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# **Attempted suicide in late life - a prospective study**

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## ABSTRACT

**Background:** Elderly have high suicide rates. While attempted suicide is the strongest known predictor of suicide death, there are few controlled studies focusing on elderly attempters and prospective studies are lacking.

**Aims:** To examine social, psychological and psychiatric characteristics in elderly suicide attempters and in a general population comparison group. To investigate one-year outcomes and associated factors.

**Methods:** One-hundred and three suicide attempters (70+) (56 women and 47 men, mean age 80 years) were recruited from five hospitals in western Sweden. A population comparison group with the same sex and age composition was randomly drawn from our ongoing epidemiological studies. Sixty suicide attempters participated in the one-year follow-up study. Instruments included, the Comprehensive Psychopathological Rating Scale (CPRS), the Montgomery-Asberg Depression Rating Scale (MADRS), the Sense of Coherence Scale (SOC) and the Eysenck Personality Inventory (EPI). Medical records were reviewed.

**Results:** Both major and minor depression were associated with suicide attempt. A relationship was observed between perceived loneliness and suicide attempt. This association remained significant after adjustment for depression. A life time history of alcohol use disorder was associated with suicide attempt in both men and women. At one-year follow-up, two thirds of those who had major depression at the index attempt no longer fulfilled criteria for that diagnosis. Predictors for non-remission included higher MADRS- and BSA score, higher suicide intent and lower sense of coherence score at index attempt. Two persons died by suicide and six persons repeated a suicide attempt during the one-year observation period. One-year overall mortality was elevated more than two-fold. Suicide attempters scored higher on neuroticism and lower on extroversion than comparison subjects. However, these associations did not remain after adjusting for major depression.

**Conclusions:** Associations observed in this study mirrored those previously shown for death by suicide in late life in the same catchment area. Early detection and adequate treatment of depression and problematic alcohol use, as well as interventions that target loneliness may reduce suicidal behaviour in this vulnerable and growing age group.

**Key words:** Elderly, suicide attempt, depression, loneliness, alcohol use disorder, prospective study, remission, one-year mortality, repeated suicidal behaviour, neuroticism, extroversion.

## ORIGINAL PUBLICATIONS

This thesis is based on the following studies, which will be referred to in the text by their Roman numerals

- I Wiktorsson S, Runeson B, Skoog I, Östling S, Waern M. Attempted Suicide in the Elderly: Characteristics of Suicide Attempters 70 Years and Older and a General Population Comparison Group.  
*American Journal of Geriatric Psychiatry*, 2010 Jan, 18 (1): 57-67.
- II Morin J, Wiktorsson S, Marlow T, Olesen P, Skoog I, Waern M. Alcohol Use Disorder in Elderly Suicide Attempters: A Comparison Study.  
*American Journal of Geriatric Psychiatry*, 2011 Oct, accepted.
- III Wiktorsson S, Marlow T, Runeson B, Skoog I, Waern M. Prospective Cohort Study of Suicide Attempters Aged 70 and Above: One-Year Outcomes.  
*Journal of Affective Disorders*, 2011 Nov, 134 (1-3): 333-40.
- IV Wiktorsson S, Berg AI, Billstedt E, Duberstein P, Marlow T, Skoog I, Waern M. Neuroticism and Extroversion in Suicide Attempters Aged 75 and Above and a General Population Comparison Group.  
2011 Dec, submitted.

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## ABBREVIATIONS

AUD	Alcohol Use Disorder
BSA	Brief Scale for Anxiety
CIRS-G	Cumulative Illness Rating Scale for Geriatrics
CPRS	Comprehensive Psychopathological Rating Scale
DSM-III-R	Diagnostic and Statistical Manual of Mental Disorder, third edition, revised, 1987
DSM-IV	Diagnostic and Statistical Manual of Mental Disorder, fourth edition, 1994
EPI	Eysenck Personality Inventory
GDS	Geriatric Depression Scale
H70	Gerontological and Geriatric Population Study
IPT	Interpersonal Psychotherapy
MADRS	Montgomery-Asberg Depression Rating Scale
MMSE	Mini Mental State Examination
NASP	National Centre for Prevention of Suicide and Mental Ill-Health
PPSW	Prospective Population Study of Women
SIS	Suicide Intent Scale
SOC	Sense of Coherence
WHO	World Health Organisation

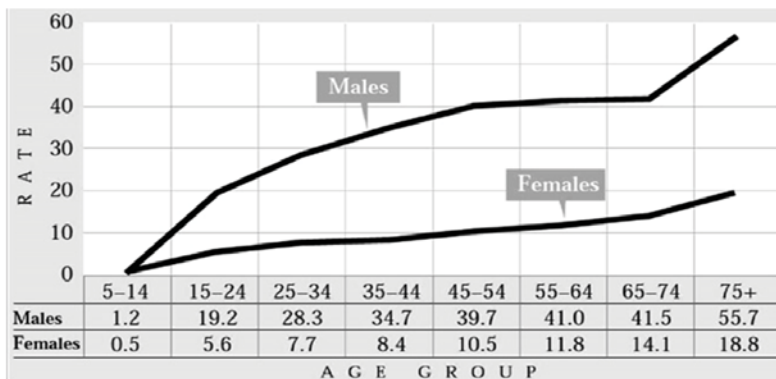




## INTRODUCTION

Suicide is a major public health problem worldwide and the elderly have high suicide rates in most countries (Hawton and van Heeringen, 2009). The number of suicide deaths is projected to increase over the next decade as elderly populations are on the rise (Christensen et al., 2009). In Australia e.g. the elderly population (65+) is estimated to rise from 12% in 2002 to 18% in year 2020 (Statistics, 2000). In east Asia the elderly population is expected to rise from 207 million in 2000 to 857 million in 2050, an increase of 314% (Chiu et al., 2003). There are approximately one million completed suicides and ten million suicide attempts worldwide each year (WHO). If the projected increase of the elderly population is correct one must expect 1.5 million completed suicide and 15-30 million attempts per year. This corresponds to one suicide death each 10-20 seconds and one suicide attempt each 1-2 seconds. In 2020 suicide will be among the ten most common death causes (Murray and Lopez, 1997). Suicide statistics should be interpreted cautiously as reporting procedures vary from country to country. Furthermore, numerous countries do not report suicide statistics to WHO.

Figure 1 shows suicide rates from a global perspective by age groups and sex. Rates increase with age and there is a dramatic increase in very old age, especially for men.

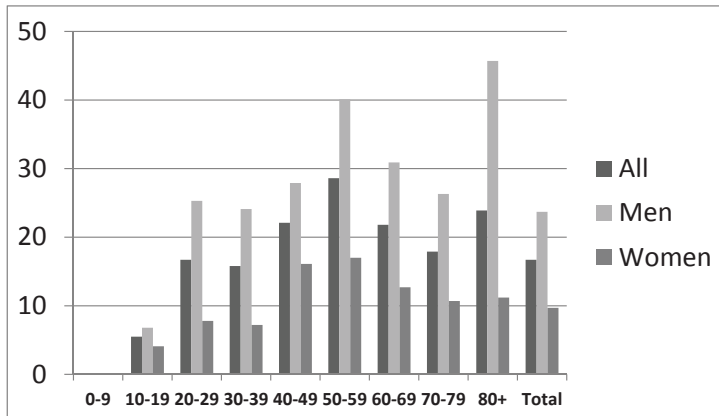


**Figure 1.** Global suicide rates per 100 000, by age groups, 2009 (Bertolote JM, 2009).

Rates of attempted and completed suicide in Sweden are at an intermediate level both in a European and in an international perspective. There are approximately 15 000 suicide attempts in Sweden yearly. Further, 1500 persons complete suicide. Fifteen percent of those who die by suicide are aged 70 years and above.

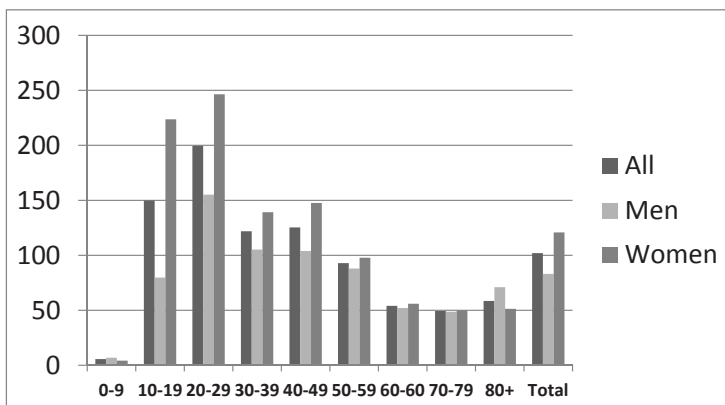
According to Statistics Sweden, 12.5% (187 500) of the total population in the region of Västra Götaland was aged over 70 years in the year 2005. Suicide rates were three times higher in men than women in Sweden in 2010 in this age group. According to the National Centre for Prevention of Suicide and Mental Ill-Health (NASP), the national rates of completed suicide in 2010 were 31/100 000 for men and 10/100 000 for women. The corresponding rates for the region of Västra Götaland were somewhat

lower 28/100 000 for men and the rates for women were half of the national rates, 5/100 000. Suicide rates in the elderly have decreased in Sweden since the beginning of the eighties. However, for men over 80 years of age the suicide rates were as high as 46/100 000 in the year of 2009. Figure 2 shows suicide rates by age groups in Sweden (2009). Men have higher rates than women in all age groups and the sex differences are most prominent in those aged 80 years and above.



**Figure 2.** Suicide rates per 100 000 by age groups in Sweden, 2009 (NASP).

According to NASP the national rates for attempted suicide (70+) in 2010 were identical in men and women, 54/100 000. Rates for the region of Västra Götaland were somewhat lower, 49/100 000 for men and 50/100 000 for women. Attempted suicide rates are based on hospital admissions in connection with a suicide attempt. The rate has been relatively stable for both men and women between the years 2005-2010. Figure 3 shows the rates of attempted suicide by age groups in Sweden (2009).



**Figure 3.** Attempted suicide rates per 100 000 by age groups in Sweden, 2009 (NASP).

## **Suicide in a historic perspective**

Suicide has historically been the focus of religious, philosophical and sociological discussions. The Greek philosopher Plato considered suicide as disgraceful and its perpetrators should be buried in unmarked graves. However, Plato stressed that there were some exceptions when suicide was excused; when one's mind is morally corrupted and one's character can therefore not be salvaged, when the self-killing is compelled by extreme and unavoidable personal misfortune and when it is a result from shame at having participated in grossly unjust actions. Aristoteles concluded that suicide is an act against the state.

The early Christian church father St. Augustine determined that suicide was an unrepentable sin. St. Thomas Aquinas defended this statement on three grounds; suicide is the contrary to natural self-love, suicide injures the community and suicide violates our duty to God as God has given us life and he alone may determine the duration of our lives. David Hume, an English philosopher in the eighteenth century, concluded that physical illness, old age and other misfortunes can make life sufficiently miserable that continued existence is worse than death. His argument is associated with the rights of personal freedom and self-determination. Emile Durkheim, French sociologist in the nineteenth century, viewed suicide as a social ill reflecting human alienation, lack of social norms and other attitudinal products of the modern society (Suicide, 2004).

Through history suicidal behaviour has been an issue with a strong taboo (Beskow, 2010). Nowadays suicide is more openly discussed although the taboo still exists. The current debate about euthanasia is strongly associated with the questions regarding personal freedom and the right of self-determination.

# SUICIDAL BEHAVIOUR IN LATE LIFE

## Suicidal ideation

Suicidal behaviour is an overall concept including suicidal ideation, suicide attempt and suicide death. Suicidal thoughts have been shown to be relatively uncommon in late life in general populations, but common in older persons with mental disorders. One Swedish study (Skoog et al., 1996) found that only four percent of mentally healthy 85-years olds thought that life was not worth living compared to 29% of those who were suffering from mental illness. Suicidal thoughts might be a marker of a beginning suicidal process which can lead to a suicide attempt or to a completed suicide. However, suicidal thoughts must not necessarily lead to self-harm as most people have suicidal feelings at some point in time when life is problematic. A suicidal process model (visualized in the middle part of Figure 4) was developed by Beskow (Beskow, 1979). Initially, death wishes and suicidal ideation may be unobservable but may at some point in time become observable to others through communication of thoughts and actions. Suicidal behaviour fluctuates over time and can vary over a day, a week or over years. This makes it difficult to identify suicidal persons. Sometimes the suicidal process fades away and sometimes the suicidal process leads to an active attempt or a death by suicide. This suicidal process model was expanded by Wasserman (Wasserman, 2001) who included risk factors and protective factors that may impact the intensity of suicidality and the outcome of the suicidal process (Figure 4).

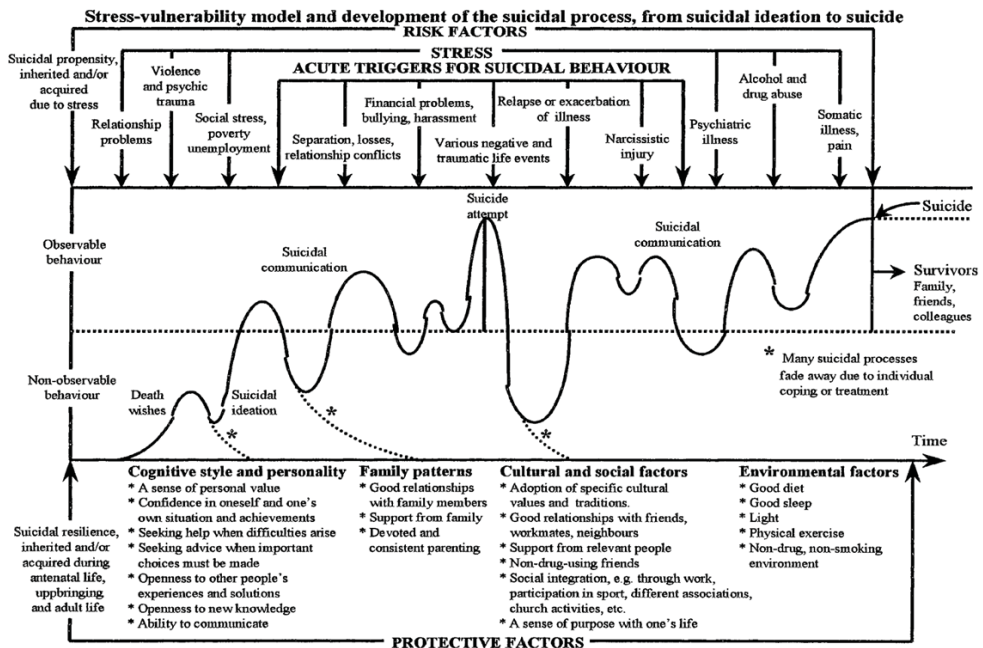


Figure 4. Model of suicidality (Wasserman, 2001).

## **Suicide attempt**

For the purpose of this thesis, suicide attempt is defined as “a situation in which a person has performed an actual or seemingly life-threatening behaviour with the intent of jeopardizing his life, or to give the appearance of such an intent but which has not resulted in death” (Beck, 1972).

## **Suicide attempt methods**

Suicide attempt methods can be categorized as violent and non-violent methods (Conwell et al., 1990). Violent methods include hanging, cutting, drowning and other violent methods while non-violent methods include medication overdose and other types of poisoning. The most common suicide attempt method in the elderly appears to be self poisoning (De Leo et al., 2002b, Hepple and Quinton, 1997, Lykouras et al., 2002, Beautrais, 2002, Lamprecht et al., 2005, Corcoran et al., 2010). The most common drugs are psychotropics especially benzodiazepines (Ticehurst et al., 2002, Chiu et al., 1996, Leuret et al., 2006). In general, men have been shown to use more violent attempt methods than women (De Leo et al., 2001). This sex difference is also well documented in completed suicide (Denning et al., 2000). According to a review (Chan et al., 2007) on deliberate self-harm in older adults the methods seem to have become more violent in recent years. Furthermore, there might be cultural variations due to differences in access to means (Chan et al., 2007). A long term mixed-age Swedish national cohort study (Runeson et al., 2010) found that violent methods predicted future death by suicide after adjusting for sociodemographic factors and psychiatric disorders.

## **Suicide intent**

A 12-year follow-up study (Suominen et al., 2004b) reported that high intention to kill oneself (as measured by the Suicide Intent Scale, SIS) (Beck et al., 1974) at index attempt predicts both death from suicide and all causes. Similar findings were found in a mixed age study (Stefansson et al., 2010) reporting that suicide intent at index attempt distinguished between suicides and survivors after 9.5 years. A study on elderly (65+) reported that high suicide intent predicts further suicide but not repeated non-fatal self-harm (Pierce, 1987). Another study showed that high suicide intent was shown to be a risk factor for future suicide in elderly (65+) compared those who were younger (Merrill and Owens, 1990). Higher suicide intent was found to be more common in those who were aged 55 and above compared to those who were younger (Harriss and Hawton, 2005). A one-year follow-up study (De Leo et al., 2002b) targeting repeated suicidal behaviour among persons aged 60 and above reported that repeaters had lower suicide intent than non-repeaters which was somewhat unexpected. High suicide intent in suicide attempters (55+) has been shown to be related to psychiatric disorders and social isolation in both men and women (Haw and Hawton, 2008). A Swedish follow-up study (Niméus et al., 2002) of suicide attempters found that those who later committed suicide scored significantly higher on the Suicide Intent Scale at index attempt compared to those who did not commit suicide. Further, they found that among those aged above 55 with mood disorder diagnoses and SIS scores of 19 or above significantly predicted suicide.

## **Sociodemographics**

Results regarding marital status among elderly suicide attempters are mixed. Marital status did not differ in attempters and in psychiatric patients who did not attempt suicide (Takahashi et al., 1995). Similarly, marital status did not distinguish attempters and a population comparison group (Tsoh et al., 2005). Two studies (Chiu et al., 1996, Beautrais, 2002) found that those who were married were more likely to attempt suicide. Disparate results may reflect different age cut-offs for study inclusion and cultural variations. One study (Lamprecht et al., 2005) suggested that marriage might no longer be a protective factor for attempting suicide in older men.

