Social anxiety disorders among stutterers: effects of different variants

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Context
Development of social anxiety disorders (SADs) among stutterers was and is still poorly understood. Despite the absence of clear factors responsible for the emergence of such a disorder among the stuttering population, age, sex, and severity of stuttering remained among the major contributing factors.
Aims
The aims of this study were to (a) determine the prevalence of SADs among stutterers and (b) discuss the relation between the age of stutterers, their sex, and the degree of stuttering severity and the presence of SAD.
Settings and design
This study was carried out among the stuttering population attending the phoniatrics outpatient clinic. The data were collected retrospectively.
Materials and methods
A total of 120 stutterers who underwent both phoniatrics and psychiatric assessments between January 2015 and January 2017 were included in this study. Assessment was performed utilizing the protocol of assessment of stuttering (including assessment of stuttering severity using Stuttering Severity Instrument for Children and Adults-3) as well as a structured psychiatric interview using Mini International Neuropsychiatric Interview and Mini International Neuropsychiatric Interview for children and adolescents and Structured Clinical Interview for DMS-IV (SCID) for the assessment of SAD.
Results
A total of 120 patients (92 males and 28 females) underwent phoniatrics and psychiatric assessments. A total of 70 patients (46 males and 24 females) were assessed as a child group and 50 patients (46 males and four females) were assessed as an adolescents and adults group. SADs were obviously present in the adolescents and adults group rather than the child group. Its development is related to the older age of the stutterers and stuttering severity score.
Conclusion
The co-morbidity of stuttering with SAD could be considered a specific sub-type of stuttering. Accordingly, this co-morbidity should be determined during the assessment and management of stuttering. Otherwise, it could markedly affect the course and prognosis of the stuttering condition.

Keywords:
severity of stuttering, social anxiety disorder, stuttering disorder

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Introduction

Anxiety is a response to perceived danger encompassing cognitive, physiological, and behavioral components [1]. Social anxiety disorder (SAD) is a type of anxiety disorders characterized by significant and persistent fear of humiliation and negative evaluation in social or performance-based situations [2]. Despite the evidence of social anxiety among adolescents and adults who stutter, the field of literature is deficient in identifying the onset of SADs among stutterers across their life span [3]. The reviewed studies indicate that preschooler child stutterers are not different from their nonstuttering peers in their personality characteristics [4,5]. The development of anxiety disorder among stutterers has clinical implications for creating an effective management plan for both disorders across the life span of stutterers [3].

Aims

The aims of this study were to (a) determine the prevalence of SADs among stutterers and (b) discuss the relation between the age of stutterers, their sex, and the degree of stuttering severity and the presence of SAD.

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Materials and methods

Patient population and study design

This is a retrospective study carried out in the period between January 2015 and January 2017. A total of 120 patients (92 males and 28 females) were included in this study. Ethical consideration were maintained according to the research ethics committee of institute of postgraduate childhood studies.

Inclusion criteria were as follows:

(1) Stutterers attending the outpatient clinics of phoniatrics and ranging in age between 5 and 27 years with stuttering of developmental onset were included in this study.
(2) Participants of clinical average intelligence.
(3) Participants who had a language aptitude corresponding to their chronological age.

Exclusion criteria were as follows:

(1) Stutterers who had any language disorders or below average intelligence.
(2) Stutterers with a previous history of psychiatric intervention because of any psychiatric disorder.
(3) Stutterers with any manifestation of any other chronic illness.

Procedure

All patients were subjected to an assessment protocol that included both phoniatrics and psychiatric assessments.

The phoniatrics assessment was performed in the phoniatrics clinic. The psychiatric assessment was performed in the psychiatric clinic (in a closed session to maintain confidentiality).

Phoniatrics assessment

Elementary diagnostic procedures included assessment of history, ear, nose, and vocal tract examination, and evaluation of communicative functions. Evaluation of communicative functions was performed through:

(1) Language assessment (for young stutterers) subjectively to confirm that their language development is consistent with their chronological age.
(2) Speech assessment was performed using the following:
    (a) Visual perceptual assessment was used as a subjective tool for assessment of eye contact and involuntary movements.
    (b) Auditory perceptual assessment was used as a subjective tool for evaluation of the patients' speech (both automatic, spontaneous speech, and reading) through careful observation and listening to every patient in a free conversation and a recorded speech sample.

