Social functioning in patients with depressive and anxiety disorders

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Saris IMJ, Aghajani M, van der Werff SJA, van der Wee NJA, Penninx BWJH. Social functioning in patients with depressive and anxiety disorders.

Objective: Adaptive social functioning is severely impeded in depressive and anxiety disorders, even after remission. However, a comprehensive overview is still lacking.
Method: Using data from the Netherlands Study of Depression and Anxiety (NESDA), behavioural (network size, social activities, social support) and affective (loneliness, affiliation, perceived social disability) indicators of social functioning were analyzed in patients with anxiety ($N = 540$), depressive ($N = 393$), comorbid anxiety and depressive disorders ('comorbid', $N = 748$), remitted participants ($N = 621$), and healthy control subjects ($N = 650$).
Results: Analyses revealed an increasing trend of social dysfunction among patient groups, in patients with comorbid anxiety and depressive disorders, showing the most severe impairments, followed by depressed and anxious patients ($P's < 0.001$ for all social functioning indicators). Affective indicators showed the largest effect sizes (Cohen's d range from 0.13 to 1.76). We also found impairments in social functioning among remitted patients. Furthermore, perceived social disability among patients was predictive of still having a depressive and/or anxiety diagnosis 2 years later ($P < 0.01$).
Conclusions: Behavioural but especially affective indicators of social functioning are impaired in patients with anxiety or depressive disorders and most in patients with comorbid disorders. After remission of affective psychopathology, residual impairments tend to remain, while social dysfunction in patients seems predictive of future psychopathology.

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Significant outcomes

- Social functioning is affected in patients with anxiety disorders, even more so in those with depressive disorders, and most prominently in patients with comorbid anxiety and depressive disorders.
- Even after complete remission of affective psychopathology, residual impairments tend to remain.
- Perceived social disability among patients is predictive of still having a depressive and/or anxiety diagnosis two years later.

Limitations

- Most of our analyses were cross-sectional, thereby not allowing causal inferences.
- More detailed aspects of social functioning, such as the exact composition of the social network, were not examined in our study.
- Differences between our findings and previous findings might stem from the use of different measures of symptomatology and social functioning. Ideally, one would have used actual behavioural data, instead of retrospective self-reports.

Introduction

Adequate social functioning is imperative for human wellbeing and survival (1), as is reflected by the severe health outcomes associated with social dysfunction, ranging from cardiovascular diseases to increased mortality rates (2–4). The influence of social functioning on premature mortality is believed to be higher than that of smoking, alcohol consumption, or obesity (3). Not only is social functioning essential for human wellbeing and survival, it is typically one of the main areas severely affected in common psychiatric disorders, such as depression and anxiety.

Social functioning can be studied in various manners, and little consensus exists on how to best describe it (5). In recent reviews (5–7), a multidimensional definition is proposed that includes both 'behavioural' and 'affective' indicators of social functioning. Behavioural indicators represent objective and quantitative measures of social function (5), including social network size, frequency of social activities, and frequency of perceived social support. Affective indicators, on the other hand, reflect more subjective and evaluative measures of interpersonal and socio-emotional functioning (8) and include features such as loneliness, affiliation, and perceived social disability,

Overall, findings on social functioning in depression seem to suggest that affective indicators are more persistently affected compared to the behavioural indicators (6). Santini et al. (6) showed that perceived support (affective indicator) was more important for social functioning in depression than received support (behavioural indicator), and increased levels of perceived support played a protective role in depression onset. In addition, Cacioppo et al. (8) indicated that loneliness increases the risk for depression. Generally, when compared to healthy controls, patients with anxiety disorders have a lower quality of life especially in the areas of social interactions and subjective wellbeing (9). With regard to comparing social functioning between different anxiety disorders, findings are not unequivocal. McKnight et al. (10) showed that anxiety disorders such as agoraphobia and generalized anxiety disorder (GAD) have a stronger association with social isolation than social phobia (SP). This is in contrast to findings that GAD, SP, and panic disorder (PD) did not differ in the amount of social impairment (11) or to the finding that PD was most impaired in social functioning in comparison to other anxiety disorders (12).

