 36,* 1543-1551.

Beautrais, A.L., Joyce, P.R., & Mulder, R.T. (1998a). Psychiatric contacts among youths aged 13 through 24 years who made serious suicide attempts. *Journal of the American Academy of Child and Adolescent Psychiatry, 37,* 504-511.

Beautrais, A.L., Joyce, P.R., & Mulder, R.T. (1998b). Psychiatric illness in a New Zealand sample of young people making serious suicide attempts. *New Zealand Medical Journal, 111,* 44-48.

Beautrais, A.L., Joyce, P.R., & Mulder, R.T. (1998c). Unemployment and serious suicide attempts. *Psychological Medicine, 28,* 209-218.

Beautrais, A.L., Joyce, P.R., & Mulder, R.T. (1999). Personality traits and cognitive styles as risk factors for serious suicide attempts among young people. *Suicide and Life-Threatening Behaviour, 29*, 37-47.

Beautrais, A.L., Joyce, P.R., & Mulder, R.T. (2000). Unmet need following serious suicide attempt: follow-up of 302 subjects for 30 months. In G. Andrews, & S. Henderson (Eds). *Unmet need in psychiatry* (pp.245-255). Cambridge: Cambridge University Press.

Beck, A.T., Schuyler, D., & Herman, I. (1974). Development of suicidal intent scales. In A.T. Beck, H.L.P. Resnik, & D.J. Letteri (Eds.), *The prediction of suicide* (pp.45-56). Bowie, MD: Charles Press.

Berglund, M., Krantz, P., Lundqvist, G. et al. (1987). Suicide in psychiatric patients. *Acta Psychiatrica Scandinavica, 76*, 431-437.

Bertolote, J.M., Fleischmann, A., De Leo, D., et al. (2003). Suicide and mental disorders: do we know enough? *British Journal of Psychiatry, 183*, 382-383.

Beskow, J., Runeson, B.S., & Asgard, U. (1990). Psychological autopsies: methods and ethics. *Suicide and Life-Threatening Behaviour, 20*, 307-323.

Beskow, J., Runeson, B.S., & Asgard, U. (1991). Ethical aspects of psychological autopsy. *Acta Psychiatrica Scandinavica, 84*, 482-487.

Bhatia, S.C., Khan, M.H., Mediratta, R.P., et al. (1987). High risk suicide factors across cultures. *International Journal of Social Psychiatry*, *33*, 226-236.

Blakely, T.A., Collings, S.C.D., & Atkinson, J. (2003). Unemployment and suicide: evidence for a causal association? *Journal of Epidemiology and Community Health*, *57*, 594-600.

Blaszczynaski, A., & McConaghy, N. (1986). Demographic and clinical data on compulsive gambling. In M. Walker (Ed.) *Faces of gambling*. Sydney: National Association for Gambling Studies.

Bongar, B., Berman, A.L., Maris, R.W., et al. (1998). *Risk management with suicidal patients*. New York: Guilford Press.

Bonner, R.L. (1992). Isolation, seclusion, and psychosocial vulnerability as risk factors for suicide behind bars. In R.W. Maris, A.L. Berman, J.T. Maltsberger, et al (Eds.), *Assessment and prediction of suicide* (pp.398-419). New York: Guilford Press.

Bostwick, J.M., & Pankratz, V. S. (2000). Affective disorders and suicide risk: a re-examination. *American Journal of Psychiatry*, *157*, 1925-1932.

Brent, D.A. (1995). Risk factors for adolescent suicide and suicidal behaviour. Mental and substance abuse disorders, family environmental factors and life stress. *Suicide and Life-Threatening Behaviour*, *25*, 52-63.

Brent, D.A., Baugher, M., Bridge, J., et al. (1999). Age- and sex-related risk factors for adolescent suicide. *Journal of the American Academy of Child and Adolescent Psychiatry, 38,* 1497-1505.

Brent, D.A., Bridge, J., Johnson, B.A., et al. (1996). Suicidal behaviour runs in families: a controlled family study of adolescent suicide victims. *Archives of General Psychiatry, 53*, 1145-1152.

Brent, D.A., Johnson, B.A., Bartle, S., et al. (1993). Personality disorder, tendency to impulsive violence, and suicidal behaviour in adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 32,* 69-75.

Brent, D.A., Johnson, B.A., Perper, J., et al. (1994). Personality disorder, personality traits impulsive violence and completed suicide in adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 33,* 1080-1086.

Brent, D.A., & Mann, J.J. (2005). Family genetic studies, suicide, and suicidal behaviour. *American Journal of Medical Genetics, 133,* 13-24.

Brent, D.A., Perper, J.A., Goldstein, C.E., et al. (1988). Risk factors for adolescent suicide: A comparison of adolescent suicide victims with suicidal inpatients. *Archives of General Psychiatry, 45,* 581-588.

Brent, D.A., Perper, J.A., Kolko, D.J., et al. (1988). The psychological autopsy: Methodological considerations for the study of adolescent suicide. *Journal of the*

American Academy of Child and Adolescent Psychiatry, 27, 362-366.

Brent, D.A., Perper, J. A., Moritz, G., et al. (1993a). Psychiatric risk factors for adolescent suicide: A case control study. *Journal of the American Academy of Child and Adolescent Psychiatry, 32*, 521-529.

Brent, D.A., Perper, J.A., Moritz, G., et al. (1993b). Suicide in adolescents with no apparent psychopathology. *Journal of the American Academy of Child and Adolescent Psychiatry, 32*, 494-500.

Brent, D.A., Perper, J.A., Moritz, G., et al. (1993c). Stressful life events, psychopathology, and adolescent suicide: A case control study. *Suicide and Life-Threatening Behaviour, 23*, 179-187.

Brent, D.A., Perper, J.A., Moritz, G., et al. (1993d). Firearms and adolescent suicide: A community case-control study. *American Journal of Diseases of Children, 147*, 1066-1071.

Brent, D.A., Perper, J.A., Mortiz, G., et al. (1993e). Validity of diagnoses obtained through the psychological autopsy procedure in adolescent suicide victims: The use of family history. *Acta Psychiatrica Scandinavica, 87*, 118-122.

Brodsky, B.S., Malone, K.M., Ellis, S.P., et al. (1997). Characteristics of borderline personality disorder associated with suicidal behaviour. *American Journal of Psychiatry, 154*, 1715-1719.

Brown, G.K. (2000). *A review of suicide assessment measures for intervention research with adults and older adults*. Bethesda, MD: National Institute of Mental Health.

Brown, G.K., Beck, A.T., Steer, R.A., et al. (2000). Risk factors for suicide in psychiatric outpatients: A 20-year prospective study. *Journal of Consulting and Clinical Psychology, 68*, 371-377.

Brown, G.K., & Harris, T. (1989). *Life events and psychiatric illness*. London: Unwin Hyman.

Brown, G.K., & Rutter, M. (1966). The measurement of family activities and relationships: A methodological study. *Human Relations, 19*, 241-263.

Bruce, M.L., & Pearson, J.L. (1999). Designing an intervention to prevent suicide: PROSPECT (Prevention of suicide in primary care elderly: Collaborative trial). *Dialogues in Clinical Neuroscience, 1*, 100-112.

Caine, E.D., Lyness, J.M., & Conwell, Y. (1996). Diagnosis of late-life depression: Preliminary studies in primary care settings. *American Journal of Geriatric Psychiatry, 4*, 45-50.

Caldwell, C.B., & Gottesman, I.I. (1990). Schizophrenics kill themselves too: A review of risk factors for suicide. *Schizophrenia Bulletin, 4*, 571-589.

