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Research paper

Validity of the 15-item social inhibition questionnaire in outpatients receiving psychological or psychiatric treatment: The association between social inhibition and affective symptoms

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ABSTRACT

Objective: Social inhibition may promote symptoms of depression and anxiety in adults from an outpatient hospital population. The current work builds on a previously corroborated construct of social inhibition and examines the psychometric properties of this assessment tool and its predictive validity in the adult outpatient hospital population.

Methods: A total of 350 adult outpatients receiving treatment at the department of Medical Psychology or Psychiatry completed measures of social inhibition and symptoms of anxiety (7-item Generalized Anxiety Disorder scale) and depression (9-item Patient Health Questionnaire). Factor analyses, reliability estimates, and regression analyses were used to replicate the robustness of the model of social inhibition, and the 15-item Social Inhibition Questionnaire (SIQ15).

Results: In the current sample ($N = 350$; $M_{age} = 45$ years; 67.4% women), factor analyses confirmed the previously suggested three-factor model of social inhibition as measured by the SIQ15. The subscales of behavioral inhibition, interpersonal sensitivity and social withdrawal proved to be internally consistent (Cronbach's α between 0.87/0.95) and stable over time (test-retest reliability between $r = 0.76/0.83$). At baseline, interpersonal sensitivity and social withdrawal were associated with anxiety and depressive symptoms. At three months follow-up, only interpersonal sensitivity was related to depressive symptoms.

Conclusions: Social inhibition is associated with anxiety and depression at baseline and can be reliably assessed with the SIQ15 in an outpatient hospital population. The association of interpersonal sensitivity with depressive symptoms at three-month follow-up suggests an important aim for future research on the development of preventive methods for affective symptoms in socially inhibited outpatients.

1. Introduction

Human social life depends on meaningful social interactions [1]. A subjective lack thereof is associated with decreasing mental and physical health in various domains [1–3]. The broad and stable personality trait social inhibition may be a contributing factor to unsatisfactory social functioning [2,4]. Social inhibition involves "behavioral inhibition during social interaction, elevated social-evaluative concerns, and withdrawal from intense social engagement situations" [2,5]. Socially inhibited individuals are less vocal and more hesitant in their behavior in social situations [5,6]. Additionally, their cognitions are more interpersonally sensitive, wherein one is perceptive to criticism and negative evaluations from their environment [7–10]. Finally, socially inhibited individuals tend to withdraw from social interaction and inhibit their emotional expression [11], and as a result experience more social anxiety and loneliness [11,12]. Social inhibition is therefore considered a multi-faceted construct consisting of three underlying facets: behavioral inhibition, interpersonal sensitivity, and social withdrawal [2]. Recently, an assessment tool has been developed to assess social inhibition and its underlying facets. This instrument (15-item Social

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Inhibition Questionnaire (SIQ15)) has been found to be a brief and valid instrument for assessing both the general social inhibition trait and the three underlying facets accurately in the general population, as well as in student and cardiac samples [2,5].

Research to date has mainly focused on how social inhibition in children affects mental and physical health outcomes [13–15]. As opposed to the body of literature on social inhibition in children, the ways in which this trait affects mental and physical health in adults are unclear [7,16,17]. Knowledge on social inhibition in adults is largely restricted to studies on Type D personality, in which outcomes are based on the interaction between high levels of negative affectivity and high levels of social inhibition [4,17]. Although Type D personality is associated with a heightened stress response in social evaluation situations [18,19], current knowledge about the unique contribution of social inhibition in adults is scarce. Recently, social inhibition as a separate trait has gained more attention [20–22]. Research shows that social inhibition and its underlying facets are related to exaggerated physiological and emotional stress responses [2,5,20]. Importantly, differential outcomes between the underlying facets have been observed [20–23]. This indicates that although they reflect one general social inhibition trait, the facets should be considered as different manifestations of the broader social inhibition personality construct and therefore should be assessed separately to identify their unique contributions in different outcomes.

From what we do know about social inhibition in adults, the relationship between social inhibition and physiological outcomes has been the primary focus thus far. In general, unsatisfying social functioning leads to various possible psychosomatic health issues, ranging from complaints such as fatigue, back pain, and trouble sleeping, to high blood pressure and impaired immune functioning [24–26]. In patients with chronic health conditions (e.g., cardiovascular disease), an inverse relationship between social relationships and mortality has been reported [16,24,27]. More precisely, stronger social relationships indicate a 50% increased likelihood of survival in chronic health patients, compared to experiencing weaker social bonds with others [27]. Additionally, negative interpersonal experience is associated with increased cardiovascular stress responses [28]. Susceptibility to social evaluative threat, which is apparent in socially inhibited individuals, may affect health status through heart rate and cardiac output, vascular resistance and blood pressure [28–30]. Because social functioning influences the likelihood of survival in people with chronic health conditions, identifying the ways in which mental- and physical health are affected by social functioning is especially important in general hospital outpatients [5].