In an estimated 50–70% of the patients, anxiety and depression tend to co-occur (i.e.,

comorbidity) (13, 14), most likely as a result of common underlying pathophysiological processes (15). When these disorders co-occur, the chronicity and functional impairments rise substantially (16–18). Yet, even though social dysfunction is among the most pervasive and debilitating symptoms of affective psychopathology and tends to persist long after remission, a thorough examination of social functioning in clinically anxious or depressed patients, as well in those presenting comorbidity and those in remission, is currently lacking (19–22).

Aims of the study

Impairments of social functioning are typically examined separately for depressive and anxiety disorders, thereby not providing a comprehensive examination of differences and commonalities in social functioning in these disorders. We addressed this important issue, by comparing social functioning indices across five large groups of participants, including patients with either pure depression or anxiety disorders, as well as their combination (comorbid), along with remitted patients and healthy control participants. First, we examined to what extent various behavioural and affective indicators of social functioning are affected in patients with depression, anxiety, or comorbid disorders, as compared to healthy controls. Second, we examined to what extent these aspects of social functioning were still impaired in individuals remitted from these disorders. Third, we examined how clinical characteristics such as type of disorder (depression, panic, social phobia, or generalized anxiety disorder), severity, age of onset, and duration of disorder are associated with the level of social functioning. Fourth, we examined whether social dysfunction among patients is predictive of still having a clinical diagnosis of anxiety or depression after 2 years.

Material and methods

Study sample

Data for the current study were derived from the ongoing Netherlands Study of Depression and Anxiety (NESDA). NESDA is a longitudinal naturalistic cohort study, set up to provide more insight into the long-term course and consequences of depression and anxiety disorders. Recruited between September 2004 and February 2007, a total of 2981 participants were enrolled from community care, primary care, and

specialized mental health care from three regions in the Netherlands. The study includes individuals without lifetime psychiatric disorders ('control subjects') and participants with current or remitted depressive and anxiety disorders or comorbid anxiety and depressive disorders. Not speaking Dutch language and the presence of clinically overt primary psychiatric disorders (e.g. obsessive–compulsive, psychotic, bipolar, or severe addictive disorders) that might interfere with NESDA's main aim to examine etiology and course of common depressive and anxiety disorders were exclusion criteria.

The study was approved by the Ethics Review Board of the VU University Medical Centre Amsterdam and by the local review boards of all participating centers. All participants gave their verbal and written informed consent. A more detailed description of NESDA is described elsewhere (23). We excluded 29 participants for whom no information on social functioning was available. Thus, baseline data from 2952 participants were used for cross-sectional analyses. Clinical follow-up data after 2 years were available for 1409 of the 1681 (84%) patients with a current disorder at baseline.

Measurements

Depressive and anxiety disorders. The DSM-IV Composite Interview Diagnostic Instrument (CIDI; WHO version 2.1) was used to diagnose major depressive disorder (MDD) and anxiety disorders [panic disorder (PD), social phobia (SP), generalized anxiety disorder (GAD), agoraphobia (AP)]. Based on the CIDI information, all 2952 respondents were categorized into one of five groups. The first group included healthy participants who have no current and past history of psychiatric disorders ('control subjects', $N = 650$). The second group included participants who have had a depressive or anxiety disorder during lifetime, but did not have this diagnosis in the last 6 months ('remitted', $N = 621$). The third and fourth group consisted of patients with diagnosis of either anxiety ('pure anxiety', $N = 540$) or depressive ('pure depression', $N = 393$) disorder in the last 6 months. The final group included participants with a comorbid anxiety and depressive disorder in the last 6 months ('comorbid anxiety and depression', $N = 748$).

Clinical characteristics. The earliest age of onset of disorders was determined using the CIDI. The Inventory of Depressive Symptoms-Self-Report (IDS) (24) was used to assess severity of depressive symptoms in the past week. The Beck Anxiety Index (BAI) (25) was used to assess severity of anxiety symptomatology. The Fear Questionnaire (FQ) measured severity of avoidance behaviour (26). The Life Chart method (27) provided more insight into the duration of symptoms in the past 4 years, estimated by dividing the duration of symptoms (number of affected months) by total number of follow-up month. Course of disorder was additionally measured by the CIDI at the 2-year follow-up assessment. Current antidepressant use and psychotherapy (defined as having >1 contact with psychologist, social psychiatric nurse, or social worker in last 6 months) were determined by routine questioning.