Caldwell, T.M., Jorm, A.F., & Dear, K.B.G. (2004). Suicide and mental health in rural, remote and metropolitan areas in Australia. *Medical Journal of Australia, 181*, 10-14.

Canetto, S.S., & Lester, D. (1995). Gender and primary prevention of suicide mortality.

Suicide and Life-Threatening Behaviour, 25, 58-69.

Cantor C.H., & Slater, P.J. (1995). The impact of firearm control legislation on suicide in Queensland: Preliminary findings. *Medical Journal of Australia, 162,* 583-585.

Cantor, C.H. (2000). Suicide in the Western world. In K. Hawton, & K. van Heeringen (Eds.), *The international handbook of suicide and attempted suicide. (*pp.9-28*)*. Chichester, UK: John Wiley and Sons.

Caspi, A., Moffitt, T.E., Newman, D.L., et al. (1996). Behavioural observations at age 3 years predict adult psychiatric disorders: longitudinal evidence from a birth cohort. *Archives of General Psychiatry, 53,* 1033-1039.

Cavanagh, J.T., Carson, A.J., Sharpe, M., et al. (2003). Psychological autopsy studies of suicide: a systematic review. *Psychological Medicine, 33*, 395-405.

Cavanagh, J.T., Owens, D.G., & Johnstone, E.C. (1999a). Life events in suicide and undetermined death in south-east Scotland: a case-control study using the method of psychological autopsy. *Social Psychiatry and Psychiatric Epidemiology, 34*, 645-650.

Cavanagh, J.T., Owens, D.G., & Johnstone, E.C. (1999b). Suicide and undetermined death in south east Scotland: A case-control study using the psychological autopsy method. *Psychological Medicine, 29*, 1141-1149.

Census and Statistics Department. (2004). *Benefits of employees under the Employment Ordinance.* Hong Kong: Author.

Centre for Disease Control. (1998). *Ten leading causes of death for the United States*. Retrieved 5 Janurary, 2005, from http://www.cdc.gov/ncipc.

Centre for Disease Control. (2003). *Data and statistics*. Retrived 22 June 2005, from http://www.cdc.gov/scientific.htm

Centre for Suicide Research and Prevention. (2005). *Suicide statistics*. Retrieved March 21, 2005 from, http://www.csrp2.hku.hk.

Chan, K.P., Hung, S.F., & Yip, P.S. (2001). Suicide in response to changing societies. *Child and Adolescent Psychiatric Clinics of North America*, *10*, 777-795.

Chan, K.P., Yip, P.S.F., Au, J., et al. (2005). Charcoal-burning suicide in post-transition Hong Kong. *British Journal of Psychiatry*, *186*, 67-73.

Chen, C.C., David, A.S., Nunnerley, H., et al. (1995). Adverse life events and breast cancer: case-control study. *British Medical Journal*, *311*, 1527-1530.

Cheng, A.T.A. (1989). Psychosocial stress and minor psychiatric morbidity: a community study in Taiwan. *Journal of Affective Disorders*, *17*, 137-152.

Cheng, A.T.A. (1995). Mental illness and suicide: A case-control study in East Taiwan. *Archives of General Psychiatry*, *52*, 594-603.

Cheng, A.T.A., Chen, T.H.H., Chen, C.C., et al. (2000). Psychosocial and psychiatric risk factors for suicide: Case-control psychological autopsy study. *British Journal of Psychiatry*, *177*, 360-365.

Cheng, A.T.A. & Lee, C.S. (2000) Suicide in Asia and the Far East. In K. Hawton, & K. van Heeringen (Eds.), *The international handbook of suicide and attempted suicide (*pp.121-135*)*. Chichester, UK: John Wiley and Sons.

Cheng, A.T.A., Mann, A.H., & Chan, K.A. (1997). Personality disorder and suicide- A case-control study. *British Journal of Psychiatry*, *170*, 441-446.

Chiu, H.F.K., Yip, P.S.F., Chi, I., et al. (2004). Elderly suicide in Hong Kong - A case-controlled psychological autopsy study. *Acta Psychiatrica Scandinavica, 109,* 299-305

Chuang, H.L., & Huang, W.C. (1996). A re-examination of "Sociological and economic theories of suicide: A comparison of the U.S.A. and Taiwan". *Social Science and Medicine, 43,* 421-423.

Chuang, H.L., & Huang, W.C. (1997). Economic and social correlates of regional suicide rates: A pooled cross-section and time-series analysis. *Journal of Socio-Economics*, *26*, 277-289.

Chung, W.S.D., & Leung, C.M. (2001). Carbon monoxide poisoning as a new method of suicide in Hong Kong. *Psychiatric Services*, *52*, 236 -237.

Chynoweth, R., Tonge, J.I., & Armstrong, J. (1980). Suicide in Brisbane: A retrospective psychosocial study. *Australian and New Zealand Journal of Psychiatry, 14*, 37-45.

Clark, D.C. (1993). Narcissistic crisis. Aging and suicidal despair. *Suicide and Life-Threatening Behaviour*, *2*, 21-26.

Clark, D.C., & Horton-Deutsch, S.L. (1992). Assessment in absentia: The value of the psychological autopsy method for studying antecedents of suicide and predicting future suicides. In R.W. Maris, A.L. Berman, J.T. Maltsberger, & R.I. Yufit (Eds.), *The assessment and prediction of suicide* (pp.144-182). New York: Guilford Press.

Cole, J.D., & Kazarian, S.S. (1988). The level of expressed emotion scale: A new measure of expressed emotion. *Journal of Clinical Psychology, 44*, 392-397.

Cole, J.D., & Kazarian, S.S. (1993). Predictive validity of the level of expressed emotion (LEE) scale: Readmission follow-up data for 1, 2, and 5-year periods. *Journal of Clinical Psychology, 49*, 216-218.

Collings, S., Blakely, T., Atkinson, J., et al. (2005). *Suicide trends and social factors – New Zealand 1981 to 1999: Analyses from the New Zealand census – Mortality study*. Wellington: Ministry of Health.

Conner, K.R., Duberstein, P.R., Conwell, Y., et al. (2001). Psychological vulnerability to completed suicide: A review of empirical studies. *Suicide and Life-Threatening Behaviour, 31*, 367-385.

Conwell, Y., & Brent, D. (1995). Suicide and aging I. Patterns of psychiatric diagnosis. *International Psychogeriatrics, 7*, 149-164.

Conwell, Y. (1996). *Diagnosis and treatment of depression in late life*. Washington, DC.: American Psychiatric Press.

Conwell, Y. (2001). Suicide in later life: a review and recommendations for prevention. *Suicide and Life-Threatening Behaviour, 31*, 32-47.

Conwell, Y., Duberstein, P.R., Cox, C., et al. (1996). Relationships of age and Axis I diagnosis in victims of completed suicide: a psychological autopsy study. *American Journal of Psychiatry, 153*, 1001-1008.

Conwell, Y., Duberstein, P.R., Cox, C., et al. (1998). Age differences in behaviours leading to completed suicide. *American Journal of Geriatric Psychiatry, 6*, 122-126.

Conwell, Y., Olsen, K., Caine, E.D., et al. (1991). Suicide in later life. Psychological autopsy findings. *International Psychogeriatrics, 3*, 59-66.

Conwell, Y., Rotenberg, M., & Caine, E.D. (1990). Completed suicide at age 50 and over. *Journal of the American Geriatrics Society, 38*, 640-644.

Cooper, J. (1999). Ethical issues and their practical application in a psychological autopsy study of suicide. *Journal of Clinical Nursing, 8*, 467-475.

Coroners' Court. (2003). *Coroners' report.* The judiciary of the Hong Kong Special Administrative Region of the People's Republic of China.

