

Social anxiety and the severity and typography of stuttering in adolescents

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Abstract

The present study examined the relationship between anxiety, attitude toward daily communication, and stuttering symptomatology in adolescent stuttering. Adolescents who stuttered ($n = 19$) showed significantly higher levels of trait, state and social anxiety than fluent speaking controls ($n = 18$). Trait and state anxiety was significantly associated with difficulty with communication in daily situations for adolescents who stutter, but not for controls. No statistically significant associations were found between anxiety and measures of communication difficulty, and the severity or typography of stuttering surface behaviours. These results highlight some of the psychosocial concomitants of chronic stuttering in adolescence, but challenge the notion that anxiety plays a direct mediating role in stuttering surface behaviours. Rather, the results suggest stuttering is a disorder that features psychosocial conflict regardless of its surface features.

Educational objectives: The reader will be able to: (1) summarise findings from previous studies with regards to stuttering and anxiety; (2) identify the sub-types of anxiety that may impact on the individual who stutters; and (3) discuss the clinical implications of the results with regards to working with adolescents who stutter.

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1. Introduction

Researchers and clinicians have argued for the adoption of a broader conceptualisation of stuttering, which aims not only to delineate the surface behaviours present in an individual's speech, but also the psychosocial impact stuttering may have on their life (Cooper & Cooper, 1996; Rustin, Cook, & Spence, 1995; Yaruss & Quesal, 2004, 2006). Negative emotions (such as anxiety, fear and guilt) have been attributed to the disorder for over 2000 years (Fitzgerald, Djurdjic, & Maguin, 1992). The role of psychosocial factors in the aetiology of stuttering has also long been proposed. Early writings have linked stuttering to a range of phenomena including suppressed anger, sexual fixations and approach–avoidance conflicts (Bobrick, 1995; Sheehan, 1975). Some theorists maintained that individuals who stutter are psychologically different to those who do not stutter (Adams, 1969), and some of the major research conducted during the 1970s and

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1980s has attempted to disprove the psychogenic notions of the diagnosogenic era, whereby stuttering was thought to be caused by parents drawing negative attention toward a child's normal dysfluencies (Johnson, 1942; Quesal, 1989). The link between emotions, negative evaluation and stuttering has therefore been a focus in research for many years.

In contemporary research, stuttering is viewed primarily as a disorder of speech motor control with psychosocial aetiological theories essentially neglected (Bloodstein, 1995). It has been suggested, however, that many variables may affect speech motor processes through effects on synaptic inputs to motor neuron pools (Zimmerman, Smith, & Hanley, 1981). The particular role of one such variable, anxiety, and its determinants, is a matter of contemporary debate and is the focus of this study (Alm & Risberg, 2007; Craig, Hancock, Tran, & Craig, 2003; Menzies, Onslow, & Packman, 1999). Research into anxiety in individuals who stutter has focussed primarily on adults, with limited investigation in children and even less in adolescents. The current literature examining the relationship between anxiety and stuttering, however, remains inconclusive.

1.1. Anxiety in children, adolescents and adults who stutter

Anxiety is described as an aversive emotional and motivational state occurring in perceived threatening circumstances (Eysenck, Derakshan, Santos, & Calvo, 2007). In its molar sense, anxiety is often dichotomised into trait and state anxiety. State anxiety reflects a temporary emotional state characterised by subjective, consciously perceived feelings of tension and apprehension, and enhanced autonomic nervous system activity (Spielberger, 1983). It may fluctuate over time and can vary in intensity. In contrast, trait anxiety denotes relatively stable individual differences in anxiety proneness and refers to a general tendency to respond with anxiety toward perceived threats in the environment (Spielberger, 1983).

Results from studies that have examined trait and state anxiety in those with chronic stuttering and also in children who stutter have produced conflicting findings. In the case of those with chronic stuttering, Craig (1990) and Ezrati-Vinacour and Levin (2004) found higher trait anxiety scores for adults who stuttered than control participants. Craig et al. (2003) replicated this finding with a population study of anxiety levels in people who stutter in the community using random selection procedures. Davis, Shisca, and Howell (2007) examined state and trait anxiety in adolescents who stuttered, with results suggesting that adolescents who stutter have higher state anxiety than controls, but not higher trait anxiety. Miller and Watson (1992), however, found no difference between adults who stuttered and a control group in relation to either state or trait anxiety levels. Hancock et al. (1998) examined state and trait anxiety in children and adolescents who stutter from treatment to two and 6 years post-treatment, with no significant differences across time or groups for children or adolescents with regards to state or trait anxiety at any stage. Craig and Hancock (1996) found that children who stutter were no more anxious (trait anxiety) than children of a similar age who did not stutter. State anxiety, however, was found to be associated with greater risks of stuttering in children (Weiss & Zebrowski, 1992).

