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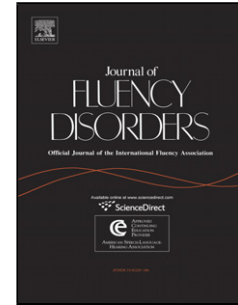
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## Comparison of adults who stutter with and without social anxiety disorder

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### Highlights

- Social anxiety is typically associated with significant life impairment.

- We compared adults who stutter with and without social anxiety disorder.
- Demographic variables were largely similar between groups.
- Socially anxious participants had a more negative view of their speech.
- Psychological difficulties were increased for socially anxious participants.

## **Abstract**

*Purpose:* Social anxiety disorder is a debilitating anxiety disorder associated with significant life impairment. The purpose of the present study is to evaluate overall functioning for adults who stutter with and without a diagnosis of social anxiety disorder.

*Method:* Participants were 275 adults who stuttered (18–80 years), including 219 males (79.6%) and 56 females (20.4%), who were enrolled to commence speech treatment for stuttering. Comparisons were made between participants diagnosed with social anxiety disorder ( $n=82$ , 29.8%) and those without that diagnosis ( $n=193$ , 70.2%).

*Results:* Although the socially anxious group was significantly younger than the non-socially anxious group, no other demographic differences were found. When compared to the non-socially anxious group, the socially anxious group did not demonstrate significantly higher self-reported stuttering severity or percentage of syllables stuttered. Yet the socially anxious group reported more speech dissatisfaction and avoidance of speaking situations, significantly more psychological problems, and a greater negative impact of stuttering.

*Conclusion:* Significant differences in speech and psychological variables between groups suggest that, despite not demonstrating more severe stuttering, socially anxious adults who stutter demonstrate more psychological difficulties and have a more negative view of their speech. The present findings suggest that the demographic status of adults who stutter is not worse for those with social anxiety disorder.

These findings pertain to a clinical sample, and cannot be generalized to the wider population of adults

who stutter from the general community. Further research is needed to understand the longer-term impact of social anxiety disorder for those who stutter.

*Keywords:* Stuttering; Anxiety; Social Phobia; Social Anxiety Disorder, Assessment; Treatment.

## **1. Comparison of adults who stutter with and without social anxiety disorder**

Stuttering is a common speech disorder marked by involuntary interruptions to speech. These interruptions can have a profound impact on communication and social participation throughout life. A growing body of research has confirmed that stuttering has a genetic basis (Domingues et al., 2014), with deficits in neural processing identified as a possible causal factor (Etchell, Johnson, & Sowman, 2014). The lifetime incidence of stuttering is approximately 4–5 %, with a 1% point prevalence (Bloodstein & Bernstein-Ratner, 2008). Stuttering typically starts in the preschool years when children are learning to put words into sentences (Yairi, Ambrose, & Cox, 1996). Recent evidence has shown that 8.5% of children are affected by stuttering at age 3 years, with a cumulative incidence of 11% at age 4 years, and only 6.3% natural recovery during the first year after onset (Reilly et al., 2013). When natural recovery does not occur, stuttering is often associated with an accumulation of social, psychological, educational, and occupational disadvantages across the lifespan.

### *1.1. Social anxiety disorder*

Social anxiety disorder is a prevalent anxiety disorder with a chronic and debilitating trajectory (Ruscio et al., 2008; Slade et al., 2009; Stein & Kean, 2000). A defining feature of the disorder is an excessive, intense, and unreasonable fear of social-evaluative situations where negative evaluation is possible (American Psychiatric Association [APA], 2013). This anxiety can occur across a broad range of situations, such as socializing at parties, meeting new people, public speaking, giving presentations, and speaking to authority figures at work (Ballenger et al., 1998). Social anxiety disorder typically develops in childhood or adolescence when social and peer relationships are growing in importance. It has an average age of onset between 14–16 years (Kessler et al., 2005; Ollendick & Hirshfeld-Becker, 2002), and lifetime prevalence in the general community is estimated at 8–13% (Kessler et al., 2005; Ruscio et al., 2008; Somers, Goldner, Waraich, & Hsu, 2006).

Socially anxious individuals tend to avoid or perform poorly in social, educational, and occupational situations. This avoidance can severely hamper social development, overall functioning,

and quality of life (Stein & Kean, 2000). Social anxiety disorder is more prevalent among females and is frequently associated with lower educational attainment, increased unemployment, financial dependency, lower socioeconomic status, less likelihood of being involved in a personal relationship, reduced quality of life, greater utilization of health services, psychological distress, and the comorbid presence of other mental disorders such as depression and substance use (Australian Bureau of Statistics, 2008; Katzelnick et al., 2001; Lipsitz & Schneier, 2000; Schneier et al., 1994; Slade et al., 2009; Stein & Kean, 2000; Wittchen & Fehm, 2003). This comorbidity tends to compound symptom severity, life interference, and functional impairment (Ballenger et al., 1998). Without treatment, social anxiety disorder is associated with a chronic and debilitating life trajectory. It also leads to significant social and economic burden relating to the ongoing costs associated with treatment, health care, disability, and social welfare (Wittchen & Fehm, 2003).

### *1.2. Stuttering and social anxiety disorder*

A growing body of evidence has established that stuttering is frequently associated with social anxiety. Across these studies, a significant proportion of adults who stutter have been found to meet criteria for social anxiety disorder (Blumgart, Tran, & Craig, 2010; Iverach, O'Brian, et al., 2009; Menzies et al., 2008; Stein, Baird, & Walker, 1996). In the only study to evaluate the prevalence of anxiety disorders among adults who stutter and non-stuttering controls using a structured diagnostic interview, 22% of adults seeking treatment for stuttering met criteria for social anxiety disorder compared to only 1.2% of non-stuttering controls from the general community (Iverach, O'Brian, et al., 2009). Whilst it was initially thought that these findings might only apply to adults who stutter, recent evidence suggests that social anxiety disorder may also be prevalent among school-age children who stutter (Iverach, Jones, et al., 2016). In particular, 24% of school-age children (7–12 years) seeking treatment for stuttering met criteria for social anxiety disorder, compared to only 4% of non-stuttering control children (Iverach, Jones et al., 2016). This suggests that social anxiety disorder in stuttering may develop earlier than previously thought. Having said this, it should be noted that other studies have

failed to find heightened anxiety scores in school age children who stutter (Messenger, Packman, Onslow, Menzies & O'Brian, 2015; Smith et al. 2017).

Several etiological risk factors associated with the development of social anxiety are relevant to stuttering. Foremost among these, the negative social conditioning experienced by children, adolescents, and adults who stutter across the lifespan is considered to be a prominent risk factor for social anxiety disorder (Iverach & Rapee, 2014; Iverach, Rapee, Wong, & Lowe, 2017). Research has confirmed that these negative experiences commence early, with evidence of bullying, teasing, exclusion, and negative peer reactions among preschool children who stutter (Langevin, Packman, & Onslow, 2009; Packman, Onslow, & Attanasio, 2003). As children move through the school years and adolescence, these negative experiences are often exacerbated by the increased importance of peer relationships. For instance, children and adolescents who stutter frequently experience peer victimization, isolation and rejection, and may be rated as less popular and less likely to have leadership potential than their non-stuttering classmates (Blood et al., 2011; Davis, Howell, & Cooke, 2002; Hearne, Packman, Onslow, & Quine, 2008). Children who stutter are also significantly more likely to repeat a grade at school than non-stuttering children (Boyle, Decoufle, & Yeargin-Allsopp, 1994), with those educational problems not explained by lower intelligence (Bloodstein & Bernstein-Ratner, 2008). As a result of those experiences, stuttering is associated with several risk factors for the development of social anxiety, including low self-esteem, reduced school performance, fear of negative evaluation, and social embarrassment (Hudson & Rapee, 2009).