Cui, J., Yip, P.S.F., & Chau, P.H. (2004). Estimation of reporting delay and suicide incidence in Hong Kong. *Statistics in Medicine, 23*, 467-476.

D'Zurilla, T.J., & Nezu, A.M. (1990). Development and preliminary evaluation of the Social Problem-Solving Inventory (SPSI). *Psychological Assessment: A Journal of*

Consulting and Clinical Psychology, 2, 156-163.

Daigle, M.S. (2005). Suicide prevention through means restriction - Assessing the risk of substitution: A critical review and synthesis. *Accident Analysis and Prevention, 37,* 625-632

De Hert, M., & Peuskens, J. (2000). Psychiatric aspects of suicidal behaviour: schizophrenia. In K. Hawton, & K. van Heeringen (Eds.), *The international handbook of suicide and attempted suicide* (pp.135-154). Chichester: John Wiley & Sons.

De Hert, M., McKenzie, K., & Peuskens, J. (2001). Risk factors for suicide in young people suffering from schizophrenia: a long-term follow-up study. *Schizophrenia Research, 47*, 127-134.

De Leo, D. (2002a). Struggling against suicide: the need for an integrative approach. *Crisis, 23*, 22-31.

De Leo, D. (2002b). Why are we not getting any closer to preventing suicide? *British Journal of Psychiatry*, *181*, 372-374.

De Leo, D., Bertolote, J. M., Lester, D., et al. (2002). Self-inflicted violence. *World report on violence and health*. Geneva: World Health Organization.

De Leo, D., & Evans, R. (2004). *International suicide rates and prevention strategies.* Brisbane: Hogrefe & Huber Publishers.

Dennehy, J.A., Appleby, L., Thomas, C.S., et al. (1996). Case control study of suicide by

discharged psychiatric patients. *British Medical Journal, 312*, 1580-1591.

Dorpat, T.L., & Ripley, H.S. (1960). A study of suicide in the Seattle area. *Comprehensive Psychiatry, 1*, 349-359.

Douglas, J.D. (1967). *The social meanings of suicide*. Princeton: Princeton University Press.

Duberstein, P.R., Conwell, Y., & Caine, E.D. (1994). Age differences in the personality characteristics of suicide completers: preliminary findings from a psychological autopsy study. *Psychiatry, 57*, 213-224.

Duberstein, P.R., Conwell, Y., Seidlitz, L., et al. (2000). Personality traits and suicidal behaviour and ideation in depressed inpatients 50 years of age and older. *Journal of Gerontology, 55*, 18-26.

Durkheim, E. (1897/1951). *Suicide: A study in sociology* (J.A., Spaulding & G. Simpson, Trans.). New York: Free Press.

D'Zurilla, T.J., & Nezu, A.M. (1990). Development and preliminary evaluation of the Social Problem-Solving Inventory. *Psychological Assessment, 2*, 156-163.

D'Zurilla, T.J., & Sheedy, C.F. (1991). Relation between social problem-solving ability and subsequent level of psychological stress in college students. *Journal of Personality and Social Psychology, 61*, 841-846.

D'Zurilla, T.J., Nezu, A.M., & Maydeu-Olivares, A. (1997). *Manual for the social problem-solving inventory -revised*. North Tonawanda, NY: Multi-Health Systems.

Ebert, B.W. (1987). Guide to conducting a psychological autopsy. *Professional Psychology: Research and Practice, 18,* 52-56.

Ernst, C., Lalovic, A., Lesage, A., et al. (2004). Suicide and no axis I psychopathology. *British Medical Journal of Psychiatry, 4,* 7-15.

Faber, R.J., & O'Guinn, C.J. (1992). A clinical screener for compulsive buying. *Journal of Consumer Research, 19,* 459-469.

Farberow, N.L. (2000). Indirect self-destructive behaviour. In R. Maris, A. Berman, & M.M. Silverman (Eds.), *Comprehensive handbook of suicidology* (pp.427-455). New York: Guildford.

Farberow, N.L., & Shneidman, E.S. (1970). Suicide among patients with malignant neoplasms. In E.S. Shneidman, N.L. Farberow, & R.E. Litman (Eds.), *The psychology of suicide* (pp.325-344). New York: Science House.

Farmer, R., Miller, D., & Lawrenson, N. (1996). *Epidemiology and public health medicine.* Oxford: Blackwell Science Ltd.

Fenton, W.S. (2000). Depression, suicide and suicide prevention in schizophrenia. *Suicide and Life-Threatening Behaviour, 30,* 34-39.

Ferguson, S., Blakely, T., Allan, B., et al. (2003). *Exploring associations with social and economic factors.* Wellington: Department of Public Health and Psychological Medicine. Public Health Monograph Series No. 10.

Fergusson, D.M., Horwood, L.J., & Lynskey, M.T. (1997). The effects of unemployment on psychiatric illness during young adulthood. *Psychological Medicine, 27*, 371-381.

Fergusson, D.M., Horwood, L.J., & Woodward, L.J. (2001). Unemployment and psychosocial adjustment in young adults: causation or selection? *Social Science and Medicine 53*, 305-320.

Fergusson, D.M., Woodward, L.J., & Horwood, L.J. (2000). Risk factors and life processes associated with the onset of suicidal behaviour during adolescence and early adulthood. *Psychological Medicine, 30,* 23-39.

First, M.B., Spitzer, R.L., Gibbon M., et al. (2002). *Structured clinical interview for DSM-IV-TR axis I disorders - Research version, patient edition, (SCID-I/P).* New York: Biometrics Research, New York State Psychiatric Institute.

Foster, T., Gillespie, K., McClelland, R, et al. (1999). Risk factors for suicide independent of DSM-III-R axis I disorder: Case-control psychological autopsy study in Northern Ireland. *British Journal of Psychiatry, 175,* 175-179.

Freud, S. (1917/1963). Mourning and melancholia. In J. Strachey (Ed. and Trans.), *The standard edition of the complete psychological works of Sigmund Freud* (vol.14). London: Hogarth Press.

Friedman, P. (1967). Suicide among police: A study of 93 suicides among New York City policemen, 1934-1940. In E.S. Shneidman (Ed.), *Essays on self-destruction* (pp.34-55). New York: Science House.

Fruehwald, S., Matschnig, T., Koenig, F., et al. (2004). Suicide in custody: Case-control study. *British Journal of Psychiatry, 185*, 494-498.

Fu, Q., Heath, A.C., Bucholz, K.K., et al. (2002). A twin study of genetic and environmental influences on suicidality in men. *Psychological Medicine, 32*, 11-24.

Gibb, S.J., Beautrais, A.L., & Fergusson, D.M. (2005). Mortality and further suicidal behaviour after an index suicide attempt: a 10 year study. *Australian and New Zealand Journal of Psychiatry, 39*, 95-100.

Gibbs, J.T. (1994). Durkheim's heavy hand in the sociological study of suicide. In D. Lester (Ed.), *Emile Durkheim : le suicide, one hundred years later*. (pp.330-346). Philadelphia: Charles Press.

Goldney, R. (2003). A novel integrated knowledge explanation of factors leading to suicide. *New Ideas in Psychology*, *21*,141-146.

Goldney, R.D., & Schioldann, J.A. (2001). Pre-Durkheim Suicidology. In O. Grad (Ed.), *Suicide risk and protective factors in the new millennium* (pp.21-25). Ljubljana: Cankarjev dom.

Goldston, D.B. (2000). *Assessment of suicidal behaviours and risk among children and*

Bethesda, MD: National Institute of Mental Health.

Goodwin, R., Beautrais, A.L., & Fergusson, D.M. (2004). Familial transmission of suicidal ideation and suicide attempts: evidence from a general population sample. *Psychiatry Research, 126,* 159-165.