Behavioural indicators of social functioning. We assessed network category, social activity status, and received social support as behavioural indicators of social functioning. Network category was operationalized as the number of adults with whom the participant has a regular and important contact. The answer is given on a six-point scale; 1 (0 or 1 individuals in network), 2 (2–5 individuals), 3 (6–10 individuals), 4 (11–15 individuals), 5 (16–20 individuals), and 6 (>20 individuals in network). The social activity status is a self-report regarding the frequency of visiting five different social activities (cultural events, trips to nature, visiting restaurants, social meetings, outdoor sport activities), ranging from almost never (1) to several times per week (6). A sum score was calculated adding up the frequency of conducting these five social activities, ranging from 5 to 30. The Close Persons Questionnaire (CPQ) measured the amount of received social support (28, 29). Participants answered ten questions about their partner and a maximum of two confidants. We calculated sum scores per partner or confidant, which were then recalculated into one mean social support score. For participants whom reported not to have a first ($n = 662$) or second ($N = 543$) confident, questions were scored as 0.

Affective indicators of social functioning. We assessed loneliness, affiliation, and perceived social disability as affective indicators of social functioning. The de Jong Gierveld loneliness scale (30) describes feelings of loneliness with 11 questions. Affiliation, in other words the perceived connection with others, was measured using the 6-item self-report 'need for affiliation' scale (31). Perceived social disability was measured using the 5-item social interaction subscale from the World Health Organization Disability Assessment

Schedule (WHO-DAS), which includes questions about difficulties in making new or maintaining friendships (32).

Statistical analyses

Demographic and clinical characteristics were described and compared using chi-square for dichotomous variables and analysis of variance (ANOVA) for continuous variables. The independent Kruskal–Wallis test was used as nonparametric test when assumptions for parametric testing were not met. Spearman correlations described associations between social functioning indicators. Analyses of covariance (ANCOVAS) adjusted for sex, age, years of education, and partner status (having a partner or not) probed for between-groups differences in behavioural and affective indicators of social functioning. Effect sizes were estimated by calculating Cohen's d, comparing clinical groups to healthy controls. To examine the association of clinical characteristics (type of disease, severity, age of onset, duration) with behavioural and affective indicators of social functioning, multiple linear regression analyses in the subgroup of patients with a current disorder were conducted. Different disorders were coded using dummy variables in the linear regression model; this allowed us to eliminate the shared variance between disorder types.

Finally, within current patients of which we had longitudinal data ($N = 1409$), we conducted logistic regression analyses to examine whether social functioning indices at baseline were predictive of the presence of (still) having an affective disorder at two-year follow-up corrected for covariates (age, sex, educational level, partner status, and in a next model also severity of depression and anxiety). Statistical analyses were conducted using SPSS (IBM, version 22.0, IBM Corp., Armonk, NY, USA), and a two-tailed significance level of $P < 0.05$ was considered statistically significant.

Results

The mean age of the study sample ($N = 2952$) was 41.9 years (SD = 13.1), and 66.4% were females (Table 1). Controls had a higher level of education and more often a partner than patients. As expected, groups differed significantly in all psychiatric characteristics, with the comorbid group showing the highest scores on all severity measures. Correlation analyses across all subjects revealed strong interrelations between social functioning indices (see Table S1). In brief, affective social functioning measures such as loneliness and perceived social disability were highly correlated with each other ($r = 0.55$), but correlations with affiliation were slightly lower ($r = -0.32$ for loneliness; $r = -0.23$ for perceived disability). Affective social functioning indices were significantly correlated with behavioural indices (network size, social activities, and social support) with correlations ranging between $r = 0.13$ (affiliation and network size) and $r = -0.40$ (loneliness and network size).

