# Social phobia among the elderly

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# ABSTRACT

**Background:** Social phobia is common and often associated with impairment in daily activities and reduced quality of life. Comorbidity with depression and other anxiety disorders is not unusual in social phobia. Few studies have examined social phobia in elderly populations.

**Methods:** The study samples were derived from the Prospective Population Study of Women (PPSW) and from the H70, the H75 and the H85 birth cohort studies in Gothenburg, Sweden. All study samples comprised a general population sample of non-demented elderly, above age 70. The procedures were identical with a semi-structured psychiatric examination including the Comprehensive Psychopathological Rating Scale (CPRS), and the Mini International Neuropsychiatric Interview (MINI-D). Social phobia was diagnosed according to the DSM-IV criteria. Personality traits were assessed with the Eysenck Personality Inventory (EPI). Cognitive function was measured with the Mini-Mental State Examination (MMSE), and a battery of eight different psychometric tests.

**Results:** The prevalence of social phobia in 70-95 year-olds varied between 1.9% and 3.5% depending on how the DSM-IV diagnostic components were applied. Almost half of those diagnosed with social phobia at baseline had no longer social fears at 5-year follow-up. Individuals with social phobia more often had minor or major depression, and scored higher on neuroticism and lower on extraversion compared to individuals without symptoms of social phobia. Comorbidity between social phobia and depression was associated with higher neuroticism and lower extraversion. Individuals with social phobia more often reported concentration difficulties and indecisiveness compared to individuals with no symptoms of social phobia.

**Conclusion:** Our results indicate that the DSM-IV criteria might exclude a large group of individuals with clinically significant social phobia, and that social phobia has a good prognosis of spontaneous recovery. Neuroticism and extraversion may be important etiological factors for social phobia in old age. Furthermore, these personality characteristics may be one reason for the high comorbidity between social phobia and depression among the elderly. We found that those with social phobia more often had subjective cognitive complaints and poorer interviewer-rated memory. On the other hand, the association between social phobia and cognitive test performance was relatively minor.



**Keywords**: Social phobia, epidemiology, elderly

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# SAMMANFATTNING PÅ SVENSKA

**Bakgrund:** Social fobi är ett av de vanligaste psykiatriska tillstånden och är associerat med både nedsatt funktion av aktiviteter i dagligt liv och reducerad livskvalitet. Det är vanligt att personer med social fobi samtidigt lider av depression och andra ångestsjukdomar. Få studier har undersökt social fobi i den äldre befolkningen. Syftet med denna avhandling är att studera social fobi i den äldre befolkningen med fokus på förekomst, prognos, samsjuklighet, personlighet och kognitiv funktion.

**Metod:** Urvalen kommer från Kvinnoundersökningen, H70-, H75- och H85-studierna i Göteborg. Alla urval kom från en allmän population av icke-demenita äldre, över 70 år. Identiska undersökningsprocedurer och bedömningsinstrument användes i alla studier. Dessa utgjordes av en semistrukturerad psykiatrisk intervju som inkluderade Comprehensive Psychopathological Rating Scale (CPRS) och Mini-International Neuropsychiatric Interview (MINI-D). Psykiatriska diagnoser ställdes enligt DSM-IV. Personlighetsdrag bedömdes enligt Eysenck Personality Inventory. Kognitiv funktion mättes med Mini-Mental State Examination (MMSE) och ett batteri bestående av åtta olika psykometriska tester.

**Resultat:** Förekomsten av social fobi varierade mellan 1,9% och 3,5% beroende av hur de diagnostiska kriterierna applicerades. Nära hälften av de med social fobi vid första undersökningen var fria från sociala rädslor vid uppföljningen fem år senare. De med social fobi hade oftare depression och en högre grad av neuroticism och en lägre grad av extraversion. Samsjuklighet mellan social fobi och depression var associerat med högre neuroticism och lägre extraversion. Individer med social fobi rapporterade oftare koncentrationssvårigheter och obeslutsamhet jämfört med de utan symtom på social fobi.

**Konklusion:** Våra resultat tyder på att DSM-IV kriterierna exkluderar en stor andel med kliniskt relevant social fobi men också att personer med social fobi har en god prognos med stor chans tillfriskna spontant. Neuroticism och extraversion kan vara betydelsefulla förklarande faktorer till social fobi i äldre åldrar. Vidare kan dessa personlighetsdrag vara en förklaring till den höga samsjukligheten mellan social fobi och depression bland äldre. Vi fann att de med social fobi oftare hade subjektiva kognitiva problem, däremot var sambandet mellan social fobi kognitiv funktion mätt med psykometriska tester svagt.

# LIST OF PAPERS

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

I. Karlsson B, Klenfeldt IF, Sigstrom R, Waern M, Ostling S, Gustafson D, Skoog I. *Prevalence of social phobia in non-demented elderly from a Swedish population study*. American Journal of Geriatric Psychiatry 2009, *17*:127-135.

II. Karlsson B, Sigstrom R, Waern M, Ostling S, Gustafson D, Skoog I. *The prognosis and incidence of social phobia in an elderly population. A 5-year follow-up.* Acta Psychiatrica Scandinavica. 2010 Jul;122(1):4-10.

III. Karlsson B, Ostling S, Waern M, Skoog I. *The prevalence of social phobia and depression and its relation to personality traits in 75- and 85-year olds without dementia.* (Manuscript)

IV. Karlsson B, Johansson B, Ostling S, Waern M, Skoog I. *Social phobia in relation to cognitive functioning in 75- and 85-year olds without dementia.* (Manuscript).

# CONTENT

# ABBREVIATIONS

| | |
|---|---|
| CBT | Cognitive Behavioral Therapy |
| CI | Confidence Interval |
| CPRS | Comprehensive Psychopathological Rating Scale |
| DSM | Diagnostic and Statistical Manual of Mental Disorders |
| EPI | Eysenck Personality Inventory |
| fMRI | Functional Magnetic Resonance Imaging |
| GAF | Global Assessment of Functioning |
| ICD | International Statistical Classification of Diseases and Related Health Problems |
| MRI | Magnetic Resonance Imaging |
| MINI-D | Mini-International Neuropsychiatric Interview |
| MMSE | Mini Mental State Examination |
| OR | Odds Ratio |
| PET | Positron Emission Tomography |

# 1 BACKGROUND

Social phobia is classified as an anxiety disorder, and is one of the most common psychiatric disorders [1, 2], and the most common anxiety disorder [3]. Anxiety disorders include several different psychiatric conditions denoted by pathological fear and anxiety. Fear and anxiety are appropriate reactions in stressful situations. An anxiety disorder on the other hand could be considered as a maladaptive reaction to a stressful stimulus. Anxiety and fear trigger an activation of the autonomic nervous system giving rise to several physiological symptoms such as palpitations, sweating, trembling and/or shaking. The anxiety reaction is also distinguished by several cognitive symptoms such as fear of dying, fear of losing control, derealization or depersonalization [4].

## 1.1 Description of the diagnosis

Social phobia is described in both the Diagnostic and Statistical Manual of Mental Disorders (DSM) [5] and the International Statistical Classification of Diseases and Related Health Problems (ICD) [6] diagnostic systems, DSM criteria are the most widely used in epidemiological settings. Social phobia, also called social anxiety disorder, is defined in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) as a "marked and persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar people or possible scrutiny by others" [7]. Thus, the core symptom of the condition is a fear of negative evaluation or potential criticism that is often accompanied by physical symptoms such as blushing, sweating, increased heart rate, trembling, nausea and difficulty talking. Social phobia can be restricted to a single social situation that may imply critical evaluation or judgment by others, such as speaking in front of an audience or eating at a restaurant, but often it encompasses a broad spectrum of social situations. The fears can be categorized based on type of social situation. A common distinction is between performance situations, for instance speaking in front of an audience, and interactional situations, for instance initiating a conversation [8].

The demarcation line between shyness and social phobia is not distinct. Rather, anxiety in social situations reflects a continuum with shyness on the one end and social phobia on the other end [9]. An important feature that theoretically distinguishes social phobia from shyness is that social phobia

interferes significantly with the person's normal routines (occupational functioning, social activities or relationships) and that situations are avoided or endured with intense anxiety. This cannot be regarded as a normal personality trait and a diagnosis of social phobia is likely [3].

Avoidant personality disorder is a condition closely related to social phobia. It is defined in DSM-IV as a "widespread pattern of inhibition around people, feeling inadequate and being very sensitive to being evaluated negatively" [7]. The boundaries between social phobia and avoidant personality disorders are not clear, and DSM-IV acknowledge that they may be different conceptualizations of the same or similar conditions [7].

## 1.2 Historical perspective

The word phobia origins from the Greek word phobos meaning fear or morbid fear. Early descriptions of phobias date back to Hippocrates, but it was first in the 19th to the 20th centuries the word acquired its present meaning, i.e. a fear that is out of proportion to the perceived threat [10]. Phobias were classified as separate diagnostic entities for the first time in the 1950s and in the 1960s social phobia was recognized as a diagnosis separate from other phobias by Isaac Marks [11].

In 1980 social phobia was included in the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III). When first introduced in DSM-III, social phobia was described as a fear of scrutiny in separate social situations [12]. Individuals fearing multiple social situations were in this system considered having avoidant personality disorder. DSM-III-R introduced a broader definition of social phobia, and also included a generalized subtype where the individual fears most social situations [13]. In DSM-III-R, and later editions of DSM, avoidant personality disorder was not considered an exclusion criterion for social phobia.

## 1.3 Subtypes of social phobia

DSM-III-R introduced a generalized subtype of social phobia which was kept in DSM-IV [7]. Individuals not included in the generalized subtype are commonly referred to as having non-generalized, discrete, circumscribed, limited or specific social phobia [14]. The non-generalized subtype of social phobia constitute a heterogeneous group, including both individuals fearing one social situation and those fearing several, but not most, social situations [15]. Several studies have tried to define distinct categories of social phobia

subtypes based on number of fears and type of fears [16-21]. Research in this field has not been able to, in a meaningful way, identify subtypes of social phobia based on type of fear, i.e. performance versus interactional situations. The general conclusion is that social phobia is best described as a continuum of severity where increasing number of social fears is associated with more social and functional disability [16-18, 20, 21].