Not surprisingly, retrospective reports from adults who stutter indicate that stuttering had an extremely damaging impact on school life, with negative long-term implications for emotional and social functioning (Blood & Blood, 2016; Daniels, Gabel, & Hughes, 2012; Hayhow, Cray, & Enderby, 2002; Hugh-Jones & Smith, 1999). These adverse outcomes continue into adulthood, with many adults who stutter experiencing negative listener reactions, stereotypes and stigma, relationship difficulties, and long-term educational and occupational disadvantages (Boyle, 2013; Healey, 2010; Klein & Hood,



2004; Van Borsel, Brepoels, & De Coene, 2011). For instance, people who stutter may be viewed as less attractive and with lower opportunities for romantic relationships (Van Borsel et al., 2011). They also report reduced chances of employment and promotion, interference with job performance, and increased likelihood of turning down a job or promotion (Klein & Hood, 2004). Employers have also reported that adults who stutter are less employable and promotable than their non-stuttering peers (Hurst & Cooper, 1983). The occupational stereotyping and role entrapment experienced by adults who stutter (Logan & O'Connor, 2012) have implications for long-term quality of life and socioeconomic status. For instance, a birth cohort study has confirmed lower socioeconomic status for those who stutter when compared to non-stuttering peers (McAllister, Collier, & Shepstone, 2012). Numerous studies have also documented poor quality of life and emotional, social, and psychological dysfunction among adults who stutter (Craig, Blumgart, & Tran, 2009).

### *1.3. Purpose of the present study*

Both stuttering and social anxiety disorder are prevalent and chronic conditions with debilitating life trajectories. Social anxiety disorder, in particular, is typically associated with demographic characteristics such as increased unemployment, lower socioeconomic status, financial dependency, and being single and/or female (Australian Bureau of Statistics, 2008; Katzelnick et al., 2001; Lipsitz & Schneier, 2000; Schneier et al., 1994; Slade et al., 2009; Stein & Kean, 2000; Wittchen & Fehm, 2003). It is also associated with increased psychological distress, emotional and social problems, life stress, and the comorbid presence of other mental disorders such as depression (Australian Bureau of Statistics, 2008; Katzelnick et al., 2001; Lipsitz & Schneier, 2000; Schneier et al., 1994; Slade et al., 2009; Stein & Kean, 2000; Wittchen & Fehm, 2003). These burdens may be multiplied for adults who stutter, and may impact overall functioning.

Therefore, the purpose of the present study is to evaluate overall functioning for adults who stutter with and without a diagnosis of social anxiety disorder. Specifically, the present study will compare demographic, speech, and psychological variables for a clinical sample of adults seeking

speech treatment for stuttering and/or cognitive behavior therapy (CBT) for anxiety in stuttering with and without a diagnosis of social anxiety disorder. Based on the literature reviewed documenting the psychosocial difficulties associated with stuttering and social anxiety disorder, it was hypothesized that adults who stutter with social anxiety disorder, compared to those who stutter without social anxiety disorder, will demonstrate greater speech and psychological difficulties, including significantly greater: (1) avoidance of speaking situations, (2) negative overall impact of stuttering, (3) social, emotional, and behavioral difficulties, (4) depressive symptomatology, (5) life stress, and (6) unhelpful thoughts and beliefs about stuttering. In addition, this study will also explore whether the presence of social anxiety disorder is associated with: (1) more negative speech outcomes, including speech dissatisfaction, self-rated stuttering severity, and clinician-rated stuttering severity; and (2) more negative demographic characteristics, including age, gender, relationships status, employment, and household income. No predictions for these latter speech and demographic variables were determined a priori, given the current lack of evidence regarding the impact of social anxiety disorder on speech and demographic variables for adults who stutter. Findings from this study will contribute new knowledge about whether additional psychosocial support is required for adults who stutter with social anxiety disorder in order to improve overall life functioning.

## **2. Method**

### *2.1. Participants*

Adults who stuttered were drawn from treatment waiting lists across seven university-affiliated stuttering treatment clinics across Australia and New Zealand (Australian Stuttering Research Centre, The University of Sydney; School of Human Communication Sciences, La Trobe University, Melbourne; Discipline of Speech Pathology, The University of Sydney; Department of Linguistics, Macquarie University, Sydney; School of Humanities and Social Science, University of Newcastle; Royal Prince Alfred Hospital, Sydney; Stuttering Treatment and Research Trust, Auckland, New Zealand). Eligibility criteria for inclusion in the study included: (1) age 18 years and above, (2)

developmental stuttering present before 12 years of age, (3) seeking speech treatment for stuttering and/or CBT for anxiety in stuttering, (4) no previous treatment for stuttering during in the six months prior to commencement in the present study, and (5) presence of stuttering confirmed by participant and speech pathologist during assessment.

Data for the present study were collected over a 10-year period (2006–2016). Participants were drawn from a range of studies involving speech treatment for stuttering and/or Cognitive Behavior Therapy (CBT) for anxiety in stuttering (Cream et al., 2010; Cream, O'Brian, Onslow, Packman, & Menzies, 2009; Erickson et al., 2016; Helgadottir, Menzies, Onslow, Packman, & O'Brian, 2009). Approval was obtained from the University of Sydney Human Research Ethics Committee to analyze all data collected over this 10-year period.

Participants were 275 adults who stuttered, including 219 males (79.6%) and 56 females (20.4%). Participants ranged in age from 18–80 years (mean = 33.5 years,  $SD = 13.2$ ), with a similar age distribution for males and females (males: mean = 33.4 years,  $SD = 0.9$ ; females: mean = 33.7 years,  $SD = 1.8$ ). Around half participants were married or in a relationship (53.5%,  $n = 147$ ), a considerable proportion were single (39.3%,  $n = 108$ ), and the remainder were separated, divorced, widowed, or unspecified (7.2%,  $n = 20$ ). More than half the participants had completed an undergraduate or postgraduate university degree (53.3%,  $n = 147$ ), and 15.3% had attained a college diploma or certificate ( $n = 42$ ). In addition, 35.3% of participants were currently studying ( $n = 97$ ). Most participants were employed on a full-time, part-time, or casual basis (73.5%,  $n = 202$ ). Nearly half the participants spoke English only (50.5%,  $n = 139$ ), 42.5% were bi-lingual/multi-lingual ( $n = 117$ ), and 6.9% were unspecified ( $n = 19$ ). A family history of stuttering was present for 177 participants (64.4%), and 222 had received previous treatment for stuttering (80.7%). Participants were considered representative of adults seeking treatment for stuttering and/or CBT on the grounds that they were drawn from a diverse range of locations around Australia and New Zealand, and demonstrated a gender ratio typical of adults who stutter with 4 males for every female (Yairi et al., 1996).