Clinical diagnostic aids

Documentation of visual perceptual assessment and auditory perceptual assessment: this was done through assessment of stuttering severity using the 'Stuttering Severity Instrument for Children and Adults (SSI-3)' [6]. The assessment was performed by measuring three parameters of stuttering (frequency, duration, and physical concomitant behaviors) in a speech sample and while reading aloud (in reader stutterers). In the spontaneous speech sample, the patient was asked to tell the clinician about his/her daily life activities, his/her job, or his/her school (according to the patient's age) to collect 150 words. The 'reading task' was performed by asking the patient to read a passage of 150 words as well. To calculate the severity of stuttering, the first and final 25 words of the 150-word sample were removed. This was done because the first 25 words were 'more stressful' and during the last 25 words, the patient was likely to be more relaxed and the frequency of disfluencies decreased artificially. The frequency of stuttering was measured through calculation of the percentage of disfluent syllables in the middle 100 words in both the speech sample and the reading text. The duration reflected the average length of the three longest disfluencies in the 100-word segments of each sample. Each physical concomitant behavior was judged on the basis of how noticeable or distracting it was. For scoring each of the three components, there was a 'task score equivalency' predetermined for the measurement or judgment made. The task score in each component was calculated and written in the corresponding box on the right. The sums of the three boxes were determined and written in the box marked the 'total overall score'. Finally, the appropriate 'severity conversion table' was used to locate the severity rating and percentile in which the participant ranked.

Psychiatric assessment

For the determination of the prevalence of SADs in the current study sample, all participants were subjected to a full psychiatric evaluation by the first author and the presence of any psychiatric disorder was reported.

The Mini International Neuropsychiatric Interview (MINI) [7] for adults and the Mini International Neuropsychiatric Interview for children and adolescents (MINI-Kid) were conducted [8]. Both are short structured diagnostic interviews for diagnostic and

statistical manual - 4th edition (DSM-IV) and International Statistical Classification of diseases and related Health Problems 10th edition (ICD-10) psychiatric disorders in adults and children and adolescents, respectively. They were developed jointly by psychiatrists and clinicians in the USA and Europe for DSM-IV and ICD-10 psychiatric disorders with an administration time of ~15 min. They were designed to meet the need for a short but accurate structured psychiatric interview for multicenter clinical trials and epidemiology studies and to be used as a first step in outcome tracking in nonresearch clinical settings.

Participants were divided into two groups: group I (child group) and group II (adolescents and adults group). Further classification of each stuttering group was performed into subgroups. Group Ia included child stutterers without comorbid SAD and group Ib included child stutterers with a co-morbidity. Group IIa included adolescent and adult stutterers without comorbid SAD and group IIb included adolescent and adult stutterers with a co-morbidity.

A descriptive analysis of the studied sample as well as a comparative analysis were carried out between the male and female child stutterers in group I and group II adolescent and adult stutterers in terms of their ages, SSI-3, and associated anxiety disorders. Further comparative studies between the subgroups of group I child stutterers in terms of their ages, SSI-3, and associated anxiety disorders as well as between the subgroups of group II adolescent and adult stutterers for the same variants were carried out. The correlative statistics between the age of the stutterers, stuttering severity, and the presence of anxiety disorders in each of the large studied groups (i.e. group I and group II) were calculated.

The data were collected and tabulated. The statistical analysis of data was carried out using the SPSS program (v. 17) (statistical package for the social sciences; SPSS Inc., Chicago, Illinois, USA) [9]. Qualitative data were presented as frequency and percentage. χ^2-test and Fisher's exact tests were used to compare groups. Quantitative data were presented as mean and SD. Comparisons between two groups were performed using a *t*-test. The correlation coefficient was used to examine the correlation between parameters. *P* was significant if less than 0.05 at a 95% confidence interval.

