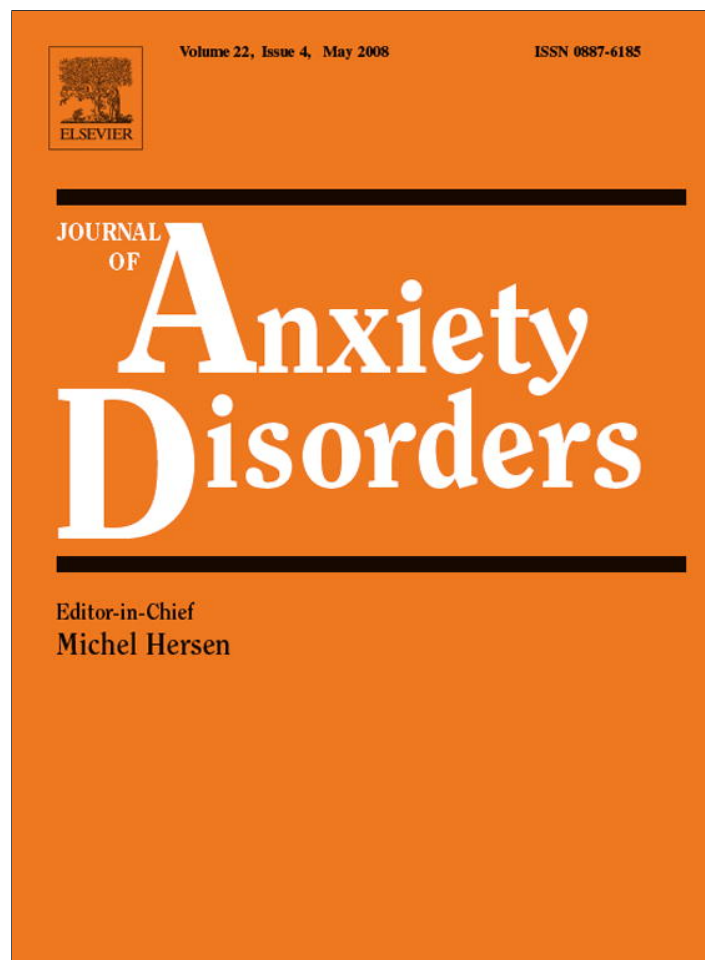


Provided for non-commercial research and education use.
Not for reproduction, distribution or commercial use.



This article appeared in a journal published by Elsevier. The attached copy is furnished to the author for internal non-commercial research and education use, including for instruction at the authors institution and sharing with colleagues.

Other uses, including reproduction and distribution, or selling or licensing copies, or posting to personal, institutional or third party websites are prohibited.

In most cases authors are permitted to post their version of the article (e.g. in Word or Tex form) to their personal website or institutional repository. Authors requiring further information regarding Elsevier's archiving and manuscript policies are encouraged to visit:

<http://www.elsevier.com/copyright>



Social phobia with sudden onset—Post-panic social phobia?

Ann Suhl Kristensen^{a,*}, Erik Lykke Mortensen^b, Ole Mors^a

^aCentre for Psychiatric Research, Aarhus University Hospital, Risskov, Denmark

^bDepartment of Health Psychology, Institute Public Health, University of Copenhagen, Denmark

Received 19 February 2007; received in revised form 25 June 2007; accepted 3 July 2007

Abstract

Overlap between social phobia (SP) and panic disorder (PD) has been observed in epidemiological, family, and challenge studies. One possible explanation is that some cases of SP develop as a consequence of a panic attack in a social situation. By definition, these cases of SP have sudden onset. It is hypothesized that patients with SP with sudden onset are more similar to patients with comorbid SP and PD than to patients with SP without sudden onset regarding age of onset, extraversion, and prevalence of anxiety symptoms. One hundred and eighty-two patients with a lifetime diagnosis of PD and/or SP were recruited as part of an etiological study. Patients with SP with sudden onset did, as hypothesized, differ from patients with SP without sudden onset with regard to age of onset and extraversion, but not with regard to symptoms. They did not differ markedly from patients with comorbid SP and PD. The concept of post-panic SP is discussed.

© 2007 Elsevier Ltd. All rights reserved.

Keywords: Classification; Diagnosis; Comorbidity; Panic attacks; Age of onset; Extraversion; Signs and symptoms

Panic disorder (PD) and social phobia (SP) are common disorders that have a serious impact on the lives of those affected. PD is characterized by recurrent, spontaneous panic attacks, whereas the distinctive features of SP are fear and avoidance of being the focus of attention or being humiliated in social situations. The two disorders are considered separate diagnostic entities and are to a certain degree also treated differently.

Overlap between PD and SP has, however, been observed in epidemiological surveys, family studies, and challenge studies. Large comorbidity between PD and SP has been found in both clinical samples (Brown, Campbell, Lehman, Grisham, & Mancill, 2001; Rodriguez et al., 2004) and epidemiological studies

(Alonso et al., 2004; Goodwin & Hamilton, 2001; Schneier, Johnson, Hornig, Liebowitz, & Weissman, 1992).