Gordon, R.S. (1983). An operational classification of disease prevention. *Public Health Reports, 98,* 107-109.

Gould, M.S., Fisher, P., Parides, et al. (1996). Psychosocial risk factors of child and adolescent completed suicide. *Archives of General Psychiatry, 53,* 1155-1162.

Gould, M.S., Greenberg, T., Velting, M., et al. (2003). Youth suicide risk and preventive interventions: a review of the past 10 years. *Journal of the American Academy of Child and Adolescent Psychiatry, 42,* 386-405.

Graham, G., & Burvill, P. (1992). A study of coroner's records of suicide in young people, 1986-88 in Western Australia. *Australian & New Zealand Journal of Psychiatry*, 26, 30-39.

Gunnell, D., & Frankel, S. (1994). Prevention of suicide: aspirations and evidence. *British Medical Journal, 308,* 1227-1233.

Gunnell, D.J., Peters, T.J., Kammerling, R.M., et al. (1995). Relation between parasuicide, suicide, psychiatric admissions, and socioeconomic deprivation. *British Medical Journal, 311,* 226-230.

Gururaj, G., Isaac, M.K., Subbakrishna, D.K., et al. (2004). Risk factors for completed suicides: A case-control study from Bangalore, India. *Injury Control and Safety Promotion, 11,* 183-191

Guze, S.B., & Robins, E. (1970). Suicide and primary affective disorders. *American Journal of Psychiatry, 117,* 437-438.

Haider, S.I., & Haider, I. (2002). Deliberate self poisoning (unemployment and debt). *Paksitan Journal of Medical Sciences, 18,* 122-125.

Hamilton, M. (1967). Development of a rating scale for primary depressive illness. *British Journal of Social and Clinical Psychology, 6,* 278-296.

Harris, M. (1971). Culture, man, and nature. New York: Thomas Y. Crowell.

Harris, E.C., & Barraclough, B.M. (1997). Suicide as an outcome for mental disorders. *British Journal of Psychiatry, 170,* 205-228.

Harris, E.C., & Barraclough, B.M. (1998). Excess mortality of mental disorder. *British Journal of Psychiatry, 173,* 11-53.

Harwood, D., Hawton, K., Hope, T., et al. (2001). Psychiatric disorder and personality factors associated with suicide in older people: A descriptive and case-control study. *International Journal of Geriatric Psychiatry, 16,* 155-165.

Hawton, K. (2000). Sex and suicide: Gender differences in suicidal behaviour. *British Journal of Psychiatry, 177,* 484-485.

Hawton, K., Appleby, L., Platt, S., et al. (1998). The psychological autopsy approach to studying suicide: A review of methodological issues. *Journal of Affective Disorders, 50,* 269-276.

Hawton, K., Arensman, E., Townsend, E., e al. (1998). Deliberate self-harm: Systematic review of efficacy of psychosocial and pharmacological treatments in preventing repetition. *British Medical Journal, 317,* 441-447.

Hawton, K., & Fagg, J. (1988). Suicide and other causes of death, following attempted suicide. *British Journal of Psychiatry, 152,* 359-366.

Hawton, K., Houston, K., Malmberg, A., et al. (2003). Psychological autopsy interviews in suicide research: the reactions of informants. *Archives of suicide research, 7,* 73-82.

Hawton, K., Simkin, S., Malmberg, A., et al. (1998). *Suicide and stress in farmers*. London: The Stationery Office.

Hawton, K., Townsend, E., Arensman, E., et al. (2000). Psychosocial versus pharmacological treatments for deliberate self harm. *Cochrane Database of Systematic Reviews, 2,* 125-131.

Hawton, K., & van Heeringen, K. (2000). *The international handbook of suicide and attempted suicide*. New York: John Wiley and Sons Ltd.

Hawton, K., Zahl, D., & Weatherall, R. (2003). Suicide following deliberate self-harm: Long-term follow-up of patients who presented to a general hospital. *British Journal of Psychiatry, 182,* 537-542.

Heikkinen, M.E., Aro, H., & Lonnqvist, J. (1994). Recent life events, social support and suicide. *Acta Psychiatrica Scandinavica, 377,* 65-72.

Heikkinen, M.E., Isometsa, E.T., Aro, H.M., et al. (1995). Age-related variation in recent life events preceding suicide. *Journal of Nervous and Mental Disease, 183,* 325-331.

Heikkinen, M.E., Isometsa, E.T., Henriksson, et al. (1997). Psychosocial factors and completed suicide in personality disorders. *Acta Psychiatrica Scandinavica, 95,* 49-57

Heikkinen, M.E., Isometsa, E.T., Marttunen, M.J., et al. (1995). Social factors in suicide. *British Journal of Psychiatry, 167,* 747-753.

Henriksson, M.M., Aro, H.M., Marttunen, M.J., et al. (1993). Mental disorders and comorbidity in suicide. *American Journal of Psychiatry, 150,* 935-940.

Henry, A. F., & Short, J.F. (1954). *Suicide and homicide: Some economic, sociological and psychological aspects of aggression*. New York: Free Press of Glencoe.

Inskip, H.M., Harris, E.C., & Barraclough, B. (1998). Lifetime risk of suicide for affective disorder, alcoholism and schizophrenia. *British Journal of Psychiatry, 172,* 35-37.

Institute of Medicine. (2002). *Reducing suicide: A national imperative*. Washington, DC: The National Academies Press: Author.

International Association for Suicide Prevention. (1999). International Association for Suicide Prevention (IASP) guidelines for suicide prevention. *Crisis, 20,* 155-163.

Isacsson, G., Bergman, U., & Rich, C.L. (1994). Antidepressants, depression and suicide: An analysis of the San Diego study. *Journal of Affective Disorders, 32,* 277-286.

Isacsson, G., & Rich, C.L. (2003). Getting closer to suicide prevention. *British Journal of Psychiatry, 182,* 457-458.

Isometsa, E.T. (2001). Psychological autopsy studies - A review. *European Psychiatry, 16,* 379-385.

Isometsa, E.T., Aro, H.M., Henriksson, M.M., et al. (1994). Suicide in major depression in different treatment settings. *Journal of Clinical Psychiatry, 55,* 523-527.

Isometsa, E.T., Heikkinen, M.E., Henriksson, M., et al. (1995). Recent life events and completed suicide in bipolar affective disorder. A comparison with major depression suicides. *Journal of Affective Disorders, 33,* 99-106.

Isometsa, E.T., Heikkinen, M.E., Martunnen, M.J., et al. (1995). The last appointment before suicide: is suicide intent communicated? *American Journal of Psychiatry, 152,* 919-922.

Isometsa, E.T., Henriksson, M.M., Aro, H., et al. (1994). Suicide in psychotic major depression. *Journal of Affective Disorders, 31,* 187-191.

Isometsa, E.T., Henriksson, M.M., Heikkinen, M.E., et al. (1996). Suicide among subjects with personality disorders. *American Journal of Psychiatry, 153,* 667-673.

Isometsa, E.T., & Lonnqvist, J. K. (1998). Suicide attempts preceding completed suicide. *British Journal of Psychiatry, 173*, 531-535.

Jacobs, D.G. (1999a). *The Harvard Medical School guide to suicide assessment and intervention*. San Francisco: Jossey-Bass.

Jacobs, D.G. (1999b). Depression screening as an intervention against suicide. *Journal of Clinical Psychiatry, 60,* 42-45.

Jacobs, D.G., Baldessarini, R.J., Conwell, Y., et al. (2003). *Practice guideline for the assessment and treatment of patients with suicidal behaviours.* Arlington (VA), USA: American Psychiatric Association.