## 2.2. Measures

The following demographic, speech, and psychological measures were completed during each participant's initial assessment for treatment:

### 2.2.1. Demographics Questionnaire

The Demographics Questionnaire was developed at the Australian Stuttering Research Centre to evaluate a range of demographic characteristics, including age, religion, languages spoken, relationship status, education, employment, household income, medication, and concomitant disorders. The Demographics Questionnaire has been used across all adult research projects conducted at the Centre and its affiliated research and clinical sites.

### 2.2.2. Speech Measures

#### 2.2.2.1. Percentage of syllables stuttered (%SS)

Percentage of syllables stuttered (%SS) is a measure of the proportion of syllables in a speech sample that contain unambiguous stuttering (Jones et al., 2005). Prior to the commencement of treatment, participants provided two 10-minute speech samples. These speech samples were made from unscheduled beyond-clinic phone calls to participants by unfamiliar research assistants. Participants completed a routine and a challenging phone call on two separate occasions, both of which were audio-recorded with consent. During routine phone conversations, the participant chose the topic, and the listener gave three positive acknowledgments. During challenging conversations, the listener chose the topic from a list of eight topics, and engaged in each of the following four behaviors twice: (1) interrupting the participant, (2) disagreeing with something the participant said, (3) talking over the participant, and (4) requesting clarification of an idea. In the present study, %SS was based on the mean of the two 10-minute phone calls (one routine, one challenging), and was rated by blinded,

independent raters. Reliability was established in the original studies from which the data for the present study was drawn.

#### 2.2.2.2. *Self-reported stuttering severity*

Participants were asked to rate their typical and worst stuttering severity across eight speaking situations: (1) talking with a family member, (2) talking with a best friend, (3) talking with a group of friends, (4) talking with a boss or teacher, (5) giving their name and address, (6) giving a class presentation, (7) talking on the phone, and (8) buying food or drink. Typical and worst stuttering severity for each situation was rated on a scale ranging from 1 = *no stuttering* to 9 = *extremely severe stuttering*. This scale is a valid and reliable method for evaluating stuttering severity (O'Brian, Packman, & Onslow, 2004; O'Brian, Packman, Onslow, & O'Brian, 2004).

#### 2.2.2.3. *Avoidance of Speaking Situations*

Participants were asked to rate how often they avoided the eight speaking situations above using a three-point scale ranging from 0 = *never avoid*, 1 = *sometimes avoid*, and 2 = *usually avoid*. Scores for each situation were summed to calculate a total avoidance score, ranging from 0 = *no avoidance* to 16 = *high avoidance*.

#### 2.2.2.4. *Overall Assessment of the Speaker's Experience of Stuttering (OASES; Yaruss & Quesal, 2010)*

The OASES is a self-report measure designed to evaluate quality of life and the overall impact of stuttering for adults. In the present study, a draft version of the OASES was used with permission from the OASES authors before the new version of the OASES-A had been published. The OASES consists of four sections: (1) General Information, (2) Your Reactions to Stuttering, (3) Communication in Daily Situations, and (4) Quality of Life. Items are rated on a 5-point scale, with higher scores indicating greater negative impact of stuttering. Impact scores for each section and the Total Impact Score range from 20–100, and are rated as Mild (20.0–29.9), Mild–Moderate (30.0–44.9), Moderate (45.0–59.9), Moderate–Severe (60.0–74.9), and Severe (75.0–100.0).

### 2.2.2.5. *Speech Satisfaction Scale*

Participants were asked to rate their current speech satisfaction on a scale ranging from 1 = *extremely happy/satisfied* to 9 = *extremely unhappy/unsatisfied*.

### 2.2.3. *Psychological measures*

#### 2.2.3.1. *Computerized version of the Composite International Diagnostic Interview (CIDI-Auto-2.1; World Health Organization, 1997)*

The CIDI-Auto-2.1 is a standardized computer interview designed to comprehensively evaluate and diagnose mental disorders according to the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV; APA, 2000). The interview is self-administered by the respondent using a computer, and is designed to mimic a clinical interview with a psychologist. The interview takes approximately 70 min to complete. Responses are computer-scored and all diagnoses are programmed according to DSM-IV criteria, thereby eliminating interviewer bias (Andrews & Peters, 1998; Wittchen, 1994). The CIDI-Auto-2.1 has shown good reliability and validity for research purposes (Andrews & Peters, 1998; World Health Organization, 1997), and returns similar prevalence rates for the anxiety disorders to those attained through psychiatric interviews with clinicians (Lampe, Slade, Issakidis, & Andrews, 2003). The severity of the social fears and the impact on the individuals functioning is assessed by the CIDI-Auto-2.1 in making a diagnosis. The interview has been previously used to evaluate the presence of mental disorders among a large sample of adults seeking speech treatment for stuttering (Iverach, O'Brian, et al., 2009). In the present study, it was used to evaluate the 12-month presence of DSM-IV social anxiety disorder.

According to the DSM-IV, the diagnosis of social anxiety disorder is prohibited when conditions such as stuttering are present (APA, 2000). However, in response to a growing body of evidence that social anxiety disorder is prevalent among adults who stutter, the DSM-5 now specifies that social anxiety disorder can be diagnosed when another condition (e.g., stuttering) is present, provided that the fear or anxiety is out of proportion with what would normally be expected (APA, 2013). That is, when

an individual's estimate of threat, and their anxiety in response to perceived threat, significantly surpasses evidence of actual threat. Hence, the DSM-IV criterion prohibiting a diagnosis of social anxiety disorder in the presence of stuttering was modified in the present study. This approach to the DSM-IV diagnosis of social anxiety has been used in previous studies of adults who stutter (e.g., Stein et al., 1996). No other change to the diagnostic process was made in the present study. That is, the CIDI-Auto-2.1 was administered in its original form. In keeping with previous studies using the instruments (e.g., Iverach, O'Brian, et al., 2009), the only change was that individuals who stuttered were not excluded from receiving a CIDI diagnosis of social anxiety disorder.

#### *2.2.3.2. Adult Self-Report (ASR; Achenbach & Rescorla, 2003)*

The ASR evaluates psychological functioning in adults, and includes 123 items to assess behavioral, emotional, and social problems experienced within the past six months. Items are rated on a 3-point scale ranging from 0=*Not true*, 1=*Somewhat or sometimes true*, to 2=*Very true or often true*. Item responses are used to calculate scores for eight Syndrome Scales, which can be classified into two broad categories: (1) Internalizing (sum of Anxious/Depressed, Withdrawn/Depressed, and Somatic Complaints scales), and (2) Externalizing (sum of the Rule-Breaking Behavior and Aggressive Behavior scales). A Total Problems score can be calculated by summing scores for the Internalizing and Externalizing scales, plus the Sleep Problems, Social Problems and Attention Problems Syndrome Scales. The Total Problems Score ranges from 0–210, with high scores indicating numerous problems. Scores can be classified as 'normal', 'borderline', or 'clinical', with separate norms available by age. The ASR is widely used and has strong psychometric properties (Achenbach & Rescorla, 2003). The ASR has demonstrated strong psychometric properties, including good internal consistency, high test-retest reliability over a 1-week interval, and long-term stability of scores over a 2-year period (Achenbach & Rescorla, 2003). Evidence has also confirmed the validity of the ASR, including good content, discriminant, criterion-related, and construct validity (Achenbach & Rescorla, 2003).

