Anxiety and cognitive bias in children and young people who stutter

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Abstract

Psychologists recognise various forms of anxiety, such as generalized anxiety disorder, separation anxiety and social phobia. People who stutter are at risk of elevated levels of anxiety, especially social phobia. Recent research has suggested that anxiety may be caused and maintained by cognitive biases such as preferentially allocating attention towards threat stimuli. These biases can be re-trained using cognitive bias modification with resulting improvements in levels of anxiety.

In the present study, we measured different forms of anxiety and attentional bias for faces among 8-18 year olds attending the Michael Palin Centre for treatment for stuttering. The clients and their parent(s) completed the child and parent versions, respectively, of the Screen for Childhood Anxiety Related Emotional Disorders (SCARED), which provides an overall anxiety score and sub-scores, with clinical cut-offs, for generalized anxiety disorder, separation anxiety, social phobia , school avoidance and panic. The clients also performed a computerised measure of attentional bias for faces, using schematic stimuli.

Levels of anxiety were higher than in the general population, and prevalence increased with age. There was a significant correlation between SCARED scores produced by clients and their parents. Socially anxious participants showed a bias towards sad faces.

1. Introduction

Clinical psychologists distinguish between various forms of anxiety (American Psychiatric Association, 2013). For example, in social phobia (also known as social anxiety disorder) the anxiety is focused on situations

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where the individual may be evaluated by others, often when social interaction is involved. Separation anxiety involves fear of being away from home or apart from people to whom the individual is emotionally attached. School avoidance refers to refusal to attend school due to emotional distress. Generalised anxiety disorder may affect a wide range of situations. The anxiety may be accompanied by panic/somatic symptoms such as blushing, sweating or elevated heart rate.

The relationship between stuttering and anxiety has long been debated. In a recent systematic review and meta-analysis, Craig &Tran (2014) found that, relative to people who do not stutter, adults with chronic stuttering experience significantly elevated levels of anxiety, especially social anxiety. They argued that these differences result from the negative effects of stuttering across the lifespan, probably beginning in childhood (see, for example, Blood & Blood, 2007; Davis, Howell & Cook, 2003; Langevin, Packman & Onslow, 2009). Smith, Iverach, O'Brian, Kefalianos & Reilly (2014) reviewed published research into risk factors for anxiety in children and adolescents who stutter. They pointed out that it is clinically important to identify the typical age of onset of anxiety disorders in this client group, but concluded, on the basis of their review, that there is currently insufficient evidence to permit this.

Carrying out anxiety research with children and young people can be challenging: they may have poor insight into their own level of anxiety, or might be affected by demand characteristics (e.g., reporting high levels of anxiety because they believe that this is what the researcher wants them to do) or perceptions of societal norms (e.g., boys may feel that admitting to their anxiety could be seen as a sign of weakness).Gunn, Menzies, O'Brian, Onslow, Packman, Lowe, Iverach, Heard Block (2014) stressed the importance of gaining confirmatory reports about anxiety from others, for example, parents.

Many studies with people who do not stutter have indicated that people with high or clinical levels of anxiety are biased in their cognitive processing (Clark & Wells, 1995; Eysenck, Mogg, May, Richards & Mathews, 1991; Mathews & MacLeod, 2005).This bias may manifest itself in a number of ways. It may affect the way that the individual allocates attention: while non-anxious people automatically direct their attention away from negative stimuli such as disapproving faces or threat words (e.g. attending preferentially to the word *feature* rather than *failure*), anxious individuals show attentional bias towards such stimuli (e.g. Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg & van Ijzendoorn, 2007; Mogg, Philippot, & Bradley, 2004). Interpretation bias occurs when the individual tends to select a negative interpretation of ambiguous stimuli or events (for example, the laughter of others is seen as a signal of derision directed at the anxious person, rather than enjoyment: Mathews & Mackintosh, 2000). These biases are believed to cause and maintain anxiety. Biases have been demonstrated in children and young people as well as adults. Weissman, Chu, Reddy & Mohlman (2012) used schematic faces to investigate attentional bias, and found that anxious 8-18 year olds allocated attention preferentially to schematic faces displaying negative expressions.