These findings (with the exception of Craig & Hancock, 1996; Hancock et al., 1998; Miller & Watson, 1992), may be taken to suggest that anxiety has an aetiological contribution in stuttering, however, they are also consistent with the possibility that anxiety may be a direct consequence of chronic stuttering with the cause of stuttering (e.g., deficient speech motor control) being extraneous to these psychosocial issues. In short, there are reasons to believe that there is a relationship between stuttering, and trait and state anxiety, with its theoretical and clinical importance to date remaining equivocal (Messenger, Onslow, Packman, & Menzies, 2004).

1.2. Anxiety and a fear of negative social evaluation

Contrary to the traditional trait–state anxiety dichotomy, a contemporary model of anxiety holds that both trait and state anxiety are multidimensional and interactive, consisting of various components including social evaluation (Endler, Edwards, & Vitelli, 1991). It is suggested that global measures may not adequately capture the particular aspects of anxiety that are directly related toward stuttering (Menzies et al., 1999). In the ongoing development of measurement procedures for anxiety in individuals who stutter, attention needs to delineate exactly what components of anxiety and its determinants should be measured.

Modern clinical psychology includes the expectancy of harm as a key construct in anxiety measurement, suggesting that anxiety is not present without a perceived danger (Beck & Emery, 1985; Endler et al., 1991; Eysenck et al., 2007; Messenger et al., 2004). This fear of being negatively evaluated by others, particularly in social situations, is described as social anxiety (Messenger et al., 2004). Social anxiety disorder is described in DSM-IV-TR as, “clinically

significant anxiety provoked by exposure to certain types of social or performance situations, often leading to avoidance behaviour” (First, 2004, p. 429).

In individuals who stutter, social anxiety is not surprising given the likely negative evaluation of speech that has been experienced for some time (Messenger et al., 2004). There is evidence that fluent children as young as 3 years of age recognise stuttering in their peers and that they may evaluate stuttering negatively as early as 4 years of age (Ezrati-Vinacour & Levin, 2004). Conflicting and variable responses from fluent communication partners and negative communication experiences have also been reported in adults who stutter (Blood, Blood, Maloney, Meyer, & Qualls, 2007; Cooper & Cooper, 1996; Kraaimaat, Vanryckeghem, & Van Dam-Baggen, 2002; Miller & Watson, 1992). Adults who stutter have demonstrated significantly greater expectancy of social harm than those who do not stutter (Davis et al., 2007; Kraaimaat et al., 2002; Messenger et al., 2004) and concerns about publicly acknowledging and discussing stuttering have been reported in adolescents who stutter (Blood, Blood, Tellis, & Gabel, 2003; Hearne, Packman, Onslow, & Quine, 2008). Results from such studies suggest that anxiety levels in stuttering may be more directly manifested in a fear of being negatively evaluated (social anxiety). No studies to date have attempted to measure both traditional trait and state anxiety and a fear of negative evaluation in adolescents who stutter.

1.3. *The mediating role of anxiety on stuttering events*

Results from recent studies suggest that anxiety may play a mediating role in the disorder, being determined by interplay between variables such as communication attitude and apprehension (Davis et al., 2007; Messenger et al., 2004). The communication–emotional model of stuttering developed by Conture et al. (2006) suggests that stuttering events, resulting from inefficiencies in speech planning and/or production, are influenced by emotional regulation (including anxiety). Anxiety and its determinants may therefore mediate and exacerbate instances of stuttering including its surface features, severity (frequency of stuttering) and typography (type of stuttering), due to the effect of this arousal on speech motor control (Conture et al., 2006). Considering the association between communication and anxiety, it appears that social anxiety potentially mediates the surface features of stuttered events in daily communication (Messenger et al., 2004). Limited evidence exists for such a relationship although it has been suggested in a range of literature (Alm & Risberg, 2007; Blood et al., 2007; Conture et al., 2006; Davis et al., 2007; Messenger et al., 2004). A study by Davis et al. (2007), for example, found that adults with persistent stuttering had higher state anxiety than a control and a recovered group, which provides experimental evidence for the suggested mediating role of anxiety in stuttering.

1.4. *Severity, typography and anxiety*

The direct influence of anxiety on the surface symptomatology of stuttering has not been clearly evaluated. Two aspects of stuttering behaviour that may demonstrate such a link are stuttering severity (or frequency), commonly measured as the percentage of syllables stuttered, and stuttering typography, such as the percentage of repetition type stutters out of the total number of stutters (Ambrose & Yairi, 1999; Franklin, Taylor, Hennessey, & Beilby, 2008; Ingham & Andrews, 1971).