The comorbidity between social phobia and avoidant personality disorder is high [22], especially for the generalized subtype of social phobia [23]. The high comorbidity has been explained as an artifact due to overlapping diagnostic criteria [24]. There appears to be more differences between non-generalized social phobia and generalized social phobia than between generalized social phobia and avoidant personality disorder regarding impairment [25]. Social phobia and avoidant personality disorder have been suggested to exist on a continuum or that they are different conceptualizations of the same disorder [26, 27]. It has been hypothesized that the co-occurrence of the two conditions reflects shared etiological factors [28]. This view is supported by a population-based twin study which found the genetic risk factors for social phobia and avoidant personality disorder to be identical [29]. A recent review conclude that social phobia and avoidant personality disorder appear to be the same disorder since the two conditions have the same symptoms, respond to the same treatment and share the same genetic risk factors [23].

## 1.4 Epidemiology of social phobia

### 1.4.1 Prevalence

The introduction of social phobia in DSM-III [12] has generated numerous studies examining its prevalence. The lifetime prevalence estimates of social phobia vary considerably between studies, from 0.5%-52.7% [1, 2, 30-64]. However, most studies report a lifetime prevalence of 2%-13%. The variance could in part be attributed to methodological differences. Studies using DSM-III tend to report lower prevalence compared to studies using DSM-III-R or DSM-IV. There are also indications of geographical variances. Studies conducted in eastern countries (i.e. Asia and the Middle East) report lower prevalence compared to studies conducted in western countries (i.e. North America, Europe and Australia). If this reflects actual cultural variations is not clear [65], there are conflicting findings within regions. In Iran for instance, one study [57] found a point-prevalence of 10.1% and another found a lifetime prevalence of 0.8% [51]. In the USA the prevalence was substantially lower in the Epidemiological Catchment Area study (ECA) [54]

compared to the National Comorbidity Survey Replication (NCS) [2] and National Comorbidity Survey Replication (NCS-R) [66] studies. This indicates that there are methodological sources for the variation in the prevalence estimates of social phobia.

### 1.4.2 Age

Point prevalence estimates of social phobia in populations above 65 years range from 0.1%-2.8% (table 1) [43, 67-70]. Lifetime prevalence of social phobia in populations above 55 years has been estimated to 4.9%-6.6% [66, 68, 71, 72]. While few studies have examined the prevalence of social phobia with a focus on the elderly, there is some evidence that the prevalence may be lower in old age compared to younger age groups [43, 51, 58, 66-69, 71, 73-75]. In the NCS-R the lifetime prevalence of social phobia was 12.1% in the total sample and 6.6% in those aged 60 years and above [66]. The 12-month prevalence of social phobia in the NCS-R was 5.1% in the age group 55-64 years, 3.1% in the ages 65-74, and 1.5% in the ages 75-84, there were no cases of social phobia in the population above the age of 85 years [74]. Other studies confirm the pattern of social phobia as less common with increasing age [43, 51, 72].

**Table 1.** Prevalence of social phobia in elderly populations.

| Location/study | Age | Prevalence (%) | | | Prevalence period | Diagnostic criteria | Assessment | N | Reference |
|---|---|---|---|---|---|---|---|---|---|
| | | Women | Men | Total | | | | | |
| Turkey | Over 65 | 3.8 | 1.8 | 2.8 | Point | DSM-IV | SCID-I | 462 | Kirmizioglu [43] |
| France | Over 65 | 1.5 | 0.9 | 1.2 | Point | DSM-IV | MINI-D | 1863 | Ritchie [68] |
| Australia | Over 65 | - | - | 0.1 | Point | DSM-IV | CIDI | 1792 | Trollor [67] |
| Sweden | Over 70 | - | - | 1.9 | Point | DSM-IV | MINI-D | 914 | Karlsson [70] |
| Canada | Over 55 | - | - | 1.3 | 12-month | DSM-IV | WMH-CIDI | 12792 | Cairney [72] |
| United States | Over 55 | - | - | 3.5 | 12-month | DSM-IV | WMH-CIDI | 2575 | Byers [74] |
| United States | Over 55 | - | - | 2.1 | 12-month | DSM-IV | WMH-CIDI | 837 | Ford [71] |

### 1.4.3 Age of onset

Most studies reporting age of onset for social phobia rely on retrospective data. In these studies social phobia is reported to have an early age of onset [50, 66], and most often debuting in younger ages compared to other anxiety disorders and mood disorders [76-78]. Social phobia often begins in childhood or early adolescence, with the large majority of cases experiencing onset before the age of 20 to 25 years [34, 54, 61, 66, 79]. Also studies conducted in older populations, over the age of 55 or 65 years, report an early age of onset, based on retrospective data [68, 72, 80]. The median first onset of social phobia is often found to be in the age of 15-17 years. In one study the median age of onset was found to be at 27 years, but when measuring first symptoms the mean age of onset was at 15.5 years [36]. Onset of social phobia after the age of 25 years is thought to be rare, and to occur secondary to another mental disorder such as depression, a psychotic disorder, or an eating disorder [36, 61]. It has been suggested that individuals with late onset of social phobia have fears early in life that do not meet the criteria for social phobia until later in life [81].

### 1.4.4 Incidence

The incidence rate of social phobia in longitudinal population studies has been estimated to range from 4-9 per 1000 person-years [79, 81-83]. In studies where age was reported, the incidence rate was highest from 10 to 19 years of age [79]. Few studies have examined factors related to onset of social phobia. A consistent finding is that low education and psychiatric history (including major depression, dysthymia, other phobias and panic disorder) appear to be important risk factors for developing social phobia [81-83]. To never have been married and female gender were factors associated with increased risk for onset of social phobia in one study [82], but not in two others [81, 83]. Childhood trauma, parental psychiatric history and personality factors such as low self-esteem and low mastery were identified as risk indicators for onset of social phobia in the Dutch NEMESIS study [83].

### 1.4.5 Prognosis

Retrospective population studies report that social phobia has a chronic course with an average duration of 19-29 years [34, 84, 85], although spontaneous recovery occurred in 38% in one study [84]. Early age of onset and increasing number of situations feared have been related to lower recovery rate [16, 84].

Prospective clinical studies have shown that social phobia has a chronic course with a low recovery rate [86-90]. In one study where patients were followed for ten years, the cumulative recovery rate for social phobia was 35%. This was lower than for panic disorder with agoraphobia (42%), generalized anxiety disorder (50%), major depressive episode (72%), and panic disorder without agoraphobia (82%) [91]. When followed for 12 years, patients with social phobia had lower chance of recovery and a higher risk of recurrence if they also had comorbid generalized anxiety disorder [87]. In a prospective study of primary-care patients, longer duration of social phobia episode and comorbid panic disorder with agoraphobia were associated with lower rates of recovery [92]. Also comorbidity with avoidant personality disorder has been associated with a lower likelihood of recovery from social phobia in clinical samples [93].

In contrast to findings from retrospective population studies and prospective clinical studies, data from longitudinal population studies suggest that social phobia has a better prognosis of spontaneous recovery and that the diagnosis is not stable over time [79, 94-98]. In the Zürich Study for instance, the participants were interviewed four times during a 10-year period, 11.8% met the criteria for social phobia and/or agoraphobia on at least one occasion. No subject met the criteria for social phobia or agoraphobia on all occasions, and only three met the criteria on two occasions [95]. Several factors have been studied in relation to the prognosis of social phobia. Early age of onset, comorbidity with depression and anxiety disorders and unemployment have been identified as predictors for persistent social phobia in several studies [34, 94, 96, 98]. Also generalized social phobia and being widowed, separated or divorced predicted persistent social phobia [96], whereas high education predicted higher recovery rate from social phobia [34]. Social phobia may also be associated with an increased risk of developing other psychiatric conditions or a worse prognosis of comorbid disorders. Findings from a community study with a four-year follow-up showed that social phobia at baseline was associated with an increased risk for major depressive disorder at follow-up [99]. Furthermore, comorbid social phobia has been associated with worse prognosis of depression [100]. To date there are only few longitudinal population studies on social phobia, and none focus on elderly populations.

### 1.4.6 Gender

While most epidemiological studies report that social phobia is more common among women than among men [2, 3, 40, 54], few studies have focused on gender differences regarding course, symptom presentation and

patterns of comorbidity. It has been found that women have an earlier age of onset [101], and report more intense fears [102]. In one longitudinal clinical study, women more often had comorbid anxiety disorders and men more often had comorbid substance use disorders but no gender differences were found regarding the prognosis of social phobia [103]. In a cross-sectional study, men were more likely to also have an alcohol or drug abuse, a conduct disorder or to use alcohol to relieve symptoms [104]. In the same study, women reported a greater number of feared situations and were more likely to have a comorbid anxiety or mood disorder. There were no gender differences regarding treatment seeking, but women seeking treatment were more likely to receive prescription for pharmacological treatment [104].

### 1.4.7 Sociodemographic correlates

In most population studies social phobia is associated with being unmarried [50, 54, 62, 95, 105], but not in all [40]. The prevalence of social phobia does not seem to differ between urban and rural areas [32, 40, 42, 53]. Social phobia has consistently been associated with lower educational level in several epidemiological studies comprising both general population samples [40, 50, 54, 62, 105] and elderly population samples [72]. Income is most often reported to be lower among individuals with social phobia [34, 50, 62, 105], but there are exceptions to this finding [72]. Results regarding occupational social class are conflicting. Some studies report that social phobia is related to lower socioeconomic status [54], and that the prevalence of social phobia is higher among unemployed [50, 62]. While no study reports opposite findings, several studies find no association between social phobia and occupational social class [40, 56, 57].

### 1.4.8 Comorbidity

Population based studies consistently find that comorbidity between social phobia and other psychiatric disorders are common. Between 52%-92% of individuals with social phobia in the general population also meet the criteria for at least one other psychiatric disorder [1, 36, 50, 54, 106-109]. Several studies indicate that comorbidity is common also in old age [72, 110-112].

The most common comorbid conditions in social phobia include major depression [1, 36, 50, 54, 113, 114] and anxiety disorders [1, 36, 50, 54, 115]. In addition, alcohol use [116-118] and substance use [119-121] disorder frequently coexist with social phobia. In population samples, between 20%-40% [36, 50, 122] of those with social phobia also meet the criteria for major depression, between 38%-57% [33, 50, 122] meet the criteria for at least one other anxiety disorder, and 40%-46% meet the criteria for any substance use

disorder [33, 50]. Population studies using retrospective data find that social phobia in most cases precedes the onset of major depression [114, 123, 124]. This is in coherence with findings from prospective population studies [79]. The same temporal association has been found for social phobia and alcohol and cannabis dependence [125].

Social phobia is a common comorbidity among individuals with bipolar disorder. In a population sample, almost 50% of those with bipolar disorder also met the criteria for social phobia [114], and in a clinical sample comprising bipolar patients, social phobia was the most common comorbid anxiety disorder [126]. Comorbid social phobia in patients with bipolar disorder has been associated with poorer prognosis, more severe illness and a history of suicide attempts [126-128].