Results

Descriptive analysis

The current study included 120 participants (92 males and 28 females). Their ages ranged from 5 to 27 years, with a mean age of 12.47 years. Patients who ranged in age from 5 to 12 years were classified as a child group (8.1 ±1.96 years), whereas those who ranged in age from 13 to 27 years (18.8±4.6 years) were classified as an adolescents and adults group. There was a male predominance in both group I [46 (66%) males, mean age: 8.2±2.1 years and 24 (34%) females, mean age: 7.9±1.9 years] and group II [46 (92%) males, mean age: 18.9±4.2 years and four (8%) females, mean age: 18±5.8 years]. The duration of stuttering ranged from 7 to 60 months in the child group, with a mean duration of about 35.49± 18.11 months, and from 72 to 264 months in adolescent and adult stutterers, with a mean duration of 164.11± 55.23 months. According to the SSI-3, the mean among group I stutterers was 19.6±7 and the mean among group II stutterers was 28±5.7 (Table 1).

According to SSI-3, the descriptive score of stuttering severity was very severe in six patients in group I and in three patients in group II; severe in six patients in group I and in 15 patients in group II; moderate in 45 patients in group I and in 26 patients in group II; and mild in 13 patients in group I and in six patients in group II (Table 2). According to the psychiatric assessment, patients were classified into two groups: those who did and did not have SADs. Anxiety-related disorders were present in 7% of the participants in the child group and in 72% of the participants in the adolescents and adults group (Table 2). Group Ia included 65 (93%) children from group I, 46 (71%) males and 19 (29%) females. Their mean age was 8±1.96 years. They had stuttering severity in the following order: 12 were mild, 43 were moderate, and six were severe, four were very severe, with a mean stuttering severity of 19±6. While group IIb were only five (7%) of group I (all of them were females) their mean ages were 9.2±1.78 years. They showed manifestation of some anxiety-related

Table 1 Descriptive analysis of the sample studied

Patients' data	Child group	Adolescents and adult group
Age (years)		
Range	5–12	13–27
Mean±SD	8.1±1.96	18.8±4.6
Sex		
Males	46	46
Females	24	4
Duration of stuttering (months)		
Range	7–60	72–264
Mean±SD	35.49 ±18.11	164.11±55.23
Severity of stuttering (mean±SD)	19.6±7	28±5.7

This table shows the age, sex, duration of stuttering, and the mean stuttering severity in the child group and the adolescents and adult group.

Table 2 Stutterers' clinical data as assessed by Stuttering Severity Instrument for Children and Adults-3 and Mini International Neuropsychiatric Interview for adult and Mini International Neuropsychiatric Interview for adolescents and children

Stuttering severity	Very severe [*n* (%)]		Severe [*n* (%)]		Moderate [*n* (%)]		Mild [*n* (%)]		Total
±SA	+SA	−SA	+SA	−SA	+SA	−SA	+SA	−SA	
Child group	2 (2.8)	4 (5.7)	0 (0)	6 (8.6)	2 (2.8)	43 (61.4)	1 (1.4)	12 (17.1)	70 (100)
Adolescents and adult group	3 (6)	0 (0)	13 (26)	2 (4)	19 (38)	7 (14)	1 (2)	5 (10)	50 (100)

This table shows the distribution of social anxiety disorder among different stuttering severity scores in the two groups studied (groups I and II); +, present; −, absent; SA, social anxiety disorder.

Table 3 Sociodemographic and clinical characteristics of the two main groups (groups I and II)

Group of the study	Number (%)	Sex	Age (mean±SD)	*P* value	Stuttering severity (descriptive terms) [*n* (%)]				Mean stuttering severity (numerical)	*P* value
					Mild	Moderate	Severe	Very severe		
Child group	46 (66)	Male	8.2±2.01	0.577	10 (14.3)	30 (42.9)	5 (7.1)	5 (7.1)	18.9±5	0.245
	24 (34)	Female	7.9±1.9		3 (4.3)	15 (21.4)	1 (1.4)	1 (1.4)	20.9±8.9	
	70 (100)	Total	8.1±1.96		13 (18.6)	45 (64.3)	6 (8.6)	6 (8.6)	19.6±6	
Adolescents and adult group	46 (92)	Male	18.8±4.55	0.721	5 (10)	24 (48)	14 (28)	3 (6)	28±5.6	0.451
	4 (8)	Female	18.2±5.88		1 (2)	2 (4)	1 (2)	0 (0)	26±6.8	
	50 (100)	Total	18.8±4.6		6 (12)	26 (52)	15 (30)	3 (6)	28±5.7	