It is suggested that, within the variable range of stuttering behaviours, two levels of speech disability exist. Repetition type stutters, referred to as primary stuttering by Ingham and Andrews (1971), are similar to normal dysfluencies and tend not to disturb the overall rate of communication exchange with a conversational partner. Sound prolongations and blocks, however, referred to as secondary stuttering by Ingham and Andrews (1971) are reported to be more disruptive to a communicative interaction because they interrupt the flow of speech to a greater extent than do repetition type stutters. A similar distinction between repetition and prolongation/block typographies has been made in the developmental literature, with the latter being more associated with chronic stuttering (Ambrose & Yairi, 1999; Guitar, 2005). Typography analysis has been shown to be useful in experimental studies of stuttering behaviour. For example, a study by Franklin et al. (2008) found that time-out procedures not only reduced stuttering severity but also resulted in a statistically significant increase in the percentage of repetition type stutters. Ingham and Andrews (1971) also provide evidence that the measurement of individual dysfluency types may lead to “knowledge that could not have been gained any other way” (p. 268) in their study of rhythmic speech intervention. Whilst typography has been used successfully in some studies to profile stuttering behaviour, it has also been criticised as having limited heuristic value because of its poor reliability (Einarsdóttir & Ingham, 2005). If social anxiety is a consequence of chronic stuttering,

the impact on communicative evaluation may be increased for those with more severe stuttering and potentially more secondary stuttering behaviours. Increased social anxiety on the speech motor control system may also impact directly upon stuttering events, particularly for those participants with more severe and/or secondary stuttering behaviours.

Limited studies have examined this link between anxiety, severity and typography in stuttering. Craig et al. (2003) reported that adults with more severe stuttering (measured by the percentage of syllables stuttered) were not significantly more anxious than those who had less severe stuttering. Their data, however, were limited to trait anxiety and the role of social anxiety and attitude toward communication in daily situations was not investigated. Results from a study by Blood et al. (2007) demonstrated no significant correlations between a standard anxiety measure and the severity of stuttering in adolescents who stuttered. Results from Blood, Blood, Tellis, and Gabel (2001), however, showed the severity of stuttering as measured by the Stuttering Severity Instrument (Riley, 1994) to be significantly, positively correlated with communication apprehension in adolescent participants as measured by the Personal Report of Communication Apprehension (McCroskey, 1984) and the Self-Perceived Communication Competence scales (McCroskey & McCroskey, 1988). Existing studies may have failed to find a consistent relationship between anxiety measures and stuttering symptomatology because they have not differentiated typography in addition to severity.

1.5. Anxiety in adolescents who stutter

Adolescence is an important developmental period in which to examine the role of social anxiety and communication attitude in individuals who stutter. The adolescent years are typically characterised by emotional conflicts that potentially interact with the anxieties and negative feelings associated with stuttering (Manning, 2001). It can be assumed that adolescents who stutter have been doing so for some time and the likelihood of spontaneous recovery decreases as age progresses (Schwartz, 1993). This fact has implications for potential psychosocial manifestations because stuttering in this population is a chronic disorder. Anxiety disorders are amongst the most prevalent forms of psychopathology during adolescence, with rates of 3–20% being reported (Langsford, Houghton, Douglas, & Whiting, 2001; Preboth, 2000). Lower levels of peer acceptance and support have been reported in socially anxious adolescents (La Greca & Lopez, 1998; Voci, Beitchman, Brownlie, & Wilson, 2006).

In summary, few studies have examined the role of trait and state anxiety, a fear of being negatively evaluated (social anxiety) and attitude toward communication in adolescents who stutter. It was proposed that adolescents who stutter will have higher levels of anxiety than control participants and also that this will be associated with reported difficulty communicating in daily situations as a result of speech being chronically negatively evaluated by others. High levels of anxiety and communication difficulty may also be associated with increased stuttering severity and/or differing typography (e.g., a lower percentage of repetition type stutters and more prolongations and blocks). Consequently, the present study aimed to determine if:

- (a) adolescents who stutter demonstrate significantly higher levels of trait, state and social anxiety, and a poorer attitude toward daily communication than adolescents who do not stutter;
- (b) anxiety levels are positively correlated with difficulty in daily communication amongst adolescents who stutter but not for adolescents who do not stutter; and
- (c) anxiety (whether trait, state or social) or difficulty with communication in daily situations are positively associated with stuttering severity and negatively associated with typography to suggest a potentially mediating role of social anxiety on stuttering outcomes.

2. Method

2.1. Participants

Participants were 37 adolescents between the ages of 11 and 18 who attended suburban and rural schools in Western Australia. An independent samples *t*-test showed no significant difference between the ages of adolescents who stuttered and the adolescents who did not stutter [$t(36) = .32, p = .75$]. Four of the 19 participants who stuttered lived in a rural area (ranging from 200 km south-west of Perth to 1600 km north-east of Perth). All other participants resided in the Perth metropolitan region. Participants who stuttered were recruited through the Curtin University of Technology Stuttering

Treatment Clinic's wait list (Perth, Western Australia) and also via clinicians throughout Western Australia. Control participants were recruited through staff and students of Curtin University's School of Psychology.