Jacobs, D.G., & Klein-Benheim, M. (1995). The psychological autopsy: A useful tool for determining proximate causation in suicide cases. *Bulletin of the American Academy of Psychiatry and the Law, 23*, 165-182.

Jamison, K.R. (2000). Suicide and bipolar disorder. *Journal of Clinical Psychiatry, 61,* 47-51.

Jenkins, R. (2002). Addressing suicide as a public-health problem. *Lancet, 359*, 813-814.

Jenkins, R., & Singh, B. (2000). General population strategies of suicide prevention. In K. Hawton, & K. van Heeringen (Eds.), *The international handbook of suicide and attempted suicide* (pp.597-615). New York: John Wiley and Sons Ltd.

Jobes, D.A., Berman, A.L., O'Carroll, P.W., et al. (1996). The Kurt Cobain suicide crisis: Perspectives from research, public health, and the news media. *Suicide and*

Life-Threatening Behaviour, 26, 260-269.

Kashden, J., Fremouw, W.J., Callahan, T.S., et al. (1993). Impulsivity in suicidal and non-suicidal adolescents. *Journal of Abnormal Child Psychology, 21*, 339-353.

Katon, W., Robinson, P., Von Korff, M., et al. (1996). A multi-faceted intervention to improve treatment of depression in primary care. *Archives of General Psychiatry, 53*, 924-932.

Kelleher, M.J., & Daly, M. (1990). Suicide in Cork and Ireland. *British Journal of Psychiatry, 157*, 533-538.

Kellermann, A.L., Rivara, F.P., Somes, G., et al. (1992). Suicide in the home in relation to gun ownership. *New England Journal of Medicine, 327,* 467-472.

Kelly, T.M., & Mann, J.J. (1996). Validity of DSM-III-R diagnosis by psychological autopsy: A comparison with clinician ante-mortem diagnosis. *Acta Psychiatrica Scandinavica, 94*, 337-343.

Kendler, K.S. (1997). Social support: A genetic-epidemiologic analysis. *American Journal of Psychiatry, 154*, 1398-1404.

Kleinman, A. (2000). Social and cultural anthropology: salience for psychiatry. In M.G. Gelder, J.J. Lopez, & N.C. Andreasen (Eds.), *New Oxford textbook of psychiatry* (pp.300-304). Oxford: Oxford University Press.

Knox, K.L., Conwell, Y., & Caine, E.D. (2004). If suicide is a pubic health problem, what are we doing to prevent it? *American Journal of Public Health, 94*, 37-45.

Kotler, M., Iancu, I., Efroni, R., et al. (2001). Anger, impulsivity, social support, and suicide risk in patients with post-traumatic stress disorder. *Journal of Nervous and Mental Disease, 189*, 162-167.

Kposowa, A.J. (2000). Marital status and suicide in the National Longitudinal Mortality Study. *Journal of Epidemiology and Community Health, 54*, 254-261.

Lecrubier, Y., Braconnier, A., Said, S., et al. (1995). The Impulsivity Rating Scale (IRS): Preliminary results. *European Psychiatry, 10*, 331-338.

Lee, D.T.S., Chan, K.P.M., Lee, S., et al. (2002). Burning charcoal: A novel and contagious method of suicide in Asia. *Archives of General Psychiatry, 59*, 293-294.

Lee, D.T.S., Yip, A.S.K., Leung, T.Y.S., et al. (2004). Ethnoepidemiology of postnatal depression: prospective multivariate study of socio-cultural risk factors in a Chinese population in Hong Kong. *British Journal of Psychiatry, 184*, 34-40.

Lee, S. (1999). Mental health problems in transition: Challenges for psychiatry in Hong Kong. *Hong Kong Medial Journal, 5*, 6-8.

Lee, S. (2000). In China, suicide in young women is a problem too. *British Medical Journal, 321*, 636-637.

Leenaars, A.A., De Leo, D., Diekstra, R.F.W., et al. (1997). Consultations for research in suicidology. *Archives of Suicide Research, 3*, 139-151.

Leenaars, A.A., Yang, B., & Lester, D. (1993). The effect of domestic and economic stress on suicide rates in Canada and the United States. *Journal of Clinical Psychology, 49,* 918-921.

Lenski, G.E, Nolan, P., & Lenski, J. . (1995). Human societies: An introduction to macrosociology. New York: McGraw-Hill.

Lesage, A.D., Boyer, R., Grunberg, F., et al. (1994). Suicide and mental disorders: A case–control study of young men. *American Journal of Psychiatry, 151*, 1063-1068.

Lester, D. (1999). Predicting the time-series suicide and homicide rates in Hong Kong. *Perceptual and Motor Skills, 89,* 204.

Lewis, G., & Sloggett, A. (1998). Suicide, deprivation, and unemployment: Record linkage study. *British Medical Journal, 317*, 1283-1286.

Lewis, G., Hawton, K., & Jones, P. (1997). Strategies for preventing suicide. *British Journal of Psychiatry*, *171*, 351-354.

Lindeman, S., Heinanen, H., Vaisanen, E., et al. (1998). Suicide among medical doctors: Psychological autopsy data on seven cases. *Archives of Suicide Research, 4*, 135-141.

Linehan, M.M. (1986). Suicidal people: One population or two? *Annuals of the New York Academy of Sciences, 487,* 16-33.

Linehan, M.M., Goodstein, J.L., Nielsen, S.L., et al. (1983). Reasons for staying alive when you are thinking of killing yourself: The reasons for living inventory. *Journal of Consulting and Clinical Psychology*, *51*, 276-286.

Linehan, M.M., Heard, H.L., & Armstrong, H.E. (1993). Naturalistic follow-up of a behavioural treatment for chronically parasuicidal borderline patients. *Archives of General Psychiatry, 50,* 971-974.

Linehan, M.M., Rizvi, S.L, Welch, S.S., et al. (2000). Psychiatric aspects of suicidal behaviour: personality disorders. In K. Hawton, & K. van Heeringen (Eds.), *The international handbook of suicide and attempted suicide* (pp.147-178). New York: John Wiley and Sons

Litman, R.E. (1989). 500 psychological autopsies. *Journal of Forensic Sciences, 34,* 638-646.

Litman, R.E. (1996). Suicidology: A look backward and ahead. *Suicide and Life-Threatening Behaviour, 26*, 1-7.

Litman, R.E., Curphey, T., Shneidman, E. S., et al. (1963). Investigations of equivocal suicides. *Journal of the American Medical Academy, 184*, 924-929.

Lonnqvist, J.K. (2000). Psychiatric aspects of suicidal behaviour: Depression. In K. Hawton, & K. van Heeringen (Eds.), *The international handbook of suicide and attempted suicide* (pp.107-120). New York: John Wiley and Sons.

Luoma, J.B., & Pearson, J.L. (2002). Suicide and marital status in the United States, 1991-1996: Is widowhood a risk factor? *American Journal of Public Health, 92*, 1518-1522.

Magne-Ingvar, U., Ojehagen, A., & Traskman-Bendz, L. (1992). The social network of people who attempt suicide. *Acta Psychiatrica Scandinavica, 86,* 153-158.

Mann, J.J., Oquendo, M., Underwood, M.D., et al. (1999). The neurobiology of suicide risk: A review for the clinician. *Journal of Clinical Psychiatry, 60*, 7-11.

Mann, J.J., Waternaux, C., Haas, G.L., et al. (1999). Toward a clinical model of suicidal behaviour in psychiatric patients. *American Journal of Psychiatry, 156,* 181-189.

Maris, R.W. (1969). *Social forces in urban suicide*. Homewood, Ill: Dorsey Press.

Maris, R.W. (1981). *Pathways to suicide: A survey of self-destructive behaviours.* Baltimore: Johns Hopkins University Press.