This table shows the sociodemographic and clinical data of the child group and adolescents and adult group before the psychiatric interview. It compares the mean ages and stuttering severities among the groups studied.

disorders mainly in the form of specific phobia and somatization (Table 4). They showed stuttering severity in the following order: one case was mild, two were moderate, and two were very severe, with a mean stuttering severity of 24±11 (Table 4). Group IIa were 14 all of them were males and their mean ages was 16.42±4.49 years. They showed stuttering severity in the following order: five were mild, seven were moderate, and two were severe, with a mean stuttering severity of 29±5. Group IIb included 36 participants (32 males and four females), mean age 19.7±4.1 years. They showed stuttering severity in the following order: one was mild, 19 were moderate, 13 were severe, and three were very severe, with a mean stuttering severity of 25±5 (Table 4).

Comparative analysis

(1) Comparative analysis between males and females in group I in terms of their age, SSI-3, and associated anxiety manifestation: comparison of the mean age of male and female stutterers in group I showed that there were nonsignificant statistical differences between them (*P*=0.577). There was a nonsignificant statistical difference between the mean stuttering severity between male and female stutterers in group I child stutterers (*P*=0.245) (Table 3).

(2) Comparative analysis between the subgroups of group I (i.e. group Ia and group Ib) in terms of their ages, stuttering severity, and associated anxiety manifestations: comparison of the mean ages of the two subgroups (group Ia and group Ib) showed a nonsignificant statistical difference in their ages (*P*=0.196). Comparison of the mean of the stuttering severity of the two subgroups also showed a nonsignificant statistical difference in their stuttering severity (*P*=0.144) (Table 4).

(3) Comparative analysis between males and females in group II in terms of their age, SSI-3, and associated anxiety manifestation: comparison of the mean ages of males and females in group II stutterers showed a nonsignificant statistical difference in the mean age between males and females (*P*=0.721) (Table 3). There was a nonsignificant statistical difference between the mean stuttering severities of males and females (*P*=0.451) (Table 3).

(4) Comparative analysis between the subgroups of group II (i.e. group IIa and group IIb) in terms of their ages, stuttering severity, and associated anxiety manifestations: comparison of the mean ages showed that there was a significant difference between the mean ages of stutterers in the two subgroups (*P*=0.022) (i.e. group IIb adolescent and adult stutterers were older) (Table 4).

Table 4 Sociodemographic characteristics of patients within the subgroups of the main group of stutterers

Group of the study	Number (%)	Subgroups	Sex	Age (mean±SD)	Stuttering severity (descriptive terms)			
					Mild	Moderate	Severe	Very severe
Child group	65	SA (–)	Male: 46 Female: 19	8.0±1.96	12	43	6	4
	5	SA (+)	Male: 0 Female: 5	9.2±1.788	1	2	0	2
	70	Total	70	8.1±1.96	13	45	6	6
Adolescents and adult group	46 (92)	SA (–)	Male: 14 Female: 0	16.42±4.49	5	7	2	0
	4 (8)	SA (+)	Male: 32 Female: 4	19.72±4.1	1	19	13	3
	50	Total		18.8±4.6	6	26	15	3

This table shows the sociodemographic and clinical characteristics of the subdivisions of the main group. It compares the mean values of the patients' ages in the child group with and without social anxiety. It compares the mean values of the patients' ages in the adolescents and adult group with and without social anxiety disorder; Using an independent *t*-test, there were significant statistical differences between the mean age in groups A and B in adolescents and adult stutterers. The *P* value was 0.022 (i.e. stutterers with social anxiety disorders are older); Using an independent *t*-test, there was a nonsignificant statistical difference between the mean age in groups A and B in child stutterers. The *P* value was 0.196; +, present; –, absent; SA, social anxiety disorder.

On comparing the mean of stuttering severity, the results showed that there was a highly statistically significant difference between the two subgroups in stuttering severity (P=0.025) (Table 4) (i.e. group IIa included participants with more severe stuttering than group IIb).