The participants who stuttered were age matched as a cohort to a control group, with 18 participants in the fluent control group ($M = 14.5$ years, $SD = 1.6$) and 19 participants who stuttered ($M = 14.3$ years, $SD = 2.3$). The group of participants who stuttered consisted of 18 males and 1 female and the control group consisted of 16 males and 2 females. None of the participants in the control group reported any history of stuttering or stuttering-like behaviour. Caregivers of participants who stuttered reported onset in early childhood in a manner consistent with developmental stuttering and all participants who stuttered had at some stage attended speech pathology treatment for their stuttering difficulties. Thirteen (68%) of the adolescents who stuttered were currently enrolled in treatment. None of the participants reported a history of pharmacological intervention for anxiety-related disorders.

2.2. Measures

2.2.1. State and trait anxiety

Each participant completed the State and Trait Anxiety Inventory (STAI; Spielberger, 1983). This questionnaire measures state and trait anxiety in a self-report format and comprises 20 statements for each state and trait section. Participants were instructed to read each statement and indicate their response on a scale of 1–4. The state measure was completed before the trait, with participants being instructed to “think about how you feel, right now, in this room with a stranger” in addition to the standard instructions provided by Spielberger (1983). The STAI took approximately 10 min to complete.

The reliability and validity of the STAI is well supported in the literature, with alpha reliability coefficients for high school aged respondents reported as .86 (for the state scale) and .90 (for the trait scale) (Spielberger, 1983). The correlations reported for high school aged students between the trait anxiety scale and other similar measures range from .52 to .85 and the correlations between state and trait anxiety scores range from .64 to .72, demonstrating satisfactory validity (Spielberger, 1983).

2.2.2. Fear of negative evaluation

Each participant completed the Fear of Negative Evaluation scale (FNE; Watson & Friend, 1969). This comprises 30 statements that address the apprehension about evaluation of oneself by others, the expectations that such evaluations would be negative and the distress incurred by this (Watson & Friend, 1969). Participants were instructed to read each statement and indicate whether or not it applied to them by circling either true or false. The FNE took approximately 15 min to complete. It is reported that the scale correlates significantly with other tests of anxiety (with Pearson correlations ranging from .18 to .60) and has strong reliability (the KR-20 reliability statistic was reported as .94; Durm & Glaze, 2001). The reliability and validity of this scale has been replicated by other researchers (Durm & Glaze, 2001).

2.2.3. Attitude toward communication

The Overall Assessment of the Speaker's Experience of Stuttering Teen Version (OASES-T; Yaruss & Quesal, 2006) was used to obtain information from participants regarding their attitude toward communication in daily situations. The OASES-T contains four sections, which include the respondent's general knowledge of, their reactions to, and quality of life as a result of their speaking ability. Section three of the OASES-T (OASES-T:S3) was used for group comparison because this section is identical for both groups and measures the communication difficulty experienced by speakers, not their fluency, in daily situations (Yaruss & Quesal, 2006). Items on the OASES-T are self-scored on a Likert scale ranging from 1 to 5. The teen version differs from the adult version in terms of alternative wording on certain items with simpler vocabulary being used. The adult version has demonstrated strong reliability, with coefficients for impact scores reported to range from .90 to .97 (Yaruss & Quesal, 2006). Concurrent validity is also strong, with coefficients reported to range from .68 to .83 (Yaruss & Quesal, 2006). No reliability or validity data are currently available for the teen version. This needs to be considered when interpreting results from the study.

An adapted scale was created for the fluent speakers, with the word *stuttering* being replaced with *speaking ability*. This version was presented to the fluent control group whilst the original OASES-T was presented to stuttering participants. Administration of the OASES-T took approximately 20 min. Raw scores were converted to impact scores using the procedure outlined by Yaruss and Quesal (2006) and these impact scores were used in data analyses to account

for participants who may not have responded to all questions. A higher impact score on the OASES-T:S3 indicates greater self-perceived difficulty with functional communication.

2.2.4. Severity of stuttering

Stuttering severity in the group of adolescents who stuttered was determined by rating a conversational speech sample obtained in a clinic setting for 17 out of the 19 participants. Samples were not available for two participants due to time constraints. A minimum of 1000 syllables of speech were obtained and rated by two final year speech pathology students from Curtin University of Technology (Perth, Western Australia) who each analysed eight samples. The remaining randomly selected sample was analysed by both raters for the purpose of assessing inter- and intra-rater reliability. The computer program Stuttering Measurement System (Ingham, Bakker, Ingham, Moglia, & Kilgo, 2005) was used to obtain the percentage of syllables stuttered (%SS). This program uses mouse-clicks to count syllables and stuttering events whilst the audio recording is played. A higher %SS indicates more severe stuttering behaviour. Stutters were identified as word or part-word repetitions, prolongations or blocks as per Guitar (2005).

Inter-rater reliability was examined by dividing each sample into 30 s time frames and then comparing the number of stutters identified across the time frames for two independent raters. An intra-class correlation coefficient of .84 was obtained using a one-way independent group random effect model of analyses (as described by Howell, 2007) which shows judgements were both satisfactorily correlated and in agreement. Intra-rater reliability was calculated using the same method and an intra-class correlation coefficient of .77 was obtained, demonstrating satisfactory correlation and agreement within each rater's judgements.