As shown in Table 2, between-group differences emerged on all measures of social functioning

Table 1. Baseline characteristics ($N = 2952$)

	Control subjects $N = 650$	Remitted anxiety or depression $N = 621$	Pure anxiety $N = 540$	Pure depression $N = 393$	Comorbid anxiety and depression $N = 748$	P-value
Demographics						
Age (years), mean (SD)	41.2 (14.7)	44.4 (12.9)	41.8 (12.8)	41.0 (12.2)	41.3 (12.0)	<0.001
Sex (% female)	61.5%	70.0%	67.4%	64.9%	68.0%	<0.05
Education (years), mean (SD)	12.8 (3.2)	12.5 (3.2)	12.1 (3.2)	12.2 (3.2)	11.3 (3.3)	<0.001
Partner status (% with partner)	75.1%	74.4%	67.4%	65.1%	64.2%	<0.001
Psychiatric characteristics						
Depression severity, mean IDS score (SD)	8.5 (7.5)	14.1 (9.0)	22.0 (9.7)	27.8 (11.3)	34.9 (12.2)	<0.001
Anxiety severity, mean BAI score (SD)	4.0 (4.9)	7.1 (6.5)	14.8 (9.4)	12.2 (8.8)	21.2 (11.2)	<0.001
Severity of fear, mean FQ score	0.8 (0.9)	1.1 (0.9)	2.1 (1.2)	1.5 (1.2)	2.6 (1.4)	<0.001
Severity of worry, mean PSWQ score (SD)	19.2 (9.9)	24.5 (12.2)	29.8 (14.3)	29.6 (15.5)	33.0 (17.8)	<0.001
Symptom duration % of time with symptoms (months with)	NA	21.7%	44.8%	33.3%	51.8%	<0.001
Age of onset (years), mean (SD)	NA	26.1 (13.0)	19.3 (12.6)	25.5 (13.1)	19.6 (12.1)	<0.001
Antidepressant use (%)						
SSRI	0.6%	10.1%	19.1%	23.7%	32.1%	<0.001
TCA	0.2%	1.6%	3.7%	2.8%	4.8%	<0.001
Other	0.2%	1.1%	6.1%	10.2%	11.6%	<0.001
Psychotherapy (%)	3.8%	6.6%	17.8%	29.5%	32.4%	<0.001

Chi-square values have been computed for categorical variables, ANOVA for interval variables.
Independent-samples Kruskal–Wallis test was used for nonparametric variables.

Table 2. Adjusted mean scores for social functioning indicators across psychopathology with effect sizes (Cohen's d)*

	Control subjects $N = 650$	Remitted anxiety or depression $N = 621$	Effect size	Pure anxiety $N = 540$	Effect size	Pure depression $N = 393$	Effect size	Comorbid anxiety and depression $N = 748$	Effect Size	P-value	Differences***
Social behavioural indicators											
Network size, mean category (SD)	3.2 (1.2)	2.9 (1.1)**	0.26	2.7 (1.1)**	0.43	2.6 (1.0)**	0.54	2.3 (1.0)**	0.81	<0.001	1 > 2 = 3 > 4 > 5
Social activities, mean (SD)	14.8 (4.0)	14.2 (4.2)		13.6 (4.2)**	0.29	12.7 (4.4)**	0.50	11.6 (4.2)**	0.78	<0.001	1 = 2 > 3 > 4 > 5
Social support, mean (SD)	29.8 (11.4)	28.6 (11.4)**	0.11	27.9 (12.3)**	0.16	27.4 (12.6)*	0.20	25.3 (12.6)**	0.38	<0.001	1 > 2 = 3 = 4 > 5
Social affective indicators											
Loneliness, mean (SD)	2.0 (2.6)	3.3 (3.2)**	0.45	4.9 (3.5)**	0.94	5.5 (3.6)**	1.11	6.7 (3.5)**	1.52	<0.001	1 > 2 > 3 > 4 > 5
Affiliation, mean (SD)	4.7 (1.6)	4.7 (1.5)		4.5 (1.6)**	0.13	4.3 (1.6)**	0.25	4.1 (1.7)**	0.36	<0.001	1 = 2 > 3 > 5; 3 = 4; 4 = 5
Perceived social disability, mean (SD)	7.0 (2.8)	8.4 (3.4)**	0.45	10.5 (4.1)**	1.00	11.4 (4.4)**	1.19	13.7 (4.6)**	1.76	<0.001	1 > 2 > 3 > 4 > 5

Based on analyses Table 1: adjusted for age, sex, educational level, partner status.