Among individuals with social phobia, between 22%-89% also met the criteria for avoidant personality disorder [33, 129-134]. Data from clinical studies indicate that those with both social phobia and avoidant personality disorder report greater fear in social situations, greater social dysfunction and higher degree of comorbidity with depression compared to those with social phobia without avoidant personality disorder [26, 135]. A prospective clinical study found that those with both social phobia and avoidant personality disorder at baseline were less likely to recover from social phobia at the seven-year follow-up compared to those with only social phobia at baseline [136]. However, another paper based on data from the same prospective study found no differences in the remission rates at the two-year follow-up [27].

## 1.5 Personality traits

Personality is defined as characteristics stable over time that influence an individual's thinking, emotions and interpersonal relations [137], and is often described in terms of factors or dimensions. Most concepts of personality include dimensions of extraversion and neuroticism. Extraversion is characterized by a proneness to experience positive emotions, to be energetic and sociable. Neuroticism is characterized by a proneness to experience negative emotions, feelings of anxiety and anger. A consistent finding in population based studies and in clinical samples is that social phobia and depression are related to high scores on neuroticism [138-142]. In addition, social phobia and depression are often reported to be related to lower scores on extraversion [143, 144]. Comorbidity between social phobia and depression is high [1, 50], and neuroticism has been suggested to partly explain this finding in younger samples [139, 145].

## 1.6 Cognitive function

There is a lack of knowledge on the relationship between social phobia and cognitive functioning in elderly populations. One study found no association with global cognitive function based on MMSE score [146]. However, MMSE is not sensitive enough to measure subtle cognitive deficits and provides no detailed information about specific cognitive domains. Research on cognitive functioning in social phobia has mainly been conducted in younger patients, with mixed findings [147]. A recent systematic review reported that social phobia in younger age groups consistently was associated with reduced visuospatial ability, but not with verbal memory or executive function. The results regarding attention were inconsistent [147]. One population study including individuals aged 20-64 years found that social phobia was associated with impaired episodic memory, but not with verbal fluency, psychomotor speed or executive function [148]. It has been reported that patients with social phobia remember more social threat words than neutral words, whereas there were no differences in a control group. In addition, individuals with social phobia had worse working memory capacity regarding neutral words compared to the control group [149].

## 1.7 Genetic and neuroimaging findings

Social phobia is known to aggregate in families [150]. This has led to the conclusion that there might be a genetic basis for this disorder. In a genome-wide linkage scan evidence was found for a risk locus on chromosome 16 [151]. Some candidate genes associated with social phobia are to be found in the risk locus on chromosome 16. One of them is a norepinephrine transporter that acts as a reuptaker of nor-epinephrine and dopamine into the presynaptic terminal.

Neuroimaging techniques make it possibility to study the brain in vivo regarding morphology, volume and function. Magnetic Resonance Imaging (MRI) is used to study brain morphology and volume. Functional Magnetic Resonance Imaging (fMRI) and Positron Emission Tomography (PET) are used to study brain function. Studies using fMRI or PET show an abnormal activity in amygdala and insula among individuals with social phobia. This suggests that these areas are involved in the pathophysiology of social phobia [152, 153]. One study using MRI [154] found that the size of both amygdala and hippocampus was reduced in cases with social phobia compared to healthy controls. Additionally, this study showed that the size of hippocampus correlated negatively with increased severity of social phobia [154].

## 1.8 Treatment

Both pharmacotherapy and psychotherapy are used in the treatment of social phobia. There is strong evidence for the effectiveness of Selective Serotonin Reuptake Inhibitors [155], Cognitive Behavioral Therapy (CBT) and group CBT for treatment of social phobia [156]. Recent research has found internet-based CBT to be as effective as group CBT in the treatment of social phobia [157].

## 1.9 Rationale

Social phobia is a common and debilitating condition associated with impairments in daily activities and reduced quality of life [158]. In addition, people with social phobia often suffer from comorbid conditions that may augment the impairment. Few population studies have examined social phobia among the elderly regarding prevalence, comorbidity, prognosis, personality traits and cognitive function.

# 2 AIM

## 2.1 Study I

To examine the prevalence of social phobia, and how different DSM-IV diagnostic components of social phobia (fear of social situations, experiencing the fear as exaggerated, enduring or avoiding the situations and social consequences of the fear) influence prevalence rates, among a population sample aged 70 years and older. Further, to examine the influence of social phobia on social and mental functioning, and comorbidity with depression, panic attacks and agoraphobia.

## 2.2 Study II

To examine prognosis and incidence of social fears and phobia in an elderly population sample followed for 5 years.

## 2.3 Study III

To examine social phobia and depression, and comorbidity between these conditions, in relation to personality traits according to Eysenck Personality Inventory (EPI) [159] in a population based sample of 75-and 85-year olds.

## 2.4 Study IV

To examine whether social phobia is associated with level of cognitive performance in a population based sample of 75-and 85-year olds, taking into account the role of depression.

# 3 METHODS

## 3.1 Samples

All study samples were derived from the population studies the Prospective Population Study of Women (PPSW), the H70- the H75 and H85 Birth Cohort Studies in Gothenburg, Sweden (table 2).

**Table 2.** Description of samples.

| Study | Sample | Participants N | Response rate (%) | Birth year | Year examined | Follow-up examination |
|---|---|---|---|---|---|---|
| Study I | PPSW and H70 | 1019 | 68.2 | 1908, 1914,1918, 1922, 1930 | 2000 | - |
| Study II | PPSW and H70 | 681 | 83.8 | 1914,1918, 1922, 1930 | 2000 | 2005-2006 |
| Study III and IV | H75 and H85 | 1398 | 62.7 | 1923, 1924, 1930 | 2005-2006 2009-2010 | - |

### 3.1.1 Study I and II

The sample for study I and II was derived from the Prospective Population Study of Women (PPSW) and from the H70 Birth Cohort Study in Gothenburg, Sweden, which were combined to become one study for the Year 2000 examination (figure 1). The samples were obtained from the Swedish Population Register, based on birth date, and included persons living in private households and in institutions. The PPSW started in 1968, with an examination of 1467 women. New women were added in 1980 and 1992. In 2000, 964 of the women were alive, and 691 accepted to participate in a new psychiatric follow-up examination (response rate 71.6%). These women were born in 1908, 1914, 1918, 1922 and 1930 [160-162]. Also in 2000, the H70 Birth Cohort Study recruited a new cohort of 70-year-old men and women born in 1930 (N=540). Of these, 531 were alive and 328 (61.7%, 99 women and 229 men) accepted to participate in a psychiatric examination. Thus of 1 572 eligible study participants living in Sweden on September 1, 2000, 1019 accepted the psychiatric examination (response rate 68.2%). This sample comprised 229 men (22.5%) and 790 women (77.5%). Of the 1 572, fifty died before they could be examined, 6 could not speak Swedish and 21 had emigrated, leaving an effective sample of 1495.

For these analyses, 95 of 1019 were excluded because of dementia and 10 due to missing information, leaving 914 individuals.

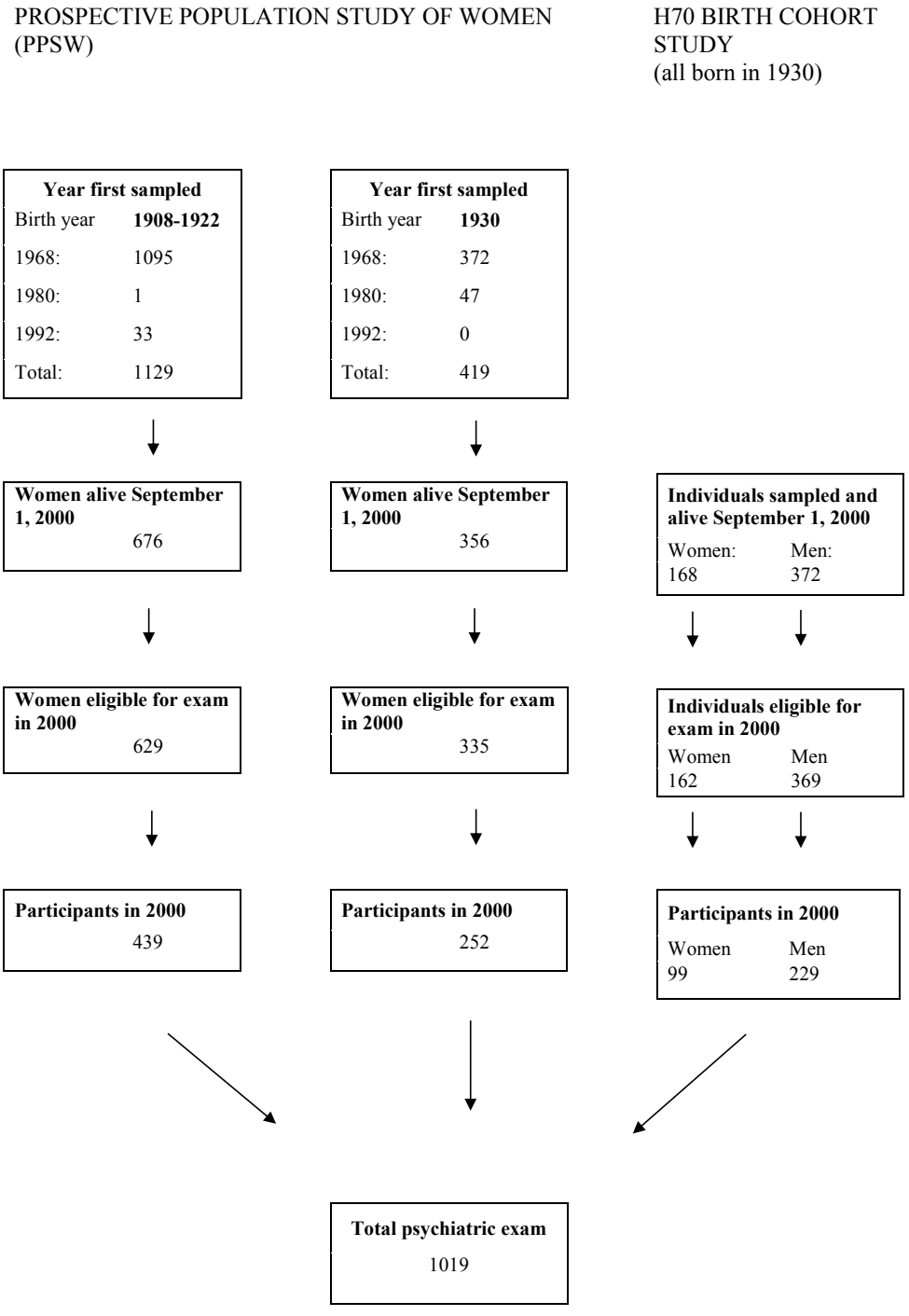


Figure 1. Description of participants in the Prospective Population Study and the H70 Birth Cohort Study examined in 2000.