2.2.5. Typography

Each stuttering event from each sample was subsequently coded as one of two stutter types, a repetition (collapsing across word and part-word repetitions), or a prolongation/block, with the support of a visual display of the acoustic speech signal using the program Praat (Boersma & Weenink, 2007). The visual representation of the acoustic signal, both the speech waveform and a wide-band spectrogram, was used to assist perceptual judgements following guidelines described by Czyzewski, Kaczmarek, and Kostek (2003). The percentage of word and part-word repetitions (%WPWR) out of the total number of stuttering events was then calculated. Inter-rater reliability was evaluated by calculating the percent agreement of typography category (repetitions vs. prolongations/blocks) for one randomly selected sample for two independent raters. This sample contained a range of fluency types. Raters agreed on typography category for 88% of stutters. Intra-rater reliability was obtained using the same method and calculated to be 86% in agreement for each rater. While some stuttering events are ambiguous in terms of typography, the reliability analysis suggests there is general agreement for the majority of stutters.

2.3. Procedure

Ethics approval was obtained for this study through Curtin University's Human Research Ethics Committee. All adolescents and their parents provided informed consent prior to participating in the study. Participants were tested individually in a quiet room at the Curtin University Stuttering Treatment Clinic. An initial 10 min screening conversation was used to assess the absence of stuttering behaviours in the fluent control participants. A 10 min conversation sample (based on a series of open-ended questions designed to elicit language and establish rapport) was obtained for participants who stuttered and digitally recorded using a Creative MuVo digital media player. All participants were asked to complete the FNE, STAI and OASES-T questionnaires and an information sheet (which outlined any history of previous stuttering treatment and pharmacological intervention for anxiety disorders). The order of presentation of questionnaires was counterbalanced to control for order effects. Participation was voluntary and participants were neither paid nor compensated for their time.

3. Results

An alpha level of .05 was used for all statistical tests as per Rom's sequentially rejective method (Wilcox, 1996). Univariate and multivariate outliers were identified and removed following recommendations of Tabachnick and Fidell (2007) to prevent extreme cases having an undue influence on the means and correlations. One adolescent from the group who stuttered was removed from all further analyses because the participant demonstrated non-compliance and

Table 1

Means (*M*), standard deviations (*SD*), ranges, *p* values and effect size (as indexed by Cohen's *d*) for Stuttering and Control Participant Groups for FNE, STAI (state and trait), OASES-T section three (excluding outliers) and age in years.

	Stuttering (<i>n</i> = 19)			Control (<i>n</i> = 18)			<i>p</i> value	Effect size
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range		
FNE	12.4	5.9	3–23	7.8	4.8	0–16	.02	0.88
STAI Trait	43.4	6.3	24–59	30.6	6.2	21–45	<.01	2.10
STAI State	34.2	7.1	21–49	26.4	5.7	20–37	<.01	1.25
OASES-T:S3	56.0	9.3	40–73	29.7	7.9	20–46	<.01	3.13
%SS	6.2	5.2	11–18	–	–	–	–	–
%WPWR	36.0	25.8	1–100	–	–	–	–	–
Age	14.3	2.3	11–18	14.5	1.6	12–17	.75	0.11

Note. FNE = Fear of Negative Evaluation; STAI = State and Trait Anxiety Inventory; OASES-T:S3 refers to section three of the overall assessment of speaker's experience of stuttering; %WPWR = percentage of word and part word repetitions.

a non-willingness to complete the questionnaires appropriately. In addition, the participant's results were 2.80 standard deviations below the group mean on the OASES-T and trait anxiety measures. One adolescent from the control group was also removed as a univariate outlier with a *z*-score of 2.30 on the trait anxiety measure. No multivariate outliers were found based on Mahalanobis distances. Descriptive statistics were computed for the FNE, OASES-T:S3, STAI, %SS, %WPWR and age, and are shown in Table 1.

Mean scores for both groups on the FNE were below the mean scores of 14.0 (for males) and 16.1 (for females) reported in normative data for university students (Watson & Friend, 1969). For the adolescents who stuttered, their trait anxiety mean was above the mean in the normative data sample.

Twelve percent of participants who stuttered demonstrated mild (0–2%SS) stuttering behaviour, 47% demonstrated moderate (2–5%SS) and 41% demonstrated severe (>5%SS), as classified by Guitar (2005). On average the adolescents who stuttered showed more prolongations and blocks than repetitions.

Independent samples *t*-tests showed that adolescents who stuttered demonstrated a greater fear of being negatively evaluated, $t(33) = 2.53$, $p = .02$, significantly higher mean state anxiety score, $t(33) = 3.58$, $p < .01$, and a significantly higher mean trait anxiety score, $t(33) = 6.05$, $p < .01$ than their fluent peers. Significant differences were also found between the two group means on the OASES-T:S3, $t(33) = 8.98$, $p < .01$.