*As compared to control subjects.

**Significant at $P < 0.05$ level as compared to control subjects.

***Significant differences between control subjects (1), remitted anxiety or depression patients (2), pure anxiety patients (3), pure depression patients (4) and comorbid anxiety and depression patients (5).

(P's<0.001) adjusted for age, sex, education, and partner status (for network size $F_{(4, 2938)} = 50.978$, $P < 0.001$; for loneliness $F_{(4, 2611)} = 173.252$, $P < 0.001$ for perceived social disability $F = {(4, 2133)} = 274.099$, $P < 0.001$). Effect sizes for the significant effects ranged from small to large (Cohen's d 0.13–1.76). Overall, groups differed significantly ($P < 0.001$), with a trend visible for all behavioural and affective indicators, as depicted in Fig. 1 with unadjusted means. Controls had the highest levels of social functioning, and patients with comorbid disorders were the most impaired. Anxiety patients differed from healthy controls on all social functioning
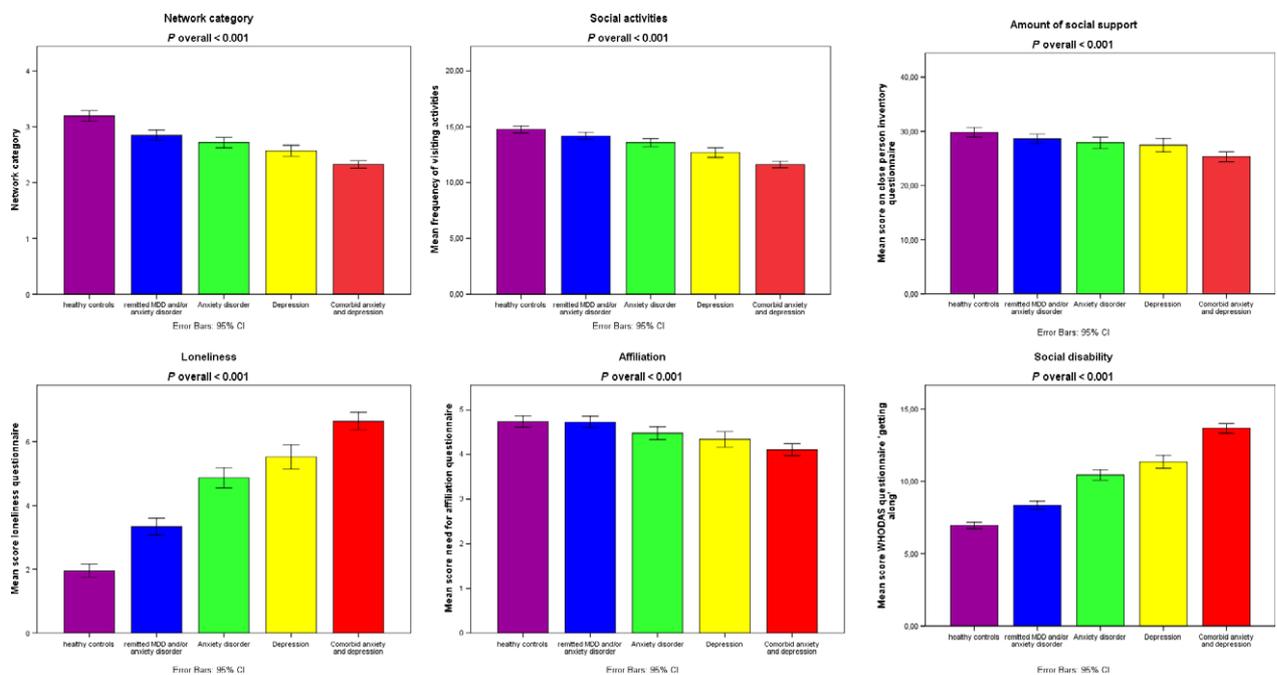

Fig. 1. Means for social behavioural and social affective indicators across psychopathology, not adjusted for age, sex, education, and partner status. Error bars represent the standard error. Y-axis depicts the different scores. [Colour figure can be viewed at wileyonlinelibrary.com]

indices, with effect sizes larger for affective indicators. This pattern, but even less favorable, was also seen in depressed patients. Patients with comorbidity showed the most severe impairments on all indicators of social functioning and differed most significantly from healthy controls. Overall, affective indicators revealed larger effect sizes across disease status than behavioural indicators of social functioning.