Besides somatic outcomes, social inhibition can also be linked to depressive symptoms and anxiety [7,17]. For example, research shows that those who are depressed later in life, generally report having had more behavioral inhibition in childhood [31]. In adults, studies have found an association between behavioral inhibition and symptoms of depression, as well as anxiety [32,33]. People who are depressed still show more behavioral inhibition, compared to non-depressed controls [34]. Additionally, high behavioral inhibition scores at baseline have been linked to a worse prognosis in patients with an affective symptom disorder [33].

The relevance of examining the relationship between social inhibition and symptoms of depression and anxiety in an adult outpatient hospital population, lies in the high comorbidity between physical diseases and mental health problems [35,36]. Specifically, patients with chronic health problems with comorbid anxiety and/or depression, show increased physical symptoms and health-care use, decreased health status, and lower adherence to medical treatment [37,38]. Given that social inhibition is a personality trait rather than a state [2,5], and that it has been linked to health outcomes through mechanisms of physiological [2,5,20] and psychological factors [7,17], this could be an underlying mechanism explaining mental health problems in somatic patients. Thus, examining whether and how social inhibition is associated with affective outcomes in an outpatient hospital population, may elucidate the role of this personality trait and its underlying facets in the vulnerability to depression and anxiety. Insight in this role of social inhibition could aid health-care providers in identifying socially inhibited adults at risk for these adverse outcomes in physical and mental functioning.

The present study aims to validate the 15-item Social Inhibition Questionnaire (SIQ15) in outpatients receiving psychological and psychiatric care, and to further examine whether the underlying facets of behavioral inhibition, interpersonal sensitivity and social withdrawal fit within the multifaceted model of social inhibition. Additionally, the association between social inhibition and affective symptoms will be studied. Identifying socially inhibited outpatients is important given the evidence that social inhibition is associated with anxiety and depression as well as somatic outcomes. Implementing a brief measurement method for social inhibition in the clinical practice is a step towards understanding this association and how it could provide additional information in the treatment of mental health symptoms in somatic patients.

2. Method

2.1. Procedure

This cross-sectional study included 350 new ambulatory patients (M_{age} = 45, SD = 14, range 18–69; 67.4% women) from the medical psychology and psychiatry departments of the Catharina Hospital Eindhoven, who were approached by their treating psychologist or psychiatrist as part of the social inhibition and affective symptoms (SIAS) study between September 2017 and October 2020.

Research assistants at the department were responsible for selecting patients meeting the inclusion criteria before their first appointment, by screening the files of the patients scheduled for a first appointment at the department of Medical Psychology and Psychiatry. Inclusion criteria were: (1) having one or more appointments with a psychologist or psychiatrist at the hospital, (2) age between 18 and 70 and (3) sufficient comprehension of the Dutch language. Exclusion criteria were (1) cognitive problems that might affect the ability to understand and fill out the questionnaire (such as mild cognitive impairment, dementia or subjective cognitive complaints calling for neuropsychological test research), (2) mental retardation and (3) a compromised experience of reality (due to reasons such as psychosis, delirium etc.).

After a patient was found eligible for the study, the patient received an envelope from their psychologist or psychiatrist after their first appointment, containing information about the study, an informed consent form and a pre-stamped envelope. After three to five working days, patients were telephoned by the research assistant to confirm their participation and sign and return the consent form by mail. Baseline questionnaires were sent by e-mail or via normal postal service when patients did not have access to a computer. Baseline measurement included questions on demographic information (including age, sex, education level and partner status), the Social Inhibition Questionnaire (SIQ15, [2]), the Type D Scale (DS14, [4]), the Behavioral, Emotional and Withdrawal scales (BEW, [39–41]), the Generalized Anxiety Disorder 7-item (GAD-7, [42]) and the Patient Health Questionnaire (PHQ-9, [43]). There were two measurement moments with these questionnaires, baseline (before the start of any psychological or pharmacological treatment) and follow-up at three months if patients were still having scheduled appointments at the department of Medical Psychology and Psychiatry. The follow-up measurement included the SIQ15, the DS14, the GAD-7 and the PHQ-9. For this study, baseline and three-months follow-up data was used. Follow-up data of the SIQ15 was only used to determine test-retest reliability in the current analysis.

The study was approved by the institutional ethics review board of Tilburg University (EC-201564a). All participants signed informed consent prior to participation.