## **Living arrangements**

Living alone was associated with suicide attempt compared to comparison subjects in a Japanese study (Takahashi et al., 1995). A study set in Britain (Dennis et al., 2007) found that 70% of elderly suicide attempters (mean age, 77 years) were living alone. Living alone was associated both with death by any cause and by suicide in a controlled follow-up study (Haw and Hawton, 2011). Further, an Italy-based study showed that elderly suicide victims (65+) were more likely to live alone compared to younger suicide victims (Pompili et al., 2008). In Hong Kong it is common for older people to reside with their adult children and this was a protective factor in one study (Tsoh et al., 2005). Again, cultural variations make direct comparison difficult.

## **Loneliness and interpersonal conflicts**

Perceived loneliness can affect mental wellbeing and several studies conclude that loneliness plays an important role in suicidal behaviour in older people (Dennis et al., 2005, Rubenowitz et al., 2001). Loneliness seems to be more pronounced in late life due to a number of reasons, including bereavement, physical disability and retirement. One study (Harrison et al., 2010) found that suicidal depressed elders had lower levels of perceived social support and had higher levels of chronic interpersonal conflicts compared to age and sex matched non-suicidal depressed and non-depressed elders. Interpersonal problems were also reported to be common in suicide completers in another study (Harwood et al., 2006b). Interpersonal conflicts might have an effect on perceived loneliness and the perception on social support (Szanto et al., 2011). Family discord has also been shown to be independently associated with completed suicide among Swedish elderly (65+) after adjusting for mental disorders (Rubenowitz et al., 2001). Similar findings were reported in a US study on adults (50+) (Duberstein et al., 2004). Further, one study (Turvey et al., 2002) showed that having a greater number of friends and relatives with whom to confide was associated with reduced suicide risk in older adults. Bereavement is associated with both attempted and completed suicide in elderly people and men seem to be especially vulnerable (O'Connell et al., 2004b, Cattell, 2000, Erlangsen et al., 2004). One study (van Ravesteijn et al., 2008) discussed loneliness as a problem that requires attention in general practice settings. The authors concluded that unless we acknowledge the suffering caused by loneliness and provide a listening ear, we may be obstructing the healing of a physical illness. A study (Beautrais, 2002) estimated that if elderly could be assured adequate social support, rates of serious suicidal behaviour in older persons would drop by 27%.

## Hopelessness

Hopelessness plays an important role in suicidal behaviour. One study (Dennis et al., 2005) found that depressed elderly with a history of suicide attempt were much more likely to report hopelessness than depressed elderly without such a history. The authors of a study (Rifai et al., 1994) that focused on older adults who were treated for depression found a relation between the intensity of hopelessness and a history of suicidal behaviour. Those with a history of suicide attempt had a high degree of hopelessness persisting even after depression in remission. Further, they were also more likely to drop out of treatment. Among older persons with a history of suicide attempt in a US study (Szanto et al., 1998) high levels of hopelessness persisted after remission in depression.

## Two models

Figure 5 shows steps in a possible suicidal process beginning with feelings of hopelessness and despair and ending with a suicide death. This model is simplified in order to give a feeling for the different stages a suicidal person might go through. As in the model developed by Beskow there are no fixed stages in this model and the level of intensity may vary over days, months and even years.

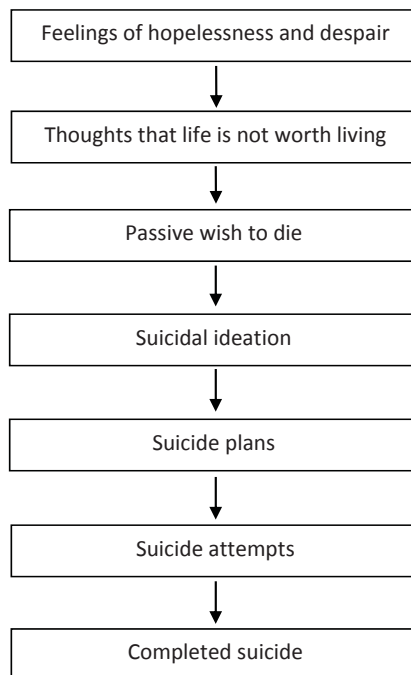
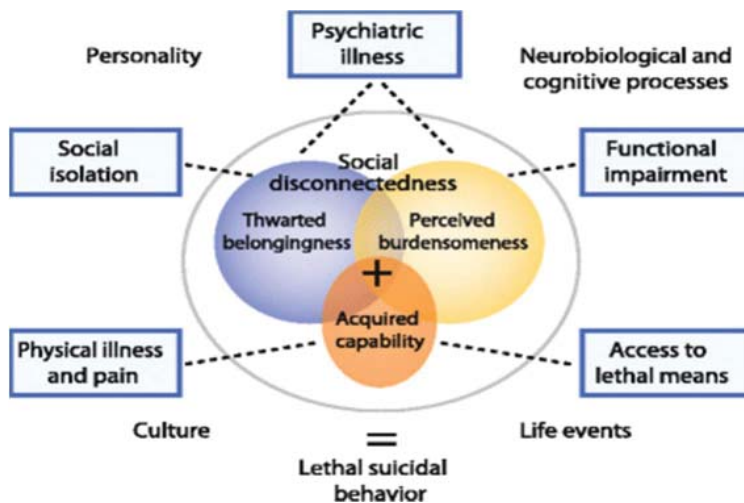


Figure 5. Model of suicidality (O'Connell et al., 2004a).

An interpersonal model of the development of suicidal behaviour (Joiner Jr and Van Orden, 2008, Van Orden et al., 2010) has been applied to late life (Figure 6 ). Briefly, this theory suggests that suicidal desire is driven by two main forces: thwarted belongingness and perceived burdensomeness. The former emphasizes a basic human need to be connected to others in a positive way. The latter represents thoughts that one is more of a burden to others which also affects the need to belong. In accordance with this model, thwarted belongingness and perceived burdensomeness are together referred to as social disconnectedness. If both states are present, suicidal desire will be accentuated, but these states are in themselves not sufficient to elicit a suicidal act. The authors suggest that social disconnectedness needs to be accompanied with an acquired capability for suicide. This capacity is acquired by no longer reacting to the fear involved in suicidal behaviour. According to this theory the risk for a suicidal act increases with increasing overlap of the three inner circles. The five boxes in the model represent well-documented risk factors for suicide in late life and all these factors are influenced by personality, culture, life events and neurobiological and cognitive processes.



**Figure 6.** The interpersonal theory of suicide applied to late life (Van Orden et al., 2010).

## History of psychiatric disorders and treatment

Several studies conclude that the proportion of elderly suicide attempters with a previous history of mental disorders and treatment is high. One Japanese study (Takahashi et al., 1995) reported that as many as 76% had a past history of psychiatric disorder and 50% had been hospitalized for psychiatric treatment. Fifty-five percent had a past psychiatric history in a British study (Hepple and Quinton, 1997) of suicide attempters aged 65 and above. A lower rate was observed in a Chinese study (Chiu et al.,



1996) that reported a past psychiatric history in a quarter of the elderly attempters. Taken together, these results demonstrate that elderly suicide attempters are vulnerable persons.

### **History of suicide attempt**

Attempted suicide in late life has been shown to be a strong predictor for completed suicide (Lawrence et al., 2000). The closer the resemblance between a suicide attempter and a suicide completer the higher the risk of a future fatal attempt (Tsoh et al., 2005). High proportions with a history of previous suicide attempt have been reported in a number of studies on elderly suicide attempters. Two studies from Taiwan (Yang et al., 2001, Liu and Chiu, 2009) reported a prevalence of over 50%. In a European multicenter study (De Leo et al., 2002b) almost half of those attempters who were referred by health services had at least one previous attempt. Family history of suicide was investigated in a large Swedish population register study (Tidemalm et al., 2011). A twofold increased risk of suicide in children and a twofold increase in siblings of suicide completers compared with corresponding relatives of controls was observed. The authors suggested that familial aggregation of suicide was influenced by substantial genetic but also by shared environmental factors. One study (Waern, 2005) on completed suicide among elderly (65+) concluded that previous episodes of suicidal behaviour were more common among suicides who lost first-degree relatives by suicide. A Japanese study (Takahashi et al., 1995) on suicide attempters (65+) did not find that a family history of suicide was more common in attempters than in comparison subjects.

### **Repeated suicidal behaviour and mortality**

A systematic review (Owens et al., 2002) of fatal and non-fatal repetition of self-harm in mixed age cohorts found that the one-year repetition rate for suicide attempts was approximately 15%. The suicide rate after one year ranged between 0.2% - 2% and after 5 years the suicide rate was 5%. Elderly who attempt suicide have high mortality due to both completed suicide and death by natural causes (Hawton and Harriss, 2006, Hepple and Quinton, 1997, Merrill and Owens, 1990). The one-year repetition rate for suicide attempt in older persons varies. One Hong Kong study (Chiu et al., 1996) reported a repetition rate of 3.6% while a European multicenter study (De Leo et al., 2002b) reported a repetition rate of 11%. The latter found that almost 13% had completed suicide within the one-year observation period.

### **A brief review of studies focusing on hospitalized elderly suicide attempters**

Table 1 gives an overview of studies focusing on hospitalized elderly suicide attempters from year 1995 and onward and shows sociodemographic and clinical characteristics. Only two of these studies have used a comparison group from the general population. None have specifically targeted “*older*” elderly. This is a lack since it is known that suicide rates increase dramatically after the age of 75, especially in men. It is also important that studies use comparison subjects from the general population in order to be able to present risk estimates.

**Table 1. Studies focusing on hospitalized elderly suicide attempters (60+) published since 1995, sociodemographic and clinical characteristics**

Year/ Country	Author	Cases/ Men/ Women	Age, Range/ Mean	Design	Setting/ Source of Controls	Married/ Cohabiting		Living Alone		Previous Attempt	Disorder	Odds Ratio	
						cases %	controls %	cases %	controls %			cases %	controls %
1995 Japan	(Takahashi et al., 1995)	50 20/30	65+ 75.7	Case-control	Psychiatric Unit in Geriatric Hospital/ Inpatient Non-attempters	30%	42%	50%	10%	46%	Mood disorder Dementia	74.0% 22.0%	60.0% 14.0%
1996 China	(Chiu et al., 1996)	55 21/34	65+ 72.8	Descriptive	Psychiatric Unit in Geriatric Hospital/ No controls	56%	-	44%	-	21.8%	Mood disorder Dementia	49.1% 3.6%	- -
2001 Taiwan	(Yang et al., 2001)	55 45/10	65+ 71.2	Case-control	Geropsychiatric Unit/ Inpatient Non-attempters	40%	-	60%	-	56.4%	Depressive disorders	56.4%	13%
2002 Australia	(Titchhurst et al., 2002)	110 44/66	65+ -	Descriptive	Poison Unit/ No controls	45.8%	-	54%	-	-	Major depression	40.0%	-
2004 Finland	(Suominen et al., 2004a)	81 35/46	65+ -	Descriptive	Emergency Room/ No controls	-	-	-	-	40%	Mood disorder	65%	-
2005 China	(Tsoh et al., 2005)	66 24/42	65+ 75.5	Case-control	Psychiatric Department/ Community controls	36.4%	46.1%	22.7%	14.3%	36.4%	Major depression Dementia	68.2% 18.2%	3.3% 2.2%
2006 France	(Lebret et al., 2006)	59 24/35	60+ 70.1	Descriptive	Hospital psychiatric service/ No controls	57%	-	-	-	30.5%	Depressive illness Dementia	67.8% 8.4%	- -
2009 Taiwan	(Liu and Chiu, 2009)	43 -	60+ 75.5	Case-Control	Hospital Emergency Service	33%	33%	-	-	53.5%	Depressive disorder Dementia	60.5% 16.3%	14% 9.3%
2011 South Korea	(Kim et al., 2011)	57 28/29	65+ 73.5	Descriptive	Hospital Emergency	40.5%	-	-	-	15.8%	Depression	94.8%	-

## **Mental disorders**

High proportions with psychiatric disorders have been reported in a number of studies focusing elderly suicide attempters (Table 1). The most common is depression. According to a review of psychological autopsy studies (O'Connell et al., 2004a) 71-95% of elderly people who commit suicide suffer from a psychiatric illness at the time of death. As in suicide attempters the most common diagnosis is depression. However, elderly people do commit suicide in the absence of psychiatric illness. Harwood and colleagues (Harwood et al., 2006a) found that personality factors, physical illness and recent bereavement were the most important factors associated with suicide in those without a psychiatric diagnosis.

## **Depression**

Affective disorders are a very strongly associated with suicide attempt in old age. In Table 1 the proportion with mood disorder ranges from 40% up to 94.8%. Among affective disorders major depression has repeatedly been shown to be the most prominent risk factor for attempted suicide and for completed suicide (Chiu et al., 2004, Harwood et al., 2000, O'Connell et al., 2004a, Waern et al., 2002b, Beautrais, 2002, Preville et al., 2005). Treating depression is seen as a main target for the prevention of suicide attempts and suicide deaths in this age group. Depression is a major public health problem, associated with low quality of life and has an increased risk of premature death also from natural causes (Almeida et al., 2010, Hamer et al., 2010). The depressive spectrum includes also minor (subsyndromal) depression, which are associated with a fivefold increase of risk to developing major depression after one year compared to non-depressed (Lyness et al., 2006). It has been estimated that serious suicidal behaviours among older adults would drop by nearly 75% if all late life depression could be prevented (Beautrais, 2002).

## **Anxiety disorders**

One review (Hawgood and De Leo, 2008) on mixed ages identified evidence suggesting that specific anxiety disorders (e.g. generalized anxiety disorder, panic disorder and obsessive-compulsive disorder) may be independently associated with suicidality, to which they particularly contribute when they are co-morbid with other psychiatric disorders e.g. depression, bipolar, schizophrenia. The proportion with anxiety disorder among older suicide attempters and completers was low in a Hong Kong study (Chiu et al., 2004) reporting a prevalence of 1-2%. One Swedish study (Waern et al., 2002b) on completed suicide in late life (65+) found that anxiety disorder was more common among completers compared to comparison subjects. The prevalence of this disorder among completers was 15% compared to 4% among comparison subjects from the general population. Disparate results might be in part explained by cultural differences in base rates of anxiety disorders but also by methodological differences. However, comorbid mood and substance use disorders are common in anxiety disorders and it is unclear how much these disorders mask anxiety. This might aggravate the assessment of anxiety disorder and its role in suicidal behaviour (Hawton and van Heeringen, 2009).

## **Alcohol Use Disorder (AUD)**

One study (Brady, 2006) found evidence to suggest that alcohol misuse is related to suicidal behaviour through its depressogenic effects and through promotion of adverse life events. In a clinical overview of articles (Sher, 2006) on alcoholism and suicidal behaviour in mixed ages the author concluded that alcoholism is associated with a considerable risk of suicidal behaviour. Both suicide completers and attempters with alcohol use disorders are characterized by major depressive episodes, stressful life events, poor social support and living alone. Further they are characterized by serious medical illness, hopelessness and prior suicidal behaviour. They are also more likely to be men and over 50 years of age.

Results regarding the elderly and the association between substance misuse and suicidal behaviour the results are mixed (Waern, 2010). Low rates have been reported from Japan and Hong Kong (Takahashi et al., 1995, Chiu et al., 1996). In contrast, high proportions have been reported from a number of other settings (Szanto et al., 1998, Waern, 2003, Beautrais, 2002). Differences in proportions might reflect cultural differences in drinking patterns. In a clinical review (Chan et al., 2007) on older adults (50+) suicide attempters the prevalence ranged from 2% to 36%.

## **Dementia**

The authors of a clinical review (Haw et al., 2009) concluded that the overall risk of suicide in persons with dementia seems to be similar or less than that of the general population. This could in part be explained by the fact that it requires a certain cognitive capacity to plan and complete a suicidal act. However, there might be an increased risk in early stages of dementia compared to later stages. One study (Lim et al., 2005) suggested that suicide risk might be increased in early stages of dementia, especially following a diagnosis when the patient might get distressed of the possible loss of autonomy and being a burden for others.

In studies focusing on elderly hospitalized suicide attempters, the prevalence of dementia ranges from 3.6% (Chiu et al., 1996) to 22% (Takahashi et al., 1995). A Danish register study (Erlangsen et al., 2008b) concluded that persons with dementia aged 70 or older have a threefold higher risk than those with no dementia. They also suggested that the time shortly after diagnosis is associated with an elevated suicide risk. The risk among persons with dementia remained significant when controlling for mood disorders in that study.

## **Sleep problems**

Sleep problems are common in the older general population (Giron et al., 2002, Ancoli-Israel and Cooke, 2005). One Canadian study (Lapierre et al., 2011a) reported that sleep problems were associated with the wish to die. Further, the association with sleep problems and risk of suicidal behaviour has been concluded both in mixed aged studies (Agargun and Besiroglu, 2005, Fawcett et al., 1990, Sjostrom et al., 2007) and in studies on the elderly (Meeks et al., 2008, McGirr et al., 2007, Wojnar et al., 2009).

## **Antidepressant treatment**

As depression has been shown to be a strong predictor for suicidal behaviour, antidepressant treatment is an important strategy to reduce suicidal behaviour. However, there has been a discussion as to whether antidepressants might increase suicide risk. In a systematic review of randomized controlled studies (Fergusson et al., 2005) including 87 000 mixed-aged patients, the authors suggested an association between the use of SSRIs (selective serotonin reuptake inhibitor) and increased risk of fatal and non-fatal suicide attempts. However, no association was shown among those aged 60 and above in that study. Another mixed age study (Simon et al., 2006) found no support in their data that the use of antidepressants increased the risk for attempted or completed suicide.

One study (Juurlink et al., 2006) on elderly (66+) reported an increase in risk of suicide during the first month of SSRI use compared to other antidepressants. However, the absolute risk was low. Barak and colleagues (Barak et al., 2006) found that elderly patients treated with antidepressants (mainly SSRI) were less likely to have attempted suicide within the month prior to admission to hospital for major depression compared to comparison subjects. Further, they suggested a direct association between prescription for an SSRI and decreased suicide risk in the elderly. A Danish population-based register study (Erlangsen et al., 2008a) on adults aged 50 years and above reported that active treatment with antidepressants seemed to account for 10% of the decline in the suicide rates. Finally, one Swedish study (Carlsten and Waern, 2009) on elderly (65+) found no association with antidepressant in general (nor SSRI), and suicide. However, both hypnotics and sedatives were associated with an increased risk of suicide.