3.1. Correlations between variables

Pearson correlations were computed to examine the relationship between measures within each group (see Table 2). Within the group of adolescents who stuttered, statistically significant correlations were obtained between the FNE and trait anxiety scores, $r(18) = .54$, $p = .02$; OASES-T:S3 and trait anxiety scores, $r(18) = .60$, $p = .01$; and OASES-T:S3 and state anxiety scores, $r(18) = .47$, $p < .05$. The correlation between trait and state anxiety scores was significant, $r(18) = .66$, $p < .01$. Within the cohort of control participants, significant correlations were obtained between the FNE and trait anxiety scores, $r(17) = .64$, $p < .01$, and also between state and trait anxiety scores, $r(17) = .71$, $p < .01$. No other correlations were significant.

As also shown in Table 2, none of the psychosocial variables correlated significantly with %SS or %WPWR. A partial correlation with %SS as a control variable also showed no significant association between %WPWR and the FNE, state, trait and OASES-T:S3 scores.

Standard multiple regression analyses were used to further evaluate whether combinations of the psychosocial variables were related toward stuttering severity and typography. As a group, the measures were not significantly associated with severity (multiple $R = .46$) or typography (multiple $R = .31$). They explained 21% of the variance in severity, $F(4,11) = .75$, $p = .58$, and 10% of the variance in typography, $F(4,11) = .30$, $p = .87$. Standardised beta slope coefficients, *t* values and corresponding significance levels are shown in Table 3 for both severity and typography regression analyses. These results confirm that individual predictors do not contribute significant unique variance to either severity or typography of stuttering in adolescents and that in combination the psychosocial measures remain independent of stuttering severity and typography.

Table 2
Results from the correlations between variables in stuttering and control participant groups.

Variable	FNE	STAI Trait	STAI State	OASES-T:S3
Adolescents who stuttered (<i>n</i> = 18)				
%SS	-.21	.09	.04	.25
%WPWR	.13	-.10	-.09	-.16
FNE	–	.54*	.34	.36
STAI Trait		–	.66**	.60**
STAI State			–	.47*
OASES-T:S3				–
Adolescents who did not stutter (<i>n</i> = 17)				
FNE	–	.64**	.07	-.05
STAI Trait		–	.71**	.08
STAI State			–	.24
OASES-T:S3				–

Note. FNE = Fear of Negative Evaluation; STAI = State and Trait Anxiety Inventory; OASES-T:S3 refers to section three of the Overall Assessment of Speaker's Experience of Stuttering; %WPWR = Percentage of word and part word repetitions. %SS acted as a control variable in %WPWR correlations.

* $p < .05$.

** $p < .01$.

Table 3
Standardised beta coefficients, *t*-values and significance for predictors used in multiple regression analyses for severity and typography.

Variable	Predictor	Standardised beta coefficient	<i>t</i> value	<i>p</i> value
Severity (%SS)	FNE	-.49	1.42	.18
	STAI Trait	.26	0.58	.57
	STAI State	-.15	0.42	.68
	OASES-T:S3	.38	1.12	.28
Typography (%WPWR)	FNE	.34	0.93	.37
	STAI Trait	-.20	0.42	.68
	STAI State	.02	0.06	.96
	OASES-T:S3	-.20	0.56	.59

Note. FNE = Fear of Negative Evaluation; STAI = State and Trait Anxiety Inventory; OASES-T:S3 refers to section three of the Overall Assessment of Speaker's Experience of Stuttering; %WPWR = Percentage of word and part word repetitions.

4. Discussion

The results obtained in this study demonstrate significant differences between anxiety and communication attitude in adolescents who do and do not stutter. Adolescents who stuttered reported statistically significantly higher levels of state and trait anxiety, a greater fear of being negatively evaluated and greater difficulty with functional communication than those who did not stutter. The measures of trait and state anxiety were significantly correlated with perceived difficulty with functional communication for the adolescents who stutter, but these same measures were not correlated for controls. The findings, however, failed to confirm any association between both anxiety and the degree of difficulty with functional communication and the surface features of stuttered speech behaviour as measured by stuttering severity and typography. Further replication of these results with a larger sample size is recommended. The following discusses the theoretical and practical implications of these findings.

4.1. Anxiety in adolescents who stutter

The finding that adolescents who stuttered displayed significantly higher trait, state and social anxiety than did control participants is consistent with results obtained by Blood et al. (2007), whereby significant differences were reported on a generalised anxiety scale between adolescent participants who did and did not stutter. This suggests that adolescents who stutter are at risk of developing higher levels of anxiety than their fluent peers. One important finding

in the present study is that increased levels of anxiety in adolescents who stutter may stem from a generalisation of speech-associated negative emotion due to the significant associations found between communication difficulty and anxiety in this study.