(5) Comparative analysis between the child group and adolescents and adults group in terms of their stuttering severity: comparison of the mean of stuttering severity results showed that there was a highly statistically significant difference between group I and group II in their stuttering severity (P=0.000) (Table 4) (i.e. group II showed a higher stuttering severity than group I) (Table 4).

Correlative statistics

The results revealed a highly significant correlation between the stage of life of stutterers and their development of social anxiety disorder (Table 5).

Among the adolescent and adult stutterers, there was a significant correlation between age and the stuttering severity score and the development of SADs (P=0.022 and 0.025, respectively) (i.e. SAD becomes more evident with increased age and severity score of the stutterers) (Table 6). However, there was a nonsignificant correlation between the sex of the stutterers and the presence of SAD (P=0.201) (Table 6).

Table 5 Correlation between stutterers' stage of life and the presence of social anxiety disorder

Variable	Correlation with the presence of social anxiety disorder	Significance
Stutterers stage of life (childhood and adolescents and adulthood)	0.674	0.000**

This table shows the correlation between stutterers' stage of life and their tendency to develop social anxiety disorders;

Table 6 Correlative statistics between the three major variables (age, sex, and stuttering severity) and the presence of social anxiety disorder in group II

Variables	Correlation with social anxiety disorder through Pearson's correlation	Significance
Age	0.324*	0.022*
Sex	0.184	0.201
Stuttering severity	0.317*	0.025*

This table shows the correlation between age, sex, and the stuttering severity score and the emergence of social anxiety disorders among group II stutterers; *Correlation is significant at a 0.05 level (two-tailed).

Discussion

Many raised questions have been raised on the exact nature of stuttering. The first question is as follows: does stuttering simply present with a speech characteristic without being accompanied by feelings that reflect the impact of stuttering on his/her life [10]? The second question is as follows: should stuttering severity be measured by the percentage of stuttered syllables only or should it also include internal reactions? Also, is there coexistence of psychopathology for individuals who stutter, e.g. SAD? Finally, should new terminology be developed to bring awareness to these issues?

In an attempt to shed light on the nature of this heterogeneous disorder, the field of stuttering research has incorporated new terminology such as the effect of stuttering on an individual's quality of

life [11], stuttered speech syndrome (SSS) [12], the iceberg of the psychological aspect of stuttering, and psychosocial aspects of chronic stuttering [13].

The current study examined the prevalence of anxiety disorders, more specifically SAD, over a long course of stuttering (i.e. during childhood, adolescents, and adults). The study attempted to focus attention on the impact of stuttering on stutterers' psychosocial development throughout their life span.

The current retrospective study was carried out on 120 participants (92 males and 28 females) who were subjected to stuttering and psychiatric assessments. They were further divided according to their age into two groups: child group and adolescents and adults group. The child group included 70 patients (46 males and 24 females) with a mean age of 8.1 years and their age ranged from 5 to 12 years. The second group was the adolescents and adults group, which included 50 patients (46 males and four females) with a mean age of 18.8 years and their age ranged from 13 to 27 years. All the patients in this study presented with stuttering (100%). SAD was present in 41% of the entire sample studied. The current study was conducted retrospectively to examine the two life periods of human beings. In this way, the emergence of SADs in relation to the ages of the stutterers' population was uniquely studied. Other studies had focused on specific age groups, i.e. some studies focused on specific age groups and some studies were mainly focused on children; other publications had focused on adolescents and adults.

In the current study, the mean age of the participants in the child group was 8.1±1.96 years (range: 5–12 years). Forty-six (66%) were males and 24 (34%) were females. The mean duration of stuttering in this group was about 35 months. All of them reported onset of stuttering typical with developmental stuttering and they were receiving speech therapy sessions. They had a mean stuttering severity of about 19.6±7. These epidemiological data are in agreement with those published in a recent critical review by Yairi and Ambrose [14] about the '21st Century Advances in Epidemiology of Stuttering'. Among their results, they reported that in recent research, stutterers exhibit a younger age at onset, a similar age of onset for the two genders, and a smaller male-to-female ratio and that most cases are of sudden onset. The authors attributed these results to the improved procedures and clinicians' efforts to examine stuttering as extensively as possible to its emergence rather than any changes in the nature of stuttering onset over the last few years. The smaller male to female ratio near the time of onset compared with the ratio at an older age indicates that recovery from stuttering is considerably more frequent in girls than in boys.