## **Physical illness and disability**

Impaired physical health has been found to be more prominent in suicide attempters in old age compared to younger attempters (Merrill and Owens, 1990). Rates of physical illness are higher among elderly suicide attempters with depression than in non-suicidal comparison subjects with depression (Bergman Levy et al., 2011). One US study (Duberstein et al., 2004) examined a number of different factors and reported that the only persisting effect was physical illness, after controlling for psychiatric disorders, in middle-aged and older adults who had attempted suicide. Regarding completed suicide (Waern et al., 2002a), physical illness was found to be associated with suicide in men but not in women. Comorbid physical illness, pain and functional disability seem all to contribute as independent risk factors (Conwell and Thompson, 2008). One mixed-age population-based study (Kaplan et al., 2007) found that functional limitation was a significant predictor of death by suicide. Interestingly, chronic physical conditions *per se* did not remain a predictor for suicide when functional limitations were taken into consideration.

## **Personality traits**

Personality has been shown to be associated with both depression and suicidal behaviour. Two studies (Duberstein et al., 2008, Steunenberget al., 2006) found that high

neuroticism predicted late life depression. Further, high neuroticism also predicted the recurrence of depression in late life (Steunenberg et al., 2010). A psychological autopsy study (Duberstein, 1995) showed that suicide victims (50+) had higher neuroticism scores than comparison subjects. Further, completers obtained lower “openness to experience” scores compared to younger suicide victims and normal controls. Another study by Duberstein found that persons high in extroversion were less likely to have a history of suicide attempts and those high in neuroticism were more likely to have suicide ideation (Duberstein et al., 2000). Obsessional and anxious personality traits were found to be associated with completed suicide in persons aged 60 and above (Harwood et al., 2001). In a qualitative psychological autopsy study, elderly suicide completers were characterized by their next of kin as obstinate and controlling persons (Kjolseth et al., 2009).

## SUICIDE PREVENTION IN THE ELDERLY

Building up Good Mental Health (Lehtinen, 2008) highlights five points to improve general mental health among elderly people: 1. Enhancing social participation, 2. Preventing loneliness and social isolation, 3. Providing opportunities for independent living, 4. Providing appropriate health and social services, 5. Combating ageism. In order to succeed to enhance mental health in late life in general, work focusing on national, organisational and individual levels is required. Mental health promotion needs to focus both on promotion and prevention strategies in order to reach the best possible outcome for both general public health and for risk groups. The three intervention levels in this proposal are very similar to those suggested by Conwell et al. focusing on indicated, selective and universal interventions in order to prevent suicidal behaviour among elderly (Table 2) (Conwell and Thompson, 2008).

The WHO's goal is to reduce suicide rates by at least a third by 2020. Sweden has a national program for suicide prevention and six regional networks focusing on suicide prevention with the goal to achieve this ambition. One approach is to raise the public awareness and to improve the knowledge in those who are in contact with suicidal persons. A macro level promotion strategy is to restrict access to means of suicide. Firearm legislation in Austria restricted availability of firearms and reduced suicide rates were observed (Kapusta et al., 2007). One US study (Kaplan, 2011) showed that 80% of older men who die by suicide use firearms. One of the best predictors for suicide by firearms in that study was the presence of a health problem. The authors suggested that access to health services must be enhanced for this group of elderly. Further, firearms availability should be reduced.

It is important for elderly to have a good access to health and social services. This could enhance the possibility to detect suicidal behaviour and depression. A 5-year depression management educational program for general practitioners (GP) and their nurses in combination with a psychiatrist telephone consultation service in a high suicide rate region was implemented. Reduced suicide rates were observed in the intervention area compared with surrounding regions without such a program (Szanto et al., 2007a). It is important with strategies from a primary care perspective as many elderly often are in contact with this sector. As a complement to care as usual interpersonal psychotherapy, has been shown to be useful in the treatment depression in older adults (van Schaik et al., 2006, van Schaik et al., 2007). One study (Heisel et al., 2009) used this method modified for person 60 years and above. The authors concluded that this adapted IPT model was tolerable and safe for this target group. Further, preliminary findings from the latter study indicated a substantial reduction in suicide ideation, death ideation and depressive symptoms. One controlled study from the Netherlands (Westerhof et al., 2009) assessed the influence of a life review on suicide risk, on personal meaning and on depressive symptoms. They concluded that that it is possible to support older people in their search for meaning by life reviews and that this also helps them to deal with depressive symptoms. A systematic review (Lapierre et al., 2011b) of elderly suicide prevention programs concluded that most studies, showed a reduction in suicidal ideation and in the suicide rate of the participating communities. For example two prevention programs (Unutzer et al., 2002, Alexopoulos et al., 2009,

Unutzer et al., 2006) including support from depression care managers, brief psychotherapy, close monitoring of depressive symptoms and follow-up of patients reported a significant reduction in suicidal ideation compared to those who received care as usual. One study (De Leo et al., 2002a) evaluated the long-term impact on suicide rates of a telephone service including a 24 hour service for elderly to call for help and a twice-a-week telephone support. After 11 years the suicide rates were significant lower in the program intervention area than that observed in the non-intervention region. One meta-analysis (Oyama et al., 2008) on Japanese multilevel intervention studies (Oyama et al., 2005, Chiu et al., 2003) including mental health workshops for elderly, screening for depression, group activities to reinforce social support found a decrease in suicide rates in the implementation areas. However, the reduction was mostly found in women. This highlights the importance to target elderly men as they have been shown to be less likely to seek help for their mental problems than women (Drapeau et al., 2009). A review (Cattan et al., 2005) of health promotion interventions for older people concluded that the effectiveness of one-to-one interventions to reduce social isolation and loneliness remains unclear. However, group interventions with an educational or social support input for specific groups of elderly were more successful. Furthermore, interventions that enable older people to be involved in planning, developing and delivering activities seems to be most effective.

Elderly with problematic alcohol use/misuse have public health implications as this vulnerable segment of the population is growing. It was recently projected that the number of older adults in the US with substance use disorder will double within a decade (Han et al., 2009). Seniors with AUD might require targeted interventions. Ageism is one prevention barrier; lack of knowledge in health professionals concerning geriatric alcohol use and treatment is another (O'Connell et al., 2003). Efforts aimed at early targeting and prevention of AUD over the entire life cycle could contribute to the reduction of suicidal behaviours in seniors.



**Table 2. Levels of preventive intervention**

<b>Intervention</b>	<b>Target population</b>	<b>Prevention objectives</b>	<b>Examples</b>
<b>Indicated</b>	Individuals who have detectable symptoms or other proximal risk factors for suicide	Treat individuals who have precursor signs and symptoms to prevent development of disorder or the expression of suicidal behaviour	Increase screening/treatment in primary care settings for elders who have depression, anxiety and substance misuse  Improve providers' assessment and restriction of access to lethal means
<b>Selective</b>	Asymptomatic or presymptomatic individuals or groups who have distal risk factors for suicide, or who have a higher-than-average risk for developing mental disorders or other more proximal risk factors	Prevent suicide-related morbidity and mortality addressing specific characteristics that place elders at risk	Promote church-based and community programs to contact and support isolated elders for those experiencing social isolation  Focus medical and social services on reducing disability and enhancing independent functioning; increase access to home care and rehabilitation service, and improve access to pain management and palliative care service; treat elders with chronic pain syndrome more effectively for those are medically ill, functionally impaired  Provide gatekeeper training  Link outreach and gatekeeper services to comprehensive evaluation and health management services in a continuum of care  Implement strategies to provide more accessible, acceptable, and affordable mental health care for elders
<b>Universal</b>	Entire population, not identified based on individual risk	Implement broadly directed initiatives to preventive suicide-related morbidity and mortality through reducing risk and enhancing protective factors	Education of the general public, clergy, the media, and health care providers concerning normal aging, ageism and stigma regarding mental illness, and depression and suicidal behaviours  Restrict access to lethal means

Table developed in collaboration with Kerry Knox, PhD, and Eric D. Caine MD (Conwell and Thompson, 2008).

## **AIMS OF THE PRESENT STUDIES**

### **Study I**

To compare social, psychological and psychiatric characteristics in hospitalized elderly suicide attempters aged 70 years and above and in a general population comparison group.

### **Study II**

To examine lifetime prevalence of alcohol use disorder (AUD) in elderly suicide attempters who were hospitalized in connection with a suicide attempt and in a population comparison group. Further, to compare previous suicidal behaviour in attempters with and without AUD.

### **Study III**

To examine one-year outcomes in suicide attempters aged 70 years and above and to identify predictors of these outcomes. Outcome measures included major/minor depression, Montgomery-Asberg Depression Rating Scale (MADRS) score, repeat non-fatal/fatal suicidal behaviour and all-cause mortality.

### **Study IV**

To examine the personality traits neuroticism and extroversion in a clinical cohort of hospitalized suicide attempters and a general population comparison group aged 75 years and above. To investigate characteristics associated with neuroticism and extroversion in suicide attempters and to determine whether these traits are associated with one-year outcomes.

## SUBJECTS AND METHODS

### Cases

#### *Study I-II*

Cases were recruited among patients aged 70 or above who were admitted to emergency wards in connection with a suicide attempt at five hospitals in western Sweden during a three-year period (2003-06). According to Statistics Sweden, this region had a total population of 1.5 million of which 12.5% (n=187 500) were aged 70 years and above in 2005 (SCB, 2011). One hundred and forty five suicide attempters were registered residents in the study area. Persons with terminal illness (n=2), Mini Mental State Examination (MMSE) (Folstein et al., 1983) score <15 (n=2) and insufficient knowledge of the Swedish language (n=1) were excluded. Seven out of 140 potential participants left the hospital before they could be informed about the study. Two further persons accepted participation but died of natural causes on the hospital ward before the scheduled interview appointment. Twenty-eight suicide attempters declined participation, leaving 103. This corresponds to 77.4% of the eligible sample. Participants did not differ from non-participants regarding age (mean age 79.7 years, SD±5.3 vs. 80.5, SD±6.2, t-value=0.744, df=131; p=0.458) and sex (55% women vs. 63%; Pearson chi-square 0.606, df=1, p=0.436). Figure 7 shows the participant flow in studies I-III.

#### *Study III*

Figure 7 shows further that sixty cases from the original clinical cohort took part in the one-year follow-up study corresponding to 71% of those who were alive at that time.

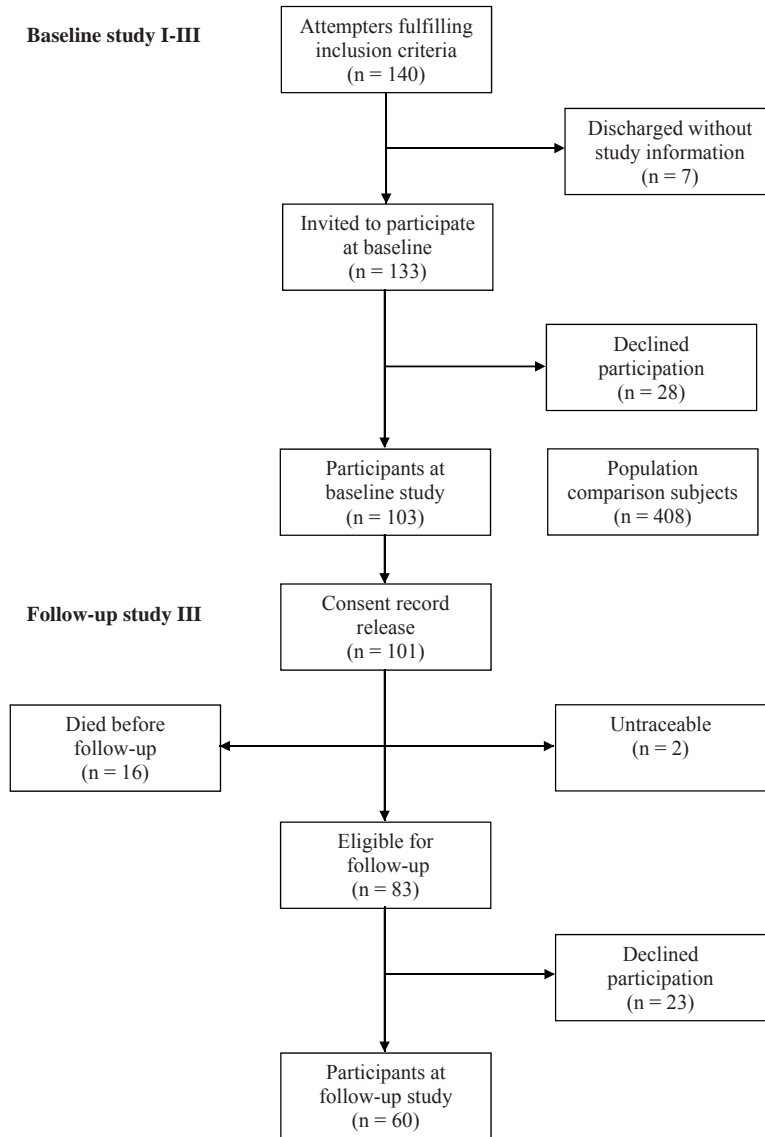
#### *Study IV*

Cases aged 75 years and above were selected from the original attempter cohort. According to Statistics Sweden, the study area had a total population of 1.5 million of which 134 402 (8.8%) were aged 75 and above in 2005 (SCB, 2011). There were eighty-three potential participants aged ≥75 for the current study. Cases with a Mini Mental State Examination (MMSE) (Folstein et al., 1983) score <20 were excluded to decrease risk of confounding results due to dementia-related personality changes (Palmer et al., 2003). The final number of participants with Eysenck Personality Inventory (EPI) (Eysenck and Eysenck, 1964) data was 72 corresponding to 87% of the potential participants. There were 30 men (42%) and 42 women (58%), (mean age = 81.4, range 75-91). Figure 8 shows the participant flow. Nineteen men and 26 women took part in the one-year follow-up interview (mean age = 81.6, range 75-89).

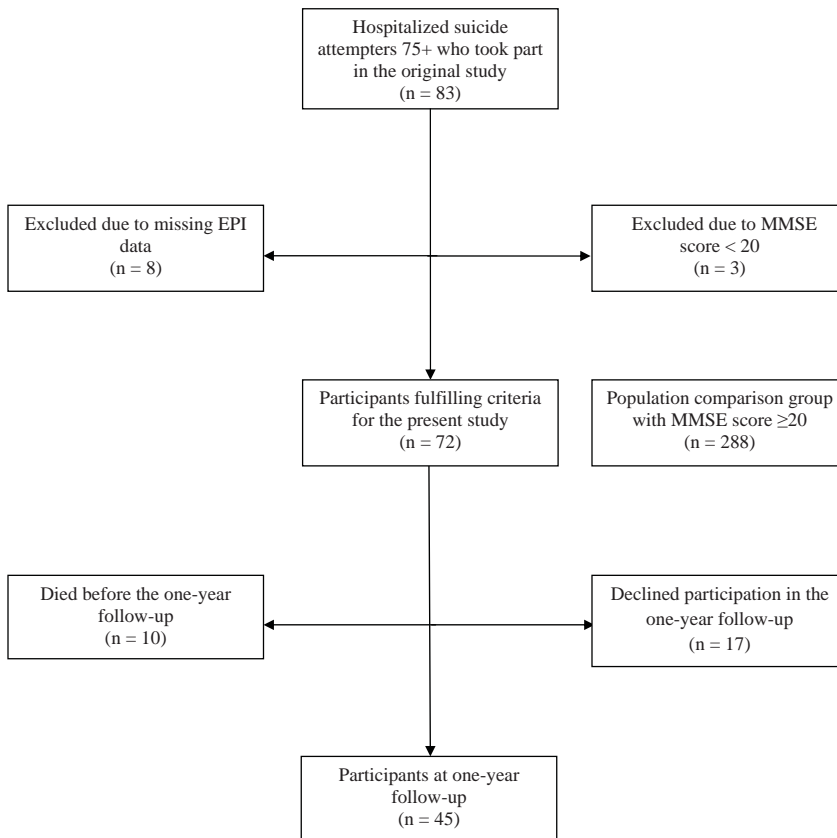
### Comparison group

#### *Study I-II*

Four comparison subjects per case were randomly selected among participants in the Gerontological and Geriatric Population Studies (H70) (Skoog, 2004) and the Prospective Population Study of Women (PPSW) (Lissner et al., 2003). Both studies are



**Figure 7.** Participant flow, study I-III.



**Figure 8.** Participant flow, study IV

based in Gothenburg and both study populations have been shown to be representative of the elderly populations from which they are derived, with a participation rate of 63% (Skoog, 2004). Comparison subjects were required to have a MMSE score  $\geq 15$ . They were matched to the cases by sex and age group (70-73, 74-77, 78-81, 82-85 and 86-91). Four cases had only three comparison subjects, yielding a total comparison group of 408.

### **Study IV**

The general population comparison group comprised participants from ongoing epidemiological studies in Gothenburg (Skoog, 2004, Karlsson et al., 2010). Individuals born in 1930 were drawn from the Prospective Population Study of Women (PPSW) and the Gerontological and Geriatric Population Studies (H70) examined 2005-06 and 2009-10. Further, individuals from a study of 85 year-olds born in 1923-24 and examined in 2009-10 were also included yielding a total number of 1980 potential comparison subjects. The studies have a longitudinal design and some subjects participated in two study waves. Therefore, duplicates were removed randomly. Participants with an MMSE score  $< 20$  and those with more than two missing items on the EPI were also

excluded. Comparison subjects reporting a history of suicide attempt were excluded (n=28) leaving a total number of 944 potential comparison subjects. Four comparison subjects per case were randomly selected from this group, yielding a final comparison group of 288. There were 107 men (36%) and 181 women (64%), (mean age=80.4 years, range, 75-85).

## **Procedure**

### ***Interview, cases***

All interviews with the suicide attempters were carried out by the same psychologist (SW). The median time between the suicide attempt and the baseline interview was 11 days. Most interviews took place on the hospital ward, but 14 were carried out after discharge. Twelve of these were performed at home, one in a nursing home and one at an outpatient department.

Follow-up interviews (studies III and IV) were carried out by the same clinical psychologist (SW) who had performed the baseline interviews. The median time between the suicide attempt and the follow-up interview was 391 days. Follow-up interviews were performed in the participants' homes (n=48), at nursing homes (n=9), on psychiatric wards (n=2) and at a psychiatric outpatient clinic (n=1).

### ***Interview, comparison subjects***

For the comparison subjects, interviews were performed by psychiatrists/psychologists/psychiatric nurses at a geriatric outpatient department or at the home of the participant (study I and II). These procedures have been described in more detail previously (Skoog, 2004). For study IV the interviews were performed by psychiatric nurses at the geriatric outpatient department or at the home of the participant.