These findings obtained during adolescence contribute toward an important developmental period for individuals who stutter, especially with regards to trait anxiety. It has been suggested that trait anxiety is a permanent personality characteristic (Endler et al., 1991). Craig and Hancock (1996) failed to find trait differences between children who stuttered relative to control participants, however it has been reported that adults who stutter do exhibit such differences (Craig et al., 2003). Trait anxiety may therefore be dynamic and age-dependent in individuals who stutter, and perhaps it is the experience of being chronically negatively evaluated that contributes to this phenomenon (see also, Davis et al., 2007; Messenger et al., 2004). The finding that adolescents who stutter have higher levels of trait, state and social anxiety than their fluent peers has important implications when the developmental path of these anxieties is considered. If the results of this study in adolescents were found to be robust in younger children, it would be incautious to assume that anxiety and a fear of being negatively evaluated only apply to chronic stuttering (Messenger et al., 2004).

4.2. Attitude toward communication in adolescents who stutter

It was hypothesised that, if adolescents who stuttered demonstrated greater anxiety than those that did not stutter, this greater anxiety would be positively associated with a reported difficulty in functional communication due to the chronic negative evaluation of speech that has occurred over time. This was confirmed by the finding that levels of state, trait and social anxiety were significantly higher in adolescents who stuttered and, in addition, that trait and state anxiety measures were statistically significantly and positively correlated with self-reported difficulty with functional communication amongst the adolescents who stuttered. There was no similar association between anxiety and self-reported difficulty with functional communication amongst the controls. A negative attitude toward communication is thought to perpetuate social anxiety among people who stutter (Blood et al., 2001; Davis et al., 2007; Kraaimaat et al., 2002; Messenger et al., 2004). It has been posited that a poorer attitude to communication may be the result of conditioning that occurs when a neutral communication activity is associated with negative and aversive consequences (Daly, McCroskey, Ayres, Hopf, & Ayres, 1997). Given the negative evaluation that has been associated with stuttering over time, it is not surprising that results from this current study indicate that adolescents who stuttered reported higher levels of social anxiety and therefore greater difficulty with functional communication.

4.3. Communication attitude and trait anxiety

Given the results of this study, it is possible that trait anxiety plays a particularly significant role in the stuttering disorder. Trait anxiety was the only measure deemed above average in comparison to normative data, and the relationship between functional communication difficulty and anxiety presented particularly strongly with trait anxiety amongst adolescents who stutter in comparison to their fluent peers. The positive correlation obtained supports an association between communication attitude (potentially related to stuttering) and intrinsic anxiety levels amongst adolescents who stutter. Trait anxiety has been found to be significantly higher in adults who stutter than those who do not (Craig et al., 2003). Given the many factors that impinge on anxiety levels, this relationship may be a worthwhile focus for future research.

4.4. Fear of being negatively evaluated

Menzies et al. (1999) suggest that it is essential to include expectancy of harm measures in studies of the role of anxiety in individuals who stutter. However, results from this current study suggest that the fear of being negatively evaluated does not contribute uniquely to the profile of adolescents who stutter because it correlates significantly with trait anxiety measures. There was no significant correlation between FNE, state or OASES-T:S3 measures in adolescents who stuttered. In addition, the effect size reported for the FNE was lower than the effect sizes obtained for state and trait anxiety measures. Thus, results do not support the argument that FNE may be a more focussed way of measuring anxiety in adolescents who stutter (as opposed to traditional trait or state anxiety measures) and suggest that an interaction between different components of anxiety contributes to its manifestation (Endler et al., 1991).

The lack of significant correlation found between the FNE, state anxiety and OASES-T (section three) might also be related to the sensitivity of the FNE scale used. Participants responded to the FNE using a binary true/false response method, whereas Likert-style scales were used for the other measures providing a greater range for responses. Increased sensitivity may, therefore, arise from using Likert-style rather than dichotomous response options (Collins, Westraa, Dozoisb, & Stewart, 2005).

4.5. *The role of social anxiety in severity and typography*

Although it is incautious to assume the results of this study can be extended to address whether anxiety mediates stuttering or vice versa, results are of interest clinically and suggest further experimental research is needed in this area. The finding that anxiety and attitude toward communication were independent of severity or typography in correlation and regression analyses does not support the mediating role of anxiety in exacerbating stuttering behaviours (Conture et al., 2006; Davis et al., 2007; Messenger et al., 2004). It is possible that rather than playing a mediating role in stuttering, increased anxiety among adolescents who stutter is, in fact, a by-product of the stuttering disorder regardless of its surface manifestation. Blood et al. (2007) also found no significant correlation between a standard anxiety measure and stuttering severity. The present study therefore supports their findings and suggests that an association is not observed even when stuttering typography is taken into account.