Recent research has focused on cognitive bias modification (CBM) interventions which automatically re-train the biases and thereby reduce levels of anxiety (Hallion & Ruscio, 2011). Attentional bias modification, in which participants learn to allocate attention in a way that is less maladaptive, has been used successfully to treat social phobia in adults (Schmidt, Richey, Buckner & Timpano, 2009). Interpretation bias modification, which uses ambiguous vignettes to train people to select positive interpretations, has been used to treat anxiety and stress, and may even be effective when used in advance of threatening situations to reduce their impact on the individual: Woud, Postma, Holmes & Mackintosh (2013) found that when participants were given interpretation bias modification prior to exposure to an extremely distressing film, they were less likely to experience disturbing intrusive thoughts subsequently.

Lowe, Guastella, Chen, Menzies, Packman, O'Brian & Onslow (2012) carried out an eye movement study to investigate the way that adults who stutter deploy visual attention while processing facial expressions delivered via a TV screen. In their study, participants who stuttered displayed attentional bias: compared with controls who did not stutter, they looked less at the TV display overall and, in particular, spent less time looking at positive facial

expressions than other expressions or the background of the TV display. However, contrary to predictions based on previous research, those who stuttered did not show a bias towards negative facial expressions. In their discussion, Lowe et al. highlighted the need for studies examining attentional bias for faces in people who stutter and who have high or low levels of social anxiety.

The present study was designed to investigate (i) the prevalence of different forms of anxiety among a clinical sample of 8-18 year olds who stutter; (ii) the extent to which these young clients and their parents agreed in their reporting of clients' anxiety; and (iii) the association between anxiety and cognitive (attentional) bias in these young clients.

2. Method

The participants were 8-18 years old attending assessment sessions at the Michael Palin Centre. Ethics permission for the study was given by the NRES Committee East of England – Hertfordshire.

Anxiety was assessed with the 41-item Screen for Childhood Anxiety Related Emotional Disorders (SCARED) (Birmaher et al., 1999), a freely-available child and parent self-report instrument used to screen for childhood anxiety disorders. It consists of 41 items and 5 factors that parallel the DSM-IV classification of anxiety disorders, with a cut-off figure indicating likely clinical problems on this factor: panic/somatic (cut-off score = 7), generalized anxiety disorder (9), separation anxiety (5), social phobia (8) and school avoidance (3). In addition, a total score of 25 or above is considered to indicate the need for further clinical investigation. The child and parent versions of the SCARED have moderate parent-child agreement and good internal consistency, test-retest reliability, and discriminant validity, and the instrument is sensitive to treatment response. Severity of symptoms for the past three months is rated using a 0- to 2-point rating scale with 0 meaning 'not true or hardly ever true', 1 meaning 'sometimes true', and 2 meaning 'true or often true'. Reliability and validity of the measure have been demonstrated via several studies. The parent and child versions each take approximately 10 minutes to complete. The parent version is similar to the version completed by the child except that it replaces *I* and *my* with *your child* or *your child's*.The client and at least one parent completed the appropriate version of the SCARED. Completion of the assessment by young participants was supervised by their clinician.
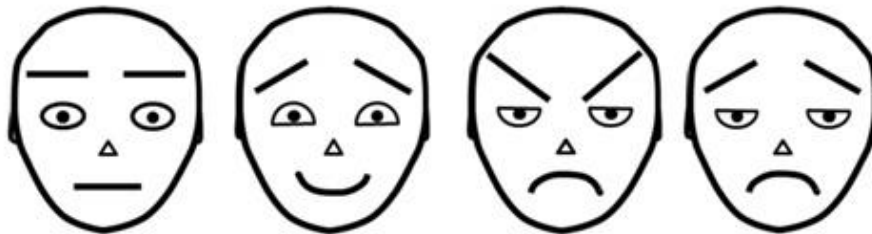
Fig 1.Schematic showing the probe detection task (neutral, happy, angry, sad)

Attentional bias was measured using a computer task based on that described by Weissman et al. (2012). The task employed the face stimuli shown in Figure 1and consisted of a number of trials; the sequence of events on a trial is illustrated in Figure 2. The participant sat before a computer screen at a distance of approximately 20 inches. A fixation cross was displayed in the centre of the screen for 500 ms and was then replaced by a pair of faces, represented as schematic line drawings, which were also displayed for 500 ms. When the faces disappeared, a probe (an upward-pointing or downward-pointing arrow) appeared at the location previously occupied by one of the faces.