### 2.2.3.3. *Beck Depression Inventory – Second Edition (BDI-II; Beck, Steer, & Brown, 1996)*

The BDI-II is a 21-item self-report measure designed to evaluate the presence and degree of cognitive, affective, somatic and vegetative symptoms of depression in adults and adolescents. Items are rated on a 4-point Likert scale ranging from 0–3 in terms of the severity of symptoms during the past two weeks. Items responses are summed to determine a total score ranging from 0–63, with total scores classified as: Minimal (0–13), Mild (14–19), Moderate (20–28), or Severe (29–63). The BDI-II is considered to be one of the most widely used measures of depressive symptomatology, and has excellent psychometric properties (Beck et al., 1996; Crits-Christoph, Connolly, Azarian, Crits-Christoph, & Shappell, 1996; Myers & Winters, 2002). In particular, the BDI-II has good internal consistency with coefficient alphas ranging from .92 to .93 for psychiatric outpatients and college students respectively, and test-retest reliability of .93 for a 1-week period among 26 psychiatric outpatients (Beck et al., 1996). The BDI-II also has acceptable content, construct, convergent, discriminant, and factorial validity (Beck et al., 1996). For example, the BDI-II has been found to correlate .74 with the Depression scale of the Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995).

### 2.2.3.4. *Recent Life Changes Questionnaire (RLCQ; Miller & Rahe, 1997; Rahe, 1975)*

The RLCQ is a measure of life stress based on the Schedule of Recent Experience (SRE; Holmes & Rahe, 1967). The RLCQ consists of 74 life event items, including 30 from the original SRE (e.g., “marriage” and “pregnancy”) plus an additional 44 specific events (e.g., “change in marital status of your parents”, “new, close, personal relationship”). These items are divided into five different content categories: (1) health, (2) work, (3) home and family, (4) personal and social, and (5) financial. Each life event is assigned a score to indicate its magnitude, with major life events (e.g., “death of a child”) assigned higher scores than less significant life events (e.g., “change in your responsibilities at work”). Respondents indicate which life events have occurred in the last 12 months by circling the assigned score for each applicable event. Scores for endorsed items are then summed to yield a total life stress



score, with higher scores indicating a great level of life stress. The RLCQ is widely used in clinical and research settings to evaluate the summative impact of stressful life events (Behling & McFillen, 1983). It has strong psychometric properties (Behling & McFillen, 1983), with a 1-month test-retest reliability of .84 in a sample of 109 army reserves (Pearson & Long, 1985).

*2.2.3.5. University of Rhode Island Change Assessment Scale (URICA; McConnaughy, DiClemente, Prochaska, & Velicer, 1989; McConnaughy, Prochaska, & Velicer, 1983)*

The URICA is a self-report measure designed to evaluate readiness for change. The URICA consists of 32 items, including four 8-item subscales to evaluate four stages of change: (1) Precontemplation (“as far as I’m concerned, I don’t have any problems that need changing), (2) Contemplation (“I have a problem and I really think I should work at it”), (3) Action (“I am really working hard to change”), and (4) Maintenance (“I may need a boost right now to help me maintain the changes I’ve already made”). Items are rated on a 5-point Likert scale ranging from 1=*Strongly disagree*, 2=*Disagree*, 3=*Undecided*, 4=*Agree*, and 5=*Strongly agree*. A continuous Readiness for Change score can be calculated as follows: (1) omit 1 item from each subscale (item 31 for Precontemplation, item 4 for Contemplation, item 20 for Action, and item 9 for Maintenance); (2) calculate the mean for each 7-item subscale; and (3) combine the 4 subscales arithmetically: mean Contemplation + mean Action + mean Maintenance – mean Precontemplation. The Readiness for Change score ranges from -2 to +14, with higher scores indicating greater readiness for change. Scores are classified as Precontemplation (below 8), Contemplation (8–11) Preparation/Action (12 and above). The URICA has demonstrated strong psychometric properties, including good test-retest reliability, construct validity, predictive validity, and internal consistency with alpha coefficients ranging from .79 to .89 (Abellanas & McLellan, 1993; McConnaughy et al., 1989; McConnaughy et al., 1983).

2.2.3.6. *Unhelpful Thoughts and Beliefs About Stuttering (UTBAS, Iverach et al., 2011; St Clare et al., 2009)*

The UTBAS scales provide a comprehensive measure of the unhelpful cognitions associated with social anxiety in stuttering. Of the 66 items included in the full UTBAS, 27 make a specific reference to stuttering (e.g., “People who stutter are boring”), and 39 make no reference to stuttering (e.g., “People will laugh at me”). The UTBAS-1 scale evaluates the frequency of negative thoughts and beliefs about stuttering; the UTBAS-2 scale evaluates how realistic, accurate, or correct respondents believe these negative thoughts are, and the UTBAS-3 scale appraises how worried, concerned, or anxious respondents are when they have these thoughts. When completing the three UTBAS scales, respondents are asked to read each of the 66 items and to indicate (a) “How frequently I have these thoughts” (UTBAS-1), (b) “How much I believe these thoughts” (UTBAS-2), and (c) “How anxious these thoughts make me feel” (UTBAS-3). A 5-point rating scale is used to indicate a response for each item (1 = *never or not at all*, 2 = *rarely or a little*, 3 = *sometimes or somewhat*, 4 = *often or a lot*, 5 = *always or totally*). Item responses for the three UTBAS scales are summed to produce a score ranging from 66 to 330 for each scale. Item responses for all three scales can be summed to yield an UTBAS total score ranging from 198 to 990, with higher scores indicates a higher frequency of unhelpful thoughts and beliefs about stuttering and greater anxiety associated with these thoughts.

Evidence has established the validity and utility of the UTBAS scales in evaluating the negative cognitions associated with social anxiety in stuttering and has confirmed the capacity of the scales to discriminate between adults who stutter with and without a diagnosis of social anxiety disorder (Iverach et al., 2011; St Clare et al., 2009). Decile ranges can be used to determine the frequency of negative thoughts or beliefs that may be associated with social anxiety (Iverach, Heard, et al., 2016). In cases where the UTBAS total score falls within or above the fifth decile, referral for a psychological assessment is recommended. This recommendation is based on previous evidence reported by Iverach

et al. (2011) that adults who stutter with a diagnosis of social anxiety disorder had significantly higher mean UTBAS scores than adults who stutter without a diagnosis of social anxiety disorder.

### 2.3. Data analysis

Demographic, speech, and psychological variables were compared for adults who stutter with and without a diagnosis of social anxiety disorder. For continuous dependent variables (e.g., age, stuttering severity), comparisons were based on independent samples *t*-tests, with Cohen's *d* reported as the effect size statistic to indicate the magnitude of differences between groups, where 0.2 = small effect, 0.5 = moderate effect, and 0.8 = large effect (Cohen, 1988). For categorical dependent variables (e.g., gender, previous treatment for stuttering), comparisons were based on chi-squared tests for independence, with Yates' Continuity Correction for variables with only two categories. For chi-squared tests with only two variable categories (2 x 2), the phi coefficient was reported as the effect size statistic to indicate the magnitude of differences between groups, where 0.10 = small effect, 0.30 = moderate effect, and 0.50 = large effect (Cramer, 1946). For chi-squared tests with more than two variable categories (e.g., 3 x 2), Cramer's *V* was reported as the effect size statistic to indicate the magnitude of differences between groups, where 0.07 = small effect, 0.21 = moderate effect, and 0.35 = large effect (Cramer, 1946). In order to reduce the chances of obtaining false-positive results, a Bonferroni adjusted alpha of 0.003 was used to account for the 16 planned comparisons between groups for demographic variables (five comparisons), speech variables (six comparisons), and psychological variables (five comparisons) ( $0.05 / 16 = 0.003$ ). Bonferroni corrections are routinely used when conducting multiple statistical analyses in order to minimize the occurrence of Type I errors (Bender & Lange, 2001).