2.2. Materials

2.2.1. Assessment of social inhibition

Participants completed all questionnaires online or on paper if they had no access to a computer. Details of the development and validation of the SIQ15 is described in detail elsewhere [2]. The SIQ15 is a self-report questionnaire, consisting of 15 statements that can be answered with a 4-point Likert scale (ranging from 0 = false to 3 = true). The total score ranges from 0 to 45, with a high score indicating a high level of social inhibition (see supplementary appendix A for the complete SIQ15 questionnaire in Dutch). In summary, the facets of *behavioral inhibition* (measured by item 1, 4, 7, 10 and 13), *interpersonal sensitivity* (measured by item 2 5, 8, 11 and 14) and *social withdrawal* (measured by item 3, 6, 9, 12 and 15) have been found to reflect the concept of social inhibition (in this sample: α = 0.88 for the behavioral inhibition factor, α = 0.85 for the interpersonal sensitivity factor and α = 0.79 for the social withdrawal factor). Subsequently this instrument has turned out to be a valid instrument for assessing these facets in other samples [2,5].

The SIQ15 was validated against theoretically related measures to examine its convergent validity. Behavioral inhibition was assessed with the 4-item Behavioral Inhibition Scale (BIS; [39]). The behavioral inhibition facet scale of the SIQ15 is expected to correlate highly with the BIS. The 10-item Emotional Inhibition Subscale from the Emotion Control Questionnaire (ECQ-EI; [40]) was used to assess emotional inhibition, which is related to interpersonal sensitivity. Therefore, it was expected that the interpersonal sensitivity facet correlates with emotional inhibition. Lastly, the 10-item Withdrawal scale from the Detachment domain of the Personality Inventory for DSM-5 (PID-5; [41]) was used to examine the convergent validity of the withdrawal facet of the SIQ15. Cronbach's alpha of the BIS, EIS and PID-5 Withdrawal scales in this sample was 0.85, 0.84, 0.94 respectively.

2.2.2. Measures of negative affectivity, anxiety, and depression

To test divergent validity, the negative affectivity (NA) scale of the DS14 (α = 0.89 in this sample) was used. This 7-item measure assesses the tendency to experience negative emotions by a 5-point Likert scale (ranging from 0 = false to 4 = true; total scores ranging between 0 and 28) [4]. A higher score indicates a higher intensity of the Type D personality trait. Symptoms of anxiety were measured by the GAD-7 (α =0.89 in this sample; [42,44,45]). Items on this scale are rated with a 4-point Likert scale, ranging from 0 = not at all to 3 = almost daily, with a total score between 0 and 21. A higher score indicates higher levels of anxiety symptoms. Depressive symptoms were measured by the PHQ-9 (α = 0.88) [46,47]. Items on this scale are rated with a 4-point Likert scale, ranging from 0 = not at all to 3 = nearly every day, with a total score between 0 and 27. A higher score indicates higher levels of depressive symptoms.

2.3. Statistical analysis

To test the validity of the previously found three-factor construct of the SIQ15, Confirmatory Factor Analysis (CFA) was used, using the freely available software R studio (Version 1.3.1073). Confirmatory factor analyses (CFA) were conducted to investigate whether the factor structure proposed by the questionnaire developers showed a good fit to the current data. The R-package Lavaan (Version 0.6–7; [48]) was used to estimate these CFAs, using diagonally weighted least squares estimation (DWLS) and polychoric threshold parameters to model the ordered categorical item scores. The fit of each CFA model was evaluated based on several fit indices (RMSEA <0.06; SRMR <0.08; CFI > 0.95; [49,50]). Next, the measurement models of the questionnaire were entered simultaneously in one correlated factor model to estimate the latent correlation between the underlying facets of social inhibition. The advantage of modeling a latent correlation matrix compared to a matrix consisting of correlations between total scale scores is that total score correlations are typically attenuated due to the measurement error in the questionnaire item scores. Latent correlations are not affected by this problem and therefore paint a less biased picture of the associations between these constructs.

Then, to examine convergent and divergent validity of the SIQ15, we used second-order principle component factor analysis (SPSS, version 24.0). Convergent validity was examined using the behavioral inhibition (BIS), emotional inhibition (ECQ-EI), and withdrawal (PID-5). Scale scores of negative affectivity (DS14), anxiety (GAD-7), and depression (PHQ-9) were used to examine the divergent validity of our model of adult social inhibition as measured with the SIQ15.