Maris, R.W. (2002). Suicide. *Lancet, 360,* 319-326.

Maris, R.W., Berman A.L., Maltsberger, J.T., et al. (1992). *Assessment and prediction of suicide*. New York: Guilford Press.

Maris, R.W., Berman, A.L., & Silverman, M.M. (2000). *Comprehensive textbook of suicidology*. New York: Guilford Press.

Marttunen, M.J., Aro, H.M., & Lonnqvist, J.K. (1993a). Adolescence and suicide. A review of psychological autopsy studies. *European Child and Adolescent Psychiatry, 2,* 10-18.

Marttunen, M.J., Aro, H.M., & Lonnqvist, J.K. (1993b). Precipitant stressors in adolescent suicide. *Journal of the American Academy of Child and Adolescent Psychiatry, 32,* 1178-1183.

Marttunen, M.J., Henriksson, M.M., Isometsa, E.T., et al. (1998). Completed suicide among adolescents with no diagnosable psychiatric disorder. *Adolescence, 33,* 669-681.

Marttunen, M.J., Henriksson, M.M., Pelkonen, S., et al. (1997). Suicide among military conscripts in Finland: A psychological autopsy study. *Military Medicine, 162,* 14-18.

Marzuk, P.M., Leon, A.C., Tardiff, K., et al. (1992). The effect of access to lethal methods of injury on suicide rates. *Archives of General Psychiatry, 49,* 451-458.

McCullagh, P. (1980). Regression models for ordinal data (with discussion). *Journal of the Royal Statistical Society, 42,* 109-142.

Mehlum, L. (2001). Suicidal behaviour and personality disorder. *Current Opinion in Psychiatry, 14,* 131-135.

Meltzer, H.Y. (1999). Suicide and schizophrenia: Clozapine and the InterSePT study. International Clozaril/Leponex suicide prevention trial. *Journal of Clinical Psychiatry, 60,* 47-50.

Menniger, K. (1938). *Man against himself.* New York: Harcourt, Brace & World.

Minois, G. (1999). *History of suicide. Voluntary death in Western culture*. Baltimore, MD: Johns Hopkins University Press.

Montgomery, S.A. (1997). Suicide and antidepressants. *Annals of the New York Academy of Sciences, 286,* 329-336.

Morano, C.D., Cisler, R.A., & Lemerond, J. (1993). Risk factors for adolescent suicidal behaviour: Loss, insufficient familial support, and hopelessness. *Adolescence, 28,* 851-864.

Mortensen, P.B., Agerbo, E., Erikson, T., et al. (2000). Psychiatric illness and risk factors for suicide in Denmark. *Lancet, 355*, 9-12.

Móscicki, E.K. (1997). Identification of suicide risk factors using epidemiologic studies. *Psychiatric Clinics of North America, 20,* 499-517.

Móscicki, E.K. (2001). Epidemiology of completed and attempted suicide: Toward a framework for prevention. *Clinical Neuroscience Research, 1,* 310-323.

Motohashi, Y. (1991). Effects of socioeconomic factors on secular trends in suicide in Japan, 1953-1986. *Journal of Biosocial Science, 23,* 221-227.

Mrazek, P.J., & Haggerty, R.J. (Eds.). (1994). *Reducing risks for mental disorders: Frontiers for preventive intervention research*. Washington, DC: National Academy Press.

Murphy, G.E. (2000). Psychiatric aspects of suicidal behaviour: Substance abuse. In K. Hawton, & K. van Heeringen (Eds.), *The international handbook of suicide and attempted suicide* (pp.135-146). New York: John Wiley and Sons.

O'Carroll, P.W. (1996). Commentary. *Suicide and Life-Threatening Behaviour, 26,* 264-269.

O'Carroll, P.W., & Potter, L.B. (1994). Suicide contagion and the reporting of suicide: Recommendations from a national workshop. *Morbidity and Mortality Weekly Report, 42,* 9-17.

O'Carroll, P.W., Berman, A.L., Maris, R.W., et al. (1996). Beyond the tower of Babel: A nomenclature for suicidology. *Suicide and Life-Threatening Behaviour, 26,* 237-252.

Official Receiver's Office, The Government of the Hong Kong Special Administrative Region (SAR) of the Republic of China. Retrieved September 1, 2004 from http://www.oro.gov.hk/

Palmer, C.S., Revicki, D.A., Halpern, M.T., et al. (1995). The cost of suicide and suicide attempts in the United States. *Clinical Neuropharmacology,* 18, 25-33.

Pearson, J.L., Caine, E.D., Lindesay, J., et al. (1999). Studies of suicide in later life: Methodological considerations and research directions. *American Journal of Geriatric Psychiatry, 7,* 203-210.

Pearson, J.L., & Conwell, Y. (1995). Suicide in late life: Challenges and opportunities for research. *International Psychogeriatrics, 7,* 131-136.

Pescosolido, B.A., & Georgianna, S. (1989). Durkheim, suicide, and religion: Toward a network theory of suicide. *American Sociological Review, 54,* 33-48.

Phillips, D.P. (1985). The Werther effect: Suicide and other forms of violence are contagious. *Science, 25,* 32-39.

Phillips, M.R., Yang, G., Zhang, Y., et al. (2002). Risk factors for suicide in China: A national case-control psychological autopsy study. *Lancet, 360*, 138-146.

Pirkola, S., Isometsa, E., Heikkinen, M., et al. (1997). Employment status influences the weekly patterns of suicide among alcohol misusers. *Alcoholism: Clinical and Experimental Research, 21*, 1704-1706.

Platt S. (1984). Unemployment and suicidal behaviour: A review of the literature. *Social Science and Medicine, 19*, 93-115.

Platt, S., & Hawton, K. (2000). Suicidal behaviour and the labour market. In K. Hawton, & K. van Heeringen (Eds.), *The international handbook of suicide and attempted suicide* (pp.309-384). New York: John Wiley and Sons Ltd.

Pompili, M., Girardi, P., Ruberto, A., et al. (2004). Toward a new prevention of suicide in schizophrenia. *World Journal of Biological Psychiatry, 5*, 201-210.

Pope, W. (1976). *Durkheim's suicide: A classic analysed*. London: University of Chicago Press.

Potter, L.B., Powell, K.E., & Kachur, S.P. (1995). Suicide prevention from a public health perspective. *Suicide and Life-Threatening Behaviour, 26*, 82-91.

Potter, L.B., Rosenberg, M.L., & Hammond, W.R. (1998). Suicide in youth: A public health framework. *Journal of the American Academy of Child and Adolescent Psychiatry, 37*, 484-487.

Qin, P., Agerbo, E., & Mortensen, P.B. (2002). Suicide risk in relation to family history of completed suicide and psychiatric disorders: a nested case-control study based on longitudinal registers. *Lancet, 360,* 1126-1130.

Qin, P., Agerbo, E., & Mortensen, P.B. (2003). Suicide risk in relation to socioeconomic, demographic, psychiatric, and familial factors: A national register-based study of all suicides in Denmark, 1981-1997. *American Journal of Psychiatry, 160*, 765-772.

Qin, P., Agerbo, E., Westergard-Nielsen, N., et al (2000). Gender differences in risk factors for suicide in Denmark. *British Journal of Psychiatry*, *177*, 546-550.

Radomsky, E.D., Haas, G.L., Mann, J.J., et al. (1999). Suicidal behaviour in patients with schizophrenia and other psychotic disorders. *American Journal of Psychiatry, 156,* 1590-1595.

Ramsay, R.F., & Tanney, B.L. (1996). *Global trends in suicide prevention: Toward the development of national strategies for suicide prevention*. Bombay Tata Institute of Social Sciences.