### 3. Results

Of the 275 participants included in the present study, nearly one-third met criteria for a diagnosis of social anxiety disorder ( $n=82$ , 29.8%), and the remaining 193 participants did not meet criteria (70.2%). This rate of social anxiety disorder corresponds with rates reported in previous studies of adults seeking treatment for stuttering (Blumgart et al., 2010; Iverach, et al., 2011; Iverach, O'Brian, et

al., 2009; Stein et al., 1996). Demographic, speech, and psychological variables were compared between groups using chi-squared tests of independence for categorical dependent variables, and independent samples *t*-tests for continuous dependent variables.

### 3.1. Demographic variables

As shown in Table 1, an independent samples *t*-test showed that adults who stutter with social anxiety disorder were significantly younger in age than adults who stutter without social anxiety disorder,  $t(231.3) = 3.211, p = 0.002$ , with equal variances not assumed based on Levene's test for equality of variances. This finding had a small effect size (0.4). Chi-squared tests for independence did not reveal any other significant differences between groups for demographic variables including gender, relationship status, employment status, and household income.

[INSERT TABLE 1 ABOUT HERE]

### 3.2. Speech variables

When compared to adults who stutter without social anxiety disorder, independent samples *t*-tests showed that adults who stutter with social anxiety disorder were significantly more dissatisfied with their speech,  $t(269) = -3.56, p < 0.001$ , and reported significantly more avoidance of speaking situations,  $t(269) = -3.378, p = 0.001$ , both with a medium effect size (0.5). They also reported a significantly greater negative impact of stuttering, as measured by the OASES,  $t(215) = -4.943, p < 0.001$ , with a medium effect size (0.7). Scores on the OASES were in the Moderate-Severe range for adults who stutter with social anxiety disorder, and the Moderate range for adults who stutter without social anxiety disorder. As shown in Table 2, there were no significant differences between groups for any other speech variables, including the percentage of syllables stuttered and self-reported stuttering severity.

[INSERT TABLE 2 ABOUT HERE]

### 3.3. Psychological variables

As shown in Table 3, several comparisons between groups were significant.

[INSERT TABLE 3 ABOUT HERE]

### 3.3.1. Total emotional, social, and behavioral problems (ASR)

The ASR classifies scores by age group, including younger (18–35 years) and older adults (36 years+). When compared to adults who stutter without social anxiety disorder, independent samples *t*-tests showed that adults who stutter with social anxiety disorder reported a significantly higher number of emotional, social, and behavioral problems, as measured by the ASR,  $t(265) = -4.261, p < 0.001$ , with a medium effect size (0.7). This comparison remained significant for younger adults,  $t(88.4) = -3.257, p = 0.002$ , also with a medium effect size (0.6), but was not significant for older adults ( $p = 0.020$ ). Despite this non-significant finding, scores on the ASR for older adults who stutter with social anxiety disorder were in the Borderline range, indicating an increasing number of emotional, social, and behavioral problems. All other scores on the ASR fell within the Normal range.

### 3.3.2. Depressive symptoms (BDI-II)

When compared to adults who stutter without social anxiety disorder, independent samples *t*-tests showed that adults who stutter with social anxiety disorder reported significantly higher scores on the BDI-II,  $t(268) = -5.005, p < 0.001$ , with equal variances not assumed based on Levene's test for equality of variances. This finding had a large effect size (0.8). However, it is important to note that BDI-II scores were in the normal range for both groups, including the Mild range for adults who stutter with social anxiety disorder and the Minimal range for adults who stutter without social anxiety disorder.

### 3.3.3. Life stress (RLCQ), readiness for change (URICA), and unhelpful thoughts and beliefs (UTBAS)

When compared to adults who stutter without social anxiety disorder, adults who stutter with social anxiety disorder did not report significantly higher life stress based on the RLCQ ( $p = 0.007$ ), or significantly greater readiness for change based on the URICA ( $p = 0.014$ ). However, the socially anxious group did report significantly more negative thoughts and beliefs, as measured by the UTBAS,

$t(271) = -6.232, p < 0.001$ , with a large effect size (0.8). The UTBAS scores for both groups indicated that referral to a psychologist would be warranted, based on guidelines reported by Iverach, Heard, et al. (2016).

#### **4. Discussion**

The purpose of the present study was to evaluate overall functioning for a clinical sample of adults who stuttered with and without social anxiety disorder. Both stuttering and social anxiety disorder are prevalent conditions that have a chronic and disabling impact across the life span. Independently, each disorder negatively impacts quality of life, social participation, educational and occupational achievement, and socioeconomic status. The co-occurrence of both disorders has the potential to compound these burdens for adults who stutter. It is important to determine whether this is the case in order to inform the clinical management of adults who stutter.

When compared to non-socially anxious adults who stuttered, findings from the present clinical sample showed that socially anxious adults who stutter: (1) were younger, (2) were more dissatisfied with their speech, despite not demonstrating higher self- or clinician-rated stuttering severity, (3) were more likely to avoid speaking situations, (4) perceived the impact of their stuttering more negatively, (5) reported a higher number of emotional, social, and behavioral problems, (6) reported more symptoms of depression even though scores were within the normal range for both groups, and (7) reported more negative thoughts and beliefs associated with social anxiety in stuttering. These findings confirm that adults who stutter with social anxiety disorder who are seeking treatment for stuttering may require additional psychosocial support to improve overall functioning. However, it appears that this support may relate largely to the psychological impact of stuttering and perceptions of speech, rather than demographic variables such as employment and relationship status. That is, for adults who stutter in the present study, the impact of comorbid stuttering and social anxiety disorder does not appear to affect demographic status beyond what would be expected for stuttering alone.

##### *4.1. Demographic variables*

In the present study, socially anxious adults who stutter were significantly younger than non-socially anxious adults who stutter. However, the socially anxious and non-socially anxious groups did not differ significantly across the large majority of demographic variables, including gender ratio, relationship and employment status, and household income. This is surprising given that social anxiety disorder in non-stuttering adults is more prevalent among females and frequently associated with lower educational attainment, increased unemployment, lower socioeconomic status, less likelihood of being involved in a personal relationship (Australian Bureau of Statistics, 2008; Katzelnick et al., 2001; Lipsitz & Schneier, 2000; Schneier et al., 1994; Slade et al., 2009; Stein & Kean, 2000; Weinstock, 1999; Wittchen & Fehm, 2003). Possible reasons for the unexpected absence of any other demographic differences between groups are unclear. Potentially, these findings indicate that the comorbid presence of stuttering and social anxiety disorder did not compound educational, occupational, relationship and socioeconomic status. That is, adults who stutter with social anxiety disorder may have been able to function at the same level as their non-anxious counterparts. Another possibility is that adults who stutter may already be impaired across key demographic areas such as educational and occupational status, regardless of whether they are socially anxious or not. Further research is clearly required to determine whether this is the case. It is important to note that these demographic findings are based on a clinical sample of adults who stutter seeking treatment for stuttering, and do not pertain to adults who stutter from the general community.