Hierarchical regression analyses (SPSS, version 24.0) were used 1) to test the association between total social inhibition scores and symptoms of anxiety (GAD-7) and depression (PHQ-9) at baseline, and 2) to examine the association between total social inhibition scores at baseline and symptoms of anxiety and depression at three months follow-up, separately. Sex, age and partner status were used as covariates in all analyses, based on previous literature [2]. In addition, baseline anxiety and depression scores were entered as covariates in examining the association between social inhibition and affective symptoms at three-months follow up. Lastly, the same regression analyses were performed, but with the three underlying facets replacing the total social inhibition score. All tests were two-tailed and a p-value $< .05$ was used to indicate statistical significance.

3. Results

3.1. Sample characteristics

A total of 1487 patients were assessed for eligibility for the study (see Fig. 1). Of those patients, 800 (53.8%) patients did not meet the inclusion criteria, mostly because of referral for cognitive problems. Of the 687 (46.2%) patients that were approached, 185 (27%) patients refused to participate, 502 (74%) agreed to participate. Eventually, 65 (13%) participants already started treatment before filling out the questionnaires, and were therefore excluded. Furthermore, 78 (15.5%) participants dropped out due to various reasons (too much work, dealing with other issues or no reason given). Additionally, 4 (0.9%) patients were excluded because they did not sign an informed consent, 5 (1.1%) patients were excluded because they did not fill in the SIQ15. Hence, 350 (70%) were included in the final analyses. This group had a mean age of 45 (SD = 13.8) and 236 (67.4%) were female. Results show that most participants (N = 273; 78.1%) had a partner and a secondary vocational education level or equal (N = 153;43.7%) or higher professional education level (N = 153; 43.7%). See Table 1 for details.

3.2. Confirmatory factor analysis

Three factor models were applied to the data of the SIQ15, in order to indicate the model with the best fit. As expected, a one-factor model proved not to be a good fit (RMSEA = 0.153; SRMR = 0.098; CFI = 0.988), since the SIQ15 is a multidimensional measurement. A two-factor model also proved to be insufficient (RMSEA = 0.075; SRMR = 0.061; CFI = 0.997). As hypothesized, the predicted three-factor model of social inhibition showed the best fit and was therefore replicated in the current sample (RMSEA = 0.045; SRMR = 0.051; and CFI = 0.999) [2,5].

3.3. Second order factor analysis

Pearson correlations and second-order factor analysis of scale scores were used to examine the construct validity of the SIQ15 against measures of negative affectivity (DS14), anxiety (GAD7), depression (PHQ-9), behavioral inhibition (BIS-4), emotional inhibition (ECQ-EI), and withdrawal (PID-5) (Table 2). This further corroborated the construct validity of the model. Inhibition (factor loading 0.88), withdrawal (factor loading 0.87) and sensitivity (factor loading 0.70) loaded on one