Rao, U. (1994). Psychological autopsy studies of suicide. *Current Opinion in Psychiatry, 7*, 330-333.

Reich, W., & Earls, F. (1987). Rules for making psychiatric diagnoses in children on the basis of multiple sources of information: Preliminary strategies. *Journal of Abnormal Child Psychology, 15*, 601-616.

Renaud, J., Brent, D. A., Birmaher, B., et al. (1999). Suicide in adolescents with disruptive disorders. *Journal of the American Academy of Child and Adolescent Psychiatry, 38*, 846-851.

Robins, E. (1981). *The final months: A study of the lives of 134 persons who committed suicide.* New York: Oxford University Press.

Robins, E., Murphy, G.E., Wilkinson, R.H., et al. (1959). Some clinical considerations in the prevention of suicide based on a study of 134 successful suicides. *American Journal of Public Health, 49,* 888-889.

Rogers, J.R. (2001). Psychological research into suicide: Past, present, future. *Suicide Prevention: Resources for the Millennium.* Bristol, PA: Taylor & Francis.

Rose, G. (1992). *The strategy of preventive medicine*. Oxford University Press: Oxford.

Roy, A. (1983). Family history of suicide. *Archives of General Psychiatry, 40*, 971-974.

Rubenowitz, E., Waern, M., Wilhelmsson, K., et al. (2001). Life events and psychosocial factors in elderly suicides: A case-control study. *Psychological Medicine, 31*, 1193-1202.

Rudd, M.D., & Joiner, T.E. (1998). The assessment, management, and treatment of suicidality: Toward clinically informed and balanced standards of care. *Clinical Psychology: Science and Practice, 5,* 135-150.

Rudd, M.D., Joiner, T.E., Jobes, D., et al. (1998). Practice guidelines in the outpatient

assessment and treatment of suicidality: An integration of science and recognition of its limitations. *Professional Psychology: Research and Practice, 30,* 437-446.

Rudd, M.D., Joiner, T.E., & Rajab, M.H. (2000). *Treating suicidal behaviour: An effective, time-limited approach*. New York: Guilford Press.

Rudestam, K.E. (1971). Stockholm and Los Angeles: A cross-cultural study of the communication of suicidal intent. *Journal of Consulting and clinical Psychology, 36,* 82-90.

Runeson, B.S. (1989). Mental disorders in youth suicide: DSM-III-R axes I and II. *Acta Psychiatrica Scandinavica, 79,* 490-497.

Runeson, B.S. (1998). History of suicidal behaviour in the families of young suicides. *Acta Psychiatric Scandinavia, 98,* 497-501.

Runeson, B.S. (2002). Suicide after parasuicide. *British Medical Journal, 325,* 1125-1126.

Runeson, B.S., & Asberg, M. (2003). Family history of suicide among suicide victims. *American Journal of Psychiatry, 160,* 1525-1526.

Runeson, B.S., & Beskow, J. (1991). Reactions of survivors of suicide victims to interviews. *Acta Psychiatrica Scandinavica, 83,* 169-173.

Runeson, B.S., Beskow, J., & Waern, M. (1996). The suicidal process in suicides among young people. *Acta Psychiatric Scandinavia, 93,* 35-42.

Runeson, B. S., & Rich, C. L. (1992). Diagnostic comorbidity of mental disorders among

young suicides. *International Review of Psychiatry, 4*, 197-203.

Rutz, W., von Knorring, L., & Walinder, J. (1989). Frequency of suicide on Gotland after systematic postgraduate education of general practitioners. *Acta Psychiatrica Scandinavica, 80,* 151-154.

Rutz, W., Walinder, J., Eberhard, G., et al. (1989). An educational program on depressive disorders for general practitioners on Gotland: Background and evaluation. *Acta Psychiatrica Scandinavica, 79,* 19-26.

Salkovskis, P.M., Atha, C., & Storer D. (1990). Cognitive-behavioural problem solving in the treatment of patients who repeatedly attempt suicide. A controlled trial. *British Journal of Psychiatry, 157,* 871-876.

Sanborn, D.E., & Sanborn, C.J. (1976). The psychological autopsy as a therapeutic tool. *Diseases of the Nervous System, 37*, 4-8.

Sarafino, E.P. (2002). *Health psychology – Biopsychosocial interactions (4th Ed.)*. New York: John Wiley & Sons.

Schmidtke, A., Weinacker, B., Apter, A., et al. (1999). Suicide rates in the world: Update. *Archives of Suicide Research, 5,* 81-89.

Segal, D.L., Hersen, M., & Van Hasselt, V.B. (1994). Reliability of the Structured Clinical Interview for DSM-III-R: An evaluative review. *Comprehensive Psychiatry, 35,* 316-327.

Shaffer, D., Gould, M. S., Fisher, P., et al. (1996). Psychiatric diagnosis in child and adolescent suicide. *Archives of General Psychiatry, 53*, 339-348.

Shafii, M., Carrigan, S., Whittinghill, J.R., et al. (1985). Psychological autopsy of completed suicide in children and adolescents. *American Journal of Psychiatry, 142*, 1061-1064.

Shafii, M., Steltz-Lenarsky, J., Derrick, A.M., et al. (1988). Comorbidity of mental disorders in the post-mortem diagnosis of completed suicide in children and adolescents. *Journal of Affective Disorders, 15*, 227-233.

Shea, S.C. (1999). *The practical art of suicide assessment*. New York: John Wiley & Sons.

Shneidman, E.S. (1971). Perturbation and lethality as precursors of suicide in a gifted group. *Suicide and Life-Threatening Behaviour, 1*, 23-45.

Shneidman, E.S. (1985). *Definition of suicide*. New York: John Wiley and Sons Ltd.

Shneidman, E.S. (1987). A psychological approach to suicide. In G.R. VandenBos, & B.K. Bryant (Eds.), *Cataclysms, crises, and catastrophes.* Washington, DC: American Psychological Association.

Shneidman, E.S. (1993). Suicide as psychache. *Journal of Nervous and Mental Disease, 181*, 147-149.

Shneidman, E.S. (1994). Clues to suicide reconsidered. *Suicide and Life-Threatening Behaviour, 24*, 395-397.

Shneidman, E.S. (1996). *The suicidal mind.* New York: Oxford University Press.

Shneidman, E.S. (1999). The psychological pain assessment scale. *Suicide and Life-Threatening Behaviour, 29,* 287-294.

Shneidman, E.S., & Farberow N.L. (1965). The LA SPC: A demonstration of public health feasibilities. *American Journal of Public Health, 55,* 21-26.

Silverman, M.M., & Felner, R.D. (1995). Suicide prevention programs: Issues of design, implementation, feasibility, and developmental appropriateness. *Suicide and Life-Threatening Behaviour, 25,* 93-105.

Silverman, M.M., & Maris, R.W. (Eds.). (1995). *Suicide prevention: Toward the year 2000*. New York: Guilford Press.

So, E., Kam, I., Leung, et al. (2003). The Chinese-bilingual SCID-I/P Project: Stage 2 - Reliability for anxiety disorders, adjustment disorders, and 'no diagnosis'. *Hong Kong Journal of Psychiatry, 13,* 19-25.

So, E., Kam, I., Liu, Z., et al. (2003). The Chinese-bilingual SCID-I/P P – Reliability for depression and schizophrenia and related disorders. *Hong Kong Journal of Psychiatry, 13,* 7-18.

Stack, S. (1992). Marriage, family, religion, and suicide. In R.W. Maris, A.L. Berman, J.T. Maltsberger, et al. (Eds.), *Assessment and prediction of suicide*. (pp.540-552). New York: The Guilford Press.