In the current study, 7% of child stutterers showed manifestations of some anxiety-related disorders mainly in the form of specific phobia and somatization; all these participants were females. Their mean age was 9.2±1.78 years. They showed a mean stuttering severity of 24±11. This severity showed a nonsignificant statistical difference compared with the rest of the stuttering children without any anxiety or anxiety-related disorders. These results were in agreement with those published by Rapee [15] and Kessler *et al.* [16] on the prevalence and mean age of onset of anxiety disorders in the general population. They reported that anxiety has been estimated to be present in 10% of the general community, with a median age of onset of 11 years. When the results of Rapee [15] and Kessler *et al.* [17] were compared with the results of the child group in the current study, it was found that anxiety was present in 7% of the female stuttering children, with a mean age of 9.2±1.78 years (i.e. older female children). This is in agreement with what has been published by Rapee [15] and Kessler *et al.* [16] (i.e. the prevalence of anxiety was close to that in the general population).

However, Iverach and Rapee [17] estimated that the prevalence of SADs was 8–13%, with a median age at onset of 13 years as reported by Kessler *et al.* [16]. The results of the present study are in agreement what has been published (i.e. SADs were not reported in the child group).

The prevalence of anxiety disorders among child group is in agreement with what has been published by Van der Merwe *et al.* [18]. Their assessment tool varied between investigation of anxiety salivary cortisol levels as a stress biomarker and completion of the parent report Preschool Anxiety Scale [19] and the Communication Attitude Test for Preschool and Kindergarten Children who Stutter (KiddyCAT) [20] for seven preschoolers stutterers (3.3–4.11 years) and seven age-matched, nonstuttering controls. In van der Merwe *et al.* [18], there was a nonsignificant statistical difference in cortisol levels or outcomes of the KiddyCAT or Preschool Anxiety Scale between stuttering preschoolers and nonstuttering controls.

The results of Ortega and Ambrose [21] are similar to those of the present work. They measured salivary cortisol levels in a sample of nine children who stutter and their ages ranged from 6 to 11 years.

They found that cortisol levels for stuttering children were in the low average range according to normative data.

An older study carried out by Andrews and Harris [22] supported the results of the present study. They utilized a group that was older compared with the study of Ortega and Ambrose [21]. Their results explored no differences between stutterers and nonstuttering controls on a range of psychological and psychometric variables including the General Anxiety Scale for Children.

The results of Craig and Hancock [23] were in agreement with those of the present study. They administered the State-Trait Anxiety Inventory for Children (STAIC) [24] to 96 stuttering children and adolescents; their ages ranged from 9 to 14 years. Trait anxiety was assessed and compared for both the stuttering group and 104 nonstuttering age-matched controls, whereas state anxiety was compared with normative data. They found that stuttering children and adolescents were not more anxious than nonstuttering controls, and state anxiety levels were within the norms established for the STAIC.

However, our results were not in agreement with what has been published by Iverach *et al.* [25]. They carried out their study on 75 stuttering children; their ages ranged from 7 to 12 years (mean: 8.7±1.50 years). Parents were subjected to a child anxiety diagnostic assessment by Youth Online Diagnostic Assessment [26]. Children completed a report that measured anxiety, mood, behavioral, and emotional problems. Among stuttering children, the prevalence of any anxiety disorder was 32%, which is significantly higher than that in nonstuttering controls: 11%. They also found that the higher prevalence of anxiety disorders among stuttering children was because of the increased prevalence of SAD. They found that 24% of children in the stuttering group showed SAD in comparison with 5% in the nonstuttering group. The differences in the results of the current study and the Iverach *et al.* [25] series could be because of (a) differences in age ranges between their study sample and the current study sample (i.e. older age range than our study sample), (b) their wider community sample, covering all stutterers, and (c) the nature of the psychiatric assessment (online assessment) in the Iverach *et al.* [25] series; no clinical interview was conducted by an expert psychiatric consultant as done in the current study. Although both studies utilized structured diagnostic interviews, the results were in different directions. Iverach *et al.* [25] attributed the inconsistent nature of past research findings among child stutterers to several methodological limitations, including small sample sizes, the inclusion of children and adolescents in the same group, and the lack of sensitivity of evaluation of speech-related anxiety. On the basis of their findings, they explained the development of SADs among child stutterers. They highlighted an etiological model for the development of social anxiety in the general population that included biological, psychological, social risk factors, and environmental influences such as traumatic social events [27]. They reported that several of these etiological factors may be experienced by children who stutter. Social anxiety will develop among child stutterers as they are more likely to encounter negative peer experiences, such as rejection, exclusion, and teasing [28–30], which may reduce opportunities for peer interaction, limit acquisition of age-appropriate social skills, and subsequently increase the risk for SAD [29,30].