## **Instruments**

### ***Neuropsychiatric examination***

The cognitive examination included the Swedish version of the Mini Mental State Examination (MMSE) (Folstein et al., 1983) and tests of short and long-term memory, abstract thinking, aphasia, apraxia and agnosia as described previously (Skoog et al., 1993).

### ***Psychiatric examination***

Symptoms were rated with identical instruments in cases and comparison subjects. The Comprehensive Psychopathological Rating Scale (CPRS) (Asberg et al., 1978) was utilized to examine psychiatric symptoms during the month preceding the suicide attempt and the month prior to the follow-up (or, for the comparison group, the month prior to the interview). The Montgomery-Asberg Depression Rating Scale (MADRS) (Montgomery and Asberg, 1979), a subscale derived from the CPRS, was used to rate depressive symptoms. Items are scored 0-6 with 6 indicating the most severe level (see Appendix B in paper I). A slightly modified version of the Brief Scale for Anxi-

ety (BSA) (Tyrer et al., 1984) was used to investigate anxiety symptoms during the month prior to the index attempt. The original BSA comprises 10 items rated 0-6, with 6 corresponding to the most severe level of symptoms (see Appendix A). For the purpose of this study we used all items (inner feelings, hostile feelings, hypochondriasis, worrying over trifles, reduced sleep, autonomic disturbances (reported and observed), aches and pains, and muscular tension) with the exception of the phobia item, yielding a maximum total score of 54. A single question (Do you feel lonely?) was used to investigate perceived loneliness among suicide attempters and comparison subjects.

### ***Eysenck Personality Inventory (EPI)***

The personality dimensions neuroticism-stability and extroversion-introversion were measured with the Eysenck Personality Inventory (Eysenck, 1964) in both cases and comparison subjects in study IV. Both personality dimensions are thought to be biologically mediated (Eysenck, 1981). Each scale includes 24 items. High scores on the neuroticism scale correspond to persons characterized by emotional reactivity, anxiety and psychosomatic concerns, low ego-strength and guilt proneness. Persons characterized as sociable, outgoing, impulsive and uninhibited score high on extroversion (Eysenck, 1975). The EPI dimensions of neuroticism and extroversion are considered to be fairly similar to those same-name dimensions in the more widely-used NEO five-factor inventory (Costa and McCrae, 1992) (Heller et al., 2002). The EPI includes also a 9-item lie-scale is included in order to detect persons who are overly concerned with their self-presentation. According to Eysenck (Eysenck, 1975), high scores on the lie-scale correspond to a tendency to present oneself in a socially desirable manner.

### ***Instruments for cases only***

As the MADRS does not include a specific hopelessness item, a single item (Do you think your situation is hopeless?) from the Geriatric Depression Scale (GDS) (Yesavage et al., 1982) was used for evaluation of hopelessness. As sleep disturbances have been shown to be related to suicide risk (Fawcett et al., 1990), we constructed a categorical sleep variable. A person who scored  $\geq 3$  on the MADRS item for reduced sleep was considered to have sleep problems. Suicide intent at the time of the index attempt was measured using the Suicide Intent Scale (SIS) (Beck A.T., 1974). This scale comprises eight objective items and seven subjective items regarding the circumstances of the attempt. Items are scored from 0 (low intent) to 2 (high intent) yielding a maximum possible score of 30 (see Appendix B). Methods were denoted as non-violent (overdose, poisoning) or violent (hanging, cutting, drowning and other violent methods) (Conwell et al., 1990). The Cumulative Illness Rating Scale for Geriatrics (CIRS-G) (Miller et al., 1992) was used to rate physical illness/disability. A score ranging from 0 (no pathology) to 4 (extremely severe illness/impairment) was generated for each organ system. For the purpose of this study, a person was considered to have a serious physical illness/disability if scoring 3 or 4 in any of the 13 (non-psychiatric) organ categories (see Appendix C). The Sense of Coherence Scale (SOC) (Antonovsky, 1987) was used to examine to what extent participants found their lives meaningful, manageable and comprehensible. The Swedish version of the 29 item SOC scale, which has high validity and reliability (Langius et al., 1992), was

administered. The answers were provided using a 7 point response scale with a maximum score of 203. A high score corresponds to strong SOC. A person who scored  $\geq 2$  on the MADRS suicide item was considered to have suicidal feelings.

## **Sociodemographics**

For the purpose of these studies, sociodemographic data were dichotomised as follows: marital status: married/cohabitating vs. no partner, living situation: living alone vs. living with others, living in an institution: yes or no, and education level: mandatory vs. beyond mandatory.

## **Collateral data sources**

### ***Study I-IV***

For suicide attempters, interview data and case records from primary care, psychiatric clinics, hospital emergency departments, and geriatric departments were reviewed for evidence of previous episodes of mental illness and treatment. We recorded past episodes of mania/hypomania in order to diagnose bipolar disorder. Lack of detailed information made it difficult to identify bipolar subtypes. Medical records were also reviewed for evidence of alcohol use disorder, antidepressant treatment and repeated suicidal acts.

### ***Study II***

Personal identification numbers were linked with the regional hospital discharge register (1976 to 2006) for both cases and comparison subjects.

### ***Study III-IV***

Cases were linked to the Swedish Cause of Death Register using the individual's unique personal identifier. Death certificates for deaths occurring during the one-year observation period were provided by the National Board of Health and Welfare. Data from Statistics Sweden (SCB, 2011) were utilized to estimate the expected one-year mortality rate for an age and sex matched general population sample.

## **Diagnostics**

### ***Study I-IV***

An algorithm based on selected CPRS (Asberg et al., 1978) items and in accordance with the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) was used for diagnosis of major depression (Skoog et al., 1993) (see Appendix A in paper I). The algorithm for minor depression was constructed in accordance with DSM-IV research criteria. A lifetime history of alcohol use disorder was identified by using interview data, medical records and the hospital discharge register and this diagnosis was made in accordance with DSM-IV. Dementia was rated according to the Diagnostic and Statistical Manual of Mental Disorder (DSM-III-R) (Skoog et al., 1993) (see Appendix A in paper I).



## **Study II**

Persons with a discharge diagnosis 303 in accordance with the International Statistical Classification of Diseases and Related Health Problems (ICD-9) or F10x (ICD-10) were considered to have AUD. A broad definition of AUD was employed, spanning over cases with social complications of problematic alcohol use to those with physiological dependency and multiple admissions for detox treatment in accordance with Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV). For the purpose of this paper, AUD refers to those with a lifetime history of AUD.

## **Statistics**

### **Study I-IV**

All exploratory and formal statistical tests in the four studies were carried out using SPSS for Windows (version 15, SPSS Inc, Chicago, IL, USA). All tests were two-tailed and  $p$  values  $<0.05$  were considered statistically significant.

### **Study I**

Chi Squared test was used to test for differences in proportions, and mean ages were compared with the  $t$  test. For analyses regarding cases and comparison subjects, all odds ratios (ORs) were calculated with conditional logistic regression analyses. Separate models were constructed for the non-demented subgroup.

### **Study II**

Matched cases and comparison subjects were analyzed using conditional logistic regression (Cox). Multivariate model was also done in order to test if AUD remained a significant factor after controlling for previous suicide attempts and history of psychiatric treatment. Within cases binary logistic regression models were used to calculate odds ratios (OR) and 95% confidence intervals (CI).

### **Study III**

A person was considered to be in remission if criteria for major depression were no longer fulfilled, and the MADRS score was  $<10$  (Licht-Strunk et al., 2009). MADRS data was missing for one participant at follow-up. A paired  $t$ -test was used to test differences in MADRS score at baseline and follow-up. Proportions were compared with Fisher's exact test (FET) and the  $t$ -test was used to test differences between groups regarding continuous baseline variables. Multivariate logistic regression was used to determine how baseline MADRS score, as a confounder, influenced associations with remission regarding SIS, BSA and SOC. A test based on the Poisson distribution was used to test the difference between observed and expected one-year mortality.

### **Study IV**

All cases ( $n=72$ ) had complete EPI data. Comparison subjects with up to two missing items in the neuroticism and extroversion scale and up to one missing item in the lie scale were included and scores were imputed using an expectation-maximization

SPSS algorithm. Differences in proportions were tested with Pearson  $\chi^2$  test and the *t*-test was used to compare means of continuous variables. Logistic regression was employed to calculate odds ratios (OR) with 95% confidence intervals (CI) for suicide attempt. Potential confounders were entered in multivariate models to determine whether these factors affected associations. Fisher's *r*-to-*z* transformation was used to test for differences in correlations between attempters and comparison subjects. Spearman's non-parametric correlation coefficient was utilized in analyses of correlations within the attempter group.

## MAIN FINDINGS

### Study I

Table 3 shows that cases were less likely to be married/cohabiting and less likely to have an education beyond mandatory compared to comparison subjects (Wiktorsson et al., 2010). Further, cases were more likely to live alone, to have a history of psychiatric treatment and to have previously attempted suicide. There was no difference regarding living in an institution.

**Table 3.** Sociodemographic and clinical characteristics of study participants

	Cases	Comparison group	Odds ratio <sup>a</sup> (95% CI)	Wald	df	p
	N = 103 (%)	N = 408 (%)				
Married/cohabiting	38 (36.9)	175 (51.9) <sup>b</sup>	0.51 (0.31 - 0.84)	7.0	1	0.008
Living alone	66 (64.1)	168 (50.0) <sup>b</sup>	1.90 (1.16 - 3.11)	6.5	1	0.011
Living in an institution	6 (5.8)	23 (5.7)	1.05 (0.41 - 2.69)	0.0	1	0.923
Education beyond mandatory	45 (43.7)	215 (52.7)	0.56 (0.35 - 0.88)	6.4	1	0.012
History of psychiatric treatment	56 (54.4)	37 (9.1)	12.31(6.80 - 22.30)	68.7	1	<0.001
Previous suicide attempt	31 (30.7)	8 (2.0)	19.46 (8.10 - 46.73)	44.1	1	<0.001

<sup>a</sup>Conditional logistic regression. <sup>b</sup>Missing values for 71 comparison subjects.

Table 4 shows differences in affective disorders between cases and comparisons. More than two thirds fulfilled criteria for major depression among attempters compared to 6% in comparison subjects corresponding to an almost fifty-fold increase in odds for attempting suicide. A diagnosis of minor depression was found in almost one quarter of the attempter group and in one tenth of the comparison group. The increase in odds was more than doubled.

Perceived loneliness was reported in 60% of the cases compared to 18% among comparison subjects. This was associated with a seven-fold increase in odds, and the association remained after adjusting for major depression. Proportions with dementia did not differ between suicide attempters and comparison subjects. Almost 60% of the attempters reported hopelessness and the proportion was greater among those with major depression compared to those with minor depression.

**Table 4.** Affective disorders in hospitalized elderly suicide attempters and a general population comparison group

	All participants				Non-demented											
	Cases N = 103	(%)	Com- parison group N = 408	(%)	Odds Ratio <sup>a</sup> (95% CI)	Wald	df	p	Cases N = 95	(%)	Com- parison group N = 377	(%)	Odds Ratio <sup>a</sup> (95% CI)	Wald	df	p
Any affective disorder	95	92.2	70	17.2	81.8 (25.8-259.5)	55.9	1	<0.001	87	84.5	62	15.2	71.6 (22.5-227.7)	52.4	1	<0.001
Major Depression	71	68.9	26	6.4	47.4 (19.1-117.7)	69.0	1	<0.001	64	62.1	22	5.4	51.8 (18.8-142.7)	58.3	1	<0.001
Unipolar	65	63.1	26	6.4	27.6 (13.2-57.8)	77.5	1	<0.001	58	56.3	22	5.4	27.3 (12.4-60.0)	67.6	1	<0.001
Bipolar	6	5.8	0	0					6	5.8	0	0				
Minor depression	24	23.3	44	10.8	2.6 (1.5-4.7)	10.9	1	0.001	23	22.3	40	9.8	2.6 (1.4-4.6)	9.6	1	0.002

<sup>a</sup>Conditional logistic regression

## Study II

A lifetime history of AUD was observed in a quarter of the elderly who sought hospital care in connection with a suicide attempt compared to 4% among comparison subjects (Morin et al., 2011, in press). This corresponds to a ten-fold increase in odds for hospital-treated suicide attempt. Among men the proportion with AUD was 45% in the attempters compared to 8% in the comparison group corresponding to an almost ten-fold increase in odds. The corresponding proportion among female attempters was 11% compared to 1% among female comparison subjects, yielding an odds ratio of 12. Nineteen percent of the male attempters had ongoing AUD at the time of the interview. Four female attempters fulfilled criteria for a current AUD.

Table 5 shows comparisons between attempters with and without a lifetime history of AUD. More than half of those with a history of AUD had made at least one previous suicide attempt (ns) and those with AUD were younger when they made their first attempt compared to those without such a history. One fifth of those in the AUD group and less than a tenth of those without AUD reported a family history of suicidal behaviour.

**Table 5.** Suicidal behaviour in hospitalized suicide attempters (aged  $\geq 70$  years) by alcohol use disorder (N=103)

	Alcohol Use Disorder		Odds Ratio <sup>a</sup> (95% CI)	Wald	df	p
	Yes, N = 27 (%)	No, N = 76 (%)				
History of previous attempt	14 (52)	23 (30)	3.03 (0.97-9.51)	3.61	1	0.057
Age at first attempt, mean (sd)	61.8 (20.3)	74.4 (15.0)	0.95 (0.92-0.99)	7.07	1	0.008
Years since first attempt, mean (sd)	15.0 (19.1)	6.3 (13.5)	1.05 (1.01-1.09)	7.07	1	0.009
Family suicidal behavior	5 (19)	5 (7)	2.82 (0.58-13.74)	1.64	1	0.201
Suicide Intent Scale <sup>b</sup> , mean (sd)	16.7 (4.8)	15.4 (4.5)	1.08 (0.96-1.21)	1.57	1	0.211

<sup>a</sup>Conditional logistic regression, adjusted for age and sex. <sup>b</sup>Missing data for one person with AUD and for nine without AUD.

## Study III

Table 6 shows that those who declined participation in the follow-up interview (Wiktorsson et al., 2011) had lower suicide intent at baseline and were physically healthier compared to those who took part in the one-year follow-up interview. Further, those who died during the one-year observation period scored lower on Sense of Coherence at baseline compared to those who survived.

One half (52%) of all those who were interviewed after one year scored  $< 10$  on the MADRS at this time. Among those with major depression at baseline, two thirds (26 out of 39) no longer fulfilled criteria for this disorder.

**Table 6.** Baseline characteristics of elderly suicide attempters (70+) (n=101) by one-year follow-up status

Baseline Characteristics	Died before follow-up			Alive at follow-up						
	Deceased (n = 16)			All living (n = 85)		Participants (n = 60)		Non-participants (n = 25)		Test result <sup>b</sup>
	Mean	SD	Test result <sup>a</sup>	Mean	SD	Mean	SD	Mean	SD	
Age	79.7	4.9	t = 0.092, 99 df, p = 0.927	79.6	5.4	79.4	5.5	80.0	5.4	t = 0.443, 83 df, p = 0.659
The Cumulative Illness Rating Scale for Geriatrics (CIRS-G)	10.1	3.7	t = 0.666, 99 df, p = 0.507	9.3	4.2	10.1	4.4	7.4	3.3	t = 2.840, 83 df, p = 0.006
The Suicide Intent Scale <sup>c</sup> (SIS)	16.9	2.3	t = 0.771, 90 df, p = 0.443	15.8	4.8	16.5	4.5	13.9	5.2	t = 2.286, 77 df, p = 0.025
The Montgomery-Asberg Depression Rating Scale <sup>d</sup> (MADRS)	31.3	11.1	t = 1.911, 96 df, p = 0.059	25.4	11.0	24.5	10.5	27.6	12.0	t = 1.152, 81 df, p = 0.253
The Brief Scale for Anxiety <sup>e</sup> (BSA)	9.6	5.8	t = 0.659, 95 df, p = 0.511	9.0	5.8	8.7	5.1	9.7	7.3	t = 1.276, 81 df, p = 0.205
Sense of Coherence <sup>f</sup> (SOC)	117.0	29.4	t = 2.182, 85 df, p = 0.032	131.4	20.4	130.3	21.3	135.2	17.4	t = 0.868, 72 df, p = 0.368
Mini Mental State Examination <sup>g</sup> (MMSE)	26.2	3.1	t = 0.336, 86 df, p = 0.738	25.8	3.1	25.8	3.3	25.8	2.5	t = 0.000, 74 df, p = 1.000

<sup>a</sup>t<sub>1</sub>-test was used to compare continuous variables between those who died during the observation period and those who survived. <sup>b</sup>t<sub>2</sub>-test was used to compare baseline scores in participants and non-participants. <sup>c</sup>Missing data for 3 deceased, 3 participants and 3 non-participants. <sup>d</sup>Missing data for 1 deceased and 3 non-participants. <sup>e</sup>Missing data for 2 deceased and 2 non-participants. <sup>f</sup>Missing data for 3 deceased, 3 participants and 8 non-participants. <sup>g</sup>Missing data for 4 deceased, 3 participants and 6 non-participants.

Table 7 shows that baseline measures associated with non-remission of major depression (MADRS  $\geq 10$ ) included higher baseline depression and anxiety scores, higher suicide intent and lower Sense of Coherence.

Six persons made non-fatal repeat attempts during the one-year observation period. There were two suicides and fourteen natural deaths. The relative risk of death (any cause) was 2.53 (95% CI = 1.45-4.10,  $p < 0.001$ ).