Family and twin studies have found significant familial aggregation for PD and SP, respectively (Fyer, Mannuzza, Chapman, Martin, & Klein, 1995; Hetttema, Neale, & Kendler, 2001; Stein et al., 1998). Some family studies have also investigated the comorbidity between PD and SP and found indications that the comorbidity between PD and SP may be non-familial or that one of the disorders could be causing the other (Merikangas, Lieb, Wittchen, & Avenevoli, 2003).

Challenge studies using Pentagastrin (McCann, Slate, Geraci, Roscow-Terrill, & Uhde, 1997), 35% CO₂ (Caldirola, Perna, Arancio, Bertani, & Bellodi, 1997; Gorman et al., 1990), hyperventilation (Nardi, Valenca, Nascimento, Mezzasalma, & Zin, 2001) and caffeine (Tancer, Stein, & Uhde, 1994) have found that patients with SP, like patients with PD, have a

* Corresponding author. Tel.: +45 77 89 35 56; fax: +45 77 89 35 99.
E-mail address: ask@psykiatri.aaa.dk (A.S. Kristensen).

heightened sensitivity to these substances compared to controls, indicating a shared neurobiology in SP and PD. Some of the results, though, have indicated that fewer patients with SP than with PD responded to the substances.

In light of the overlap found in these areas of research, it is relevant to investigate possible reasons for the association between PD and SP.

We propose a possible explanation for the overlap between PD and SP. During diagnostic interviews, some patients with SP have described that the condition begun very suddenly. These patients were able to recall the first time they experienced anxiety symptoms in a social situation very similarly to the way patients with PD most often remember their first panic attack. On the basis of this clinical observation, we suggest a possible route to the development of SP: a sudden unexpected panic attack in a social situation may initiate fear of similar social situations. If so, SP begins very suddenly in these patients.

The idea parallels the common learning theory of agoraphobia with PD, i.e. agoraphobic avoidance is conditioned by panic attacks experienced in agoraphobic situations. Prior studies have suggested the importance of the context in which the first panic attack occurred in the development of subsequent agoraphobic avoidance behavior (Faravelli, Pallanti, Biondi, Paterniti, & Scarpato, 1992; Lelliott, Marks, McNamee, & Tobena, 1989). The unpleasant experience was attributed to the specific type of situation in which it occurred. Furthermore, if a person has experienced an initial panic attack with uncontrollable anxiety symptoms, such as shaking, sweating, and blushing, in a social situation, it may also have triggered a fear of other people noticing the anxiety symptoms.

McNally and Lukach (1992) have found that in a minority of cases, panic attacks could lead to posttraumatic stress disorder (PTSD) with symptoms such as intrusive thoughts and startle response, although at a lower rate than following prototypical traumatic stressors. The subjective experience of a panic attack may have mirrored that of a trauma for a number of reasons.

First, panic attacks have often led to a subjective experience of catastrophe and fear of dying. The severity of PTSD has been thought to be a function of the perceived threat, and patients with PD have certainly often perceived their panic attacks, especially the initial panic attack, as life threatening (McNally & Lukach, 1992).

Second, by definition a panic attack has happened suddenly, “out of nowhere”, which is also the defining feature of SP with sudden onset. Brown and Kulik, who

coined the phrase “flashbulb memories” to refer to the vivid and detailed memories of the personal context for the reception of surprising news, have claimed that in relation to forming strong emotional memories, “the registration of surprise and unexpectedness in the central nervous system is the first step and the sine qua non of all else” (Brown & Kulik, 1977, p. 84).

Third, both encoding and long-term memory are highly affected by the level of arousal present (Bradley, Greenwald, Petry, & Lang, 1992; Cahill & Alkire, 2003). The more arousing or stressing the stimuli, the better the memory of it. Although a panic attack may not have been a traumatic event in the traditional sense of the word, it has involved a surge of autonomic arousal and may therefore in large part be responsible for the vivid memory of the situation in which the patient first experienced a panic attack.

1. Purpose and hypotheses

The purpose of this study was firstly to describe the phenomenon of SP with sudden onset. Secondly, it was hypothesized that if SP with sudden onset was post-panic SP it would be more similar to comorbid SP and PD than it would be to SP without sudden onset.

Comorbid SP and PD has unfortunately not been the focus of enough studies to make it possible to draw hypotheses about expected differences between patients with SP and patients with comorbid SP and PD. Instead, hypotheses about differences between the diagnostic categories in the present study were based on prior research indicating areas with robust differences between patients with PD and patients with SP: age of onset, personality, and prevalence of specific anxiety symptoms.

SP typically starts in childhood or during the teenage years, whereas PD typically begins in the early to mid 20s (Regier, Rae, Narrow, Kaelber, & Schatzberg, 1998).

A number of prior studies have used different versions of the NEO personality questionnaire (Costa & McCrae, 1992) to compare the personality of patients with PD or SP with that of controls without anxiety disorders (Cuijpers, van Straten, & Donker, 2005; Katon et al., 1995; Trull & Sher, 1994). These studies have consistently found that patients with both anxiety disorders had higher scores on neuroticism than controls, whereas patients with SP had lower scores on extraversion than controls.