#### *4.2. Speech variables*

There were no differences between groups for the %SS and self-reported stuttering severity. Despite this, significant differences were found between groups for several other speech variables, with socially anxious adults who stutter reporting significantly more speech dissatisfaction, avoidance of speaking situations, and negative impact of stuttering. These findings are aligned with a recently developed model of cognitive-behavioral processes involved in social anxiety for adults who stutter, which argues that social fears may occur regardless of stuttering severity (Iverach et al., 2017). That is,

the severity of negative thoughts and beliefs about stuttering may not be linearly related to stuttering severity. It is also possible that the negative thoughts and beliefs associated with stuttering may increase the overestimation of stuttering severity and/or the perceived negative consequences of stuttering, thereby triggering and exacerbating anxiety and avoidance (Iverach et al., 2017). This highlights the cognitive distortions that often accompany and exacerbate social anxiety.

#### *4.3. Psychological variables*

Although socially anxious adults who stutter in the present study did not demonstrate a more negative impact of stuttering in relation to demographic variables, they did report significantly more psychological difficulties than non-socially anxious adults who stutter. Specifically, socially anxious adults who stutter reported significantly more emotional, social, and behavioral problems, more symptoms of depression, more negative thoughts and beliefs about stuttering, and a trend towards higher total life stress and greater readiness for change. It is important to note that depressive symptoms for both the socially anxious and non-socially anxious groups were within the normal range, but were higher for the socially anxious group (Mild range) in comparison to the non-socially anxious group (Minimal range). Taken as a whole, these findings correspond with previous evidence of elevated psychological difficulties among socially anxious adults seeking treatment for stuttering (Blumgart et al., 2010; Iverach et al., 2009b, 2010; Iverach, O'Brian, 2009; Messenger, Onslow, Packman, & Menzies, 2004). It is possible that these psychological difficulties were related to the presence of social anxiety disorder. It is also important to note that these findings came from a clinical sample of adults seeking treatment for stuttering, and suggest that the presence of psychological difficulties may have prompted enrolment in treatment for stuttering. A different profile of findings may pertain to adults who stutter from the general community.

#### *4.4. Clinical implications and future directions*

Findings from the present study are based on a clinical sample of adults who stuttered seeking treatment for stuttering and/or anxiety. Findings suggest that the psychological impact of stuttering may



be more pronounced for socially anxious adults who stutter than non-socially anxious adults who stutter, and this impact may occur regardless of stuttering severity. This is logical given the debilitating and chronic nature of social anxiety disorder. It emphasizes the importance of behavioral treatments for stuttering such as speech restructuring. However, for decades it has been recognized that the ability to maintain the benefits of speech restructuring treatment is compromised, with only a third of adults who stutter achieving this (Craig & Hancock, 1995). In a large study of adults who stutter, significantly poorer outcomes following speech-restructuring treatment were found for the one-third of adults who stutter with an anxiety-related disorder. Those findings provide one possible explanation as to why a large proportion of adults who stutter have difficulty maintaining the benefits of behavioral stuttering treatments. They also indicate that socially anxious adults who stutter may benefit from a combination of both speech and psychological treatment (Menziés et al., 2008). Even if speech treatment significantly reduces stuttering, the social fears and avoidance reported by socially anxious adults who stutter may interfere with maintenance of speech treatment gains. In addition, the reduction of stuttering does not guarantee the elimination of anxiety, which may have been conditioned over many years across countless social interactions. Therefore, psychological treatment programs such as CBT should be offered prior to, or in combination with, speech restructuring treatment in order to address the cognitive-behavioral processes that may contribute to the maintenance of social fears (Iverach et al., 2017). This is particularly relevant given that socially anxious adults who stutter in the present study felt worse about their stuttering than non-socially anxious adults who stutter, despite no differences in stuttering severity between groups.

Further research is required to determine whether adults who stutter are more impaired across key life areas than non-stuttering controls from the general community. For instance, future research could examine overall functioning and psychological functioning for socially anxious and non-socially anxious adults who stutter, in comparison with socially anxious and non-socially anxious adults who do not stutter from the general community. The true impact of comorbid social anxiety disorder and

stuttering will remain unknown until such research is conducted, and this will illuminate our understanding of unique speech and psychological needs of adults who stutter. Further research is also needed to understand the longer-term impact of social anxiety disorder for those who stutter. This is especially relevant given that older adults who stutter with social anxiety disorder demonstrated ASR scores in the Borderline range, indicating an increasing number of emotional, social, and behavioral problems.

#### *4.5. Limitations*

Several limitations pertain to the present study. First, as noted above, the absence of a non-stuttering control group precludes an understanding of the true impact of comorbid social anxiety disorder and stuttering. Having said this, the present study provides the first insight into demographic variables associated with comorbid social anxiety disorder and stuttering for a clinical sample. Second, socially anxious and non-socially anxious adults who stutter in the present study were not found to differ significantly in terms of demographic factors such as educational, occupational, and relationship status. Due to the cross-sectional nature of this study, it is not possible to determine whether demographic differences between groups may become more evident with increasing age. Third, adults who stutter in the present study came from a variety of socioeconomic and cultural backgrounds, and participants were recruited over a 10-year period. These factors increased the variability of the sample, and this may have influenced the findings obtained. Hence, the results should be interpreted with caution, and only provide a preliminary account of the impact of social anxiety disorder for adults who stutter. Further research is needed to determine whether particular demographic and speech-related variables may influence the relationship between anxiety and stuttering.

Fourth, findings from the present study are based on a clinical sample of adults seeking treatment for stuttering and/or anxiety and cannot be generalized to adults who stutter from the general community who have not sought treatment. The design of the present study could be improved by the inclusion of both clinical and non-clinical samples of adults who stutter. Fifth, this was an Australian-

based study and the majority of participants had completed tertiary study, thereby indicating a highly educated sample from a single country. This calls into question the generalizability of the present findings to other samples of adults who stutter. Sixth, the correlational nature of this study precludes an understanding of causality regarding the impact of social anxiety disorder for adults who stutter. It is possible that other unmeasured variables may have influenced the dependent variables. Seventh, given the large number of comparisons being made in the study, Bonferonni adjustments reduced the alpha rate to 0.003. Such a low Type I error rate rate increases the chances of Type II errors; failing to identify a real effect due to the conservative nature of the error rate used. Finally, social anxiety disorder diagnoses were made using a computerized structured diagnostic interview, according to DSM-IV criteria. Given the release of the DSM-5 in 2013, it is important for future research to determine social anxiety disorder diagnoses based on current DSM-5 criteria. In particular, it should be noted that the DSM-5 criteria require the assessing clinician to determine that the fear level experienced is more than might be reasonably expected. This raises a variety of complex questions in the case of stuttering. What level of anxiety might be expected in PWS in a range of social situations? How can this be determined? Does it relate to the severity of stuttering and/or the type of stuttering, such as fixed postures, repeated movements and superfluous behaviors? Clearly, the automated diagnostic program (CIDI-Auto 2.1) used in the present study did not address these questions.