It is also possible, however, that a relationship exists between these variables that was not found in this study (see, e.g., Blood et al., 2001). For example, what adolescents focus on in terms of the surface manifestation of their own speech, and what may therefore impact on their attitude toward functional communication and/or level of anxiety, may not relate directly toward the surface symptomatology of stuttering as reflected in %SS and %WPWR. The context in which stuttering occurs, and how well that can be managed, for example, was not considered in the present study and may have greater significance for adolescents than simple measures of stuttering frequency and typography. It is possible that speech-related anxiety suppressed a true representation of stuttering surface features. Investigation of alternative approaches to obtaining representative measures of stuttering severity and typography, perhaps in more ecologically valid conversational contexts than the clinic and of greater syllable length, would also be of value to further examine potential relationships between psychosocial variables and stuttered speech (as suggested by Block, Onslow, Packman, Gray, & Dacakis, 2005). More detailed speech analyses of stuttering rates and/or other methods of evaluating severity are needed to explore the relationship between stuttering and anxiety more closely.

4.6. *Anxiety and treatment status*

Craig et al. (2003) suggest that individuals who stutter who have sought speech pathology treatment have higher levels of anxiety when compared to those who have not. Alternatively, however, Craig (1994) proposes that even moderately successful treatment may reduce anxiety levels and negative expectancies. Menzies et al. (1999) propose the inclusion of both treated and untreated participants in a single sample may be confounding. Given that only adolescents who had been enrolled in treatment for their stuttering participated in this study and 68% were currently enrolled, the results allow for examination of anxiety in the clinical population of adolescents who stutter. If, as suggested by Craig (1994), this current sample has lower anxiety due to treatment effects, it is important to consider the potentially greater prevalence of anxiety in the wider population of adolescents who stutter who are both treated and untreated. Conversely, results may be overestimating the anxiety levels in this population. An accurate examination of treatment-related factors in individuals who stutter (such as type, length and frequency) should be considered in future research to account for possible treatment effects and to examine this relationship more precisely.

4.7. *Clinical management of adolescents who stutter*

The primary interests of speech pathologists who manage the stuttering disorder include its aetiology, treatment and prognosis. The finding that adolescents who stutter have higher levels of trait, state and social anxiety and greater difficulty with functional communication associated with this anxiety has potential implications for each of these. The current results suggest a place for anxiolytic treatments (such as desensitisation) in the management of adolescents who stutter, particularly for speech-specific difficulties or in individual cases where anxiety is debilitating. Cognitive-behavioural procedures for stuttering need to be examined more thoroughly in light of the current view of the construct

of anxiety and these results (see also, [Menzies et al., 1999](#)). In addition, the significant correlation found between the communication attitude and anxiety measures argues for the use of anxiety-reduction therapy as a way of minimising functional communication limitations. [Lincoln, Onslow, and Menzies \(1996\)](#) suggest that, in Australia, the majority of speech-language pathologists regularly include anxiety management strategies in the treatment of their adult clients. The findings from this current study suggest that a multidisciplinary approach to intervention is encouraged for the adolescent who stutters, such as the behavioural-cognitive treatment developed by [Blood \(1995\)](#). The finding that stuttering severity and typography were independent of anxiety and communication attitude also challenges the current clinical practice whereby individuals with more severe stuttering are given a preference in therapy. It is recommended that a flexible and holistic view to treatment priority and choice be adopted in management of adolescents who stutter, as it is clear that clients may intrinsically differ in their symptoms and needs regardless of the surface features of their speech.

In summary, adolescents who stutter were found to have greater trait, state and social anxiety associated with greater difficulty in daily or functional communication than their fluent peers. These results are both clinically and theoretically significant and advocate the need for a multidisciplinary perspective when managing adolescents who stutter. The results highlight stuttering as a disorder that potentially features psychosocial conflict regardless of its surface features.

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Appendix A. CONTINUING EDUCATION

Social anxiety and the severity and typography of stuttering in adolescents.

QUESTIONS

1. In the past, stuttering has been associated with:
 - a. suppressed anger
 - b. approach–avoidance conflicts
 - c. anxiety
 - d. all of the above
 - e. none of the above
2. Surface symptomatology of stuttering behaviour in this paper includes:
 - a. frequency and typography
 - b. typography
 - c. severity and frequency
 - d. self-perceived attitude towards communication
 - e. all of the above
3. According to current research, anxiety in adolescents who stutter may be more directly manifested in:
 - a. trait anxiety
 - b. state anxiety
 - c. fear of being negatively evaluated
 - d. fear of communication
 - e. none of the above
4. The results of the current study showed that, in adolescents who stutter:
 - a. increased levels of anxiety may stem from speech-associated negative emotion
 - b. communication in daily situations is difficult due to anxiety
 - c. the more anxious you are, the worse your stuttering is

- d. none of the above
 - e. all of the above
5. The clinical implications of this study include:
- a. treatment priorities should be based only on the severity of a client's speech
 - b. there is a role for treatment of anxiety in managing adolescents who stutter
 - c. stuttering will reduce by treating anxiety in adolescents who stutter
 - d. none of the above
 - e. all of the above

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