Next, regression analyses (Table 3) examined how dimensional and categorical measures of psychopathology relate to social functioning indicators within the subgroup of patients with current affective disorder ($N = 1681$), all adjusted for age, sex, education, and partner status. In the first model, comorbid anxiety and depression related to more severe impairments on all indicators of social functioning, when contrasted to pure anxiety (reference) ($\beta = 0.343$, $P < 0.001$ for perceived social disability). Pure depression similarly related to more severe impairments in social functioning when contrasted to pure anxiety ($\beta = 0.081$, $P < 0.01$ for perceived social disability), with exception of social support and affiliation. Subsequently, we explored whether different depressive or anxiety disorders similarly impact social functioning (Table 3). Overall, of the specific types of disorders, MDD and SP seemed to impact social functioning most (network size SP: $\beta = -0.098$, $P < 0.001$; MDD: $\beta = -0.097$, $P < 0.001$; loneliness SP: $\beta = 0.100$, $P < 0.001$; MDD: $\beta = -0.136$, $P < 0.001$; perceived social disability SP: $\beta = 0.306$, $P < 0.001$; MDD: $\beta = 0.247$,

$P < 0.001$), followed by GAD, and dysthymia, with network size (GAD: $\beta = -0.052$, $P < 0.05$; dysthymia: $\beta = -0.076$, $P < 0.01$), loneliness (GAD: $\beta = 0.072$, $P < 0.01$; dysthymia: $\beta = -0.119$, $P < 0.001$), and perceived social disability (GAD: $\beta = 0.077$, $P < 0.001$; dysthymia: $\beta = 0.133$, $P < 0.001$). PD and AP were not associated with social functioning indicators in these analyses, in which shared variance between disorder types was eliminated.

The third model assessed the association between dimensional measures of psychopathology and social functioning (Table 3). Overall, more severe depressive or anxiety symptomatology related to more impairment in social functioning. Depression severity was more strongly associated than anxiety severity with social functioning indicators. Severity of worrying was not significantly associated with social behavioural indicators, but highly associated with all affective indicators. Longer symptom duration was strongly associated with more unfavorable scoring on almost all social functioning indicators, except for social activities and affiliation. Lastly, a younger age of onset was associated with a smaller network size and all affective indicators (P's<0.01, except for affiliation $P < 0.05$). Loneliness and perceived social disability were negatively associated with all clinical characteristics.

Finally, we examined whether any of the social indicators was predictive for having a depressive or anxiety disorder 2 years later, using the clinical subsample of patients from the baseline with two-

Table 3. Adjusted† associations of clinical characteristics and various social functioning indicators† within the group of current patients ($N = 1681$)

	Social behavioural indicators			Social affective indicators		
	Network size β	Social activities β	Social support β	Loneliness β	Affiliation β	Perceived social disability β
Model 1						
Pure anxiety	Ref	Ref	Ref	Ref	Ref	Ref
Pure depression	−0.062*	−0.095***	−0.012	0.072**	−0.038	0.081**
Comorbid	−0.174***	−0.189***	−0.084**	0.227***	−0.097***	0.343***
Model 2						
Panic disorder	0.020	−0.020	−0.015	−0.032	−0.020	−0.007
GAD	−0.052*	−0.033	−0.034	0.072**	−0.003	0.077***
Social phobia	−0.098***	−0.062**	−0.048*	0.100***	−0.100***	0.306***
Agoraphobia	0.034	−0.030	−0.012	0.001	−0.018	0.032
MDD	−0.097***	−0.128***	−0.052*	0.136***	−0.088***	0.247***
Dysthymia	−0.076**	−0.139***	−0.067**	0.119***	−0.035	0.133***
Model 3						
Severity of depression	−0.224***	−0.255***	−0.143***	0.374***	−0.181***	0.599***
Severity of anxiety	−0.090***	−0.176***	−0.054*	0.207***	−0.117***	0.382***
Severity of fear	−0.124***	−0.160***	−0.061*	0.231***	−0.126***	0.438***
Severity of worrying	−0.027	−0.023	0.034	0.256***	−0.079**	0.131***
Symptom duration	−0.091***	−0.051*	−0.071***	0.135***	−0.027	0.152***
Age of onset	0.100***	0.037	0.024	−0.162***	0.058*	−0.236***

†Corrected for sex, age, educational level and partner status.