#### *4.6. Conclusion*

The purpose of the present study was to evaluate the impact of social anxiety disorder on adults who stutter seeking treatment for stuttering by comparing overall functioning for those with and without a diagnosis of social anxiety disorder. The rationale for this study was based on evidence that stuttering and social anxiety disorder both independently lead to poor quality of life and lowered educational, occupational, socioeconomic, and relationship status. Hence, this study examined whether the impact and burdens associated with stuttering were compounded for socially anxious adults who stuttered, when compared to non-socially anxious adults who stuttered. The lack of demographic

differences between groups is in contrast to the differences that are typically found between socially anxious and non-socially anxious adults from the general non-stuttering community. Although socially anxious adults who stutter did not demonstrate more severe stuttering than their non-anxious counterparts, they reported a more negative appraisal of their speech, more avoidance of speaking situations, and more psychological difficulties across several domains. The increased speech dissatisfaction and avoidance reported by socially anxious adults who stutter, despite not having higher stuttering severity, highlights the importance of efficacious speech and psychological treatment for this population.

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### **Biographical Sketch**

**Dr Lisa Iverach** is a Senior Research Fellow at the Australian Stuttering Research Centre, The University of Sydney, and an Honorary Associate with the Department of Psychology, Macquarie University. She was previously funded by an Early Career Fellowship from the National Health and Medical Research Council, based at the Centre for Emotional Health, Macquarie University. Her research interests include the relationship between stuttering and anxiety, and the mental health of people who stutter.

**Dr Mark Jones** is a Senior Lecturer in Biostatistics at the School of Public Health, University of Queensland. He obtained his PhD at the Australian Stuttering Research Centre, University of Sydney, and has a strong research interest in stuttering.

**Dr Robyn Lowe** is a researcher at the Australian Stuttering Research Centre. Her research interests include exploring the psychological aspects associated with stuttering and how this impacts the long-term maintenance of speech treatment benefits. Robyn is involved in the development and evaluation of online speech and anxiety treatment programs for stuttering.

**Dr Sue O'Brian** is a Senior Researcher at the Australian Stuttering Research Centre. She has extensive experience in the field of stuttering treatment and research. Her current interests include the effectiveness of early stuttering intervention in community settings, development of treatments for adults who stutter and stuttering measurement.

**Associate Professor Ross Menzies** is a clinical psychologist with an interest in the origins and management of anxiety. He has developed cognitive behaviour therapy packages for the treatment of

obsessive compulsive disorders and published theories of the origins of phobias. He is currently the director of the Anxiety Clinic at The University of Sydney.

**Associate Professor Ann Packman** is a Principal Research Fellow at the Australian Stuttering Research Centre. She has worked for more than 30 years in the area of stuttering as a clinician, teacher and researcher. One of her current interests is theories of the cause of stuttering.

**Professor Mark Onslow** is the foundation Director of the Australian Stuttering Research Centre at The University of Sydney. His research interests are epidemiology of early stuttering, mental health and stuttering, measurement of stuttering, and clinical trials for the disorder.



## **Tables**

*Table 1:* Demographic variables for adults who stutter with and without social anxiety disorder

*Table 2:* Speech variables for adults who stutter with and without social anxiety disorder

*Table 3:* Psychological variables for adults who stutter with and without social anxiety disorder

Table 1: Demographic variables for adults who stutter with and without social anxiety disorder

	<i>N</i>	No social anxiety disorder ( <i>N</i> = 193)	Social anxiety disorder ( <i>N</i> = 82)	Total ( <i>N</i> = 275)	<i>p</i> -value <sup>a</sup>
Age in years Mean (S.D.)	275	34.8 (14.4)	30.2 (9.2)	33.5 (13.3)	<b><i>t</i> (231.3) = 3.211, <i>p</i> = 0.002*</b> <b><i>d</i> = 0.35 (CI = -1.19–1.89)</b>
Gender % ( <i>n</i> )	275				
Male		81.9 (158)	74.4 (61)	79.6 (219)	<i>X</i> <sup>2</sup> (1, <i>n</i> = 275) = 1.55, <i>p</i> = 0.213, <i>phi</i> = 0.085
Female		18.1 (35)	25.6 (21)	20.4 (56)	
Relationship status <sup>b</sup> % ( <i>n</i> )	273				
Single		36.1 (69)	47.6 (39)	39.6 (108)	<i>X</i> <sup>2</sup> (2, <i>n</i> = 273) = 3.99, <i>p</i> = 0.136, <i>Cramer's V</i> = 0.121
In a relationship		56.0 (107)	48.8 (40)	53.8 (147)	
Other		7.9 (15)	3.7 (3)	6.6 (18)	
Employment <sup>c</sup> % ( <i>n</i> )	266				
Employed		76.9 (143)	73.8 (59)	75.9 (202)	<i>X</i> <sup>2</sup> (2, <i>n</i> = 266) = 1.70, <i>p</i> = 0.428, <i>Cramer's V</i> = 0.080
Unemployed		8.6 (16)	13.8 (11)	10.2 (27)	

Other		14.5 (27)	12.5 (10)	13.9 (37)	
Household income <sup>d</sup> % ( <i>n</i> )	248				
<\$80,000		57.9 (99)	55.8 (43)	57.3 (142)	$X^2 (1, n = 248) = 0.27, p = 0.870,$ $phi = 0.019$
>\$80,000		42.1 (72)	44.2 (34)	42.7 (106)	

Note: Findings in bold represent significance at  $p \leq 0.003$ .

\* Equal variances not assumed, based on Levene's test for equality of variances.

<sup>a</sup> Based on independent samples t-tests for continuous variables, and chi-squared tests for independence for categorical variables.

<sup>b</sup> Relationship status was missing for two participants with social anxiety disorder. The category of 'Other' included: divorced, separated, widowed, or other.

<sup>c</sup> Employment status was missing for nine participants, including seven with social anxiety disorder and two without social anxiety disorder. The category of 'Other' included: caregiver/domestic duties, student, or retired.

<sup>d</sup> Household income is based on Australian dollars (2006–2016). Household income was missing for 27 participants, including five with social anxiety disorder and 22 without social anxiety disorder.

Table 2: Speech variables for adults who stutter with and without social anxiety disorder

	<i>N</i>	No social anxiety disorder ( <i>N</i> = 193)	Social anxiety disorder ( <i>N</i> = 82)	Total ( <i>N</i> = 275)	<i>p</i> -value <sup>a</sup>
Previous treatment for stuttering <sup>a</sup>	275				
% ( <i>n</i> )					
Yes		82.9 (160)	75.6 (62)	80.7 (222)	$X^2(2, n = 275) = 2.32, p = 0.316,$ <i>Cramer's V</i> = 0.091
No		15.5 (30)	23.2 (19)	17.8 (49)	
Don't know		1.6 (3)	1.2 (1)	1.5 (4)	
OASES Total Impact <sup>b</sup>	217	58.3 (11.8) <i>Moderate</i>	66.7 (10.4) <i>Mod–Severe</i>	60.7 (12.2) <i>Mod–Severe</i>	<b><math>t(215) = -4.943, p &lt; 0.001</math></b> <b><math>d = -0.74 (CI = -2.26–0.77)</math></b>
Speech dissatisfaction <sup>c</sup>	271	5.6 (1.8)	6.4 (1.7)	5.8 (1.8)	<b><math>t(269) = -3.56, p &lt; 0.001</math></b> <b><math>d = -0.45 (CI = -0.66–0.24)</math></b>
Avoidance of speaking situations <sup>d</sup>	271	6.8 (3.9)	8.5 (3.3)	7.3 (3.8)	<b><math>t(269) = -3.378, p = 0.001</math></b> <b><math>d = -0.46 (CI = -0.90–0.01)</math></b>
Self-rated stuttering severity <sup>e</sup>					
Mean (S.D.)					