Regarding the prevalence of specific anxiety symptoms, several studies have found differences between PD and SP but as the findings have not been entirely consistent, only findings that have been

replicated could form the basis of the hypotheses in the present study. It has been found that during anxiety attacks, patients with PD more frequently than patients with SP experienced palpitations (Perugi et al., 1990; Reich, Noyes, & Yates, 1988), a feeling of choking (Hazen, Stein, & Walker, 1996; Page, 1994; Perugi et al., 1990), chest pain or discomfort (Perugi et al., 1990; Reich et al., 1988), feeling dizzy or faint (Hazen et al., 1996; Page, 1994; Perugi et al., 1990), numbness or tingling sensations (Hazen et al., 1996; Page, 1994), and fear of dying (Hazen et al., 1996; Page, 1994; Perugi et al., 1990; Reich et al., 1988).

Hence, the hypotheses of the present study were that patients with SP with sudden onset would have a later age of onset, score higher on extraversion, and have a higher prevalence of palpitations, feeling of choking, chest pain or discomfort, feeling dizzy or faint, numbness or tingling sensations, and fear of dying than patients with SP without sudden onset. Patients with SP with sudden onset were instead hypothesized to be similar to patients with PD or patients with comorbid SP and PD on these variables.

2. Method

2.1. Participants

One hundred and eighty-two patients, who in a lifetime perspective fulfilled the DSM-IV diagnostic criteria for PD, agoraphobia, and/or SP before the age of 21, were included as part of a larger study conducted at the Centre for Psychiatric Research, investigating genetic and environmental risk factors of developing PD, agoraphobia, and SP. Participants were recruited through advertisements, pamphlets, and the project homepage. Exclusion criteria were bipolar disorder, obsessive–compulsive disorder, schizophrenia, or psychotic symptoms in a lifetime perspective; bipolar disorder or schizophrenia in first-degree relatives; abuse of alcohol or drugs prior to onset of the anxiety disorder; depression immediately prior to, concurrent with, or immediately after onset of the anxiety disorder; mental retardation; language disabilities; or being under 18 years of age. Inclusion and exclusion criteria were defined to optimize the investigation of genetic risk factors. Of the 673 persons who volunteered to participate in the study, 491 were excluded either because they did not fulfill the diagnostic criteria for PD, agoraphobia, or SP before the age of 21 or because they fulfilled one or more of the exclusion criteria. Of the 491 excluded, 139 were excluded because of age of onset later than 20 years.

2.2. Measures and procedure

Subjects were interviewed about present and prior psychiatric disorders using Schedules for Clinical Assessment in Neuropsychiatry (SCAN) (Wing et al., 1990; Wing, Sartorius, & Üstun, 1998). SCAN is a semi-structured diagnostic interview, which has been shown to have satisfactory reliability even when administered by non-clinical interviewers (Rijnders et al., 2000). The interviewers in the present study were two psychologists who had attended a 5-day SCAN training course at the WHO Centre in Aarhus. Interrater meetings were held monthly to ensure reliability of ratings and were supervised by an experienced psychiatrist. A report was written for each patient interviewed for the study. Each report was then reviewed by O. Mors at the WHO Collaborating Centre for Mental Health, Aarhus University Hospital, and best estimate diagnoses were applied in accordance with the ICD-10 (World Health Organization, 1993) and the DSM-IV (American Psychiatric Association, 2000). Additionally, interviews performed by one of the interviewers were audio taped and independently rated by the other interviewer. Interrater reliability was satisfactory (Cohen's κ 0.93).

For the purpose of the present study, SP with sudden onset was operationalized as SP where the patient stated that the first experience of social anxiety occurred suddenly, and where the patient remembered the first time he or she felt anxious in a social situation.

As part of the diagnostic interview, patients were asked about 14 specific avoidance behaviors and about onset situation. For each anxiety disorder patients were also asked which of the anxiety symptoms of the DSM-IV and ICD-10 diagnostic criteria they had experienced during the first 6 months after onset of the anxiety disorder. Age of onset was defined as the age when diagnostic criteria of a full anxiety diagnosis were met for the first time.

The NEO PI-R (Costa & McCrae, 1992) was sent to the participants who answered it before the interview. The questionnaire consists of 240 items assessing five major personality dimensions: neuroticism, extraversion, openness, agreeableness and conscientiousness. Recently, the Danish version has been standardized and norm data published (Hansen, Mortensen, & Schiøtz, 2003).

The project has been approved by the regional ethics committee and by the Danish Data Protection Agency. Participation was unpaid. Participants were given information about the project and of their rights, both verbally and in writing, before signing the consent form.

The study was conducted in accordance with the Helsinki Declaration (June 1964, modified at the 48th World Medical Association, South Africa, October 1996).

2.3. Analysis

For the purpose of the present study, the included patients were divided into four mutually exclusive categories: (1) patients with SP without sudden onset and without comorbid PD, (2) patients with SP with sudden onset and without comorbid PD, (3) patients with comorbid SP and PD, regardless of whether SP was with or without sudden onset, and (4) patients with PD without comorbid SP.