*Significant at $P < 0.05$ level; **significant at $P < 0.01$; ***significant at $P < 0.001$

year follow-up data ($N = 1409$). Overall, 47% of the sample still had a diagnosis of anxiety or depressive disorder after 2 years. For low social activities (odds ratio 0.97 (0.94–1.00), $P = 0.06$, Table 4) and high loneliness (odds ratio 1.04 (1.00–1.08) $P = 0.07$, Table 4), non-significant trends were visible when unadjusted for severity of depression and anxiety but adjusted for age, sex, years of education, and partner status. Higher perceived social disability predicted a higher risk of still having a disorder 2 years later, both adjusted for sex, age, education, partner status, and severity of anxiety and depression (odds ratio, respectively, 1.10 (1.07–1.14), $P < 0.001$, 1.05 (1.01–1.08), $P < 0.01$, Table 4).

Discussion

This comprehensive study of affective and behavioural indicators of social functioning found strong associations with depressive and anxiety disorders in a large naturalistic cohort. The findings indicate that social functioning is affected in patients with anxiety, even more so in those with depressive disorders, and most prominently in patients with comorbid anxiety and depression. Overall, affective aspects of social functioning seemed more hampered than behavioural ones. Interestingly, even after complete remission of affective psychopathology, residual impairments in social functioning exist, while social dysfunction in patients was predictive of future psychopathology. To our knowledge, no previous study has examined social functioning within a large sample comprising anxious, depressed, comorbid, remitted patients, and healthy controls.

Table 4. Logistic regression analyses predicting still having a depression and/or anxiety disorders at 2 year follow up in persons with a current baseline disorder ($N = 1409$)

	Basic adjusted* Odds ratio (95% CI), P-value	Adjusted for severity of depression and anxiety† Odds ratio (95% CI), P-value
Social behavioral indicators		
Network size	1.04 (0.91–1.19), 0.56	1.01 (0.88–1.15), 0.91
Social activities	0.97 (0.94–1.00), 0.06	0.98 (0.95–1.02), 0.28
Social support	1.00 (1.00–1.00), 0.86	1.00 (1.00–1.00), 0.76
Social affective indicators		
Loneliness	1.04 (1.00–1.08), 0.07	1.01 (0.97–1.06), 0.51
Affiliation	0.97 (0.90–1.05), 0.50	0.99 (0.92–1.08), 0.85
Perceived social disability	1.10 (1.07–1.14), $P < .001$	1.05 (1.01–1.08), $P < 0.01$

*Corrected for age, sex, years of education, partner status.
†Corrected for age, sex, years of education, partner status, severity of depression (IDS), severity of anxiety (BAI).

Our study clearly indicates both affective and behavioural aspects of social functioning are affected in patients with depressive and/or anxiety disorders, with affective aspects being most severely impaired. These findings are in line with two prior studies that combined both behavioural and affective indicators of social functioning in relation to physical and psychological wellbeing (6, 33). Rico-Uribe et al. (33) showed that loneliness was the strongest contributor to diminished physical health in comparison with network size, frequency of contact, and quality of social network. Santini et al. (6) described in a review that perceived support is more important in depressive disorders than received support. Our findings of impairments of behavioural aspects are in agreement with the findings of a prior study showing that the absence of close friends and relatives is associated with increased risk of clinical anxiety and depression (34).

We found that remitted patients differed significantly from healthy controls in network size, social support, loneliness, and perceived social disability. This is in line with earlier findings (35–37) showing that social functioning remains impaired in remitted depressed participants. Stout et al. (22) also described that social functioning levels remain impaired for up to 18 months following remission from panic disorder. This impaired social functioning following remission can be the result of residual cognitive of affective symptoms or 'social scarring'. However, such impaired social functioning can also be reflective of a vulnerability toward development of affective disorders, as was recently described by Schopman et al. (38) for anxiety disorders and by Ormel et al. (39) and Papmeyer et al. (40) for depression. Longitudinal studies have tried to disentangle these different causal routes and have found evidence for both routes (22, 38–40).