Typical stuttering severity	268	4.0 (1.5)	4.5 (1.5)	4.1 (1.5)	$t(266) = -2.386, p = 0.018$ $d = -0.34 (CI = -0.51-0.16)$
....Worst stuttering severity	269	6.3 (1.7)	6.7 (1.5)	6.5 (1.6)	$t(267) = -1.851, p = 0.065$ $d = -0.24 (CI = -0.44-0.05)$
Percentage of syllables stuttered <sup>f</sup>		No social anxiety disorder ( $N = 76$ )	Social anxiety disorder ( $N = 35$ )	Total ( $N = 111$ )	$p$ -value
Mean (S.D.)	111	7.2 (5.6)	7.1 (5.9)	7.1 (5.8)	$t(109) = -0.114, p = 0.910$ $d = 0.02 (CI = -1.03-1.07)$

Note: Findings in bold represent significance at  $p \leq 0.003$ .

<sup>a</sup> The 'Don't Know' category was removed from analysis due to insufficient cell counts.

<sup>b</sup> OASES Total Impact scores range from Mild (20.0–29.9), Mild–Moderate (30.0–44.9), Moderate (45.0–59.9), Moderate–Severe (60–74.9), Severe (75.0–100.0). Scores were missing for 58 participants, including 19 with social anxiety disorder and 39 without.

<sup>c</sup> Self-rated speech dissatisfaction was rated on a scale ranging from 1 = 'Extremely satisfied' to 9 = 'Extremely dissatisfied'. Scores were missing for four participants, including two with social anxiety disorder and two without social anxiety disorder.

<sup>d</sup> Self-rated avoidance of speaking situations was rated on a scale ranging from 0 = 'Never avoid', 1 = 'Sometimes avoid', 2 = 'Always avoid'. Scores were missing for two with social anxiety disorder and two without social anxiety disorder.

<sup>e</sup> Self-rated stuttering severity was rated on a scale ranging from 1 = 'No stuttering' to 9 = 'Extremely severe stuttering'. Typical stuttering severity was missing for seven participants, including one with social anxiety disorder and six without social anxiety disorder. Worst stuttering severity was missing for six participants, including one with social anxiety disorder and five without.

<sup>f</sup> Percentage of syllables stuttered (%SS) was based on the mean of two 10-minute phone calls (one routine, one challenging). The %SS data was available for 111 participants, including 36 with social anxiety disorder and 76 without social anxiety disorder.

Table 3: Psychological variables for adults who stutter by social anxiety disorder status

	<i>N</i>	No social anxiety disorder ( <i>N</i> = 193) Mean (S.D.)	Social anxiety disorder ( <i>N</i> = 82) Mean (S.D.)	Total ( <i>N</i> = 275) Mean (S.D.)	<i>p</i> -value <sup>a</sup>
ASR Total Problems <sup>b</sup>	267	45.4 (25.1)	64.1 (35.8)	50.5 (29.6)	<b><i>t</i> (265) = -4.261, <i>p</i> &lt; 0.001</b> <b><i>d</i> = -0.66 (CI = -4.09–2.78)</b>
18–35 years	173 <sup>c</sup>	46.5 (26.1) <i>Normal</i>	63.6 (36.2) <i>Normal</i>	52.1 (30.7)	<b><i>t</i> (88.4) = -3.257, <i>p</i> = 0.002*</b> <b><i>d</i> = -0.58 (CI = -4.90–3.74)</b>
36–59 years	71 <sup>c</sup>	44.7 (23.5) <i>Normal</i>	65.6 (35.6) <i>Borderline</i>	50.9 (29.0)	<i>t</i> (27.6) = -2.474, <i>p</i> = 0.020* <i>d</i> = -0.77 (CI = -7.09–5.55)
BDI-II Total Depression <sup>c</sup>	270	7.5 (7.8) <i>Minimal</i>	14.3 (11.1) <i>Mild</i>	9.4 (9.3) <i>Minimal</i>	<b><i>t</i> (268) = -5.005, <i>p</i> &lt; 0.001*</b> <b><i>d</i> = -0.77 (CI = -1.83–0.29)</b>
RLCQ Total Life Stress	275	259.0 (194.8)	331.6 (218.5)	280.6 (203.1)	<i>t</i> (273) = -2.727, <i>p</i> = 0.007 <i>d</i> = -0.36 (CI -24.16–23.44)
URICA Readiness for Change <sup>d</sup>	275	9.6 (1.5) <i>Contemplation</i>	10.1 (1.4) <i>Contemplation</i>	9.8 (1.5) <i>Contemplation</i>	<i>t</i> (273) = -2.480, <i>p</i> = 0.014 <i>d</i> = -0.33 (CI = -0.51–-0.15)

UTBAS Total <sup>e</sup>	273	452.9 (154.6)	578.8 (147.4)	487.1 (162.4)	<b><math>t(271) = -6.232, p &lt; 0.001</math></b>
		<i>Psych referral</i>	<i>Psych referral</i>	<i>Psych referral</i>	<b><math>d = -0.83 (CI = -18.85-17.19)</math></b>

Note: Findings in bold represent significance at  $p \leq 0.003$ . Comparisons were based on independent samples t-tests.

\* Equal variances not assumed, based on Levene's test for equality of variances.

<sup>a</sup> Comparisons based on independent samples t-tests.

<sup>b</sup> The ASR Total Problems score evaluates emotional and behavioural problems. Possible scores range between 0–240, with higher scores indicating a greater number of problems. Scores were missing for two participants with social anxiety disorder and six without. Normative data for the ASR are available for adults 18–35 years and 36–59 years. In order to compare ASR scores with normative scores, participants were divided into the following groups: 18–35 years with social anxiety disorder ( $n = 57$ ) and without social anxiety disorder ( $n = 116$ ), and 36–59 years with social anxiety disorder ( $n = 21$ ) and without social anxiety disorder ( $n = 50$ ).

<sup>c</sup> BDI-II scores are classified as Minimal (0–13), Mild (14–19), Moderate (20–28), and Severe (29–63). Scores were missing for five participants, including two with social anxiety disorder and three without social anxiety disorder.

<sup>d</sup> URICA scores evaluate readiness for change and are classified as: Precontemplation (-2–7), Contemplation (8–11), Preparation/Action (12–14).

<sup>e</sup> UTBAS Total scores range from 198–990. Based on decile ranges reported by Iverach and colleagues (2016), UTBAS Total scores of 421 and above indicate that referral for a psychological assessment is recommended. Scores were missing for two participants, including one with social anxiety disorder and one without social anxiety disorder.