**Table 7.** Remission vs. non remission by baseline characteristics for elderly suicide attempters (70+) with major depression at baseline (n=39)

Baseline Characteristics	Remission, MADRS score <10				Test Result <sup>a</sup>
	Yes (n = 17)		No (n = 22)		
	n	(%)	n	(%)	p
Women	9	(53)	12	(55)	1.000
Living alone	13	(77)	17	(77)	1.000
Education, mandatory only	12	(71)	14	(64)	0.740
History of psychiatric treatment	11	(65)	13	(59)	0.753
Previous suicide attempt(s)	7	(41)	7	(32)	0.738
AD <sup>c</sup> prescription at index attempt	11	(65)	14	(64)	1.000
Reduced sleep <sup>d</sup>	6	(35)	12	(55)	0.334
Serious physical illness <sup>e</sup>	10	(59)	16	(73)	0.497
Hopelessness <sup>f</sup>	8	(47)	16	(73)	0.184
Loneliness	9	(53)	15	(68)	0.508
Violent attempt <sup>g</sup>	5	(29)	6	(27)	1.000
	<b>Mean</b>	<b>SD</b>	<b>Mean</b>	<b>SD</b>	<b>Test result<sup>b</sup></b>
Age	79.4	5.9	79.7	5.1	t = 0.153, 37 df, p = 0.879
The Cumulative Illness Rating Scale for Geriatrics (CIRS-G)	9.9	4.5	10.5	4.0	t = 0.373, 37 df, p = 0.711
The Suicide Intent Scale <sup>h</sup> (SIS)	14.1	4.1	17.8	4.0	t = 2.788, 35 df, p = 0.009
The Montgomery-Asberg Depression Rating Scale (MADRS)	26.7	5.2	33.0	6.9	t = 3.119, 37 df, p = 0.004
The Brief Scale for Anxiety (BSA)	8.2	3.7	12.3	4.6	t = 2.957, 37 df, p = 0.005
Sense of Coherence <sup>i</sup> (SOC)	133.4	24.2	117.7	16.8	t = 2.324, 35 df, p = 0.026
Mini Mental State Examination <sup>j</sup> (MMSE)	26.5	2.4	24.9	3.5	t = 1.626, 36 df, p = 0.113

<sup>a</sup>Fisher's exact test was used to compare proportions. <sup>b</sup>t-test was used to compare continuous variables. <sup>c</sup>Antidepressant. <sup>d</sup> $\geq 3$  on the MADRS item, reduced sleep. <sup>e</sup> $\geq 3$  in at least one of the CIRS-G somatic organ categories. <sup>f</sup>One item from the Geriatric Depression Scale (GDS). <sup>g</sup>Hanging, cutting, drowning and other violent methods. <sup>h</sup>Missing data for 2 participants. <sup>i</sup>Missing data for 2 participants. <sup>j</sup>Missing data for 1 participant.

## Study IV

Table 8 shows that attempters scored higher on the neuroticism and the extroversion scale compared to comparison subjects. These differences did not remain after adjustment for major depression. While neuroticism and extroversion scores did not differ between suicide attempters and comparison subjects with major depression, attempters with minor depression were less neurotic than comparison subjects with this diagnosis (mean, 6.6 vs. 11.1,  $t = -3.35$ ,  $df = 3$ ,  $p = 0.001$ ). A negative association remained in a multivariate model.

**Table 8.** Mean EPI scores in hospitalized suicide attempters (n=72) and in population comparison subjects (n=288) aged 75 and above

	Cases			Comparison Subjects			Test Results <sup>a</sup>		
	n	mean	(sd)	n	mean	(sd)	t	df	p
<b>Neuroticism</b>									
Men	30	9.0	(4.8)	105	6.9	(4.6)	2.18	135	0.031
Women	42	10.5	(4.2)	179	8.0	(4.7)	3.18	221	0.002
All	72	9.9	(4.5)	288	7.6	(4.7)	3.74	358	<0.000
<b>Extroversion</b>									
Men	30	11.3	(3.6)	105	12.2	(3.1)	-1.27	135	0.206
Women	42	10.5	(3.1)	179	11.9	(3.3)	-2.58	221	0.011
All	72	10.8	(3.3)	288	12.0	(3.3)	-2.76	358	0.006
<b>Lie Scale</b>									
Men	30	3.6	(1.3)	105	3.6	(1.8)	.13	135	0.900
Women	42	3.6	(1.6)	179	4.0	(1.8)	-1.24	221	0.216
All	72	3.6	(1.5)	288	3.8	(1.8)	-.951	358	0.342

<sup>a</sup>t-test

Within the attempter group, characteristics that were associated with high scores on the neuroticism scale were hopelessness, loneliness and major depression. Characteristics associated with low scores on the extroversion scale were a history of psychiatric treatment and major depression.

Table 9 shows results of correlation analyses within the attempter group. There was a moderate correlation between MADRS score and neuroticism. The correlation with extroversion was negative and more modest. This was the case for BSA score as well. Sense of coherence (SOC) showed a moderate negative correlation with neuroticism and a moderate positive correlation for extroversion. Modest negative correlations were observed with neuroticism score for both age at index attempt and for age at first suicide attempt. There were no correlations regarding age and extroversion.

We were unable to show associations between neuroticism and/or extroversion and depression outcomes. Mean baseline neuroticism score was numerically higher in those with suicidal feelings compared to those without these feelings at follow-up, but the small number of participants at follow-up was clearly a limitation.



**Table 9.** Correlations between clinical characteristics and EPI personality traits in hospitalized suicide attempters aged 75 and above (n=72)

Characteristics	Neuroticism		Extroversion	
	r <sup>a</sup>	p	r	p
Montgomery-Asberg Depression Rating Scale (MADRS)	0.61	<0.001	- 0.29	0.015
Brief Scale for Anxiety (BSA)	0.51	<0.001	- 0.25	0.033
Sense of Coherence (SOC)	- 0.51	<0.001	0.54	<0.001
Suicide Intent Scale (SIS)	0.02	0.858	- 0.17	0.162
Cumulative Illness Rating Scale for Geriatrics (CIRS-G)	0.00	0.985	0.16	0.168
Age	- 0.24	0.041	0.05	0.689
Age at first suicide attempt	- 0.31	0.009	0.12	0.308

<sup>a</sup>Spearman's, non-parametric correlation coefficient.

## DISCUSSION

### Strengths

Main strengths of these studies are the high age cut-off for inclusion (70+ and 75+), the prospective design and the use of a population comparison group that rendered it possible to generate risk estimates. Samples in previous waves of our population studies, from which the comparison subjects were drawn, have been shown to be representative of the general population (Skoog, 2004). Other strengths include the face-to-face interview design and the fact that the same psychologist carried out all interviews at baseline and at the one-year follow-up. The psychologist was previously employed as an interviewer in the population studies from which the comparison subjects were drawn, and interrater agreement between the psychologist and the psychiatry research nurses who performed interviews in the population studies was high. Further, the MADRS is a validated and widely used rating scale for the quantification of depressive symptom burden. Both the MADRS and the BSA have been shown to retain clinical relevance for elderly populations (van der Laan et al., 2005). Regarding the prospective part of the study, an important strength is the use of both categorical and dimensional depression outcomes.

### Limitations

Cases were recruited in a hospital setting and some elderly may attempt suicide without seeking hospital care. While comparison subjects were examined during ordinary life circumstances, the attempters were interviewed shortly after a traumatic life event. Further, cases were asked to remember symptoms experienced during the month prior to the attempt, and there was a time lag (median time 11 days) between the attempt and the interview. While it is unlikely that attempters would over report symptoms, it is possible that there was some underreporting, which might result in underestimations of odds ratios for depression. Another consideration is that the prevalence of depression in the control group may be an underestimation as depressed persons would probably be less likely to take part in a population study. Further, prevalence figures for lifetime AUD are most likely underestimated as persons with AUD might be less inclined to take part in research studies or to disclose alcohol problems. One limitation regarding study II is the lack of a internationally recognized instrument for the rating of alcohol-related behaviours. For reasons of study design, we employed the same study protocol as in our longitudinal population studies. These studies were initiated in the sixties, before the introduction of standardized, internationally recognized instruments for the identification of problematic alcohol use. The original protocols were used at each wave of the study, in order to maintain comparability over time. The number of persons in some subgroups is small, which is reflected in large confidence intervals, limiting interpretation of results. The follow-up study was underpowered for some analyses, in particular regarding the one-year outcomes.

In study IV the EPI questionnaire was administered differently in cases and comparison subjects but it is unclear how situational differences in EPI administration might have affected results. The choice of the EPI rather than the more widely-used NEO

Five Factor Model (Costa and McCrae, 1992) can be seen as limitation as only two personality domains are covered by the EPI. Another limitation is that EPI data were available at baseline only.

## **Discussion of findings**

### ***Study I***

To the best of our knowledge, this is the first study on suicide attempters aged 70 and above to present odds ratios associated with a number of sociodemographic factors. While being married was a protective factor, living alone was associated with an almost two-fold increase in odds for suicide attempt. Low education level also predicted attempted suicide, paralleling our findings on completed suicide in late life (Rubenowitz et al., 2001). Over half of the suicide attempters had a history of psychiatric treatment, a proportion somewhat larger than that reported in a study of elders referred to a specialist team (Dennis et al., 2007). Previous psychiatric treatment was a strong predictor of suicide attempt. A previous suicide attempt was associated with an almost 20-fold increase in odds for suicide attempt, a figure not unlike that reported from a Hong Kong based study on suicide attempters aged 65 and above (Tsoh et al., 2005).

Paralleling results from our previous findings regarding completed suicide in late life, and conclusions from a review of the mixed-age literature, dementia was not associated with attempted suicide. This finding contrasts with the results of the hospital-based Hong Kong study. The proportion with major depression among cases was high (69%) in the current study and almost identical to that reported in the Hong Kong study, but proportions in the comparison groups differed somewhat. The proportion of elderly suicide attempters with bipolar disorders in our study (6%) was similar to that observed in our study on completed suicide among elderly in the same catchment area (Waern et al., 2002b) and to that reported from a study on suicide attempters at a geriatric hospital in Japan (Takahashi et al., 1995). Paralleling findings from our study on completed suicide in late life, suicide attempters were more than twice as likely to have minor depression as their counterparts in the general population. Minor depression is associated with significant suffering (Lyness, 2008) and is more prevalent than major depression in elderly general populations (Lyness et al., 1999). One fifth of the non-demented suicide attempters with affective disorders in the current study had psychotic symptoms. We note that the proportion of suicide attempters with psychotic symptoms was similar to that reported from a study on elderly Chinese suicide attempters in Taiwan (Yang et al., 2001). While one study focusing on elderly depressed inpatients did not find an association between psychotic features and attempted suicide (Lykouras et al., 2002), there are both population (Ostling and Skoog, 2002) and clinical (Lyness et al., 1992) studies linking psychotic features and suicidal behaviour in the elderly.

Over half of the depressed suicide attempters reported feelings of hopelessness. We cannot present risk data regarding hopelessness as this was not investigated in the population comparison group. One study (Dennis et al., 2005) used the same GDS item to investigate hopelessness in depressed elderly who were referred to a local spe-

cialist self-harm team and found that those who self-harmed were more apt to report hopelessness than depressed elders with no history of self harm. Perceived loneliness was a predictor of suicide attempt in the current study, mirroring results regarding completed suicide in the catchment area (Rubenowitz et al., 2001). It is notable that the association between loneliness and suicide attempt remained also after adjustment for depression in the current study.

### **Study II**

Using data from multiple sources, we found a ten-fold increase in the odds for suicide attempt in elderly persons with AUD. The association was observed in both sexes. Controlled studies from other settings are lacking for direct comparison. The proportion with AUD among the cases in our study (26%) was similar to the 28% reported from an uncontrolled Finnish study (Suominen et al., 2004a) and was not unlike the 20% reported from a Chinese study on suicide attempters aged over 65 who were admitted to a geropsychiatric unit (Yang et al., 2001). Lower proportions of AUD in elderly hospital-treated suicide attempters have been reported from Australia (Ticehurst et al., 2002), France (Lebret et al., 2006) and Japan (Takahashi et al., 1995) A Taiwan-based study (Liu and Chiu, 2009) examined drinking habit rather than specific disorders, and found that hospital-treated suicide attempters aged 60 and older were more likely to have a habit of drinking than their peers who did not attempt suicide. Regarding completed suicide, rates of AUD vary widely among different geographical settings (Waern, 2010).

Odds ratios associated with AUD were similar in both sexes in our study. While this contrasts somewhat with observations regarding younger populations suggesting that alcohol use may have a less important role in female compared to male suicidal behaviours (Sher, 2006) it was in line with our previous study on completed suicide in late life which was carried out in the same geographical setting (Waern, 2003). Previous suicide attempts were more common among hospital-treated suicide attempters with a history of AUD compared to those without such a history. Half of the cases with AUD had made at least one previous suicide attempt. Those with AUD were younger at the time of the first attempt and AUD was associated with a longer interval between the first attempt and the index attempt. This extends the mid-life findings of Sher and colleagues who reported that the development of suicidal behaviour over time differs in persons with and without AUD (Sher, 2006).

### **Study III**

Two thirds of those with major depression at index attempt no longer fulfilled criteria for this disorder at one-year follow-up, and half of those who had fulfilled DSM-IV research criteria for minor depression at baseline had neither major nor minor depression. While affective psychopathology was significantly reduced, the mean MADRS score at follow-up (11.0) was still above that (6.2) observed in a general population sample with similar mean age (Vercelletto et al., 2002). Severity of depression at baseline predicted non-remission at follow-up, in line with results from a study on sequential treatment of late-life depression (Kok et al., 2009). High anxiety score at baseline

was also associated with non-remission at follow-up. Pre-existing anxiety symptoms have been shown to be independently related to poorer antidepressant treatment response in late-life depression (Cohen et al., 2009). The subjective part of the Suicide Intent Scale predicted non-remission independent of baseline depressive symptoms. In contrast, physical illness burden ratings were identical in those with and without remission. This was somewhat unexpected, as concomitant physical illness has been shown to affect outcome in late life depression (Lyness et al., 2002, Tuma, 2000). As anticipated, SOC at index attempt was low in comparison with a healthy elderly cohort (Wiesmann and Hannich, 2008). Two of the attempters committed suicide during the follow-up period. As Swedish late-life suicide rates are at an intermediate level in an international perspective, we anticipated a proportion more in line with that (13%) observed in the European multicenter study (De Leo et al., 2002b). Six percent of the elderly attempters repeated non-lethal self-harm during the one-year observation period, a figure also lower than the 11.1% reported from the multicenter study. Suicide intent score did not predict repeat attempt in our study. Scores were numerically *higher* in non-repeaters, as was also demonstrated in the European multicenter study (De Leo et al., 2002b). Overall one-year mortality was more than double the population rate, suggesting that elderly who attempt suicide are physically more fragile than their peers. The proportion that died (16%) was however lower than that (24%) previously reported from the British study on 100 attempters aged 65 and above who were referred to geriatric liaison services during 1989-1992 (Hepple and Quinton, 1997).

Paralleling previous findings from our study focusing on completed suicide in the same region (Waern et al., 1996), the proportion who were already prescribed depression treatment at the time of the suicidal act was relatively high. It has been demonstrated that suicidal older people may require adjunctive medication (Szanto et al., 2007b). At follow-up, 87% of all of the participants were on at least one antidepressant. Psychosocial treatments were initiated in over 40% of the cases after the index attempt in the current study. There are several studies, albeit involving somewhat younger cohorts, showing that specific psychotherapies (van Schaik et al., 2007, van Schaik et al., 2006) are useful in the treatment of late-life depression. One study (Heisel et al., 2009) used this method modified for person 60 years and above. The authors concluded that this adapted IPT model was tolerable and safe for this target group. Further, preliminary findings from the latter study indicated a substantial reduction in suicide ideation, death ideation and depressive symptoms.

#### **Study IV**

We examined neuroticism and extroversion in a cohort of “*older*” elderly and found that suicide attempters scored higher on neuroticism and lower on extroversion compared to comparison subjects from the general population. Our study expands on the findings regarding somewhat younger cohorts of suicide attempters (Tsoh et al., 2005, Useda et al., 2004). While results are not directly comparable as the latter two studies used the NEO Five Factor Inventory (Costa and McCrae, 1992), findings may be considered similar. The EPI dimensions of neuroticism and extroversion have been shown to correlate well with the NEO Five Factor traits of neuroticism and extroversion (Heller et al., 2002). As in the Hong Kong study (Tsoh et al., 2005), the rate of

major depression was extremely high, which might help to explain the lack of significant findings once depression was included in the model. The finding that attempters with minor depression were *less* neurotic than comparison subjects with this diagnosis was unexpected and needs to be tested in larger samples.

Within the attempter group we observed a moderate correlation for SOC with both neuroticism and extroversion. Finnish researchers examined personality traits and SOC in a middle-aged population, reporting a very strong association between neuroticism and SOC (Feldt et al., 2007). A modest association between extroversion and SOC was observed in that study, and the authors suggested that SOC could be considered the opposite of neuroticism. A similar conclusion was reached in a mixed-aged (18-65 years) Scottish study suggesting that SOC can be perceived as an indirect measure of neuroticism (Gibson and Cook, 1996). Neither neuroticism nor extroversion were associated with one-year outcomes (depressive symptom burden, suicidal feelings). Lack of power may help to explain these results.

## **SUMMARY OF FINDINGS**

The use of a comparison group from the general population gave us a possibility to identify a number of factors associated with attempted suicide in late life. Our results showed that not only major but also minor depression was associated with suicide attempt. Percieved loneliness was associated with suicide attempt, independent of depression. A lifetime history of alcohol use disorder was strongly related with suicide attempt in both men and women. The prospective design enabled us to follow the attempters for one-year. The prognosis was relatively good. Half of the attempters were free from depression at the follow-up examination. Predictors for non-remission included higher MADRS- and BSA score, higher suicide intent and lower sense of coherence at index attempt. There were relatively few who repeated a fatal/non-fatal suicidal act, however, one-year overall mortality was high. Attempters were more neurotic and less extroverted than comparison subjects.

## IMPLICATIONS

Early detection and effective treatment of depression and problematic alcohol use constitute main targets for the prevention of suicidal behaviours in this vulnerable age group. Further, interventions aimed to enhance social connectedness are required. As many older persons have contact with primary care this could be the arena for specific preventive interventions. However, specific treatment models for suicidal person should also be implemented within the geriatric psychiatry. As elderly might be less likely to communicate depressive mood and maybe even less likely to volunteer suicidal feelings (Gunnell and Frankel, 1994) involving relatives is one way to get information. Frequent revisits for monitoring and support are required both in primary care and mental health services as it has been shown that over a fourth reported non-adherence among older adults who were undergoing antidepressant treatment (Bosworth et al., 2008). Further, it has been demonstrated that some older persons may require adjunctive treatment (Szanto et al., 2007b). As a complement to antidepressant treatment psychosocial counseling is required.



## FUTURE RESEARCH

Studies with larger samples are required in order to expand the findings of these studies and other studies. As the suicide rates in the elderly are much higher for men than for women studies with larger samples are needed in order to detect gender differences regarding suicidal behaviour in old age. Studies focusing interventions for problematic alcohol use among suicidal elderly are required as this problem was strongly associated with attempted suicide. Qualitative studies are needed to deepen the knowledge about how persons in this vulnerable group think, feel and act.