Compared to non-participants, those who participated in the study were more likely to survive to November 2003 (93.8% vs. 90.1%, Pearson chi-square 6.5, df=1, p=0.011), were more often women (77.5% vs. 70.6%, Pearson chi-square 8.4, df=1, p=0.004), and were less often registered with a psychiatric diagnosis (8.8% vs. 14.3%, Pearson chi-square 10.2, df=1, p=0.001) and stroke (8.0% vs. 12.0%, Pearson chi-square 5.9, df=1, p=0.015) in the Swedish Hospital Discharge register. There were no significant differences regarding birth year (Pearson chi-square 5.6, df=4, p=0.232), age (mean 74.6, SD 5.6 years vs. mean 74.1, SD 5.4 years; t=1.498, df=963.25, p=0.135) or hospital discharge diagnoses of dementia (3.3% vs. 5.0%, Pearson chi-square 2.5, df=1, p=0.112).

For study II a follow-up examination was performed in 2005-2006. Of the 914 examined in 2000, 813 were alive in 2005 and 681 accepted participation in a psychiatric follow-up examination (response rate 83.8%). Of those, 433 (159 men and 274 women) were born in 1930 and 248 women were born in 1914, 1918 or 1922. For these analyses those who developed dementia (N=55) and those with missing information at follow-up (N=14) were excluded, leaving 612 individuals.

Responders and non-responders in 2005 did not differ regarding age group among women, regarding sex among individuals born in 1930, or prevalence of social fears and social phobia at baseline.

Most participants were investigated at the geriatric outpatient clinic of Vasa Hospital in Gothenburg. Those who declined examination at the clinic, as well as those who had moved to other regions within Sweden, were offered home visits. Written informed consent was obtained from all participants and/or their relatives. The studies were approved by the Ethics Committee for Medical Research at University of Gothenburg in Gothenburg.

### 3.1.2 Study III and IV

The sample for study III and IV was derived from the H75 and the H85 Birth Cohort Study in Gothenburg, Sweden. Both samples were obtained from the Swedish Population Register, based on birth date, and included both persons living in private households and in institutions.

For the H75 Birth Cohort Study, 1363 75-year-olds born in 1930 were invited to take part in a health examination in Gothenburg, Sweden. Of these, 11 died before they could be examined, 18 could not be traced, 15 had emigrated outside Sweden, and 32 could not speak Swedish, leaving an effective sample of 1287 individuals. Of these, 827 (321 men and 506 women) accepted to

take part in a psychiatric examination (response rate 64.3%). For the present studies, 48 individuals were excluded because of dementia and 11 due to missing information, leaving 768 individuals. Non-participants more often died before the age of 78 years compared with participants (14.3 vs. 4.7%, Pearson chi-square 37, df=1, p<0.001). There were no differences between the groups regarding sex, marital status, or hospitalization during the last year with psychiatric diagnoses (5.7% vs. 4.2%; Pearson chi-square 1.3, df=1, p=0.25), depression (3.0% vs. 1.8%; Pearson chi-square 2.0, df=1, p=0.15), anxiety disorders (1.5% vs. 0.5%; Pearson chi-square 3.8, df=1, p=0.053), or dementia (4.1% vs. 2.4%; Pearson chi-square 2.9, df=1, p=0.086), according to the Swedish Hospital Discharge register.

For the H85 Birth Cohort Study, every second 85-year-old born between July 1, 1923 and June 30, 1924 and registered for census purposes in Gothenburg, Sweden, were invited to take part in a health examination. Both people living in the community and at institutions were included (N=944). Of those invited, 571 individuals accepted participation (response rate 60.5%) (212 men and 359 women), the participation rate did not differ between men and women. For these analyses, 125 were excluded because of dementia and 14 due to missing information on social phobia, leaving 432 individuals.

The total sample thus comprised 1200 individuals. Among those, 901 (75.1%) individuals completed the Eysenck Personality Inventory. The participation rate was higher among 75- than among 85-year olds (80.1% vs. 66.2%, p<0.001), and lower among depressed than among non-depressed (66.8% vs. 77.5%, p<0.001), but the response rate did not differ by sex and diagnosis of social phobia. A subsample of 1098 (91.5%) individuals participated in the psychometric testing. The participation rate was lower among depressed than among non-depressed (88.1% vs. 92.5%, p=0.025), but the response rate did not differ by age, sex, level of education and diagnosis of social phobia.

Participants were examined at the psychogeriatric or geriatric outpatient clinic of Sahlgrenska University Hospital in Gothenburg. Those who declined examination at the clinic were offered home visits. Written informed consent was obtained from all participants and/or their relatives. The study was approved by the Ethics Committee for Medical Research at University of Gothenburg in Gothenburg.

## 3.2 Assessment

Trained psychiatric research nurses carried out the semi-structured psychiatric examinations that included ratings of past month psychiatric signs and symptoms according to the Comprehensive Psychopathological Rating Scale (CPRS) [163] and the Mini-International Neuropsychiatric Interview (MINI-D) [164]. Questions regarding the duration and severity of symptoms were also included. Mental and social functioning was assessed using the Global Assessment of Functioning (GAF) scale [165]. Background factors such as marital status, education, self-rated health, medical history, medication use, sensory impairment, physical impairment, cigarette smoking and alcohol consumption (defined as at least 37.5 g/week versus less, at least 75 g/week versus less, and mean consumption/week) were also assessed.

## 3.3 Assessment of personality traits

Personality traits were assessed with the Eysenck Personality Inventory [159]. The EPI conceptualizes two dimensions of personality: neuroticism-emotional stability and extraversion-introversion. The EPI includes 57 dichotomous items, 24 items for each personality dimension, and a 9 item lie-scale designed to identify individuals excessively concerned with their self-presentation. Comparisons between the EPI dimensions of neuroticism and extraversion and the corresponding dimensions within the five-factor model of personality show that the two different systems match well [166, 167]. The EPI was assessed blindly to clinical diagnoses.

## 3.4 Assessment of cognitive function

Self-reports regarding memory, concentration, and indecisiveness were rated during the psychiatric interview. The participants were asked to evaluate their memory, and ability to concentrate and to make decisions on a seven graded scale. Zero represented no subjective problems and one to six mild, moderate to severe problems. ‘Low’ performance was defined as values >1, i.e. occasional problems and more persistent, troublesome symptoms. During the semi-structured psychiatric examinations, the research nurses rated recent and remote memory on a scale graded from 0-6. Zero for no memory impairment and one to six for mild, moderate to severe memory impairments. Impaired memory was defined as values >1, i.e. occasional problems and more persistent, troublesome symptoms. Most individuals in these studies had a grading of 0-2, as those with more than 3 often fulfilled criteria for dementia which was an exclusion criterion in these studies.

The examination also included assessments from the Alzheimer's Disease Assessment Scale-Cognitive (ADAS-Cog) [168] regarding spoken language ability, comprehension of spoken language, word-finding difficulty, following commands, naming objects and fingers, constructional praxis and orientation. The Mini-Mental State Examination (MMSE) [169] was administered to provide a measure of global cognitive function.

The psychometric battery, administered by a research nurse, consisted of nine cognitive tests. The use of these tests has been described in detail previously [170, 171]. Digit span backward and Block design are part of the Wechsler Adult Intelligence Scale (WAIS) battery [172]. The following tests were used:

*Ten Word Memory Test* measures long-term verbal memory. The individual is asked to immediately recall ten words read from a list. The maximum score is 10.

*Digit Span* measures short-term or working memory. The individual is asked to immediately recall an increasing series of digits both forwards and backwards. The maximum score is 9 in the forward series and 8 in the backward series.

*MIR Memory Test* measures long-term memory. The individual is shown a 3D model of an apartment and asked to place ten different real-life objects in the different rooms of the apartment. The test of free recall determines the individual's ability to recall the objects, the maximum score is 10.

*Thurstone Picture Memory Test* is a nonverbal memory test designed to measure long-term memory. The individual is shown 28 pictures and are immediately asked to recognize them among distractors, maximum score is 28.

*Block Design Test* measures spatial ability, the individual is asked to organize wooden cubes according to a pattern shown to them, maximum score is 42.

*The Clock Test* measures visuospatial ability and executive function. The individual draws a clock, sets the time and tells the time, the maximum score is 15.

*Figure Classification Test* measures inductive logical reasoning. The individual is asked to identify one figure of five constructed on a principle not shared by the others, the maximum score is 30.

*Word Fluency* for Animals is a test of verbal fluency where the subject is asked to say as many animals as possible in 60 seconds.

## 3.5 Diagnostic procedures

*Social phobia* was diagnosed according to DSM-IV [165], based on the following questions from the Mini-D:

a) Are you afraid that you will receive attention from others or become the center of attention? Or are you afraid of being embarrassed, humiliated or making a fool of yourself in those situations? These situations include, for example, speaking in front of an audience, eating together with others or at a restaurant, being with other people or writing while someone watches you.

b) Do you consider this feeling or fear as excessive or unreasonable?

c) Are you so afraid of these situations that you avoid them or endure them with intense anxiety or distress?

d) Does this feeling or fear worsen your functioning in social situations (or at work), or does it cause considerable distress to you?

These symptoms should be present, or assumed to be present during the last month, but could have been present longer.

DSM-IV requires that four criteria are met for a diagnosis of social phobia: a) fearing social situations, b) experiencing the fear of social situations as unreasonable or excessive, c) avoiding feared social situations or enduring them with intense anxiety or distress, and d) criteria a, b, and c interferes significantly with normal routine, occupational functioning, or social activities or relationships, or there is marked distress of having the phobia. In this study, *'Clinical social phobia'* implies fulfillment of criteria a, c and d. Those who fulfilled all four DSM-IV criteria were thus included in this group. *Sub-clinical social phobia* implies fulfillment of criteria a and c. *Any fear of social situations* refers to all persons fulfilling criterion a.

*Dementia* was diagnosed according to DSM-III-R [13], as described previously [173], but only used as an exclusion criterion. Major depression,

agoraphobia and panic attacks were diagnosed according to DSM-IV criteria, and minor depression according to DSM-IV research criteria [5]. Dysthymia was diagnosed according to DSM-IV criteria, due to lack of information the time criterion was not applied and dysthymia was considered a mild form of depression.