Although impairment of social functioning seemed generally more prominent in depressive disorders than in anxiety disorders, the largest effect sizes were found in patients with comorbid anxiety and depression. These results support previous data comparing psychosocial functioning in pure anxiety or depressive disorders (17, 41) and their comorbidity (42). With regard to specific anxiety disorders, we found that GAD and especially SP are more strongly associated with social dysfunction or higher impairment compared to PD and AP, which is in agreement with findings of several other studies (9, 34, 43). Some authors suggest that GAD resembles MDD when it comes to social impairment (43), while others opine that SP perturbs social functioning more strongly than many

other psychiatric disorders (44). In our study, we found no differences in social functioning between SP, MDD, and dysthymia, although overall the effect sizes in MDD were larger than those of anxiety disorders. Remarkably, McKnight et al. (10) described in their review a significantly lower correlation between social functioning impairment and SP, compared to the other anxiety disorders. This contrasts the findings reported here, as well as those documented previously (5, 9, 20, 44), which indicate that SP involves more severe impairments on all social functioning indicators, as compared to other anxiety disorders.

The current study also found that high perceived social disability was predictive of clinical anxiety or depression 2 years later. Evidence suggests that residual psychosocial impairment increases the recurrence of depressive and anxious symptomatology (41, 45), and the affective components are suggested to drive this effect. Several studies have for instance shown that loneliness is predictive of both depressive symptomatology within geriatric populations (8, 46, 47) and social phobia (48). Yet, in our analyses, loneliness was not predictive of future psychopathology, with perceived social disability emerging as the sole significant predictor of anxiety and/or depressive disorders 2 years after the initial screening. Despite this apparent discrepancy, our results do further implicate impaired affective social functioning as a strong predictor of future psychopathology. Of note, this analysis implicates that disability contributes to subsequent psychopathology course. This possible preexistent vulnerability for psychopathology has been described by others (38–40). Although this was not addressed in our study, it is likely that there is also a reversed link, that is, a longitudinal impact of psychopathology on subsequent social functioning.

As described, impaired social functioning is highly associated with anxious and depressive symptomatology, although the underlying pathophysiological mechanisms remain largely elusive (49, 50). One possible explanation is that social interactions might be appreciated as less rewarding in anxious or depressed patients, due to impaired signaling of brain's reward system, in which the amygdala is crucially implicated (51). This inability to gain reward from social interactions may lead to anhedonia symptoms (49). Future studies focusing specifically on the 'social brain', including the social reward system, could greatly advance our understanding of the underlying pathomechanisms of impaired social functioning.

This study is unique in its large size and its comparison of different patient groups and characteristics in relationship to social functioning. Some

limitations, however, need to be discussed as well. First, most of our analyses were cross-sectional, thereby not allowing causal inferences. Also, more detailed aspects of social functioning, such as the exact composition of the social network, were not examined in our study. Differences between our findings and previous findings might stem from the use of different measures of symptomatology and social functioning. In addition, cognitive biases associated with depression or anxiety may have influenced the patient's response and thus their reported social function. Ideally, we would have used actual behavioural data, instead of retrospective self-reports. An interesting new development is the use of tools like ecological momentary assessment, which allows obtaining real-time information about social activities of patients and their affective state.

In summary, this study reveals that social functioning is affected in patients with anxiety, even more so in those with depressive disorders, and most prominently in patients with comorbid disorders. Interestingly, even after complete remission of affective psychopathology, residual impairments of social functioning exist, which might indicate possible 'social scarring' or preexisting vulnerability factors, with perceived social disability in patients additionally predicting future psychopathology. As social impairments are one of the earliest presenting symptoms in a wide variety of psychopathologies, future studies should aim to disentangle common and specific (biological) characteristics of social functioning using a transdiagnostic approach.

Declaration of interest

We declare that we have no conflicts of interest.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:
Table S1. Correlations of indicators for all groups.