The participants in the second group were 50 adolescents and adults stutterers; their ages ranged from 13 to 27 years, with a mean age of 18.8±4.6 years. In all 46 (92%) were males and there were only four (8%) females; their ages ranged from 13 to 27 years. Their mean stuttering severity was 29±5. Results showed that they had a prevalence of SADs as high as 72%.

This figure was significantly higher than that of a national survey on the prevalence of mental health disorders among 14 640 adults. Their ages ranged from 18 to 64 years and they were from five regions in Egypt. A study was carried out by Ghanem *et al.* [31] using the MINI-Plus diagnostic interview. In their study, the overall prevalence of mental health disorders was estimated to be 16.93% of the entire population studied. The most prevalent disorders were mood disorders, 6.43%, anxiety disorders, 4.75%, and multiple disorders, 4.72%.

The prevalence of SADs among adolescent and adult stutterers in the present work was in agreement with what has been published by Davis *et al.* [32]. They used the STAIC among a group of stutterers; their ages ranged between 10 and 16 years. They compared outcomes on the STAIC for 18 stutterers, 17 recovered stutterers who had stuttered previously, and 19 nonstuttering controls. Their results showed that the stuttering group had higher state anxiety levels compared with the recovered and control groups during all the speech situations examined, except talking with a group of friends. Davis *et al.* [32]

concluded that stuttering is associated with increased anxiety levels in certain communication situations.

The current work was also supported by Mulcahy *et al*. [13]. They investigated social anxiety in stuttering adolescents. They administered the STAIC, the Fear of Negative Evaluation scale [33], and the Overall Assessment of Speakers Experience of Stuttering – Teen Version [34] to 19 young individuals who stuttered (their ages ranged between 11 and 18 years) and 18 age-matched, nonstuttering controls. The results of their assessments showed that the stuttering group had statistically higher state, trait, and social anxiety compared with the nonstuttering controls.

The results of the present work are also in agreement with those of a study carried out by Erikson and Block [35]. They administered the Personal Report of Communication Apprehension [36]. They utilized this tool in a group of 36 stuttering adolescents (age: 11–18 years). They found that 64% of the participants reported high levels of communication competence on the 'Meeting' subscale and 81% recorded high levels of communication efficacy on the 'Public speaking' subscale. Their results supported the presence of heightened speech-related anxiety in adolescents who stutter.

The results of the current study are in agreement with the results obtained by Iverach *et al*. [37]. They carried out their study on 94 adults receiving speech therapy. Their ages ranged from 18 to 73 years, with a mean age of 32.8±12.0 years. They found that the prevalence of anxiety disorder for adult stutterers receiving speech therapy for stuttering was seven times more than the matched control group. The prevalence of DSM-IV and ICD-10 criteria of SAD was also significantly higher for the stuttering group compared with the matched controls.

The results of the present study were supported by Craig [38] and Ezrati-Vinacour and Levin [39]. They found higher trait anxiety scores for adults who stutter than control participants.

More specifically, Stein *et al.* [40], Iverch *et al*. [37], and Blumgart *et al*. [41] studied SADs among adolescent and adult stutterers. They found highly significant differences between them and the control group in terms of social anxiety levels.

Stein *et al*. [40] found in their series of 16 adults who stutter that the prevalence of SADs in the stutterer group was 44%. A similar prevalence was found by Blumgart *et al*. [41]. The difference between the prevalence of social phobia among adults in the current study and other studies carried out by Stein *et al*. [40] and Blumgart *et al*. [41] could be because of what has been stated by Craig *et al*. [42]. They reported that those receiving treatment had higher severity ratings and tended to have higher anxiety levels than stutterers who do not receive treatment.