Stack, S. (2000a). Suicide: a 15-year review of the sociological literature. Part I: cultural and economic factors. *Suicide and Life-Threatening Behaviour, 30,* 145-162.

Stack, S. (2000b). Suicide: a 15-year review of the sociological literature. Part II: modernization and social integration perspectives. *Suicide and Life-Threatening Behaviour, 30,* 163-176.

Stack, S., & Haas, A. (1984). The effect of unemployment duration on national suicide rates: a time series analysis, 1948-1982. *Sociological Focus, 17,* 17-29.

Stein, D.J., Hollander, E., & Liebowitz, M.R. (1993). Neurobiology of impulsivity and the impulse control disorders. *Journal of Neuropsychiatry and Clinical Neurosciences, 5,* 9-17.

Stengel, E.N., & Cook, R. (1958). *Attempted suicide. Maudelsey monograph No. 4.* Chapman and Hall: London.

Suominen, K.H., Isometsa, E.T., Henriksson, M.M., et al. (1998). Inadequate treatment for major depression both before and after attempted suicide. *American Journal of Psychiatry*, *155*, 1778-1780.

Tabachnick, B.G., & Fidell, L.S. (1989). *Using multivariate statistics (*2nd Ed.). New York: Harper Collins Publishers.

Takahashi, Y. (1997). Culture and suicide: From a Japanese psychiatrist's perspective. *Suicide and Life-Threatening Behaviour*, *27,* 137-145.

Tanney, B.L. (2000). Psychiatric diagnoses and suicidal acts. In R.W. Maris, A.L. Berman, & M.M. Silverman (Eds.), *Comprehensive textbook of suicidology*. (pp.311-341). New York: Guilford Press.

Taylor, S.J. (1982). *Durkheim and the study of suicide*. London: Macmillan.

Taylor, S.J., Kingdom, D., & Jenkins, R. (1997). How are nations trying to prevent suicide? An analysis of national suicide prevention strategies. *Acta Psychiatrica Scandinavica, 95,* 457-463.

Tolsdorf, C. (1976). Social networks, support, and coping: An exploratory study. *Family Process, 15*, 407-417.

Traskman-Bendz, L., & Mann, J.J. (2000). Biological aspects of suicidal behaviour. In K. Hawton, & K. van Heeringen (Eds.), *The international handbook of suicide and attempted suicide* (pp.65-77). New York: John Wiley and Sons Ltd.

Trout. D.L. (1980). The role of social isolation in suicide. *Suicide and Life-Threatening Behaviour, 10*, 10-23.

Tsuang, M.T., Simpson, J.C., & Fleming, J.A. (1992). Epidemiology of suicide. *International Review of Psychiatry, 4*, 117-129.

United Nations/World Health Organization. (1996). *Prevention of suicide: Guidelines for the formulation and implementation of national strategies*. Geneva: World Health Organization.

Upanne, M. (1999). A model for the description and the interpretation of suicide prevention. *Suicide and Life-Threatening Behaviour, 29,* 241-255.

van Heerigen, K. (2001). *Understanding suicidal behaviour: The suicidal process approach to research, treatment and prevention*. Oxford: Wiley

Verona, E., & Patrick, C.J. (2000). Suicide risk in externalizing syndromes: Temperamental and neurobiological underpinnings. In T.E. Joiner, & D.M., Rudd (Eds.), *Suicide science: Expanding the boundaries.* (pp.137-173). Norwell, MA: Kluwer Academic Publishing.

Vijayakumar, L., & Rajkumar, S. (1999). Are risk-factors for suicide universal? A case-control study in India. *Acta Psychiatrica Scandinavica, 99,* 407-411.

Waern, M., Rubenowitz, E., & Wilhelmsson, K. (2003). Predictors of suicide in the old elderly. *Gerontology, 49,* 328-334.

Waern, M., Runeson, B. S., Allebeck, P., et al. (2002). Mental disorder in elderly suicides: A case-control study. *American Journal of Psychiatry, 159,* 450-455.

Wasserman, D. (1984). Imitation and suicide: A reexamination of the Werther effect. *American Sociological Review, 49,* 427-436.

Wasserman, D. (2001). *Suicide – An unnecessary death.* London: Martin Dunitz.

Weeke, A. (1979). Causes of death in manic-depressives. In M. Schou, & E. Stromgren (Eds.), *Origin, prevention and treatment of affective disorders* (pp.289-299). London: Academic Press.

Weissman, M.M., Gammon, G.D., John, K., et al. (1987). Children of depressed parents: Increased psychopathology and early onset major depressive episode. *Archive of General Psychiatry, 44*, 847-853.

Wolford, K. M., Reihman, J., & Tars, S. E. (1991). Psychological autopsy database development: A strategy for the development of suicide. *Forensic Reports, 4*, 437-450.

World Health Organization. (1999). *Figures and facts about suicide.* Geneva: Department of Mental Health, WHO.

World Health Organization (2001). *World health report 2001: Mental health: New understanding, new hope.* Geneva: WHO.

World Health Organization (2003a). *Country reports and charts*. Retrived April, 4, 2005 from www.who.int/mental_health/prevention/suicide/country_reports/en/.

World Health Organization (2003b). *Mortality database*. Retrived April, 4, 2005 from www3.who.int/whosis/.

Yang, B., & Clum, G.A. (1994). Life stress, social support, and problem-solving skills predictive of depressive symptoms, hopelessness, and suicide ideation in an Asian student population: A test of a model. *Suicide and Life-Threatening Behaviour, 24,*

127-139.

Yip, P.S.F. (1997). Suicides in Hong Kong, 1981–1994. *Social Psychiatry and Psychiatric Epidemiology*, *32*, 243-250.

Yip, P.S.F. (2001). An epidemiological profile of suicides in Beijing, China. *Suicide and Life-Threatening Behaviour*, *31*, 62-70.

Yip, P.S.F., Callanan, C., & Yuen, H.P. (2000), Urban/rural and gender differentials in suicide rates: East and west. *Journal of Affective Disorder*, *57*, 99-106.

Yip, P.S.F., Chi, I., Chiu, H., et al. (2003). A prevalence study of suicide ideation among older adults in Hong Kong SAR. *International Journal of Geriatric Psychiatry*, *18*, 1-7.

Yip, P.S.F., Law, C.K. & Law, Y.W. (2003). Suicide in Hong Kong: Epidemiological profile and burden analysis, 1981 to 2001. *Hong Kong Medical Journal*, *9*, 419-426.

Younger, S.C., Clark, D.C., Oehmig-Lindroth, et al. (1990). Availability of knowledgeable informants for psychological autopsy study of suicides committed by elderly people. *Journal of the American Geriatrics Society*, *38*, 1169-1175.

Zahl, D.L., & Hawton, K. (2004). Repetition of deliberate self-harm and subsequent suicide risk: long-term follow-up study of 11,583 patients. *British Journal of Psychiatry*, *185*, 70-75.

Zhang, J., Conwell., Y., & Zhou, J., et al. (2004). Culture, risk factors and suicide in rural China: A psychological autopsy case control study. *Acta Psychiatrica Scandinavica*,

110, 430-439

Zhang, J. Wieczorek, W., Jiang, C., et al. (2002). Studying suicide with psychological autopsy: social and cultural feasibilities of the methodology in China. *Suicide and Life-Threatening Behaviour*, *32*, 370-379.

Zilboorg, G. (1996). Differential diagnostic types of suicide. In J.T. Maltsberger & J. M. Goldblatt (Eds.), *Essential papers on suicide*, (pp.36-61). New York: New York University Press.

Zimmerman, J.K., & Asnis, G.M. (1995). *Treatment approaches with suicidal adolescents*. New York: John Wiley & Sons.