## 3.6 Statistical analysis

Differences in proportions were tested with Pearson chi-square or two-sided Fisher's exact test, differences in means were tested using t-tests. Results were considered statistically significant at $p<0.05$. Odds ratios (OR) were calculated with 95% confidence intervals (95%-CI). SPSS statistical package was used in all analyses (version 15.0 for study I and II, version 20.0 for study III and IV), except those including the penalized likelihood method by Firth [174], for these analyses SAS statistical software (version 9.3) was used.

For study I and II the sample was stratified into two groups: those born 1930, and those born 1908, 1914, 1918 or 1922. Due to sample characteristics, associations with age could only be assessed among women, and sex differences only among those born 1930.

### 3.6.1 Study I

Logistic regression analyses (with age and sex as background variables) were used to test associations between different categories of social phobia and comorbid conditions, GAF score and alcohol consumption. The relation between social phobia and GAF score was also examined with age, sex, depression, panic attacks and agoraphobia as background variables.

### 3.6.2 Study II

Logistic regressions were used to analyze background variables (age and sex).

Incidence was defined as new events (any social fear, social fear only, subclinical social phobia, clinical social phobia and DSM-IV social phobia) occurring during a 5-year period in those without the condition at baseline. We had no information on episodes of social fears occurring before the baseline examination. To estimate incidence, person-years at risk for those who did not develop the event were calculated from the date of the baseline examination to the date of the last follow-up examination. For those who developed the event, person-years at risk were calculated from the date of the

baseline examination to the date of the last follow-up divided by two (with the assumption that the event developed in the middle of the follow-up period).

### 3.6.3 Study III

Linear regression analyses with age, sex, and DSM-IV social phobia as background variables were used to test associations between the two personality traits and different categories of depression. Linear regression analyses with age, sex, and major depression as background variables were used to test associations between the two personality traits different categories of social phobia. The neuroticism and extraversion scales were also dichotomized based on median values. A score below or equal to the median was considered low, and a score over the median was considered high. Logistic regression analyses with age, sex, major depression and DSM-IV social phobia as background variables were used to test associations between combinations of the dichotomized personality factors and social phobia and depression. For some combinations of the dichotomized personality factors and social phobia the observed frequency was zero. To account for the separation of data points we used the penalized likelihood method by Firth. Logistic regression analyses with age and sex as background variables were used to test associations between different categories of social phobia and depression.

### 3.6.4 Study IV

Logistic regression analyses (with age, sex, education and major depression as background variables) were used to test associations between different categories of social phobia and cognitive symptoms. Linear regression analyses (with age, sex, education and major depression as background variables) were used to test differences in means between different categories of social phobia and performance on cognitive tests.

# 4 RESULTS

## 4.1 Prevalence

The prevalence of social phobia in study I, III and IV in relation to age and sex is shown in table 3. The prevalence of clinical social phobia and DSM-IV social phobia was highest among 75-year olds and lowest among 78-92-year olds.

**Table 3.** Prevalence of social phobia in study I, III and IV.

| | Clinical social phobia | | |
|---|---|---|---|
| Age | Women N (%) | Men N (%) | Total N (%) |
| 70 (N=562) | 16 (4.7) | 7 (3.1) | 23 (4.1) |
| 75 (N=768) | 34 (7.2) | 12 (4.1) | 46 (6.0) |
| 85 (N=432) | 11 (4.1) | 4 (2.4) | 15 (3.5) |
| 78-92 (N=352) | 9 (2.6) | - | 9 (2.6) |
| | DSM-IV social phobia | | |
| Age | Women N (%) | Men N (%) | Total N (%) |
| 70 | 9 (2.7) | 3 (1.3) | 12 (2.1) |
| 75 | 18 (3.8) | 5 (1.7) | 23 (3.0) |
| 85 | 6 (2.3) | 1 (0.6) | 7 (1.6) |
| 78-92 | 5 (1.4) | - | 5 (1.4) |

In study I almost one fourth (N=220) of the population feared social situations (table 4). This was more common in 70-year old women compared to both 70-year old men (29.6% vs. 20.5%; p=0.018) and to women aged 78-92 years (21.2%; p=0.014).

The one-month prevalence of social phobia, defined according to DSM-IV criteria, was 1.9% (N=17). An additional 1.6% (N=15) fulfilled criteria a, c and d for social phobia according to DSM-IV, but not criteria b (experiencing the fear as unreasonable or excessive). Thus, 3.5% had 'social phobia' that caused social consequences, here labeled 'clinical social phobia'. There were no sex or age differences in the prevalence of DSM-IV or clinical social phobia.

Sub-clinical social phobia (avoiding feared social situations or enduring them with intense anxiety or distress without social consequences) was observed in another 11.5% (N=105). There were no sex or age differences in the prevalence of sub-clinical social phobia.

In study III and IV almost one quarter (N=291) of the population reported any fear of social situations (table 7). The one-month prevalence of social phobia, according to DSM-IV was 2.5% (N=30), and an additional 2.6% (N=31) had social phobia with social consequences but did not experience the fear as unreasonable or excessive. Thus, 5.1% (N=61) had 'clinical social phobia'. Any fear of social situations, clinical social phobia and DSM-IV social phobia were more common among women than among men. There were no age group differences regarding the prevalence of these conditions.

**Table 4.** Prevalence of different categories of social phobia in 70-year olds and in 78-92 year olds.

| | Total population | 70-year olds | | | 78-92 year olds |
|---|---|---|---|---|---|
| | N=914<br>N (%) | Women<br>N=338<br>N (%) | Men<br>N=224<br>N (%) | Total<br>N=562<br>N (%) | Women<br>N=352<br>N (%) |
| Only fear of social situations | 83 (9.1) | 37 (10.9) | 15 (6.7) | 52 (9.3) | 31 (8.8) |
| Sub-clinical social phobia | 105 (11.5) | 47 (13.9) | 24 (10.7) | 71 (12.6) | 34 (9.7) |
| Clinical social phobia | 32 (3.5) | 16 (4.7) | 7 (3.1) | 23 (4.1) | 9 (2.6) |
| DSM-IV social phobia | 17 (1.9) | 9 (2.7) | 3 (1.3) | 12 (2.1) | 5 (1.4) |
| Any fear of social situations | 220 (24.1) | 100 (29.6) | 46 (20.5)* | 146 (26.0) | 74 (21.0)* |

*=$p<0.05$, compared to 70-year old women.

## 4.2 Study I

### 4.2.1 Comorbidity

Individuals with clinical social phobia more often had major depression (21.9% vs. 3.6%; p<0.001), panic attacks (21.9% vs. 0.1%; p<0.001) or agoraphobia (15.6% vs. 0.4%; p=0.013) compared to individuals with no social phobia (adjusted for age and sex).

Mental and social functioning measured using the GAF-scale was worse among those with clinical social phobia and DSM-IV social phobia compared to those with no social phobia (p<0.001, adjusted for age and sex). GAF scores were similar between those who experienced the fear as excessive (i.e. social phobia according to DSM-IV) compared to those that did not experience it as excessive (mean value 70.6 (±14.0) vs. mean value 75.3 (±12.2), P=0.318).

Comorbidity with depression was significantly related to worse GAF score in all categories of social phobia. However, even when depressed individuals were excluded, those with clinical and DSM-IV social phobia had significantly lower GAF scores than the other categories of social phobia and those with no social phobia. A logistic regression analysis showed that clinical social phobia (OR 0.96 (95%-CI 0.93-0.99) was related to lower GAF score independent of age, sex, depression, panic attacks and agoraphobia.

## 4.3 Study II

### 4.3.1 Prognosis

Social fears, sub-clinical social phobia, clinical social phobia and DSM-IV social phobia at baseline were not related to 5-year mortality, refusal or dementia at follow-up.

The prognosis of social phobia is shown in table 5. Among 21 individuals with clinical social phobia at baseline, ten (47.6%) had no social fears at follow-up. Six (28.6%) had fear of social situations only or subclinical social phobia and five (23.8%) still met the criteria for clinical social phobia at follow-up, including two (9.5%) who also fulfilled the criteria for DSM-IV social phobia. The result was similar for the subgroup DSM-IV social phobia. Individuals with clinical social phobia at baseline had an increased odds of having sub-clinical social phobia (OR 4.5 (95%-CI 1.4-14.8), clinical social

**Table 5.** Social fears and social phobia at baseline in relation to social fears and social phobia at 5-year follow-up.

| | 5-year follow-up | | | | |
|---|---|---|---|---|---|
| Condition at baseline (N) | Any social fear N (%) | Social fear only N (%) | Sub-clinical social phobia N (%) | Clinical social phobia N (%) | DSM-IV social phobia N (%) |
| No social fears (N=465) | 77 (16.6) | 40 (8.6) | 21 (4.5) | 16 (3.4) | 4 (0.9) |
| Any social fear (147) | 59 (40.1)*** | 28 (19.0)*** | 17 (11.6)** | 14 (9.5)** | 9 (6.1)*** |
| Social fear only (53) | 18 (34.0)** | 11 (20.8)** | 5 (9.4) | 2 (3.8) | 2 (3.8) |
| Sub-clinical social phobia (73) | 30 (41.1)*** | 15 (20.5)** | 8 (11.0)* | 7 (9.6)* | 5 (6.8)** |
| Clinical social phobia (21) | 11 (52.4)*** | 2 (9.5) | 4 (19.0)* | 5 (23.8)*** | 2 (9.5)* |
| DSM-IV social phobia (9) | 4 (44.4)* | 1 (11.1) | 2 (22.2) | 1 (11.1) | 1 (11.1) |
| Total population (612) | 136 (22.2) | 68 (11.1) | 38 (6.2) | 30 (4.9) | 13 (2.1) |

*=p<0.05, **=p<0.01, ***=p<0.001 Fisher's exact test, compared to individuals without social fears in 2000.
55 individuals who developed dementia after the examination in 2000 were excluded and 14 individuals with missing information in the examination in 2005 were excluded.

phobia (OR 7.7 (95%-CI 2.4-24.3) or DSM-IV social phobia (OR 10.3 (95%-CI 1.7-64.1) at follow-up compared to individuals without social fears (adjusted for age and sex).

### 4.3.2 Incidence

The incidence of social fears and social phobia is shown in table 6. Among those without social fears at baseline, the five-year cumulative incidence of any social fear was 16.6% (N=77). It was higher among women aged 70 at baseline compared to men aged 70 and women aged 78-86.