Large, prospective studies are required to guarantee sufficient number of participants in follow-up examinations. Several follow-up examinations are necessary in order to determine which specific treatment elements are sustainable. This could be a possibility in multicenter studies.

Future studies focusing on personality are required to investigate the role of personality in suicidal behaviour in the elderly. A prospective design with long term follow-up could help to understand the role of personality on its own but also how it interacts with other factors.

Elderly who die by suicide represent a heterogenous group. Interventions need to be tailored and tested in different health care settings including primary care and psychiatric services. Community-based interventions that aim to enhance social connectedness in elderly in the general population may also prove to be important suicide prevention strategies.

# POPULÄRVETENSKAPLIG SAMMANFATTNING

## Bakgrund

I Sverige dör omkring 1 500 människor varje år till följd av suicid och cirka 15 000 gör ett suicidförsök. Femton procent av de som dör i suicid är 70 år eller äldre, vilket år 2010 motsvarade 226 personer. I denna åldersgrupp har män tre gånger högre suicidantal än kvinnor, och män över 80 år har de högsta självmordstalen per 100 000 i jämförelse med övriga åldersgrupper och jämfört med kvinnor. Bidragande orsaker till denna könsskillnad kan bland annat vara att män har svårare att hantera förlust av hälsa, förlust av anhöriga samt att män ofta har ett glesare socialt nätverk än kvinnor. Vad beträffar suicidförsökstalen är de lika höga bland män och kvinnor i den här åldersgruppen. Andelen personer som gör suicidförsök är inte lika hög bland äldre som bland yngre åldersgrupper. Möjliga förklaringar till detta kan vara att äldres suicidavsikter är mer genomtänkta och att de ofta använder våldsammare metoder, något som får till följd att de i högre utsträckning än yngre fullbordar självmord. Suicid och suicidförsök är handlingar som är uttryck för den enskildes psykiska, fysiska och sociala belastningar och lidanden. Men suicidhandlingar medför också lidande för människor som finns i den nära omgivningen.

Suicidalt beteende har historiskt sett varit kopplat till ett starkt tabu. På senare tid har dock en större öppenhet i diskussionen kunnat skönjas. Inom psykiatrin, bland frivilligorganisationer, kommuner och landsting, finns idag ett ökat intresse kring frågor som rör suicidproblematik. Vi har fått suicidpreventiva handlingsplaner både på nationell och på regional nivå, och den ökade exponeringen i media leder också till en ökad medvetenhet bland allmänheten. Den största delen av suicidforskningen har dock fokuserat yngre åldersgrupper, medan forskning med fokus på äldre har varit sparsam.

## Studiens syften

Det övergripande syftet med föreliggande studie har varit att öka kunskapen om suicidförsök bland äldre personer (70+) som blivit inlagda på sjukhus i samband med ett suicidförsök. Den första delstudien syftar till att identifiera sociala, psykologiska och psykiatriska kännetecken bland äldre som gjort ett suicidförsök och undersöka hur dessa kännetecken skiljer sig från ett slumpmässigt urval ur befolkningen med samma ålder och kön. I den andra studien är syftet att undersöka livstidsförekomsten av alkoholproblem bland äldre suicidförsökspersoner och jämföra med befolkningen med samma ålder och kön. Syftet med den tredje delstudien är dels att undersöka hur äldre mår ett år efter att de vårdats för suicidförsök med avseende på depressionssymtom, nya suicidala handlingar och överlevnad, dels att undersöka den behandling som erbjudits efter suicidförsöket. Den fjärde och avslutande delstudiens syfte är att undersöka neuroticism och extroversion bland äldre personer som gjort ett suicidförsök och jämföra dessa personlighetsdrag med jämförelsegruppen.

## Studiens genomförande

Ettihundratre personer som var 70 år eller äldre deltog i studien, 56 kvinnor och 47 män med en medelålder på 80 år. De rekryterades från fem sjukhus i Västra Göta-

landsregionen i samband med inläggning efter ett suicidförsök. Antalet deltagare motsvarade sjuttiosju procent av de som var potentiellt möjliga för deltagande i studien. I ettårsuppföljningen deltog 60 personer, 32 kvinnor och 28 män med en medelålder på 81 år. För att kunna undersöka skillnader mellan suicidförsökspersoner och personer från befolkningen valdes en grupp ut slumpmässigt från pågående befolkningsstudier av äldre i Göteborg, Kvinnoundersökningen (KVUS) och Hälsoundersökningen av 70-åringar (H70). Deltagarna i dessa undersökningar har visat sig vara representativa för äldre i befolkningen. Samtliga suicidförsökspersoner intervjuades av samma psykolog, både i samband med suicidförsöket och vid uppföljningen ett år senare. Intervjun innehöll frågor om bakgrundsfaktorer, depressions- och ångestsymtom, tidigare psykiatrisk behandling, tidigare suicidalt beteende, tester av minne, ensamhets- och hopplöshetskänslor, alkoholproblematik, personlighetsdrag, med mera. Frågor om i hur hög utsträckning personerna upplever livet som hanterbart, begripligt och meningsfullt (känsla av sammanhang) ställdes. De flesta frågorna var identiska i de båda intervjuerna och med de som använts i befolkningsstudierna. För att komplettera intervjudata granskades medicinska journaler från primärvård, psykiatri, geriatrik och akutmottagningar. Dödsbevis rekvirerades från Dödsorsaksregistret för identifikation av dödsorsaker. Första intervjun genomfördes i genomsnitt elva dagar efter suicidförsöket och uppföljningsintervjuerna utfördes 391 dagar efter suicidförsöket.

## **Resultat**

### ***Studie I***

Andelen som bodde ensamma samt de som hade låg utbildningsnivå var högre bland suicidförsökspersonerna jämfört med befolkningen. Över hälften hade tidigare i livet erhållit psykiatrisk behandling och en tredjedel hade tidigare vid ett eller flera tillfällen försökt ta sitt liv. Cirka två tredjedelar hade en djupare form av depression vid tiden för suicidförsöket. Motsvarande andel i normalbefolkningen var sex procent. Även mildare depression var vanligare bland de äldre som gjort ett suicidförsök: tjugotre procent jämfört med elva procent i befolkningen. En känsla av ensamhet var vanligare bland suicidförsökspersonerna och sex av tio rapporterade också att de upplevde sin situation som hopplös.

### ***Studie II***

En fjärdedel bland de äldre som gjort ett suicidförsök hade en livstidsförekomst av alkoholproblematik jämfört med fyra procent i kontrollgruppen. Nästan hälften av männen hade eller hade haft denna problematik. Motsvarande siffra i befolkningen var åtta procent. Bland kvinnorna var det elva procent som hade eller haft alkoholproblem jämfört med en procent i befolkningen. Av suicidförsökspersoner med denna problematik hade mer än hälften tidigare gjort ett eller flera suicidförsök. De var också yngre när de gjorde sitt första försök jämfört med de som inte hade eller hade haft problem med alkohol.

### ***Studie III***

Två tredjedelar av de som hade en djup depression vid tiden för suicidförsöket hade inte denna diagnos vid ettårsuppföljningen. De som fortfarande var deprimerade ett

år efter suicidförsöket hade högre depressions- och ångestbörda, högre suicidavsikt samt upplevde en lägre grad av känsla av sammanhang vid tiden för suicidförsöket jämfört med de som inte var deprimerade vid uppföljningen. Sexton personer hade avlidit under året efter suicidförsöket. Två av dessa dödsfall var fullbordade suicid. Sex personer hade gjort ett ytterligare suicidförsök. Ettårsdödligheten var mer än dubbelt så hög i suicidförsöksgruppen jämfört med befolkningen med samma köns- och åldersfördelning. Nästan samtliga av de som deltog i ettårsuppföljningen hade en anti-depressiv medicinerings.

#### **Studie IV**

Personer som gjort ett suicidförsök var mer neurotiska och mindre extroverta jämfört med jämförelsegruppen. Dessa samband försvann när depression togs med i beräkningen. Neuroticism och extroversion hade en stark koppling till depressions- och ångestsymptom samt till en låg känsla av sammanhang.

#### **Sammanfattning**

Depression är en viktig faktor vad beträffar äldre och suicidförsök. Tidig upptäckt av depression och optimal behandling kan reducera suicidalt beteende. Många av de äldre har en kontakt med primärvården, något som gör det möjligt att tidigt upptäcka äldres psykiska ohälsa. Äldre kan vara mindre benägna att rapportera psykiska symptom, varför en noggrann bedömning är viktig. Att involvera anhöriga i bedömningen kan ge värdefull information. Ensamhet är ytterligare en faktor som kan påverka suicidalt beteende, och den sociala situationen måste alltid beaktas. Ytterligare en faktor är alkoholproblem, som var mycket vanliga bland suicidförsökspersonerna. Tidig upptäckt och adekvat behandling av alkoholrelaterade problem blir ytterligare en suicidpreventiv åtgärd. Depression, ensamhet och alkoholproblem är ofta kopplade till varandra.

Prognosen var relativt god i denna grupp. Hälften av de som deltog i uppföljningen var fria från depression ett år efter suicidförsöket, dock var ettårsdödligheten hög. Personlighetsdragen neuroticism och extroversion var kopplat till självmordsförsök. Vissa studier visar att personer med uttalade neurotiska drag har en ökad risk för depression sent i livet. Studier pekar också på att hög neuroticism och låg extroversion är kopplat till suicidalt beteende. Många olika faktorer bör beaktas i suicidpreventivt arbete med äldre för att reducera mänskligt lidande på ålderns höst och för att ge ökade möjligheter till ett meningsfullt åldrande.

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## REFERENCES

- Agargun, M. Y., & Besiroglu, L. (2005). Sleep and suicidality: do sleep disturbances predict suicide risk? *Sleep*, 28(9), 1039-1040.
- Alexopoulos, G. S., Reynolds, C. F., 3rd, Bruce, M. L., Katz, I. R., Raue, P. J., Mulsant, B. H., et al. (2009). Reducing suicidal ideation and depression in older primary care patients: 24-month outcomes of the PROSPECT study. *Am J Psychiatry*, 166(8), 882-890.
- Almeida, O. P., Alfonso, H., Hankey, G. J., & Flicker, L. (2010). Depression, antidepressant use and mortality in later life: the Health In Men Study. *PLoS One*, 5(6), e11266.
- Ancoli-Israel, S., & Cooke, J. R. (2005). Prevalence and comorbidity of insomnia and effect on functioning in elderly populations. *J Am Geriatr Soc*, 53(7 Suppl), S264-271.
- Antonovsky, A. (1987). *Unraveling The Mystery of Health - How People Manage Stress and Stay Well*. San Francisco: Jossey-Bass Publishers.
- Asberg, M., Montgomery, S. A., Perris, C., Schalling, D., & Sedvall, G. (1978). A comprehensive psychopathological rating scale. *Acta Psychiatr Scand Suppl*(271), 5-27.
- Barak, Y., Olmer, A., & Aizenberg, D. (2006). Antidepressants reduce the risk of suicide among elderly depressed patients. *Neuropsychopharmacology*, 31(1), 178-181.
- Beautrais, A. L. (2002). A case control study of suicide and attempted suicide in older adults. *Suicide Life Threat Behav*, 32(1), 1-9.
- Beck, A., Davis, JR, Frederick, CJ, et al. (1972). *Classification and nomenclature. Suicide prevention in the seventies*.
- Beck A.T., R. H. L. P., Lettieri D.J. (Ed.). (1974). *The Prediction of Suicide. Development of suicidal scale*. Bowie, Maryland: Charles Press.
- Beck, R. W., Morris, J. B., & Beck, A. T. (1974). Cross-validation of the Suicidal Intent Scale. *Psychol Rep*, 34(2), 445-446.
- Bergman Levy, T., Barak, Y., Sigler, M., & Aizenberg, D. (2011). Suicide attempts and burden of physical illness among depressed elderly inpatients. *Arch Gerontol Geriatr*, 52(1), 115-117.
- Bertolote JM, F. A. (2009). A global perspective on the magnitude of suicide mortality. In W. C. Wassweman D (Ed.), *The Oxford Textbook of Suicidology and Suicide Prevention: A Global Perspective* (pp. 91-98). Oxford: Oxford University Press.
- Beskow, J. (1979). Suicide in mental disorder in Swedish men. *Acta Psychiatr Scand Suppl* (277), 1-138.
- Beskow, J. (2010). [Let us break the suicide taboo!]. *Lakartidningen*, 107(15), 960-961.
- Bosworth, H. B., Voils, C. I., Potter, G. G., & Steffens, D. C. (2008). The effects of antidepressant medication adherence as well as psychosocial and clinical factors on depression outcome among older adults. *Int J Geriatr Psychiatry*, 23(2), 129-134.
- Brady, J. (2006). The association between alcohol misuse and suicidal behaviour. *Alcohol Alcohol*, 41(5), 473-478.
- Carlsten, A., & Waern, M. (2009). Are sedatives and hypnotics associated with increased suicide risk of suicide in the elderly? *BMC Geriatr*, 9, 20.

- Cattan, M., White, M., Bond, J., & Learmouth, A. (2005). Preventing social isolation and loneliness among older people: a systematic review of health promotion interventions. *Ageing and Society, 25*(01), 41-67.
- Cattell, H. (2000). Suicide in the elderly. *Advances in Psychiatric Treatment, 6*(2), 102.
- Chan, J., Draper, B., & Banerjee, S. (2007). Deliberate self-harm in older adults: a review of the literature from 1995 to 2004. *Int J Geriatr Psychiatry, 22*(8), 720-732.
- Chiu, H. F., Lam, L. C., Pang, A. H., Leung, C. M., & Wong, C. K. (1996). Attempted suicide by Chinese elderly in Hong Kong. *Gen Hosp Psychiatry, 18*(6), 444-447.
- Chiu, H. F., Takahashi, Y., & Suh, G. H. (2003). Elderly suicide prevention in East Asia. *Int J Geriatr Psychiatry, 18*(11), 973-976.
- Chiu, H. F., Yip, P. S., Chi, I., Chan, S., Tsoh, J., Kwan, C. W., et al. (2004). Elderly suicide in Hong Kong--a case-controlled psychological autopsy study. *Acta Psychiatr Scand, 109*(4), 299-305.
- Christensen, K., Doblhammer, G., Rau, R., & Vaupel, J. W. (2009). Ageing populations: the challenges ahead. *The Lancet, 374*(9696), 1196-1208.
- Cohen, A., Gilman, S. E., Houck, P. R., Szanto, K., & Reynolds, C. F., 3rd. (2009). Socioeconomic status and anxiety as predictors of antidepressant treatment response and suicidal ideation in older adults. *Soc Psychiatry Psychiatr Epidemiol, 44*(4), 272-277.
- Conwell, Y., Rotenberg, M., & Caine, E. D. (1990). Completed suicide at age 50 and over. *J Am Geriatr Soc, 38*(6), 640-644.
- Conwell, Y., & Thompson, C. (2008). Suicidal behavior in elders. *Psychiatr Clin North Am, 31*(2), 333-356.
- Corcoran, P., Reulbach, U., Perry, I. J., & Arensman, E. (2010). Suicide and deliberate self harm in older Irish adults. *Int Psychogeriatr, 22*(8), 1327-1336.
- Costa, P. T., & McCrae, R. R. (1992). Revised neo personality inventory (neo pi-r) and neo five-factor inventory (neo-ffi).
- De Leo, D., Padoani, W., Scocco, P., Lie, D., Bille-Brahe, U., Arensman, E., et al. (2001). Attempted and completed suicide in older subjects: results from the WHO/EURO Multi-centre Study of Suicidal Behaviour. *Int J Geriatr Psychiatry, 16*(3), 300-310.
- De Leo, D., Dello Buono, M., & Dwyer, J. (2002a). Suicide among the elderly: the long-term impact of a telephone support and assessment intervention in northern Italy. *Br J Psychiatry, 181*, 226-229.
- De Leo, D., Padoani, W., Lonnqvist, J., Kerkhof, A. J., Bille-Brahe, U., Michel, K., et al. (2002b). Repetition of suicidal behaviour in elderly Europeans: a prospective longitudinal study. *J Affect Disord, 72*(3), 291-295.
- Denning, D. G., Conwell, Y., King, D., & Cox, C. (2000). Method choice, intent, and gender in completed suicide. *Suicide Life Threat Behav, 30*(3), 282-288.
- Dennis, M., Wakefield, P., Molloy, C., Andrews, H., & Friedman, T. (2005). Self-harm in older people with depression: comparison of social factors, life events and symptoms. *Br J Psychiatry, 186*, 538-539.
- Dennis, M. S., Wakefield, P., Molloy, C., Andrews, H., & Friedman, T. (2007). A study of self-harm in older people: mental disorder, social factors and motives. *Aging Ment Health, 11*(5), 520-525.