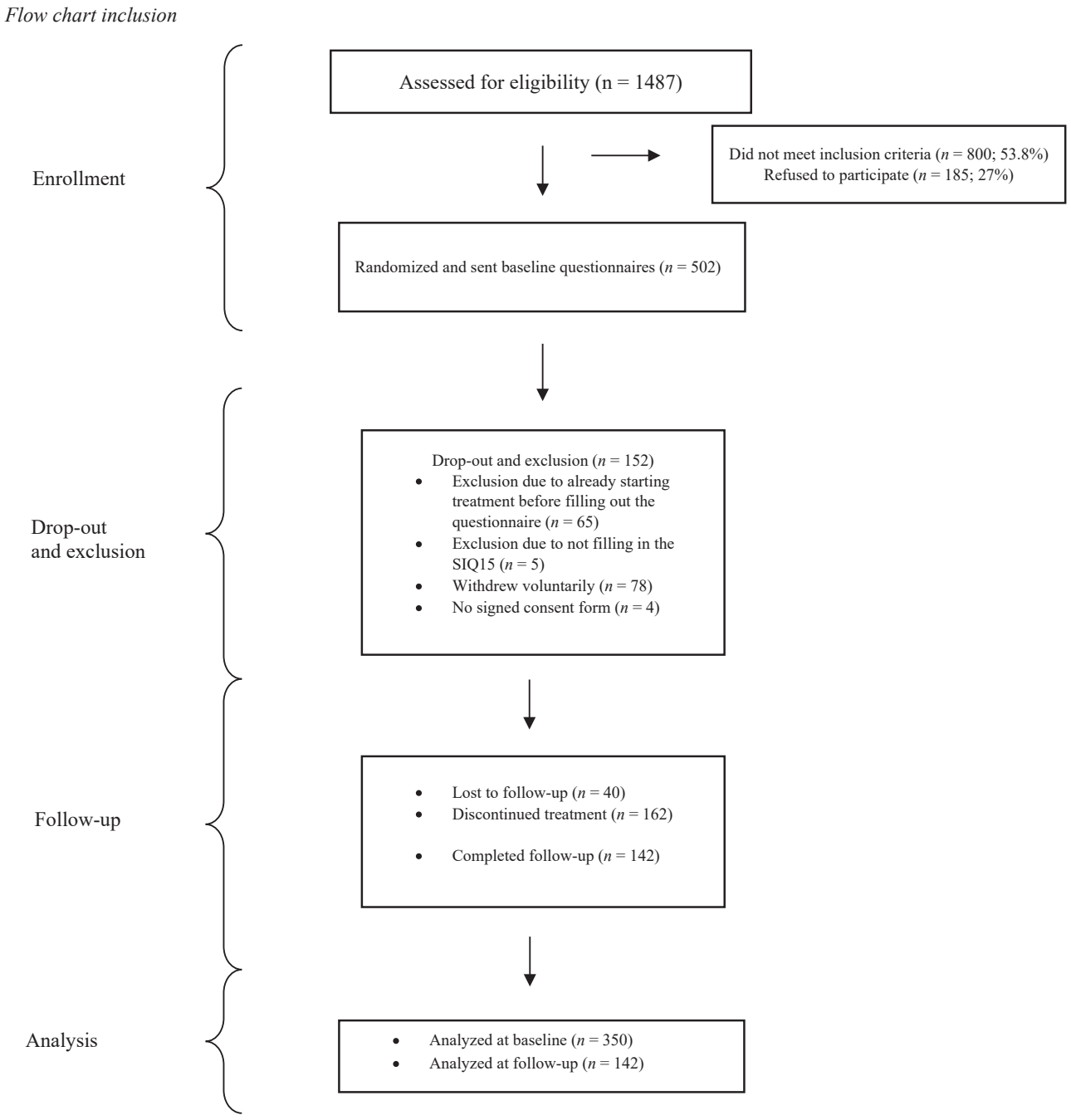

Fig. 1. Flow chart inclusion.

social inhibition factor, together with behavioral inhibition (BIS4; factor loading 0.80), emotional inhibition (ECQ-EI; factor loading 0.70) and withdrawal (PID-5; factor loading 0.79), indicating good convergent validity. On the other hand, anxiety (factor loading 0.90), depression (factor loading 0.86) and negative affectivity (factor loading 0.79) loaded on a distinct distress factor, confirming divergent validity (Table 2). This result confirms that the SIQ15 in fact measures a separate construct of distress than anxiety, depression and negative affectivity.

3.4. Internal validity and reliability

Cronbach's alfa (SIQ15 total, $\alpha = 0.95$; SIQ15 behavioral inhibition, $\alpha = 0.92$; SIQ15 interpersonal sensitivity, $\alpha = 0.92$, SIQ15 social withdrawal, $\alpha = 0.87$) indicated a high level of internal consistency for the total score and the three factors measured in the general hospital population. In other words, the items within each subscale adequately measure the proposed construct.

Pearson correlations were conducted to examine the test-retest correlations between baseline measurements and three months follow-up. High correlations were found for the total SIQ15 score ($r = 0.85$), behavioral inhibition ($r = 0.83$), interpersonal sensitivity ($r = 0.80$), and social withdrawal ($r = 0.76$), confirming good test-retest reliability.

3.5. Associations of social inhibition (SIQ15), anxiety (GAD-7), and depression (PHQ-9)

3.5.1. Association between social inhibition and anxiety at baseline

First, a hierarchical regression analysis was performed with anxiety at baseline as the dependent variable. In the first step, sex, age, marital status, and educational level were entered as covariates. As shown in

Table 1
Sample characteristics.

	N	%
Sex		
Male	114	32.6
Female	236	67.4
Education		
Less than High School	13	3.7
High School (no) diploma	29	8.3
Secondary vocational education or equal	153	43.7
Higher professional education	153	43.7
Unknown	2	0.6
Job		
Fulltime	82	23.4
Part-time	110	31.4
Unemployed	33	9.4
Retired	28	8.0
Studying/student	16	4.6
Other	81	23.1
Marital status		
Married	185	52.9
Living together	64	18.3
Partner, not living together	24	6.9
Single	52	14.9
Divorced	21	6.0
Widow(er)	4	1.1

Table 3, the covariates did not explain a significant amount of the variance (0.8%) of anxiety scores at baseline (F (4, 341) = 1.70, p = .150). In the second step the total score of social inhibition was entered, explaining an additional 18.6% of variation in anxiety scores at baseline and this change in R^2 was significant, F_{change} (1, 340) = 79.68, $p < .001$. Social inhibition was significantly related to anxiety scores (t = 8.93, $p < .001$) indicating that high social inhibition scores are associated with higher anxiety scores at baseline.