Among those without clinical social phobia at baseline the five-year cumulative incidence of clinical social phobia was 4.2% (N=25). It was higher among women aged 70 at baseline compared to women aged 78-86, but not different from men aged 70. Based on person-years at risk, the estimated annual incidence of clinical social phobia in the total population was 16.9/1000 person-years (women aged 70; 26.7/1000 person-years, men aged 70; 16.4/1000 person-years and women aged 78-86; 4.2/1000 person-years).

Among those without DSM-IV social phobia at baseline the five-year cumulative incidence of DSM-IV social phobia was 2.0% (N=12). It was higher among women aged 70 at baseline compared to men aged 70 and women aged 78-86. Based on person-years at risk, the estimated annual incidence of DSM-IV social phobia in the total population was 8.0/1000 person-years (women aged 70; 16.9/1000 person-years, and women aged 78-86; 2.1/1000 person-years. No man developed DSM-IV social phobia during follow-up.

Data regarding age of onset was available for 17 of the 25 new cases of clinical social phobia. Two individuals reported the age of onset to be in age 60-70, 15 individuals reported lifelong social phobia with onset before age 30, but only four of those had acknowledged any social fear at baseline.

**Table 6.** Five-year cumulative incidence and estimated annual incidence (based on years at risk) of social fears and social phobia in a population sample aged 70- and 78-86 at baseline.

| | | | Baseline age 70 | | | | Baseline age 70-86 | |
|---|---|---|---|---|---|---|---|---|
| | Total | | Men | | Women | | Women | |
| | N (%) | N/1000 person-years | N (%) | N/1000 person-years | N (%) | N/1000 person-years | N (%) | N/1000 person-years |
| Any social fear | 77 (16.6) | 66.2 | 14 (11.7)* | 46.7 | 43 (22.6) | 90.5 | 20 (12.9)* | 51.6 |
| Social fear only | 40 (8.6) | 34.4 | 5 (4.2) | 16.7 | 20 (10.5) | 42.1 | 15 (9.7) | 38.7 |
| Sub-clinical social phobia | 26 (5.0) | 20.1 | 5 (3.9) | 15.6 | 17 (7.8) | 31.2 | 4 (2.3)* | 9.3 |
| Clinical social phobia | 25 (4.2) | 16.9 | 6 (4.1) | 16.4 | 17 (6.7) | 26.7 | 2 (1.1)** | 4.2 |
| DSM-IV social phobia | 12 (2.0) | 8.0 | 0 (0)** | 0 | 11 (4.2) | 16.9 | 1 (0.5)* | 2.1 |

*=$p<0.05$, **=$p<0.01$, Fisher's exact test, compared to women aged 70 at baseline.

## 4.4 Study III and IV

Characteristics of the sample for study III and IV are shown in table 7. The one-month prevalence of any depression was 22.3% (N=268). Of those, 16.1% (N=193) had minor depression, and 6.2% (N=75) had major depression. Major depression was more common among those with DSM-IV social phobia (33.3% vs. 4.3%; $p<0.001$), clinical social phobia (29.5% vs. 4.3%; $p<0.001$) and any fear of social situations (12.4% vs. 4.3%; $p<0.001$) compared to individuals with no social phobia (adjusted for age and sex).

The proportion with low education (defined as compulsory school or less) was 49.4% (N=581), with no differences between men and women. Low education was more common among those with DSM-IV social phobia (73.3% vs. 46.2%, OR: 3.1 (95%-CI 1.3-7.0), clinical social phobia (63.3% vs. 46.2%, OR: 1.9 (95%-CI 1.1-3.3) and any fear of social situations (59.6% vs. 46.2%, OR: 1.8 (95%-CI 1.4-2.3) compared to individuals with no social phobia (adjusted for age and sex).

**Table 7.** Characteristics of the sample for study III and IV.

| | Total study population | | | 75-year olds | | | 85-year olds | | |
|---|---|---|---|---|---|---|---|---|---|
| | Women N=740 N (%) | Men N=460 N (%) | Total N=1200 N (%) | Women N=474 N (%) | Men N=294 N (%) | Total N=768 N (%) | Women N=266 N (%) | Men N=166 N (%) | Total N=432 N (%) |
| Any fear of social situations | 213 (28.8) | 78 (17.0)*** | 291 (24.3) | 139 (29.3) | 50 (17.0)*** | 189 (24.6) | 74 (27.8) | 28 (16.9)** | 102 (23.6) |
| Clinical social phobia | 45 (6.1) | 16 (3.5)* | 61 (5.1) | 34 (7.2) | 12 (4.1) | 46 (6.0) | 11 (4.1) | 4 (2.4) | 15 (3.5) |
| DSM-IV social phobia | 24 (3.2) | 6 (1.3)* | 30 (2.5) | 18 (3.8) | 5 (1.7) | 23 (3.0) | 6 (2.3) | 1 (0.6) | 7 (1.6) |
| Major depression | 56 (7.6) | 19 (4.1)* | 75 (6.2) | 32 (6.8) | 10 (3.4)* | 42 (5.5) | 24 (9.0) | 9 (5.4) | 33 (7.6) |
| Education, elementary school or less | 365 (50.3) | 216 (48.0) | 581 (49.4) | 267 (56.9) | 149 (51.0) | 416 (54.7) | 98 (38.3) | 67 (42.4) | 249 (39.3) |

*=p<0.05, **=p<0.01, ***=p<0.001 compared to women, adjusted for age when applicable in a logistic regression analysis.
†= p<0.05, ††= p<0.01, †††=p<0.001 compared to 75-year olds, adjusted for sex in a logistic regression analysis.

### 4.4.1 Social phobia and depression in relation to personality traits

The mean score on neuroticism in the total sample was 7.2 (±4.7), with no differences between 75- and 85-year olds (7.1 (±4.6) vs. 7.5 (±4.9); p=0.30), but it was higher in women than in men (7.8 (±4.7) vs. 6.3 (±4.5); p<0.001). The mean score on extraversion in the total sample was 11.8 (±3.5), with no differences between 75- and 85-year olds (11.9 (±3.5) vs. 12.1 (±3.5); p=0.50), or between men and women (12.3 (±3.5) vs. 11.8 (±3.5); p=0.059).

Relationships between personality factors and the different categories of social phobia and depression are given in table 8. Individuals with any fear of social situations, clinical social phobia and DSM-IV social phobia scored higher on neuroticism and lower on extraversion than individuals without social phobia (adjusted for age, sex and major depression). Individuals with any depression, minor depression and major depression scored higher on neuroticism, and lower on extraversion compared to individuals without depression (adjusted for age, sex and DSM-IV social phobia).

**Table 8.** Personality traits[1] in relation to different categories of social phobia and depression in non-demented 75 and 85-year-olds.

| | Neuroticism Mean ±SD | Extraversion Mean ±SD | Lie-scale Mean ±SD |
|---|---|---|---|
| | Total (N=819) | Total (N=815) | Total (N=850) |
| No social phobia (N=645) | 6.6 ±4.4 | 12.5 ±3.2 | 4.0 ±1.8 |
| Any fear of social situations (N=205) | 9.0 ±5.1*** | 10.4 ±3.7*** | 3.9 ±1.7 |
| Clinical social phobia (N=40) | 11.8 ±5.1*** | 8.2 ±3.2*** | 3.7 ±1.9 |
| DSM-IV social phobia (N=16) | 12.5 ±4.8*** | 7.6 ±3.6*** | 3.4 ±1.5 |
| No Depression (N=679) | 6.4 ±4.2 | 12.3 ±3.4 | 4.0 ±1.8 |
| Any depression (N=171) | 10.6 ±5.3††† | 10.8 ±3.7††† | 3.7 ±1.8†† |
| Minor depression (N=130) | 9.6 ±5.1††† | 11.2 ±3.8†† | 3.6 ±1.8† |
| Major depression (N=41) | 13.3 ±5.0††† | 9.5 ±3.1††† | 3.7 ±1.6 |

*= p<0.05, **= p<0.01, ***=p<0.001 compared to individuals with no social phobia, adjusted for age, sex and major depression in a linear regression analysis**.**

†= p<0.05, ††= p<0.01, †††=p<0.001 compared to individuals with no depression, adjusted for age**,** sex and DSM-IV social phobia in a linear regression analysis.

[1]= according to Eysenck Personality Inventory.

### 4.4.2 Personality traits and comorbid conditions

All combinations of comorbid social phobia and depression were associated with higher scores on neuroticism (table 9a) and lower scores on extraversion (table 9b), compared to those with neither social phobia nor depression (adjusted for age and sex). Individuals with DSM-IV social phobia and concurrent major depression had the highest scores on neuroticism and the lowest scores on extraversion.

Among individuals with any depression, all categories of social phobia were associated with higher neuroticism compared to individuals with no social phobia (table 9a.). Among individuals with social fears, both major and minor depression were associated with higher neuroticism compared to individuals with no depression. Among individuals with clinical social phobia, major depression was associated with higher neuroticism compared to individuals with no depression. (adjusted for age and sex).

**Table 9a.** Neuroticism[1] in relation to different categories of social phobia and depression in non-demented 75 and 85-year-olds.

| | Neuroticism<br>Mean ±SD | | | |
|---|---|---|---|---|
| | No Depression<br>(N=666) | Any depression<br>(N=153) | Minor depression<br>(N=114) | Major depression<br>(N=39) |
| No social phobia (N=625) | 6.1 ±4.0<br>(N=528) | 9.6 ±5.1$^{\dagger\dagger\dagger\#\#\#}$<br>(N=97) | 9.2 ±5.2$^{\dagger\dagger\dagger\#\#\#}$<br>(N=79) | 11.2 ±4.8$^{\dagger\dagger\dagger\#\#\#}$<br>(N=18) |
| Any fear of social situations (N=194) | 7.7 ±4.4$^{***\#\#\#}$<br>(N=138) | 12.3 ±5.3$^{**\dagger\dagger\dagger\#\#\#}$<br>(N=56) | 10.6 ±5.0$^{\dagger\dagger\dagger\#\#\#}$<br>(N=35) | 15.1 ±4.6$^{*\dagger\dagger\dagger\#\#\#}$<br>(N=21) |
| Clinical social phobia (N=44) | 10.9 ±4.8$^{***\#\#\#}$<br>(N=22) | 12.8 ±5.2$^{*\#\#\#}$<br>(N=22) | 10.5 ±5.3$^{\#\#\#}$<br>(N=13) | 16.0 ±3.0$^{\dagger\#\#\#}$<br>(N=9) |
| DSM-IV social phobia (N=19) | 11.5 ±4.1$^{***\#\#\#}$<br>(N=10) | 13.7 ±5.5$^{*\#\#\#}$<br>(N=9) | 11.3 ±5.3$^{\#\#}$<br>(N=6) | 18.3 ±1.5$^{\#\#\#}$<br>(N=3) |

*= p<0.05, **= p<0.01, ***=p<0.001 compared to individuals with no social phobia, adjusted for age and sex in a linear regression analysis**.**

$^{\dagger}$= p<0.05, $^{\dagger\dagger}$= p<0.01, $^{\dagger\dagger\dagger}$=p<0.001 compared to individuals with no depression adjusted for age and sex in a linear regression analysis.