- Drapeau, A., Boyer, R., & Lesage, A. (2009). The influence of social anchorage on the gender difference in the use of mental health services. *J Behav Health Serv Res*, 36(3), 372-384.
- Duberstein, P. R. (1995). Openness to experience and completed suicide across the second half of life. *Int Psychogeriatr*, 7(2), 183-198.
- Duberstein, P. R., Conwell, Y., Seidlitz, L., Denning, D. G., Cox, C., & Caine, E. D. (2000). Personality traits and suicidal behavior and ideation in depressed inpatients 50 years of age and older. *J Gerontol B Psychol Sci Soc Sci*, 55(1), P18-26.
- Duberstein, P. R., Conwell, Y., Conner, K. R., Eberly, S., & Caine, E. D. (2004). Suicide at 50 years of age and older: perceived physical illness, family discord and financial strain. *Psychol Med*, 34(1), 137-146.
- Duberstein, P. R., Palsson, S. P., Waern, M., & Skoog, I. (2008). Personality and risk for depression in a birth cohort of 70-year-olds followed for 15 years. *Psychol Med*, 38(5), 663-671.
- Erlangsen, A., Jeune, B., Bille-Brahe, U., & Vaupel, J. W. (2004). Loss of partner and suicide risks among oldest old: a population-based register study. *Age and ageing*, 33(4), 378.
- Erlangsen, A., Canudas-Romo, V., & Conwell, Y. (2008a). Increased use of antidepressants and decreasing suicide rates: a population-based study using Danish register data. *Journal of epidemiology and community health*, 62(5), 448.
- Erlangsen, A., Zarit, S. H., & Conwell, Y. (2008b). Hospital-diagnosed dementia and suicide: a longitudinal study using prospective, nationwide register data. *Am J Geriatr Psychiatry*, 16(3), 220-228.
- Eysenck, H. J., Eysenck, S.G.G., (1964). *Manual of the Eysenck Personality Inventory*. London: University of London Press.
- Eysenck, S. B., & Eysenck, H. J. (1964). An Improved Short Questionnaire for the Measurement of Extraversion and Neuroticism. *Life Sci*, 3, 1103-1109.
- Eysenck, H. J., Eysenck, S.G.G., (1975). *Manual of the Eysenck Personality Questionnaire*. London: Hodder and Stoughton Educational.
- Eysenck, H. J. (1981). Personality and psychosomatic diseases. *Act Nerv Super (Praha)*, 23(2), 112-129.
- Fawcett, J., Scheftner, W. A., Fogg, L., Clark, D. C., Young, M. A., Hedeker, D., et al. (1990). Time-related predictors of suicide in major affective disorder. *Am J Psychiatry*, 147(9), 1189-1194.
- Feldt, T., Metsäpelto, R. L., Kinnunen, U., & Pulkkinen, L. (2007). Sense of coherence and five-factor approach to personality. *European psychologist*, 12(3), 165-172.
- Fergusson, D., Doucette, S., Glass, K. C., Shapiro, S., Healy, D., Hebert, P., et al. (2005). Association between suicide attempts and selective serotonin reuptake inhibitors: systematic review of randomised controlled trials. *BMJ*, 330(7488), 396.
- Folstein, M. F., Robins, L. N., & Helzer, J. E. (1983). The Mini-Mental State Examination. *Arch Gen Psychiatry*, 40(7), 812.
- Gibson, L. M., & Cook, M. (1996). Neuroticism and sense of coherence. *Psychological reports*.



- Giron, M. S., Forsell, Y., Bernsten, C., Thorslund, M., Winblad, B., & Fastbom, J. (2002). Sleep problems in a very old population: drug use and clinical correlates. *J Gerontol A Biol Sci Med Sci*, 57(4), M236-240.
- Gunnell, D., & Frankel, S. (1994). Prevention of suicide: aspirations and evidence. *BMJ*, 308(6938), 1227-1233.
- Hamer, M., Bates, C. J., & Mishra, G. D. (2010). Depression, Physical Function, and Risk of Mortality: National Diet and Nutrition Survey in Adults Older Than 65 Years. *Am J Geriatr Psychiatry*.
- Han, B., Gfroerer, J. C., Colliver, J. D., & Penne, M. A. (2009). Substance use disorder among older adults in the United States in 2020. *Addiction*, 104(1), 88-96.
- Harrison, K. E., Dombrowski, A. Y., Morse, J. Q., Houck, P., Schlernitzauer, M., Reynolds, C. F., 3rd, et al. (2010). Alone? Perceived social support and chronic interpersonal difficulties in suicidal elders. *Int Psychogeriatr*, 22(3), 445-454.
- Harriss, L., & Hawton, K. (2005). Suicidal intent in deliberate self-harm and the risk of suicide: the predictive power of the Suicide Intent Scale. *J Affect Disord*, 86(2-3), 225-233.
- Harwood, D. M., Hawton, K., Hope, T., & Jacoby, R. (2000). Suicide in older people: mode of death, demographic factors, and medical contact before death. *Int J Geriatr Psychiatry*, 15(8), 736-743.
- Harwood, D., Hawton, K., Hope, T., & Jacoby, R. (2001). Psychiatric disorder and personality factors associated with suicide in older people: a descriptive and case-control study. *Int J Geriatr Psychiatry*, 16(2), 155-165.
- Harwood, D., Hawton, K., Hope, T., & Jacoby, R. (2006a). Suicide in older people without psychiatric disorder. *Int J Geriatr Psychiatry*, 21(4), 363-367.
- Harwood, D. M., Hawton, K., Hope, T., Harriss, L., & Jacoby, R. (2006b). Life problems and physical illness as risk factors for suicide in older people: a descriptive and case-control study. *Psychol Med*, 36(9), 1265-1274.
- Haw, C., & Hawton, K. (2008). Life problems and deliberate self-harm: associations with gender, age, suicidal intent and psychiatric and personality disorder. *J Affect Disord*, 109(1-2), 139-148.
- Haw, C., Harwood, D., & Hawton, K. (2009). Dementia and suicidal behavior: a review of the literature. *Int Psychogeriatr*, 21(3), 440-453.
- Haw, C., & Hawton, K. (2011). Living alone and deliberate self-harm: a case-control study of characteristics and risk factors. *Soc Psychiatry Psychiatr Epidemiol*, 46(11), 1115-1125.
- Hawgood, J., & De Leo, D. (2008). Anxiety disorders and suicidal behaviour: an update. *Curr Opin Psychiatry*, 21(1), 51-64.
- Hawton, K., & Harriss, L. (2006). Deliberate self-harm in people aged 60 years and over: characteristics and outcome of a 20-year cohort. *Int J Geriatr Psychiatry*, 21(6), 572-581.
- Hawton, K., & van Heeringen, K. (2009). Suicide. *Lancet*, 373(9672), 1372-1381.
- Heisel, M. J., Duberstein, P. R., Talbot, N. L., King, D. A., & Tu, X. M. (2009). Adapting Interpersonal Psychotherapy for Older Adults at Risk for Suicide: Preliminary Findings. *Prof Psychol Res Pr*, 40(2), 156-164.

- Heller, W., Schmidtke, J. I., Nitschke, J. B., Koven, N. S., & Miller, G. A. (2002). States, traits, and symptoms: Investigating the neural correlates of emotion, personality, and psychopathology.
- Hepple, J., & Quinton, C. (1997). One hundred cases of attempted suicide in the elderly. *Br J Psychiatry*, *171*, 42-46.
- Joiner Jr, T. E., & Van Orden, K. A. (2008). The interpersonal-psychological theory of suicidal behavior indicates specific and crucial psychotherapeutic targets. *International Journal of Cognitive Therapy*, *1*(1), 80-89.
- Juurlink, D. N., Mamdani, M. M., Kopp, A., & Redelmeier, D. A. (2006). The risk of suicide with selective serotonin reuptake inhibitors in the elderly. *Am J Psychiatry*, *163*(5), 813-821.
- Kaplan, M. S., McFarland, B. H., Huguet, N., & Newsom, J. T. (2007). Physical illness, functional limitations, and suicide risk: a population-based study. *Am J Orthopsychiatry*, *77*(1), 56-60.
- Kaplan, M. H., N. McFarland, B. Mandle, J. (2011). Factors Associated With Suicide by Firearms Among U.S. Older Adult Men. *Psychology of Men & Masculinity*.
- Kapusta, N. D., Etzersdorfer, E., Krall, C., & Sonneck, G. (2007). Firearm legislation reform in the European Union: impact on firearm availability, firearm suicide and homicide rates in Austria. *Br J Psychiatry*, *191*, 253-257.
- Karlsson, B., Sigstrom, R., Waern, M., Ostling, S., Gustafson, D., & Skoog, I. (2010). The prognosis and incidence of social phobia in an elderly population. A 5-year follow-up. *Acta Psychiatr Scand*, *122*(1), 4-10.
- Kim, Y. R., Choi, K. H., Oh, Y., Lee, H. K., Kweon, Y. S., Lee, C. T., et al. (2011). Elderly suicide attempters by self-poisoning in Korea. *International Psychogeriatrics*, *1*(1), 1-7.
- Kjolseth, I., Ekeberg, O., & Steihaug, S. (2009). "Why do they become vulnerable when faced with the challenges of old age?" Elderly people who committed suicide, described by those who knew them. *Int Psychogeriatr*, *21*(5), 903-912.
- Kok, R. M., Nolen, W. A., & Heeren, T. J. (2009). Outcome of late-life depression after 3 years of sequential treatment. *Acta Psychiatr Scand*, *119*(4), 274-281.
- Lamprecht, H. C., Pakrasi, S., Gash, A., & Swann, A. G. (2005). Deliberate self-harm in older people revisited. *Int J Geriatr Psychiatry*, *20*(11), 1090-1096.
- Langius, A., Bjorvell, H., & Antonovsky, A. (1992). The sense of coherence concept and its relation to personality traits in Swedish samples. *Scandinavian Journal of Caring Sciences*, *6*(3), 165-171.
- Lapierre, S., Boyer, R., Desjardins, S., Dube, M., Lorrain, D., Preville, M., et al. (2011a). Daily hassles, physical illness, and sleep problems in older adults with wishes to die. *Int Psychogeriatr*, 1-10.
- Lapierre, S., Erlangsen, A., Waern, M., De Leo, D., Oyama, H., Scocco, P., et al. (2011b). A systematic review of elderly suicide prevention programs. *Crisis*.
- Lawrence, D., Almeida, O. P., Hulse, G. K., Jablensky, A. V., & Holman, C. D. (2000). Suicide and attempted suicide among older adults in Western Australia. *Psychol Med*, *30*(4), 813-821.
- Lebret, S., Perret-Vaille, E., Mulliez, A., Gerbaud, L., & Jalenques, I. (2006). Elderly suicide attempters: characteristics and outcome. *Int J Geriatr Psychiatry*, *21*(11), 1052-1059.

- Lehtinen, V. (2008). *Building Up Good Mental Health*.
- Licht-Strunk, E., Van Marwijk, H. W., Hoekstra, T., Twisk, J. W., De Haan, M., & Beekman, A. T. (2009). Outcome of depression in later life in primary care: longitudinal cohort study with three years' follow-up. *BMJ*, *338*, a3079.
- Lim, W. S., Rubin, E. H., Coats, M., & Morris, J. C. (2005). Early-stage Alzheimer disease represents increased suicidal risk in relation to later stages. *Alzheimer Dis Assoc Disord*, *19*(4), 214-219.
- Lissner, L., Skoog, I., Andersson, K., Beckman, N., Sundh, V., Waern, M., et al. (2003). Participation bias in longitudinal studies: experience from the Population Study of Women in Gothenburg, Sweden. *Scand J Prim Health Care*, *21*(4), 242-247.
- Liu, I. C., & Chiu, C. H. (2009). Case-control study of suicide attempts in the elderly. *Int Psychogeriatr*, *21*(5), 896-902.
- Lykouras, L., Gournellis, R., Fortos, A., Oulis, P., & Christodoulou, G. N. (2002). Psychotic (delusional) major depression in the elderly and suicidal behaviour. *J Affect Disord*, *69*(1-3), 225-229.
- Lyness, J. M., Conwell, Y., & Nelson, J. C. (1992). Suicide attempts in elderly psychiatric inpatients. *J Am Geriatr Soc*, *40*(4), 320-324.
- Lyness, J. M., King, D. A., Cox, C., Yoediono, Z., & Caine, E. D. (1999). The importance of subsyndromal depression in older primary care patients: prevalence and associated functional disability. *J Am Geriatr Soc*, *47*(6), 647-652.
- Lyness, J. M., Caine, E. D., King, D. A., Conwell, Y., Duberstein, P. R., & Cox, C. (2002). Depressive disorders and symptoms in older primary care patients: one-year outcomes. *Am J Geriatr Psychiatry*, *10*(3), 275-282.
- Lyness, J. M., Heo, M., Datto, C. J., Ten Have, T. R., Katz, I. R., Drayer, R., et al. (2006). Outcomes of minor and subsyndromal depression among elderly patients in primary care settings. *Ann Intern Med*, *144*(7), 496-504.
- Lyness, J. M. (2008). Naturalistic outcomes of minor and subsyndromal depression in older primary care patients. *Int J Geriatr Psychiatry*, *23*(8), 773-781.
- McGirr, A., Renaud, J., Seguin, M., Alda, M., Benkelfat, C., Lesage, A., et al. (2007). An examination of DSM-IV depressive symptoms and risk for suicide completion in major depressive disorder: a psychological autopsy study. *J Affect Disord*, *97*(1-3), 203-209.
- Meeks, T. W., Dunn, L. B., Kim, D. S., Golshan, S., Sewell, D. D., Atkinson, J. H., et al. (2008). Chronic pain and depression among geriatric psychiatry inpatients. *Int J Geriatr Psychiatry*, *23*(6), 637-642.
- Merrill, J., & Owens, J. (1990). Age and attempted suicide. *Acta Psychiatr Scand*, *82*(5), 385-388.
- Miller, M. D., Paradis, C. F., Houck, P. R., Mazumdar, S., Stack, J. A., Rifai, A. H., et al. (1992). Rating chronic medical illness burden in geropsychiatric practice and research: application of the Cumulative Illness Rating Scale. *Psychiatry Res*, *41*(3), 237-248.
- Montgomery, S. A., & Asberg, M. (1979). A new depression scale designed to be sensitive to change. *Br J Psychiatry*, *134*, 382-389.
- Morin, J., Wiktorsson, S., Marlow, T., Olesen, P., Skoog, I., & Waern, M. (2011). Alcohol Use Disorder in Elderly Suicide Attempters: A Comparison Study. *Am J of Ger Psych*, *In press*.

- Murray, C. J., & Lopez, A. D. (1997). Alternative projections of mortality and disability by cause 1990-2020: Global Burden of Disease Study. *Lancet*, 349(9064), 1498-1504.
- Niméus, A., én, M., & Träskman-Bendz, L. (2002). High suicidal intent scores indicate future suicide. *Archives of Suicide Research*, 6(3), 211-219.
- O'Connell, H., Chin, A. V., Cunningham, C., & Lawlor, B. (2003). Alcohol use disorders in elderly people--redefining an age old problem in old age. *BMJ*, 327(7416), 664-667.
- O'Connell, H., Chin, A. V., Cunningham, C., & Lawlor, B. A. (2004a). Recent developments: suicide in older people. *BMJ*, 329(7471), 895-899.
- O'Connell, H., Chin, A. V., Hamilton, F., Cunningham, C., Walsh, J. B., Coakley, D., et al. (2004b). A systematic review of the utility of self-report alcohol screening instruments in the elderly. *Int J Geriatr Psychiatry*, 19(11), 1074-1086.
- Ostling, S., & Skoog, I. (2002). Psychotic symptoms and paranoid ideation in a nondemented population-based sample of the very old. *Arch Gen Psychiatry*, 59(1), 53-59.
- Owens, D., Horrocks, J., & House, A. (2002). Fatal and non-fatal repetition of self-harm. Systematic review. *Br J Psychiatry*, 181, 193-199.
- Oyama, H., Watanabe, N., Ono, Y., Sakashita, T., Takenoshita, Y., Taguchi, M., et al. (2005). Community-based suicide prevention through group activity for the elderly successfully reduced the high suicide rate for females. *Psychiatry Clin Neurosci*, 59(3), 337-344.
- Oyama, H., Watanabe, N., Ono, Y., & Sakashita, T. (2008). [Community-based suicide prevention through group activity for the elderly successfully reduced the high suicide rate for females]. *Seishin Shinkeigaku Zasshi*, 110(9), 731-738.
- Palmer, K., Backman, L., Winblad, B., & Fratiglioni, L. (2003). Detection of Alzheimer's disease and dementia in the preclinical phase: population based cohort study. *BMJ*, 326(7383), 245.
- Pierce, D. (1987). Deliberate self harm in the elderly. *International journal of geriatric psychiatry*, 2(2), 105-110.
- Pompili, M., Innamorati, M., Masotti, V., Personne, F., Lester, D., Di Vittorio, C., et al. (2008). Suicide in the elderly: a psychological autopsy study in a North Italy area (1994-2004). *Am J Geriatr Psychiatry*, 16(9), 727-735.
- Preville, M., Hebert, R., Boyer, R., Bravo, G., & Seguin, M. (2005). Physical health and mental disorder in elderly suicide: a case-control study. *Aging Ment Health*, 9(6), 576-584.
- Rifai, A. H., George, C. J., Stack, J. A., Mann, J. J., & Reynolds, C. F., 3rd. (1994). Hopelessness in suicide attempters after acute treatment of major depression in late life. *Am J Psychiatry*, 151(11), 1687-1690.
- Rubenowitz, E., Waern, M., Wilhelmson, K., & Allebeck, P. (2001). Life events and psychosocial factors in elderly suicides--a case-control study. *Psychol Med*, 31(7), 1193-1202.
- Runeson, B., Tidemalm, D., Dahlin, M., Lichtenstein, P., & Langstrom, N. (2010). Method of attempted suicide as predictor of subsequent successful suicide: national long term cohort study. *BMJ*, 341, c3222.
- SCB. (2011). Statistiska centralbyrån.
- Sher, L. (2006). Alcoholism and suicidal behavior: a clinical overview. *Acta Psychiatr Scand*, 113(1), 13-22.