The same regression was performed, but with the three underlying facets of social inhibition entered in the second step. The facets explained an additional 19.9% of the variation in anxiety symptoms at baseline (F_{change} (3, 338) = 29.52, $p < .001$). Interpersonal sensitivity (t = 5.05, $p < .001$) and social withdrawal (t = 2.05, p = .041) were significantly associated with anxiety scores, but behavioral inhibition was unrelated (t = −0.36, p = .718).

3.5.2. Association between social inhibition and depression at baseline

A hierarchical regression analysis was performed with depression at baseline as the dependent variable. In the first step, the covariates explained a significant amount of variation (*Adjusted* R^2 = 0.02) of depression scores at baseline (F (4, 339) = 2.53, p = .041). As shown in Table 3, educational level was the only significant predictor in this model. In the second step, the total score of social inhibition was entered, explaining an additional 23% of variation in depressive symptoms at baseline and this change in R^2 was significant, F_{change} (1, 338) = 104.35, $p < .001$. The total score of social inhibition was a significant predictor for depression scores at baseline (t = 10.22, $p < .001$). This indicates that higher social inhibition is associated with higher depression scores at baseline.

When the three underlying facets of social inhibition replaced the total score, results showed that the facets explained an additional 23.5% of the variation in depressive symptoms at baseline (F_{change} (3, 336) = 36.39, $p < .001$). Both interpersonal sensitivity (t = 3.25, p = .001) and

Table 2
Correlations of SIQ15 subscales and second order factor analysis.

Construct validity	Correlations			Second-order factor analysis[a]	
	SIQ15 behavioral inhibition	SIQ15 interpersonal sensitivity	SIQ15 social withdrawal	Social inhibition	Distress
Behavioral inhibition (SIQ15)	–	–	–	**0.88**	0.24
Interpersonal sensitivity (SIQ15)	0.81	–	–	**0.70**	0.41
Social withdrawal (SIQ15)	0.90	0.73	–	**0.87**	0.27
Behavioral inhibition (BIS4)	0.87	0.72	0.70	**0.80**	0.08
Emotional inhibition (ECQ-EI)	0.68	0.62	0.82	**0.70**	0.24
Withdrawal (PID-5)	0.79	0.57	0.93	**0.79**	0.26
Negative affectivity (DS14)	0.55	0.69	0.55	0.35	**0.79**
Anxiety (GAD-7)	0.43	0.51	0.44	0.15	**0.90**
Depression (PHQ-9)	0.50	0.53	0.57	0.34	**0.86**

[a] Factor analysis of sum scores of the different scales. Factor loadings ≥0.50 are presented in boldface. SIQ15 = 15 item social inhibition questionnaire; BIS4 = Behavioral inhibition scale; ECQ-EI = Emotion Inhibition subscale; PID-5 = Personality Inventory for DSM-5; DS14 = 14-item Type D Personality Scale; GAD-7 = Generalized Anxiety Disorder scale; PHQ-9 = Patient Health Questionnaire.

Table 3
Hierarchical linear regression analyses of social inhibition facets (SIQ15) and anxiety and depression at baseline.

	Baseline score anxiety symptoms (GAD-7)						Baseline score depressive symptoms (PHQ-9)					
	B	SE B	β	*p*	*F*	*Adj.* R^2	B	SE B	β	*p*	*F*	*Adj.* R^2
Model 1					1.70	0.01					2.53*	0.02
Sex	0.58	0.70	0.05	0.408			0.05	0.79	<0.01	0.946		
Age	−0.04	0.03	−0.08	0.147			−0.02	0.03	−0.04	0.465		
Marital status	0.03	0.24	0.01	0.887			0.29	0.27	0.06	0.276		
Educational level	0.75	0.40	0.10	0.061			1.28	0.45	0.15	0.005**		
Model 2					13.86**	0.21					17.49**	0.25
Sex	0.38	0.65	0.03	0.555			0.19	0.71	0.01	0.791		
Age	0.01	0.02	0.03	0.566			0.03	0.03	0.06	0.249		
Marital status	0.03	0.21	0.01	0.894			0.22	0.24	0.05	0.361		
Educational level	0.31	0.36	0.04	0.386			0.65	0.40	0.08	0.102		
Behavioral inhibition	−0.05	0.14	−0.03	0.718			0.02	0.16	0.01	0.912		
Interpersonal sensitivity	0.54	0.11	0.38	<0.001**			0.38	0.12	0.24	0.001**		
Social withdrawal	0.26	0.13	0.16	0.041*			0.57	0.14	0.31	<0.001**		

Note. B = unstandardized beta; SE B = standard error for the unstandardized beta; β = standardized beta; GAD-7 = 7-item Generalized Anxiety Disorder scale; PHQ-9 = 9- item Patient Health Questionnaire; *$p < .05$, ** $p < .01$.

social withdrawal ($t = 4.03$, $p < .001$) were significantly associated with baseline depression scores (Table 3).