$^{\#\#}$=p<0.01, $^{\#\#\#}$=p<0.001compared to individuals with no social phobia and no depression, adjusted for age and sex in a linear regression analysis**.**

[1]= according to Eysenck Personality Inventory.

Among individuals with any depression, all categories of social phobia were associated with lower extraversion compared to individuals with no social phobia (table 9b). Among individuals with any social fears, clinical social phobia or DSM-IV social phobia, depression did not influence extraversion score (adjusted for age and sex).

**Table 9b.** Extraversion[1] in relation to different categories of social phobia and depression in non-demented 75 and 85-year-olds.

| | Extraversion<br>Mean ±SD | | | |
|---|---|---|---|---|
| | No Depression<br>(N=658) | Any depression<br>(N=157) | Minor depression<br>(N=121) | Major depression<br>(N=36) |
| No social phobia (N=621) | 12.7 ±3.2<br>(N=522) | 11.4 ±3.4$^{\dagger\dagger\dagger\#\#\#}$<br>(N=99) | 11.7 ±3.2$^{\dagger\dagger\#\#\#}$<br>(N=82) | 9.9 ±3.6$^{\dagger\dagger\dagger\#\#\#}$<br>(N=17) |
| Any fear of social situations (N=194) | 10.6 ±3.6$^{***\#\#\#}$<br>(N=136) | 9.7 ±4.0$^{**\#\#\#}$<br>(N=58) | 10.0 ±4.5$^{*\#\#\#}$<br>(N=39) | 9.2 ±2.7$^{\#\#\#}$<br>(N=19) |
| Clinical social phobia (N=39) | 8.0 ±3.4$^{***\#\#\#}$<br>(N=20) | 8.4 ±3.1$^{***\#\#\#}$<br>(N=19) | 8.0 ±2.8$^{***\#\#\#}$<br>(N=11) | 9.0 ±3.7$^{\#\#\#}$<br>(N=8) |
| DSM-IV social phobia (N=16) | 7.9 ±4.4$^{***\#\#\#}$<br>(N=9) | 7.1 ±2.5$^{**\#\#\#}$<br>(N=7) | 8.5 ±2.6$^{\#\#}$<br>(N=4) | 5.3 ±0.6$^{\#\#\#}$<br>(N=3) |

*= p<0.05, **= p<0.01, ***=p<0.001 compared to individuals with no social phobia, adjusted for age and sex in a linear regression analysis**.**

$^{\dagger}$= p<0.05, $^{\dagger\dagger}$= p<0.01, $^{\dagger\dagger\dagger}$=p<0.001 compared to individuals with no depression adjusted for age and sex in a linear regression analysis.

$^{\#\#}$=p<0.01, $^{\#\#\#}$=p<0.001compared to individuals with no social phobia and no depression, adjusted for age and sex in a linear regression analysis**.**

[1]= according to Eysenck Personality Inventory.

### 4.4.3 High neuroticism combined with low extraversion

Individuals with any fear of social situations (48.3% vs. 25.0%), clinical social phobia (71.8% vs. 25.0%) and DSM-IV social phobia (75.0% vs. 25.0%) more often had a combination of low extraversion and high neuroticism compared to those with no social phobia. Individuals with any depression (53.9% vs. 25.0%), minor depression (47.2% vs. 25.0%) and major depression (74.3% vs. 25.0%) more often had a combination of low extraversion and high neuroticism compared to those with no depression.

### 4.4.4 Cognitive test results

Mean MMSE scores were nearly identical in all three categories of social phobia and in the group with no social fear. Individuals with social phobia according to DSM-IV performed worse on the Clock Test (mean value 13.9 (±2.1) vs. mean value 14.6 (±1.3), p=0.020) compared to individuals with no social fears or phobia (adjusted for age, sex, education and major depression).

Individuals with any fear of social situations performed worse on the Thurstone Picture Memory Test (mean value 19.4 (±4.7) vs. mean value 20.4 (±4.4), p=0.003) and Word Fluency test (mean value 19.0 (±5.8) vs. mean value 20.3 (±6.4), p=0.032) compared to individuals with no social phobia (adjusted for age, sex, education and major depression).

The performance on Digit Span, Figure Classification Test, MIR Memory Test, Block Design Test and Ten Word Memory Test were not associated with any of the categories of social phobia.

### 4.4.5 Interviewer-rated cognitive symptoms

Interviewer-rated cognitive symptoms in relation to social phobia are shown in table 10. A rating of worse short-term memory was related to DSM-IV social phobia (OR: 2.3 (95%-CI 1.1-5.1), clinical social phobia (OR: 1.8 (95%-CI 1.0-3.2) and any fear of social situations (OR: 1.4 (95%-CI 1.0-1.8). There were no differences in interviewer-rated long-term memory between individuals with social phobia compared to individuals with no social phobia (adjusted for age, sex, education and major depression).

### 4.4.6 Self-reported cognitive function

Self-reported cognitive symptoms in relation to social phobia are shown in table 10. Self-reported memory disturbance was related to any fear of social situations (OR: 1.3 (95%-CI 1.0-1.8), but not to clinical or DSM-IV social phobia. Self-reported indecisiveness was related to DSM-IV social phobia (OR: 3.5 (95%-CI 1.5-8.1), clinical social phobia (OR: 3.0 (95%-CI 1.7-5.4) and any fear of social situations (OR: 2.0 (95%-CI 1.5-2.7). Difficulty Concentrating was related to DSM-IV social phobia (OR: 3.0 (95%-CI 1.4-6.6), clinical social phobia (OR: 3.0 (95%-CI 1.7-5.2), and any fear of social situations (OR: 1.5 (95%-CI 1.1-2.0) (adjusted for age, sex, education and major depression).

**Table 10.** Self-reported and interviewer-rated cognitive symptoms in relation to different categories of social phobia in non-demented 75- and 85-year-olds.

| | Self-reported memory disturbance N (%) | Self-reported indecisiveness N (%) | Self-reported concentration difficulties N (%) | Interviewer-rated short-term memory disturbance N (%) | Interviewer-rated long-term memory disturbance N (%) |
|---|---|---|---|---|---|
| No social phobia (N=909) | 453 (49.9) | 248 (27.4) | 206 (22.8) | 282 (31.2) | 125 (13.8) |
| Any fear of social situations (N=291) | 166 (57.0)* | 136 (47.1)*** | 94 (32.4)** | 109 (37.7)* | 46 (15.9) |
| Clinical social phobia (N=61) | 37 (60.7) | 38 (62.3)*** | 32 (52.5)*** | 27 (45.0)* | 10 (16.4) |
| DSM-IV social phobia (N=30) | 20 (66.7) | 20 (66.7)** | 16 (53.3)** | 15 (51.7)* | 5 (16.7) |

*= p<0.05, **= p<0.01, ***=p<0.001 compared to individuals with no social phobia, adjusted for age, sex, education and major depression in a logistic regression analysis.

# 5 DISCUSSION

## 5.1 Strengths

Among the strengths of these studies are the population based samples, the comprehensive examinations conducted by experienced psychiatric nurses, high inter-rater reliability between the examining nurses, the semi-structured instrument that allowed for clarifying questions, and the longitudinal design for study II. For the prospective part of the study the response-rate at follow-up was high (83.8%). We used the category of clinical social phobia because the DSM-IV criteria of experiencing the fear as unreasonable or excessive might exclude a large group of individuals with social phobia among the elderly. It has been discussed whether the DSM-V criteria for elderly should be revised to encompass also these individuals [175].

## 5.2 Limitations

There are possible limitations and sources of error that need to be addressed. First, the response rate was 62.7% to 68.2%. We cannot exclude the possibility that those who declined more often had social phobia than those who participated, which might have led to an underestimation of social phobia in our sample. However, in study II, there were no differences in response rate at follow-up between individuals with and without social fears at baseline. Second, despite relatively large samples and many cases with social phobia, it has to be emphasized that some of the subgroups (e.g. individuals with DSM-IV social phobia) are too small to yield statistical power. This might have led to some false negative results. Third, in study I and II we could only examine sex differences in those born in 1930, and age differences among women. Fourth, in study II, incidence might have been overestimated as we had no information on occurrence of previous social phobia in those without the disorder at baseline. We can thus not claim that incidence refers to first-onset disease. Fifth, study I, III and IV were cross-sectional, we can thus not determine the directions of the observed associations. Sixth, the use of EPI instead of the more widely used five-factor model of personality in study III could be seen as a limitation. However, the EPI dimensions of neuroticism and extraversion and the corresponding dimensions within the five-factor model of personality show that the two different systems match well [166, 167]. Seventh, cognitive performance might be influenced by several factors besides social phobia, major depression and education (e.g. sensory deficits, chronic illnesses, and

medication) that are likely to confound the results. Eighth, multiple comparisons were made regarding psychometric testing, which may lead to false positive findings. On the other hand the use of the Bonferroni method to correct for this may give rise to false negative results. One way to treat this problem is to make no adjustments for the number of comparisons but to give information on how many comparisons have been made and to emphasize that new findings should be considered only suggestive until further confirmed [176]. The findings that Thurstone Picture Memory and Clock Test were significantly associated with social phobia was in the expected direction, but should be interpreted cautiously due to the large number of analyses.

## 5.3 Prevalence

In study I the prevalence of social phobia defined according to the DSM-IV criteria was 1.9% among 70- and 78-92-year olds. In study III and IV the prevalence of social phobia according to the DSM-IV criteria was 2.5% among 75- and 85-year olds. However, in study I 3.5%, and in study III and IV 5.1% of the population had symptoms of social phobia that caused social consequences. Approximately half of these did not experience the fear as unreasonable or excessive. Strictly speaking, these individuals did not fulfill the DSM-IV criteria for social phobia, despite experiencing similar impacts on mental and social functioning. Our results indicate that DSM-IV criteria might exclude a large group of individuals with 'social phobia'. Based on these findings, the Advisory Committee to the DSM-V Lifespan Disorders Work Group discussed whether the DSM-V criteria for the elderly should be revised to encompass also these individuals [175]. The recommendation for the DSM-V criteria in a review commissioned by the DSM-V Anxiety, Obsessive-Compulsive Spectrum, Post Traumatic, and Dissociative Disorders workgroup is that it is sufficient if the clinician recognizes the fear as exaggerated [177]. The exclusion of these individuals might be due to DSM-IV criteria being based on symptoms noted in clinical patients. It is unlikely that a person with social phobia who does not experience the fear as unreasonable or excessive will seek psychiatric help.