Differences between the diagnostic categories with regard to age, gender, comorbidity, presence of anxiety disorder at the time of interview, age of onset, extraversion scores, and number of feared social situations were analyzed using appropriate statistics; χ^2 for dichotomous data, one-way ANOVA for normally distributed data and median test for non-normal continuous data. A possible differential association between extraversion and the four diagnostic groups was investigated using linear regression analysis, adjusting for presence of anxiety disorder at the time of interview, comorbidity in a lifetime perspective, and gender. In order to retain the variation at the extreme low end of the extraversion scale, raw extraversion scores were used in the analysis. The presence of an anxiety disorder at the time of completing the NEO PI-R has probably lowered the extraversion score, as phobic behaviors are logically linked to diminished activity and less positive emotions. Consequently, anxiety disorder at the time of interview was included as a covariate and was operationalized as any DSM-IV anxiety diagnosis, except specific phobia. The presence of any additional DSM-IV diagnosis in a lifetime perspective was included in the regression model, as previous studies have found low extraversion scores to be associated with a number of different psychiatric disorders (Bienvenu et al., 2004; Trull & Sher, 1994).

Differences between the diagnostic groups with regard to the presence of specific anxiety symptoms were investigated using logistic regression analysis, controlling for comorbid agoraphobia in a lifetime perspective. Agoraphobia has been found to be associated with a higher frequency of specific anxiety symptoms besides those associated with panic disorder (Schneier et al., 1991). For patients with comorbid SP and PD, only symptoms experienced during the first 6

months of social phobic anxiety were included in the analysis.

3. Results

3.1. Description of the sample

Demographic and clinical characteristics of the diagnostic groups are presented in Table 1. The patients with SP with sudden onset were asked to describe the first time they experienced an anxiety attack. The following case stories illustrate the phenomenon¹:

Lisa was 16 years old when she, while having lunch with her boyfriend's family, suddenly started shaking. She got scared that the others would notice. After this incident she avoided eating and drinking with others and in her early 20s, the fear spread to other social situations: writing with others watching, going to parties and being physically close to strangers, such as being at the hairdresser's or dentist's.

John, who was 17 years old, was reprimanded by his high school teacher in front of the whole class for not doing his homework, and all of a sudden he felt hot and dizzy. His heart was beating fast, a strange tingling sensation spread in his feet and hands, and it became very hard for him to concentrate on what the teacher was saying. After this, John started feeling anxious in a number of different social situations; in school, while eating with others and when he had to speak to customers at the shop where he was working after school.

3.2. Age of onset

Diagnostic plots and a Shapiro-Wilk *W*-test revealed that age of onset was not normally distributed; a median test was then used to compare the groups (Fig. 1).

As hypothesized, patients with SP with sudden onset had a later age of onset than patients with SP without sudden onset, similar to patients with comorbid SP and PD and patients with PD.

3.3. Personality

The scales of the NEO PI-R all had satisfactory internal consistency with Cronbach's Alpha coefficients between 0.87 and 0.92 in the present sample. Three patients did not return the questionnaire and were therefore not included in the analysis. A linear regression analysis, including diagnoses, comorbidity

¹ Names have been changed to ensure anonymity.

Table 1

Characteristics of patients in the four diagnostic groups

	SP without sudden onset	SP with sudden onset	Comorbid SP and PD	PD	Overall comparison <i>p</i> -value
Number of patients	46	35	46	55	
Age, mean (S.D.)	36.7 (12.0)	35.4 (10.9)	39.2 (13.7)	34.2 (11.6)	NS
Gender (females, %)	60.9	57.1	82.6	81.8	.008
Anxiety diagnosis at the time of interview (%)	91.3	94.3	84.8	74.6	.035
Lifetime comorbidity					
Agoraphobia (%)	21.7	37.1	84.8	87.3	.000
Major depression (%)	78.3	28.6	73.9	52.7	.000
GAD (%)	6.5	2.9	13.0	16.4	NS
Alcohol dependence (%)	21.7	11.4	17.4	10.9	NS
Age of onset, median	13.5	16	16	17	.000
Extraversion <i>t</i> -score, mean (S.D.)	34.3 (10.6)	38.3 (10.4)	38.5 (11.5)	46.8 (9.2)	.000
Number of feared social situations, mean (S.D.) of 14	8.2 (4.2)	7.8 (3.6)	7.3 (3.8)	0.6 (1.6)	.000

GAD: generalized anxiety disorder.

in a lifetime perspective, presence of anxiety disorder at the time of study, and gender as predictors of extraversion scores, was performed (Table 2).

Patients with SP with sudden onset had significantly different scores on extraversion than both patients with SP without sudden onset and patients with PD, when controlling for comorbidity in a lifetime perspective, presence of anxiety disorder at time of study, and gender. Patients with SP without sudden onset scored lower on extraversion, and patients with PD scored higher on extraversion. Patients with comorbid SP and PD did not have significantly different extraversion scores than patients with SP with sudden onset.