3.5.3. Predictive value of social inhibition in anxiety

A hierarchical regression analysis was performed with anxiety at three-month follow up as the dependent variable. In the first step, sex, age, marital status, and educational level were entered as covariates. As shown in Table 4, the covariates did not explain a significant amount of the variance (0.5%) of anxiety scores at three-months follow up (F (4, 138) = 1.18, $p = .322$). In the second step the baseline anxiety scores were entered, explaining an additional 24.8% of variation in anxiety scores at three-month follow up and this change in R^2 was significant, F_{change} (1, 137) = 46.84, $p < .001$. Entering the total social inhibition score in the last step, did not significantly explain additional variation in anxiety scores at follow up ($R^2_{\text{change}} < 0.01$, $p = .348$), and social inhibition did not predict anxiety scores at three-month follow up ($t = 0.94$, $p = .348$).

The same regression was performed, but with the three underlying facets of social inhibition entered in the third step. The facets did not explain an additional proportion of the variation in anxiety symptoms at three months follow-up (F_{change} (3, 134) = 1.00, $p = .395$). As shown in Table 4, none of the underlying facets of social inhibition were significant predictors of anxiety at follow up.

3.5.4. Predictive value of social inhibition in depression

To assess the predictive value of social inhibition on depressive symptoms at three-month follow-up, a hierarchical regression analysis was performed with follow up depression scores as the dependent variable. In the first step, the covariates did not explain a significant amount of the variance (6.0%) of depression scores at three-month follow up (F (4, 138) = 2.21, $p = .071$). In the second step, baseline depressive symptom scores were entered, explaining an additional 27.7% of variation in depressive symptoms at three-month follow up and this change in R^2 was significant, F_{change} (1, 137) = 57.35, $p < .001$. Depression scores at baseline was a significant predictor of depression scores at three-month follow up ($t = 7.57$, $p < .001$). In the last step, the total score of social inhibition was entered, but no additional variation was explained in this model ($R^2_{\text{change}} < 0.01$, $p = .334$). The total social inhibition score was not associated with the depression score at follow up ($t = 0.97$, $p = .334$), indicating that social inhibition does not predict higher depression scores at three-month follow up when correcting for baseline depression scores.

When the three underlying facets of social inhibition replaced the total score, results showed that the facets explained an additional 0.8% of the variation in depressive symptoms at three months follow-up, which was not significant (F_{change} (3, 134) = 1.52, $p = .211$). As shown in Table 4, interpersonal sensitivity was the only social inhibition facet to significantly predict depression scores at three months follow up ($t = 2.11$, $p = .037$), after correcting for baseline depression scores.

4. Discussion

This is the first study to examine the validity and predictive value of the 15-item Social Inhibition Questionnaire (SIQ15) in an outpatient general hospital population. As hypothesized and in line with previous literature in the general -, student - and cardiac patient samples [2,5], results showed that all items of the SIQ15 were related to one of the three constructs of social inhibition and fitted in a three-factor model with a high internal consistency. Moreover, the evidence for convergent validity on this instrument is supported by the correlations of the SIQ15 facet scores with already validated, existing questionnaires for measuring inhibition, such as the Behavioral Inhibition Scale (BIS; [39]), the Emotion Control Questoinnaire (ECQ-EI; [40]) and the Withdrawal scale of the PID-5 [41]. Correspondingly, the fact that theoretically different scales than the SIQ15 (the GAD-7 [42,44] and PHQ-9 questionnaires [46,47]), load more strongly on other factors, reflects the divergent validity of the SIQ15. In summary, the SIQ15 appears to be a valid questionnaire to measure social inhibition in the general hospital outpatient population.

Also, results showed that social inhibition, and more specifically the facets of interpersonal sensitivity and social withdrawal, are associated with increased anxiety and depressive symptoms at baseline, even after accounting for sex, age, education level and partner status. Although behavioral inhibition has been linked to affective symptoms in other samples [32,33], no association was found between behavioral inhibition and depressive or anxiety symptoms in this population. In addition, social inhibition and its underlying facets did not predict anxiety scores at three-months follow-up. However, interpersonal sensitivity was associated with higher depression scores at three-months follow-up. These findings are in line with previous research showing that interpersonal sensitivity is associated with symptoms of depression [51,52]. This may suggest that interpersonal sensitivity plays an important role in the vulnerability to mental health problems, and specifically depression, in outpatient adults.