However, the results of the current study were different from those obtained by Miller and Watson [43], who found no difference between adults who stuttered and a control group in relation to either state or trait anxiety levels.

Theories on the relation between stuttering and mental health disorders are complex in nature. Some authors claim that both developmental stuttering and some psychiatric disabilities have a genetic component in their origin [44]. Others believe that stuttering is associated with an overactive presynaptic dopamine system in regions of the brain that modulate verbalization. In this aspect of neurotransmitter disturbance, it could be similar to neurobiological bases of some psychiatric disorders such as SAD. This theory could explain the similarities between both disorders in their symptomatology, pathophysiological bases, and consequently management [45]. Costa and Kroll [46] claimed that psychiatric co-morbidities among stutterers might be because of the long-lasting chronic disability of stuttering. Such chronicity could contribute toward the multifactorial causes of some psychiatric disabilities such as anxiety and depression. Other authors suggested that both stuttering and psychiatric disability resulted from neurodevelopmental delay [47].

Irwin [12] explained this multidimensional relation between stuttering and SAD in a more comprehensive model. She introduced a new term that explained the coexistence of both disorders. She claimed that stuttering presentations could be either simple stuttering, with its overt and covert manifestations, or may occur as a symptom of a larger syndrome termed SSS. It was reported by Irwin [12] that SSS could be defined as responses resulting from the complex interplay between stuttered speech (overt and covert) and negative emotional and attitudinal reactions to it (SAD).

In the present work, three factors were found to influence the presence of psychiatric disorders: sex, severity of stuttering, and age. Data in the present study showed that male stutterers had a significantly higher prevalence of SADs than females. This result

was explained by Klein and Hood [48] and Haley [49]. They found that males who stutter perceived their dysfluency as more handicapping for vocational opportunities than did females who stutter (possibly because of their very high negative emotional and cognitive reactions toward their stuttering). The second factor that influenced the presence of SAD was the severity of stuttering. In the present work, there was a significant difference between child stutterers and adolescents and adult stutterers in terms of stuttering severity. More evidently, it was found in the current study that adolescents and adult stutterers who had SADs showed significantly higher stuttering severity than their peers without social anxiety.

This result was supported by Craig and Calver [50] and Menzies *et al*. [51], who found that many individuals with a moderate to severe stuttering severity had impaired effective communication. Therefore, they were considered at a higher risk of psychological and social negative consequences. However, Craig and Tran [52] and Huinck *et al*. [53] reported that the chronicity of stuttering is considered the crucial factor in the development of anxiety disorders (mostly social anxiety). The findings of the current study support both opinions, i.e. SAD occurs among adolescents and adult stutterers when the condition becomes chronic. At the same time, the mean value of stuttering severity among adolescent and adult stutterers who received an additional diagnosis of SAD was 28 (moderate stuttering severity).

The results of the present study were in contrast to the results obtained by Huinck *et al*. [53]. They studied the relation between the emergence of SAD and severity of stuttering. Their work was carried out on 25 adults who stuttered (17 males and eight females), mean age 29.6 years. They found that although the severity of stuttering tends to correlate with the severity of the psychosocial clinical characteristics of stutterers, negative emotional and cognitive reactions could occur even if the severity of stuttering is mild. They concluded from their study that the severe stuttering group benefited the most from treatment, provided that their negative emotional and cognitive reaction was mild. They concluded that the severity of negative emotion and cognitive reaction is a determinant of treatment outcome, not the stuttering severity.

Conclusion

Stuttering is a multidimensional disorder that could be considered across a spectrum of different subtypes. Co-morbidity with social anxiety may be considered a specific type of stuttering that may be missed during the assessment process despite its considerable effect on the severity and chronicity of the disorder, and treatment outcome. Therefore, the clinician should be aware of social anxiety co-morbidity among stutterers to offer a suitable assessment and intervention program for this subgroup of stutterers.

Further studies are warranted to explore the management of anxiety among adolescents and adults who stutter to enhance their overall functioning. This may include further studies of the role of cognitive behavioral therapy and pharmacological treatments for social phobia in stuttering.

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Conflicts of interest

There are no conflicts of interest.

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