3.4. Specific anxiety symptoms

Logistic regression analysis of the association between diagnostic categories and frequency of specific

anxiety symptoms, adjusting for presence of comorbid agoraphobia in a lifetime perspective, was performed (Table 3).

With regard to the frequency of palpitations, feeling of choking, chest pain or discomfort, feeling dizzy or faint, numbness or tingling sensations, and fear of dying, SP with sudden onset was not significantly different from SP without sudden onset. SP with sudden onset and comorbid SP and PD were also not significantly different with respect to these symptoms, except fear of dying, which patients with comorbid SP and PD experienced more often. SP with sudden onset and PD differed significantly with respect to feeling dizzy or faint, numbness or tingling sensations, and fear of dying, but not with respect to palpitations, feeling of choking, or chest pain and discomfort. Additional analyses, not reported here, indicated that removing the adjustment for presence of agoraphobia would not significantly alter the results.

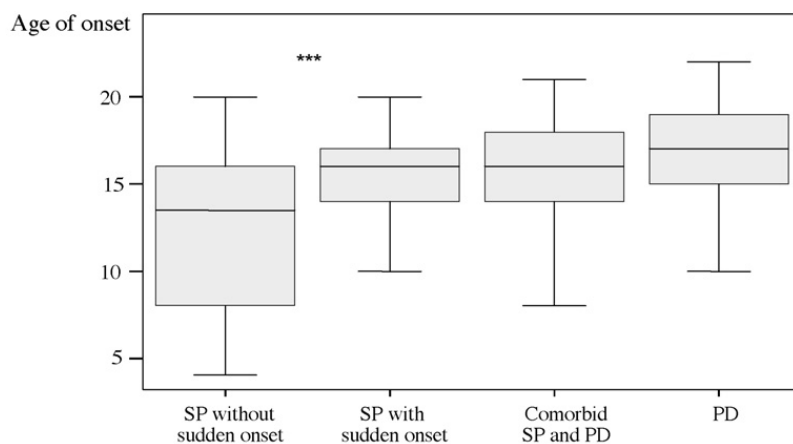


Fig. 1. Median age of onset. ***, $p < .001$.

Table 2
Model of the effect of diagnoses, comorbidity, present anxiety disorder and gender on extraversion scores

Dependent variable: raw score on extraversion	Standardized coefficient (β)	[95% confidence interval]	
Diagnoses			
A. SP without sudden onset	−9.34*	[−18.53	−0.15]
B. SP with sudden onset	Reference group	–	–
C. Comorbid SP and PD	−1.74	[−11.31	7.83]
D. PD	13.62**	[4.32	22.92]
Anxiety disorder at time of interview	−14.41**	[−23.00	−5.81]
Comorbidity in a lifetime perspective	−5.61	[−17.24	6.01]
Female gender	−2.12	[−9.01	4.78]
R^2 adjusted	0.20		
Significance of model	$F(6, 172) 8.45, p < .000$		

* $p < .05$.

** $p < .01$.

Table 3
Frequency of specific anxiety symptoms

Symptom	A: SP without sudden onset (%)	B: SP with sudden onset (%)	C: Comorbid SP and PD (%)	D: PD (%)	Comparison of groups
<i>Palpitations or pounding heart, or accelerated heart rate</i>	80.4	82.9	78.3	96.4	A, C < D*
Sweating	91.3	74.3	78.3	65.5	A > D*
Trembling or shaking	58.7	77.1	63.0	76.4	NS
Dry mouth	43.5	45.7	52.2	60.0	NS
Difficulty breathing	28.3	37.1	45.7	85.5	A, B, C < D***
<i>Feeling of choking</i>	8.7	17.1	34.8	54.6	A < D**
<i>Chest pain or discomfort</i>	17.4	17.1	30.4	36.4	NS
Nausea or abdominal distress	71.7	71.4	67.4	58.2	NS
<i>Feeling dizzy, unsteady, faint or lightheaded</i>	17.4	31.4	45.7	85.5	A < C* A, B, C < D***
Derealization or depersonalization	45.7	71.4	67.4	83.6	A < B* A < D**
Fear of losing control, going crazy, or passing out	43.5	65.7	56.5	83.6	A < D* C < D**
<i>Fear of dying</i>	2.2	2.2	23.9	72.7	A, B < C* A, B, C < D***
Hot flushes or cold chills	58.7	62.9	60.9	70.9	NS
<i>Numbness or tingling sensation</i>	8.7	17.1	26.1	61.8	A < D*** B, C < D**

The symptoms written in italics were hypothesized to differ in frequency between groups. The group comparisons were controlled for presence of comorbid agoraphobia in a lifetime perspective.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

4. Discussion

Our sample consisted of patients who all had very early age of onset, which was clearly reflected in the relatively low median age of onset in the group of patients with PD compared to what has been found in epidemiological studies (Regier et al., 1998; Kessler et al., 2005). Furthermore, the included patients did not have comorbid bipolar disorder, obsessive–compulsive disorder, schizophrenia or psychotic symptoms. Inclusion criteria of onset of the anxiety disorder before the

age of 21 was a limitation, as age of onset was one of the main variables of investigation. Our sample was recruited through advertisements, pamphlets, and a homepage where it was clearly stated that we were looking for persons who had either panic disorder, agoraphobia, or social phobia before the age of 21. Of the 491 volunteers who were excluded, 139 were excluded because of a later age of onset. Results regarding age of onset must therefore be interpreted with caution until further studies can be conducted in samples without this potential bias.