The current and previous findings highlight the importance of a valid instrument for measuring social inhibition in general hospital outpatients. Given that patients with chronic health problems, cardiac illnesses, and various psychiatric diseases tend to be more interpersonally sensitive [2,53], and poor social functioning has been associated with increased mortality in patients with chronic condition [16,24,54], this further underlines the importance of focusing on adult social inhibition in clinical practice. Since social inhibition is a personality trait, and not a

Table 4
Hierarchical linear regression analyses of social inhibition facets (SIQ15) and anxiety and depression at three-month follow-up.

	Three-month follow-up score anxiety symptoms (GAD-7)						Three-month follow-up score depressive symptoms (PHQ-9)					
	B	SE B	β	*p*	*F*	*Adj.* R^2	B	SE B	β	*p*	*F*	*Adj.* R^2
Model 1					1.18	0.01					2.21	0.033
Sex	−0.19	0.09	−0.02	0.845			0.23	1.05	0.02	0.828		
Age	0.02	0.04	0.05	0.620			−0.05	0.04	−0.11	0.212		
Marital status	0.36	0.32	0.10	0.257			0.55	0.34	0.14	0.110		
Educational level	0.92	0.55	0.15	0.094			1.13	0.58	0.16	0.056		
Model 2					10.63**	0.25					13.96**	0.31
Baseline score[a]	0.43	0.06	0.50	<0.001**			0.47	0.06	0.54	<0.001**		
Model 3					7.02**	0.25					9.40**	0.32
Baseline score[a]	0.39	0.07	0.44	<0.001**			0.47	0.07	0.51	<0.001**		
Behavioral inhibition	−0.06	0.17	−0.04	0.734			−0.19	0.18	−0.13	0.295		
Interpersonal sensitivity	0.23	0.14	0.19	0.103			0.29	0.14	0.22	0.037*		
Social withdrawal	−0.05	0.16	−0.03	0.763			0.01	0.17	0.01	0.948		

Note. B = unstandardized beta; SE B = standard error for the unstandardized beta; β = standardized beta; GAD-7 = 7-item Generalized Anxiety Disorder scale; PHQ-9 = 9- item Patient Health Questionnaire; *$p < .05$, ** $p < .01$. Model 2 and 3 are also corrected for the covariates displayed in Model 1.

[a] Baseline score = corrected for baseline depressive symptoms (PHQ-9) or anxiety symptoms (GAD-7)

temporary state of being, the SIQ15 can be easily used as a screening instrument. This will aid healthcare providers in identifying somatic patients at risk for developing affective symptoms. Consequently, treatment can be provided which is tailored to the personality characteristics of the patient, thereby enhancing patient-centered care and possibly reduce affective symptoms more effectively.

Current findings should be interpreted in light of the study limitations. First, self-report questionnaires were used, making it possible for participants to answer in accordance with the social standards they experience. Second, the patient group used for this sample included only patients receiving treatment at the department of medical psychology and psychiatry, which raises the question if they differ from outpatients who are not referred for psychological or psycho-pharmacological help, by means of symptom severity and personality traits. Furthermore, clinical variables were not taken into account. Because the sample included a heterogeneous patient population with several kinds of somatic diseases, comorbidities, varying medication use and psychological and/or psychiatric complaints, generalizing the data to a specific patient population is hampered. On the other hand, the heterogeneity makes the conclusions more generalizable to a bigger, more general patient group.

Future research could focus on the long-term predictive value of the SIQ15, and it is recommended to use multiple follow-up measurements over a longer period to provide an accurate measurement over time. In addition, it would be relevant to gain insight in which types of treatment (e.g., cognitive behavioral therapy, acceptance and commitment therapy) could benefit socially inhibited individuals most in diminishing interpersonal sensitivity and affective symptoms. Lastly, a study on the feasibility of the SIQ15 as a screening tool to detect social inhibition in somatic patients is suggested, to identify patients that may be at risk for developing symptoms of anxiety and depression in clinical practice.

In conclusion, the results of the current work indicate that the SIQ15 is a valid and reliable measure of social inhibition in general hospital outpatients. Additionally, the results showed that the facet interpersonal sensitivity may play an important role in the vulnerability to depressive symptoms in this population. Due to its brevity, this questionnaire could be used in the clinical practice for identifying patients at risk for developing anxiety and depression as a consequence of impaired social functioning.

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Declaration of Competing Interest

None.

Data availability

The authors do not have permission to share data.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.genhosppsych.2021.08.011.

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