- Simon, G. E., Savarino, J., Operskalski, B., & Wang, P. S. (2006). Suicide risk during antidepressant treatment. *Am J Psychiatry*, *163*(1), 41-47.
- Sjostrom, N., Waern, M., & Hetta, J. (2007). Nightmares and sleep disturbances in relation to suicidality in suicide attempters. *Sleep*, *30*(1), 91-95.
- Skoog, I., Nilsson, L., Palmertz, B., Andreasson, L. A., & Svanborg, A. (1993). A population-based study of dementia in 85-year-olds. *N Engl J Med*, *328*(3), 153-158.
- Skoog, I., Aevansson, O., Beskow, J., Larsson, L., Palsson, S., Waern, M., et al. (1996). Suicidal feelings in a population sample of nondemented 85-year-olds. *Am J Psychiatry*, *153*(8), 1015-1020.
- Skoog, I. (2004). Psychiatric epidemiology of old age: the H70 study--the NAPE lecture 2003. *Acta Psychiatr Scand*, *109*(1), 4-18.
- Statistics, A. B. o. (2000). *Australien Social Trends 1998*. Canberra Australia: Australien Bureau of Statistics.
- Stefansson, J., Nordstrom, P., & Jokinen, J. (2010). Suicide Intent Scale in the prediction of suicide. *J Affect Disord*.
- Steunenberg, B., Beekman, A. T. F., Deeg, D. J. H., & Kerkhof, A. J. F. M. (2006). Personality and the onset of depression in late life. *Journal of Affective Disorders*, *92*(2-3), 243-251.
- Steunenberg, B., Beekman, A. T., Deeg, D. J., & Kerkhof, A. J. (2010). Personality predicts recurrence of late-life depression. *J Affect Disord*, *123*(1-3), 164-172.
- Suicide. (2004). Suicide. Retrieved 20111117, from Stanford Encyclopedia of Philosophy:
- Suominen, K., Isometsa, E., & Lonnqvist, J. (2004a). Elderly suicide attempters with depression are often diagnosed only after the attempt. *Int J Geriatr Psychiatry*, *19*(1), 35-40.
- Suominen, K., Isometsa, E., Ostamo, A., & Lonnqvist, J. (2004b). Level of suicidal intent predicts overall mortality and suicide after attempted suicide: a 12-year follow-up study. *BMC Psychiatry*, *4*, 11.
- Szanto, K., Reynolds, C. F., 3rd, Conwell, Y., Begley, A. E., & Houck, P. (1998). High levels of hopelessness persist in geriatric patients with remitted depression and a history of attempted suicide. *J Am Geriatr Soc*, *46*(11), 1401-1406.
- Szanto, K., Kalmar, S., Hendin, H., Rihmer, Z., & Mann, J. J. (2007a). A suicide prevention program in a region with a very high suicide rate. *Arch Gen Psychiatry*, *64*(8), 914-920.
- Szanto, K., Mulsant, B. H., Houck, P. R., Dew, M. A., Dombrovski, A., Pollock, B. G., et al. (2007b). Emergence, persistence, and resolution of suicidal ideation during treatment of depression in old age. *J Affect Disord*, *98*(1-2), 153-161.
- Szanto, K., Dombrovski, A. Y., Sahakian, B. J., Mulsant, B. H., Houck, P. R., Reynolds, C. F., et al. (2011). Social Emotion Recognition, Social Functioning, and Attempted Suicide in Late-Life Depression. *American Journal of Geriatric Psych*.
- Takahashi, Y., Hirasawa, H., Koyama, K., Asakawa, O., Kido, M., Onose, H., et al. (1995). Suicide and aging in Japan: an examination of treated elderly suicide attempters. *Int Psychogeriatr*, *7*(2), 239-251.
- Ticehurst, S., Carter, G. L., Clover, K. A., Whyte, I. M., Raymond, J., & Fryer, J. (2002). Elderly patients with deliberate self-poisoning treated in an Australian general hospital. *Int Psychogeriatr*, *14*(1), 97-105.

- Tidemalm, D., Runeson, B., Waern, M., Frisell, T., Carlstrom, E., Lichtenstein, P., et al. (2011). Familial clustering of suicide risk: a total population study of 11.4 million individuals. *Psychol Med*, 1-8.
- Tsoh, J., Chiu, H. F., Duberstein, P. R., Chan, S. S., Chi, I., Yip, P. S., et al. (2005). Attempted suicide in elderly Chinese persons: a multi-group, controlled study. *Am J Geriatr Psychiatry*, 13(7), 562-571.
- Tuma, T. A. (2000). Outcome of hospital-treated depression at 4.5 years. An elderly and a younger adult cohort compared. *Br J Psychiatry*, 176, 224-228.
- Turvey, C. L., Conwell, Y., Jones, M. P., Phillips, C., Simonsick, E., Pearson, J. L., et al. (2002). Risk factors for late-life suicide: a prospective, community-based study. *Am J Geriatr Psychiatry*, 10(4), 398-406.
- Tyrer, P., Owen, R. T., & Cicchetti, D. V. (1984). The brief scale for anxiety: a subdivision of the comprehensive psychopathological rating scale. *J Neurol Neurosurg Psychiatry*, 47(9), 970-975.
- Unutzer, J., Katon, W., Callahan, C. M., Williams, J. W., Jr., Hunkeler, E., Harpole, L., et al. (2002). Collaborative care management of late-life depression in the primary care setting: a randomized controlled trial. *JAMA*, 288(22), 2836-2845.
- Unutzer, J., Tang, L., Oishi, S., Katon, W., Williams, J. W., Jr., Hunkeler, E., et al. (2006). Reducing suicidal ideation in depressed older primary care patients. *J Am Geriatr Soc*, 54(10), 1550-1556.
- Useda, J. D., Duberstein, P. R., Conner, K. R., & Conwell, Y. (2004). Personality and attempted suicide in depressed adults 50 years of age and older: a facet level analysis. *Compr Psychiatry*, 45(5), 353-361.
- Waern, M., Beskow, J., Runeson, B., & Skoog, I. (1996). High rate of antidepressant treatment in elderly people who commit suicide. *BMJ*, 313(7065), 1118.
- Waern, M., Rubenowitz, E., Runeson, B., Skoog, I., Wilhelmson, K., & Allebeck, P. (2002a). Burden of illness and suicide in elderly people: case-control study. *BMJ*, 324(7350), 1355.
- Waern, M., Runeson, B. S., Allebeck, P., Beskow, J., Rubenowitz, E., Skoog, I., et al. (2002b). Mental disorder in elderly suicides: a case-control study. *Am J Psychiatry*, 159(3), 450-455.
- Waern, M. (2003). Alcohol dependence and misuse in elderly suicides. *Alcohol Alcohol*, 38(3), 249-254.
- Waern, M. (2005). Suicides among family members of elderly suicide victims: an exploratory study. *Suicide Life Threat Behav*, 35(3), 356-364.
- Waern, M. (2010). Alcoholism and Suicidal Behavior in the Elderly. In V. A. Sher L. (Ed.), *Suicidal Behavior in Alcohol and Drug Abuse and Dependence*: Nova Science Publishers.
- van der Laan, N. C., Schimmel, A., & Heeren, T. J. (2005). The applicability and the inter-rater reliability of the Comprehensive Psychopathological Rating Scale in an elderly clinical population. *Int J Geriatr Psychiatry*, 20(1), 35-40.
- Van Orden, K. A., Witte, T. K., Cukrowicz, K. C., Braithwaite, S. R., Selby, E. A., & Joiner, T. E., Jr. (2010). The interpersonal theory of suicide. *Psychol Rev*, 117(2), 575-600.

- van Ravesteijn, H., Lucassen, P., & van der Akker, M. (2008). GPs' experiences with loneliness. *Aust Fam Physician*, *37*(11), 973-976.
- van Schaik, A., van Marwijk, H., Ader, H., van Dyck, R., de Haan, M., Penninx, B., et al. (2006). Interpersonal psychotherapy for elderly patients in primary care. *Am J Geriatr Psychiatry*, *14*(9), 777-786.
- van Schaik, D. J., van Marwijk, H. W., Beekman, A. T., de Haan, M., & van Dyck, R. (2007). Interpersonal psychotherapy (IPT) for late-life depression in general practice: uptake and satisfaction by patients, therapists and physicians. *BMC Fam Pract*, *8*, 52.
- Wasserman, D. (2001). A stress-vulnerability model and the development of the suicidal process. In D. Wasserman (Ed.), *Suicide: an unnecessary death* (pp. 13-27). London: Dunitz.
- Vercelletto, M., Martinez, F., Lanier, S., Magne, C., Jaulin, P., & Bourin, M. (2002). Negative symptoms, depression and Alzheimer's disease. *Int J Geriatr Psychiatry*, *17*(4), 383-387.
- Westerhof, G., Bohlmeijer, E., van Beljouw, I., & Pot, A. (2009). Improvement in Personal Meaning Mediates the Effects of a Life Review Intervention on Depressive Symptoms in a Randomized Controlled Trial. *The Gerontologist*.
- WHO. World Health Organisation.
- Wiesmann, U., & Hannich, H. J. (2008). A salutogenic view on subjective well-being in active elderly persons. *Aging Ment Health*, *12*(1), 56-65.
- Wiktorsson, S., Runeson, B., Skoog, I., Ostling, S., & Waern, M. (2010). Attempted suicide in the elderly: characteristics of suicide attempters 70 years and older and a general population comparison group. *Am J Geriatr Psychiatry*, *18*(1), 57-67.
- Wiktorsson, S., Marlow, T., Runeson, B., Skoog, I., & Waern, M. (2011). Prospective cohort study of suicide attempters aged 70 and above: one-year outcomes. *J Affect Disord*, *134*(1-3), 333-340.
- Wojnar, M., Ilgen, M. A., Wojnar, J., McCammon, R. J., Valenstein, M., & Brower, K. J. (2009). Sleep problems and suicidality in the National Comorbidity Survey Replication. *J Psychiatr Res*, *43*(5), 526-531.
- Yang, C. H., Tsai, S. J., Chang, J. W., & Hwang, J. P. (2001). Characteristics of Chinese suicide attempters admitted to a geropsychiatric unit. *Int J Geriatr Psychiatry*, *16*(11), 1033-1036.
- Yesavage, J. A., Brink, T. L., Rose, T. L., Lum, O., Huang, V., Adey, M., et al. (1982). Development and validation of a geriatric depression screening scale: a preliminary report. *J Psychiatr Res*, *17*(1), 37-49.

## APPENDIX A

### THE BRIEF SCALE FOR ANXIETY (Tyrer et al., 1984)

The rating should be based on a clinical interview moving from broadly phrased questions about symptoms to more detailed ones which allow a precise rating of severity. The rater must decide whether the rating lies on the defined scale steps (0, 2, 4, 6) or between them (1, 3, 5) and then report the appropriate number. The items should be rated with regards to the state of the patient over the past week.

1. INNER TENSION - representing feelings of ill defined discomfort, edginess, inner turmoil, mental tension mounting to panic, dread and anguish. Rate according to intensity, frequency, duration and the extent of reassurance called for.
  - 0 Placid. Only fleeting inner tension.
  - 1
  - 2 Occasional feelings of edginess and ill defined discomfort.
  - 3
  - 4 Continuous feelings of inner tension, or intermittent which the individual can only master with some difficulty.
  - 5
  - 6 Unrelenting dread or anguish.
  
2. HOSTILE FEELINGS - representing anger, hostility and aggressive feelings regardless of whether they are acted or not. Rate according to intensity, frequency and the amount of provocation tolerated.
  - 0 Not easily angered.
  - 1
  - 2 Easily angered. Reports hostile feelings which are easily dissipated.
  - 3
  - 4 Reacts to provocation with excessive anger and hostility.
  - 5
  - 6 Persistent anger, rage or intense hatred which is difficult or impossible to control.
  
3. HYPOCHONDRIASIS - representing exaggerated preoccupation or unrealistic worrying about ill health or disease. Distinguish from worrying over trifles and aches and pains.
  - 0 No particular preoccupation with ill health.
  - 1
  - 2 Reacting to minor bodily dysfunction with foreboding. Exaggerated fear of disease.
  - 3
  - 4 Convinced that there is some disease but can be reassured, if only briefly.
  - 5
  - 6 Incapacitating or absurd hypochondriacal convictions (body rotting away, bowels have not worked for months).



4. **WORRYING OVER TRIFLES** - representing apprehension, and undue concerns, which is difficult to stop and out of proportion to the circumstances.
  - 0 No particular worries.
  - 1
  - 2 Undue concern, worrying that can be shaken off.
  - 3
  - 4 Apprehensive and bothered about trifles or minor daily routines.
  - 5
  - 6 Unrelenting and often painful worrying. Reassurance is ineffective.
  
5. **PHOBIAS** - representing feelings of unreasonable fear in specific situations (such as buses, supermarkets, crowds, feeling enclosed, being alone) which are avoided if possible.
  - 0 No phobias.
  - 1
  - 2 Feelings of vague discomfort in particular situations which can be mastered without help or by taking simple precautions like avoiding rush hours when possible.
  - 3
  - 4 Certain situations consistently provoke marked discomfort, and are avoided without impairing social performance.
  - 5
  - 6 Incapacitating phobias which severely restrict activities, for example completely unable to leave home.
  
6. **REDUCED SLEEP** - representing a subjective experience of reduced duration or depth of sleep compared to the subject's own normal pattern when well.
  - 0 Sleeps as usual.
  - 1
  - 2 Slight difficulty dropping off to sleep or slightly reduced, light or fitful sleep.
  - 3
  - 4 Sleep reduced or broken by at least 2 hours.
  - 5
  - 6 Less than two or three hours' sleep.
  
7. **AUTONOMIC DISTURBANCES (reported symptoms)** - representing descriptions of palpitations, breathing difficulties, dizziness, increased sweating, cold hands and feet, dry mouth, indigestion, diarrhoea, frequent micturition. Distinguish from inner tension and aches and pains.
  - 0 No autonomic disturbances.
  - 1
  - 2 Occasional autonomic symptoms which occur under emotional stress.
  - 3
  - 4 Frequent or intense autonomic disturbances which are experienced as discomforting or socially inconvenient.
  - 5
  - 6 Very frequent autonomic disturbances which interrupt other activities or are incapacitating.

8. ACHES AND PAIN - representing reports of bodily discomfort, aches and pains. Rate according to intensity, frequency and duration, and also request for relief. Disregard any symptom of organic cause. Distinguish from hypochondriasis, autonomic disturbance, and muscular tension.
- 0 Absent or transient aches.
  - 1
  - 2 Occasional definite aches and pains.
  - 3
  - 4 Prolonged and inconvenient aches and pains. Requests for effective analgesic.
  - 5
  - 6 Severely interfering or crippling pains.
9. AUTONOMIC DISTURBANCES (observed signs) - representing signs of autonomic dysfunction, hyperventilation or frequent sighing, blushing, sweating, cold hands, enlarged pupils and dry mouth, fainting.
- 0 No observed autonomic disturbances.
  - 1
  - 2 Occasional or slight autonomic disturbances such as blushing or blanching, or sweating under stress.
  - 3
  - 4 Obvious autonomic disturbance on several occasions even when not under stress.
  - 5
  - 6 Autonomic disturbances which disrupt the interview.
10. MUSCULAR TENSION - representing observed muscular tension as shown in facial expression, posture, and movements.
- 0 Appears relaxed.
  - 1
  - 2 Slightly tense face and posture.
  - 3
  - 4 Moderately tense posture and face (easily seen in jaw and neck muscles). Does not seem to find a relaxed position when sitting. Stiff and awkward movements.
  - 5
  - 6 Strikingly tense. Often sits hunched and crouched, or tense and rigidly upright at the edge of the chair.

## APPENDIX B

### SUICIDE INTENT SCALE (SIS) (Beck et al., 1974)

#### OBJECTIVE CIRCUMSTANCES RELATED TO THE SUICIDE ATTEMPT

1. ISOLATION
  - 0 Somebody present
  - 1 Somebody nearby, or in visual or vocal contact
  - 2 No one nearby or in visual or vocal contact
2. TIMING
  - 0 Intervention is probable
  - 1 Intervention is not likely
  - 2 Intervention is highly unlikely
3. PRECAUTIONS AGAINST DISCOVERY/INTERVENTION
  - 0 No precautions
  - 1 Passive precautions (as avoiding other but doing nothing to prevent their intervention; alone in room with unlocked door)
  - 2 Active precautions (as locked door)
4. ACTING TO GET HELP DURING/AFTER ATTEMPT
  - 0 Notified potential helper regarding attempt
  - 1 Contacted but did not specifically notify potential helper regarding attempt
  - 2 Did not contact or notify potential helper
5. FINAL ACTS IN ANTICIPATION OF DEATH (WILL, GIFTS, INSURANCE)
  - 0 None
  - 1 Thought about or made some arrangements
  - 2 Made definite plans or completed arrangements
6. ACTIVE PREPARATION FOR ATTEMPT
  - 0 None
  - 1 Minimal to moderate
  - 2 Extensive
7. SUICIDE NOTE
  - 0 Absence of note
  - 1 Note written, but torn up; note thought about
  - 2 Presence of note
8. OVERT COMMUNICATION OF INTENT BEFORE THE ATTEMPT
  - 0 None
  - 1 Equivocal communication
  - 2 Unequivocal communication

## SELF REPORT

### 9. ALLEGED PURPOSE OF ATTEMPT

- 0 To manipulate environment, get attention, get revenge
- 1 Components of above and below
- 2 To escape, surcease, solve problems

### 10. EXPECTATIONS OF FATALITY

- 0 Thought that death was unlikely
- 1 Thought that death was possible but not probable
- 2 Thought that death was probable or certain

### 11. CONCEPTION OF METHOD'S LETHALITY

- 0 Did less to self than she/he thought would be lethal
- 1 Wasn't sure if what she/he did would be lethal
- 2 Equaled or exceeded what she/he thought would be lethal

### 12. SERIOUSNESS OF ATTEMPT

- 0 Did no seriously attempt to end life
- 1 Uncertain about seriousness to end life
- 2 Seriously attempted to end life

### 13. ATTITUDE TOWARD LIVING/DYING

- 0 Did not want to die
- 1 Components of above and below
- 2 Wanted to die

### 14. CONCEPTION OF MEDICAL RESCUABILITY

- 0 Thought that death would be unlikely if he received medical attention
- 1 Was uncertain whether death could be averted by medical attention
- 2 Was certain of death even if he received medical attention

### 15. DEGREE OF PREMEDITATION

- 0 None; impulsive
- 1 Suicide contemplated for three hours of less prior to attempt
- 2 Suicide contemplated for more than three hours prior to attempt

## APPENDIX C

### THE CUMULATIVE ILLNESS RATING SCALE FOR GERIATRICS (CIRS - G) (Miller et al., 1992)

#### ***General Rating Strategy***

- 0 No problem
- 1 Current mild problem or past significant problem
- 2 Moderate disability or morbidity/ requires “first line” therapy
- 3 Severe/ constant significant disability/ “uncontrollable” chronic problems
- 4 Extremely severe/ immediate treatment required/ end organ failure/ severe impairment in function

#### ***Psychiatric Rating Strategy***

- 0 No psychiatric problem or history thereof
- 1 Minor psychiatric condition or history thereof. Specifically: previous outpatient mental health treatment during a crisis / outpatient treatment for depression > 10 years ago / current usage of minor tranquilizers for episodic anxiety (occasional usage) mild early dementia
- 2 A history of major depression (by DSM III-R\*) within the past 10 years (treated or untreated) / mild dementia / any previous psychiatric hospitalization / any psychotic episode / substance abuse history >10 years ago
- 3 Currently meets DSM III-R\* criteria for major depression or two or more episodes of major depression in the past 10 years / moderate dementia / current use of daily antianxiety medication / currently meets DSM III-R\* criteria for substance abuse or dependence / requires daily antipsychotic medication
- 4 Current mental illness requiring psychiatric hospitalization, institutionalization, or intensive outpatient management, e.g. patient with severe or suicidal depression, acute psychosis or psychotic decompensation, severe agitation from dementia, severe substance abuse etc. / severe dementia

\*DSM-III-R was used for diagnosis of dementia in the current study

\*DSM- IV was used for diagnoses of major and minor depression and alcohol use disorders