## 5.4 Study I

Among the different diagnostic components of social phobia (a/ fear of social situations, b/ experiencing the fear as unreasonable or excessive, c/ avoiding feared social situations or enduring them with intense anxiety or distress, and d/ that this cause social consequences), the main sources of variation in

prevalence were experiencing the fear as unreasonable or excessive, and that the fear causes social consequences. It has previously been noted [52] that small changes in criteria of social phobia may lead to large variations in prevalence estimates.

We found that panic attacks, agoraphobia and depression were more common among individuals with social phobia than in other individuals. This is in line with previous studies on elderly suggesting that comorbidity is common also in this age group [75, 178]. Also studies comprising younger samples finds that social phobia often coexist with other psychiatric disorders [34, 36, 50, 51, 54], and that social phobia in most cases precedes the comorbid disorder [36, 54]. The most common comorbid conditions in social phobia are panic disorder, agoraphobia, major depression, generalized anxiety disorder and obsessive-compulsive disorder [34, 36, 50, 51, 54, 75, 178].

In line with a previous study [158], we found that social phobia, regardless of whether it was experienced as excessive or not, was associated with a lower social and mental functioning. GAF scores were lower in individuals having clinical social phobia, and awareness of the fear as unreasonable or excessive did not influence the GAF score. Despite having lower GAF scores than the rest of the population, individuals with social phobia in our population sample had GAF ratings that were very mild indicating, on average, “no more than slight impairment in social occupational functioning”. Most likely, individuals with social phobia in our study represent a group with milder symptoms than found in clinical samples, which are selected samples of individuals with more severe disease.

## 5.5 Study II

To our knowledge, this is the first prospective population study on social phobia among the elderly. We found that almost half of those diagnosed with clinical social phobia or DSM-IV social phobia at baseline no longer acknowledged social fears at 5-year follow-up. These results are in agreement with prospective studies focusing on younger populations [94, 95]. In contrast, prospective clinical studies and cross-sectional population studies report that social phobia has a chronic course [16, 34, 84, 86, 87]. The reason for the higher rate of recovery from social phobia in population samples than in clinical samples might be that those seeking treatment represent a subset of the population with a more severe form of the disease and lower recovery rate. Due to small sample size, we could only study the influence of age and sex on the prognosis of social fears and phobia in relation to any social fears at follow-up. In these analyses, 70-year old women with any social fear,

social fear only and clinical social phobia at baseline more often had any social fear at follow-up compared to women aged 78-86. Sex and treatment with antidepressants at baseline, at follow-up or at both baseline and follow-up was not associated with the prognosis of social fears or social phobia.

While almost half of those with clinical social phobia recovered during the 5-year follow-up period, clinical social phobia occurred during follow-up in 4%, and DSM-IV social phobia in 2%, among those without these conditions at baseline. This gives an incidence of 16.9 per 1000 person-years for clinical social phobia and 8 per 1000 person-years for DSM-IV social phobia. These figures are on par with two studies on younger populations, reporting an incidence of 9 per 1000 person-years [82] and 4-5 per 1000 person-years [81]. Comparisons with younger age groups should be taken cautiously as it may be more difficult to exclude previous social phobia among the elderly. It is thus possible that our incidence reflects re-occurrence and an episodic or fluctuating course, rather than first-onset social phobia.

Age had an effect on the prognosis of social fears and clinical social phobia. Seventy-year old women with social fear or clinical social phobia at baseline were more likely to have any social fears also at the five year follow-up compared to women aged 78-86. Furthermore, the five-year cumulative incidence of both DSM-IV social phobia and clinical social phobia was higher among younger women compared to older women. These findings support the general belief that the frequency of social phobia decreases with increasing age [72], and can in part explain why social phobia generally is found to be less common in older ages.

## 5.6 Study III

We found that social phobia and depression were independently related to high neuroticism and low extraversion in a population sample of Swedish 75- and 85 year olds. These associations could not be explained by the high comorbidity between these disorders, although neuroticism was higher and extraversion was lower in those who had both social phobia and depression. Our findings suggest that these personality characteristics may be one reason for the high comorbidity between social phobia and depression among the elderly.

Our finding that the different categories of social phobia, as well as minor and major depression were associated with higher neuroticism and lower extraversion are in line with results from both clinical [139, 140], and population-based studies [138, 179] comprising younger samples. We can

thus replicate these associations also among the elderly, including a large subsample of 85-year-olds. In addition, three quarters of those with DSM-IV social phobia had the combination of high neuroticism and low extraversion as compared with only one quarter of those with no social phobia. The results were similar for those with clinical social phobia and major depression.

Comorbidity was related to higher neuroticism and lower extraversion, with the strongest association in those with DSM-IV social phobia and concurrent major depression. This indicates that personality traits might be of importance for comorbidity between social phobia and depression among the elderly. Personality traits in relation to comorbidity has been discussed by several authors [139, 145, 180-182]. However, this has not previously been shown in older populations, but it is in coherence with findings from younger samples. In a study including patients with major depression, neuroticism was positively associated with the number of comorbid psychiatric disorders [139]. Findings from a population-based twin study indicate that the comorbidity between anxiety and depression in part can be explained by genetic factors related to neuroticism [183]. In contrast to our results, Bienvenu et al [145] found in a population-based sample that the relation between neuroticism and comorbidity mainly resulted from the higher prevalences of anxiety and depressive disorders that are associated with this personality trait. In our sample, individuals with any depression and concurrent social phobia had higher neuroticism than those with only depression. Furthermore, individuals with clinical social phobia and concurrent major depression had higher neuroticism than those with only clinical social phobia. This suggests that neuroticism is of importance for comorbidity between social phobia and depression. In addition, individuals with any depression and concurrent social phobia had lower extraversion than those with only depression. However, among those with social phobia, concurrent depression did not influence level of extraversion. Extraversion might thus be of minor importance in explaining comorbidity of depression in those with social phobia. On the other hand, low extraversion might contribute to comorbid social phobia in those with depression. There are no previous studies in the elderly on comorbidity of social phobia and depression in relation to extraversion. Results from studies on younger samples are mixed. One clinical study showed that low extraversion was associated to comorbidity with social phobia among patients with depression [139], whereas another study found that high extraversion was related to increased psychiatric comorbidity in general [145].

## 5.7 Study IV

We examined different categories of social phobia in relation to cognitive function taking into account the role of depression in a population-based sample of individuals aged 75- and 85-year. The different categories of social phobia were related to lower educational level, self-reported concentration difficulties and indecisiveness, and interviewer-rated memory problems, but not with global cognitive functioning measured with MMSE. There were few associations between social phobia and performance on cognitive tests.

In line with a previous study [146], we found no association between the different categories of social phobia and overall cognitive function measured with the MMSE. Individuals with DSM-IV social phobia performed worse on Clock Test which measures visuospatial ability with an executive function component. Any fear of social situations was related to poorer performance on Thurstone Picture Memory Test, a test of nonverbal memory. This is partly in line with findings from younger samples where social phobia has been associated with visuospatial difficulties but not with executive dysfunction [147]. On the other hand, we found no association between social phobia and performance on Block Design Test that also measures visuospatial ability.

Major depression [184-186], and psychotic symptoms and paranoid ideation [187] has previously been reported to be related to worse cognitive performance. In comparison with other psychiatric conditions among the elderly, social phobia thus appears to be less closely related to cognitive performance.

Interviewer-rated short-term memory problems, but not long-term memory problems, were more common in all categories of social phobia compared to those with no social phobia. It should be noted though that most people had only very mild symptoms, as those with dementia were excluded. We have previously reported that interviewer-rated mild memory problems are stronger predictors for development of dementia compared to psychometric memory tests [188]. It may be that interviewers are more sensitive to subtle deficits in memory, or that rating of memory problems includes subtle cognitive deficits beyond just memory.

In contrast to test performance, individuals with social phobia more often reported cognitive symptoms. Our findings may seem contradictory as social phobia was associated with worse subjective and interviewer-rated cognitive function, whereas the impact of social phobia was minor on cognitive tests.

However, it needs to be emphasized that subjective memory complaints typically correlate poorly with cognitive test performance [184, 189].

Our finding that social phobia was associated with lower education is in line with results from studies in younger populations [34, 40, 50, 54]. In elderly populations, generalized anxiety disorders and phobic disorders, but not social phobia, have been found to be associated with lower education [43, 73, 74]. The use of cross-sectional data means that we cannot determine the direction of observed associations. The association between social phobia and lower educational level may be due to the early age of onset of social phobia which may interfere with educational attainment [3]. It may also illustrate that factors early in life, such as education, can have a long lasting influence on mental health over the life-course.

# 6 CONCLUSION

Social phobia is common among the elderly and related to worse social and mental functioning. The current DSM-IV criteria may underrate the occurrence of significant social phobia in the elderly community. We found that almost half of those with social phobia at baseline no longer had social fears at 5-year follow-up, indicating that social phobia has a good prognosis of spontaneous recovery. There are no previous clinical or population-based studies in the elderly regarding the association between social phobia and personality traits. Our results indicate that neuroticism and extraversion may be important etiological factors for social phobia also in old age. Furthermore, as demonstrated for younger individuals, neuroticism may account for part of the comorbidity between social phobia and depression also among elderly. We found that those with social phobia more often had subjective cognitive complaints and poorer interviewer-rated memory. On the other hand, the association between social phobia and cognitive test performance was relatively minor.

# 7 FUTURE RESEARCH

In order to better understand the natural course of social phobia and its temporal relationship with other anxiety disorders and depression longitudinal population studies with multiple examinations with short intervals are needed. Studies with a longitudinal design can also provide more accurate estimates of lifetime prevalence. In the Dunedin birth cohort study participants were examined on four occasions from ages 18 to 32. It was found that the lifetime prevalence of social phobia was doubled when using prospective data compared to retrospective data [190], emphasizing the need for longitudinal design to obtain reliable estimates of lifetime prevalence for mental disorders. Furthermore, longitudinal studies are needed to examine the temporal relationship between social phobia and personality traits.

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