Information on onset of anxiety disorder was collected retrospectively and must as such be viewed with caution. The sample was not collected for the purpose of studying SP with sudden onset and it has not been our intention to include a certain number of these patients—which makes it all the more striking that a large proportion of the patients with SP in the sample has experienced sudden onset of the disorder.

As hypothesized, patients with SP with sudden onset had a later age of onset than patients with SP without sudden onset, similar to the ages at onset in the groups of patients with comorbid SP and PD and patients with PD. It may be speculated that the age of onset for patients with PD may be more affected by selection bias than the age of onset for patients with SP. If the age of onset for PD would be higher in a less selected sample, larger age differences between PD and SP may be observed. It is an open question whether the difference found in this sample between SP with and without sudden onset would be observed in a less selected sample, although a prior study has found that phobias acquired through conditioning experiences have a later age of onset than phobias acquired in other ways (Ost, 1987).

As hypothesized, patients with SP with sudden onset were different from patients with SP without sudden onset with regard to extraversion. The extraversion scores of patients with SP with sudden onset were similar to those of patients with comorbid SP and PD, but significantly different from those of patients with only PD. The difference between patients with only PD and patients with either comorbid SP and PD or SP with sudden onset could indicate that patients with panic attacks who develop SP (comorbid SP and PD or SP with sudden onset) are at risk of developing SP because of their a priori tendency to be more introverted. However, as this is a cross sectional study, we cannot determine whether introversion has led to SP or vice versa.

We did not find the hypothesized differences between SP with and without sudden onset with regard to specific anxiety symptoms. Patients with SP with sudden onset and patients with comorbid SP and PD were not different either, except with regard to fear of dying. Patients with PD experienced feeling dizzy or faint, numbness or tingling sensations, and fear of dying during anxiety attacks more often than patients with SP with sudden onset. Overall, differences between the groups on specific anxiety symptoms were mainly found between the group of patients with PD and one or more of the other groups.

It has previously been suggested that some patients with PD develop social fears because they fear having

panic attacks in social situations (Liebowitz, Gorman, Fyer, & Klein, 1985; Mannuzza, Fyer, Liebowitz, & Klein, 1990; Munjack, Brown, & McDowell, 1987). “Patients with panic disorder often report that their social fears stem from fears of embarrassment should they have a panic attack in front of another person” (Munjack et al., 1987, p. 50). The phrase “secondary social phobia” has been coined to set this condition apart from primary SP. It has been argued that secondary SP and primary SP can be clearly distinguished, as patients with secondary SP “also have panic attacks in a variety of non-social situations” (Liebowitz et al., 1985, p. 729). The patients in the present study who had SP with sudden onset would not have been classified as having secondary SP on the basis of this distinction, as they did not have spontaneous, uncured panic attacks; i.e. comorbid PD. In fact, the two groups of patients who did not have PD also had a significantly lower prevalence of comorbid agoraphobia than the groups with diagnosed PD (Table 1), indicating that patients with SP with sudden onset neither had PD, nor more panic attacks in agoraphobic situations than those without sudden onset.

The rate of SP with sudden onset in the present study is comparable to the rates of SP acquired by traumatic conditioning found in studies of clinical samples (Stemberger, Turner, Beidel, & Calhoun, 1995). Since SP with sudden onset is hypothesized to develop on the basis of a single panic attack in a specific social situation, it can be speculated that SP with sudden onset could be specific SP, limited to one or two social situations. In the present study, though, both patients with SP with and without sudden onset and patients with comorbid SP and PD had generalized SP (Table 1).

In conclusion, SP with sudden onset was, as hypothesized, different from SP without sudden onset with regard to age of onset and extraversion score, but not with regard to specific anxiety symptoms. In support of the idea that SP with sudden onset could be post-panic SP, patients with SP with sudden onset were not different from patients with comorbid SP and PD with regard to age of onset, extraversion, or panic-related symptoms, except fear of dying during anxiety attacks.

If SP with sudden onset is really post-panic SP, the disorder may etiologically have more in common with comorbid SP and PD than with SP without sudden onset. This could have consequences both for the definition of subtypes of SP for research purposes as well as for the understanding and treatment of different subtypes of SP. Further studies investigating characteristics and etiology of SP with and without sudden onset are warranted; preferably both epidemiological studies,

family studies, and studies of response to challenge agents such as CO₂.

Acknowledgements

This study was performed in partial fulfillment of the requirements of the International Master in Affective Neuroscience at the Universities of Maastricht and Florence. The work reported was supported by grants from Merchant LF Foght's Foundation, The Carl and Ellen Hertz Foundation, The Helga and Peter Korning's Foundation, and the Psychiatric Research Foundation (Pulje til Styrkelse af Psykiatrisk Forskning).

Reference

- Alonso, J., Angermeyer, M. C., Bernert, S., Bruffaerts, R., Brugha, T. S., Bryson, H., et al. (2004). 12-Month comorbidity patterns and associated factors in Europe: Results from the European Study of the Epidemiology of Mental Disorders (ESEMeD) project. *Acta Psychiatrica Scandinavica*, *109*, 28–37.
- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders. Text Revision* (4th ed.). Washington, DC: American Psychiatric Association.
- Bienvenu, O. J., Samuels, J. F., Costa, P. T., Reti, I. M., Eaton, W. W., & Nestadt, G. (2004). Anxiety and depressive disorders and the five-factor model of personality: A higher- and lower-order personality trait investigation in a community sample. *Depression and Anxiety*, *20*, 92–97.
- Bradley, M. M., Greenwald, M. K., Petry, M. C., & Lang, P. J. (1992). Remembering pictures: Pleasure and arousal in memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *18*, 379–390.
- Brown, R., & Kulik, J. (1977). Flashbulb memories. *Cognition*, *5*, 73–99.
- Brown, T. A., Campbell, L. A., Lehman, C. L., Grisham, J. R., & Mancill, R. B. (2001). Current and lifetime comorbidity of the DSM-IV anxiety and mood disorders in a large clinical sample. *Journal of Abnormal Psychology*, *110*, 585–599.
- Cahill, L., & Alkire, M. T. (2003). Epinephrine enhancement of human memory consolidation: Interaction with arousal at encoding. *Neurobiology of Learning and Memory*, *79*, 194–198.
- Caldirola, D., Perna, G., Arancio, C., Bertani, A., & Bellodi, L. (1997). The 35% CO₂ challenge test in patients with social phobia. *Psychiatry Research*, *71*, 41–48.
- Costa, P. T., & McCrae, R. R. (1992). *Revised NEO personality inventory (NEO PI-R) and the NEO five-factor inventory (NEO-FFI)*. Professional manual. Odessa, Florida: Psychological Assessment Resources Inc.
- Cuijpers, P., van Straten, A., & Donker, M. (2005). Personality traits of patients with mood and anxiety disorders. *Psychiatry Research*, *133*, 229–237.
- Faravelli, C., Pallanti, S., Biondi, F., Paterniti, S., & Scarpato, M. A. (1992). Onset of panic disorder. *American Journal of Psychiatry*, *149*, 827–828.
- Fyer, A. J., Mannuzza, S., Chapman, T. F., Lipsitz, J., Martin, L. Y., & Klein, D. F. (1996). Panic disorder and social phobia: Effects of comorbidity on familial transmission. *Anxiety*, *2*, 173–178.
- Fyer, A. J., Mannuzza, S., Chapman, T. F., Martin, L. Y., & Klein, D. F. (1995). Specificity in familial aggregation of phobic disorders. *Archives of General Psychiatry*, *52*, 564–573.
- Goodwin, R. D., & Hamilton, S. P. (2001). Panic attack as a marker of core psychopathological processes. *Psychopathology*, *34*, 278–288.
- Gorman, J. M., Papp, L. A., Martinez, J., Goetz, R. R., Hollander, E., Liebowitz, M. R., et al. (1990). High-dose carbon dioxide challenge test in anxiety disorder patients. *Biological Psychiatry*, *28*, 743–757.
- Hansen, H. S., Mortensen, E. L., & Schiøtz, H. K. (2003). *NEO PI-R (NEO personality inventory-revised), manual-Klinisk*. Virum, Denmark: PsykologiErhverv A/S.
- Hazen, A. L., Stein, M. B., & Walker, J. R. (1996). Anxiety symptoms in panic disorder and social phobia: Support for suffocation theory of panic? *Anxiety*, *2*, 102–105.
- Hettema, J. M., Neale, M. C., & Kendler, K. S. (2001). A review and meta-analysis of the genetic epidemiology of anxiety disorders. *American Journal of Psychiatry*, *158*, 1568–1578.
- Horwath, E., Wolk, S. I., Goldstein, R. B., Wickramaratne, P., Sobin, C., Adams, P., et al. (1995). Is the comorbidity between social phobia and panic disorder due to familial cotransmission or other factors? *Archives of General Psychiatry*, *52*, 574–582.
- Katon, W., Hollifield, M., Chapman, T., Mannuzza, S., Ballenger, J., & Fyer, A. (1995). Infrequent panic attacks: Psychiatric comorbidity, personality characteristics and functional disability. *Journal of Psychiatric Research*, *29*, 121–131.
- Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*, *62*, 593–602.
- Lelliott, P., Marks, I., McNamee, G., & Tobena, A. (1989). Onset of panic disorder with agoraphobia. Toward an integrated model. *Archives of General Psychiatry*, *46*, 1000–1004.
- Liebowitz, M. R., Gorman, J. M., Fyer, A. J., & Klein, D. F. (1985). Social phobia. Review of a neglected anxiety disorder. *Archives of General Psychiatry*, *42*, 729–736.
- Mannuzza, S., Fyer, A. J., Liebowitz, M. R., & Klein, D. F. (1990). Delineating the boundaries of social phobia—its relationship to panic disorder and agoraphobia. *Journal of Anxiety Disorders*, *4*, 41–59.
- McCann, U. D., Slate, S. O., Geraci, M., Roscow-Terrill, D., & Uhde, T. W. (1997). A comparison of the effects of intravenous pentagastrin on patients with social phobia, panic disorder and healthy controls. *Neuropsychopharmacology*, *16*, 229–237.
- McNally, R. J., & Lukach, B. M. (1992). Are panic attacks traumatic stressors? *American Journal of Psychiatry*, *149*, 824–826.
- Merikangas, K. R., Lieb, R., Wittchen, H. U., & Avenevoli, S. (2003). Family and high-risk studies of social anxiety disorder. *Acta Psychiatrica Scandinavica. Supplementum*, 28–37.
- Munjack, D. J., Brown, R. A., & McDowell, D. E. (1987). Comparison of social anxiety in patients with social phobia and panic disorder. *The Journal of Nervous and Mental Disease*, *175*, 49–51.
- Nardi, A. E., Valenca, A. M., Nascimento, I., Mezzasalma, M. A., & Zin, W. A. (2001). Hyperventilation in panic disorder and social phobia. *Psychopathology*, *34*, 123–127.
- Ost, L. G. (1987). Age of onset in different phobias. *Journal of Abnormal Psychology*, *96*, 223–229.
- Page, A. C. (1994). Distinguishing panic disorder and agoraphobia from social phobia. *The Journal of Nervous and Mental Disease*, *182*, 611–617.
- Perugi, G., Simonini, E., Savino, M., Mengali, F., Cassano, G. B., & Akiskal, H. S. (1990). Primary and secondary social phobia:

- Psychopathologic and familial differentiations. *Comprehensive Psychiatry*, 31, 245–252.
- Regier, D. A., Rae, D. S., Narrow, W. E., Kaelber, C. T., & Schatzberg, A. F. (1998). Prevalence of anxiety disorders and their comorbidity with mood and addictive disorders. *British Journal of Psychiatry*, 173, 24–28.
- Reich, J., Noyes, R., & Yates, W. (1988). Anxiety symptoms distinguishing social phobia from panic and generalized anxiety disorders. *The Journal of Nervous and Mental Disease*, 176, 510–513.
- Rijnders, C. A., van den Berg, J. F., Hodiament, P. P., Nienhuis, F. J., Furer, J. W., Mulder, J., et al. (2000). Psychometric properties of the schedules for clinical assessment in neuropsychiatry (SCAN-2.1). *Social Psychiatry and Psychiatric Epidemiology*, 35, 348–352.
- Rodriguez, B. F., Weisberg, R. B., Pagano, M. E., Machan, J. T., Culpepper, L., & Keller, M. B. (2004). Frequency and patterns of psychiatric comorbidity in a sample of primary care patients with anxiety disorders. *Comprehensive Psychiatry*, 45, 129–137.
- Schneier, F. R., Fyer, A. J., Martin, L. Y., Ross, D., Mannuzza, S., Liebowitz, M. R., et al. (1991). A comparison of phobic subtypes within panic disorder. *Journal of Anxiety Disorders*, 5, 65–75.
- Schneier, F. R., Johnson, J., Hornig, C. D., Liebowitz, M. R., & Weissman, M. M. (1992). Social phobia. Comorbidity and morbidity in an epidemiologic sample. *Archives of General Psychiatry*, 49, 282–288.
- Stein, M. B., Chartier, M. J., Hazen, A. L., Kozak, M. V., Tancer, M. E., Lander, S., et al. (1998). A direct-interview family study of generalized social phobia. *American Journal of Psychiatry*, 155, 90–97.
- Stemberger, R. T., Turner, S. M., Beidel, D. C., & Calhoun, K. S. (1995). Social phobia: An analysis of possible developmental factors. *Journal of Abnormal Psychology*, 104, 526–531.
- Tancer, M. E., Stein, M. B., & Uhde, T. W. (1994). Lactic-acid response to caffeine in panic disorder—comparison with social phobics and normal controls. *Anxiety*, 1, 138–140.
- Trull, T. J., & Sher, K. J. (1994). Relationship between the five-factor model of personality and Axis I disorders in a nonclinical sample. *Journal of Abnormal Psychology*, 103, 350–360.
- Wing, J. K., Babor, T., Brugha, T., Burke, J., Cooper, J. E., Giel, R., et al. (1990). SCAN. Schedules for clinical assessment in neuropsychiatry. *Archives of General Psychiatry*, 47, 589–593.
- Wing, J. K., Sartorius, N., & Üstun, T. B. (1998). *Diagnosis and clinical measurement in psychiatry. A reference manual for SCAN*. United Kingdom: Cambridge University Press.
- World Health Organization (1993). *The ICD-10 classification of mental and behavioral disorders: Diagnostic criteria for research*. Geneva: WHO.