The participant pressed a button to indicate whether they saw the upward-pointing or downward-pointing arrow, and reaction times and accuracy were recorded. The fixation cross then appeared, signaling the start of the next trial. On the 20 practice trials, both faces displayed a neutral facial expression. Each practice trial was followed by feedback to indicate whether the participant correctly identified the probe. On the 96 randomly-ordered experimental trials, one face displayed a neutral expression and the other an emotionally valenced expression – anger (32 trials), happiness (32 trials) or sadness (32 trials). Relative position of the faces, position and orientation of the probe, and the expression of the face it replaced were counterbalanced. The computer task took approximately 7 minutes to complete.
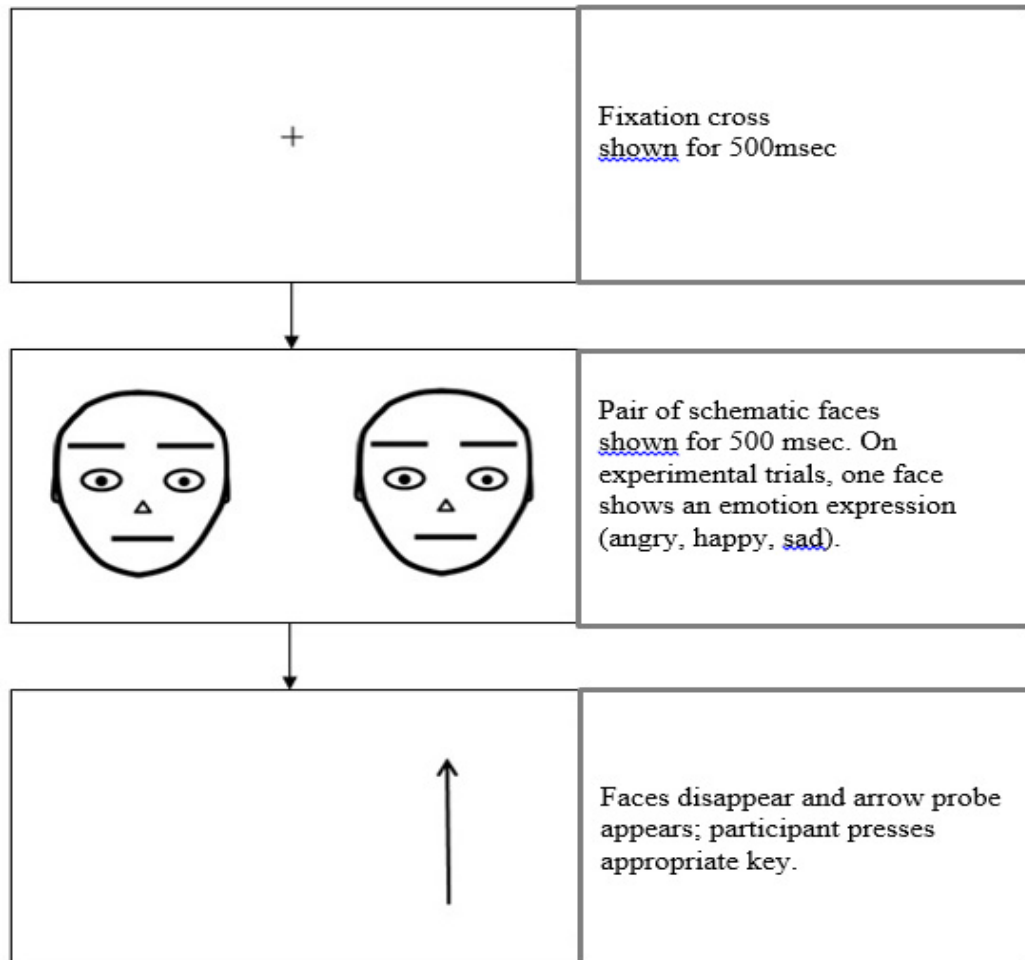
Fig. 2. Schematic showing the sequence of events in the probe detection task

Bias scores were calculated for each participant. These relied on the concept of congruent and incongruent trials for each of the three emotion types (angry, happy, sad). On all experimental trials there was one emotion face (angry, happy, sad) and one neutral face; a congruent trial was one where the arrow probe replaced the emotion face, and an incongruent trial was one where the probe replaced the neutral face. A participant's bias score was the result of subtracting the mean congruent value from the mean incongruent value. A positive bias score (i.e., congruent

trials are faster) indicates bias towards that emotion, and a negative bias score (congruent trials are slower) indicates bias away from that emotion.

3. Results

Thirty five children (8-11 years old; mean age 9.9 years, s.d. 1.07) and 33 young people (12-18 years old; mean age 14.22 years, s.d. 1.73) took part in the study.

Table 1 shows the frequency of occurrence of the different forms of anxiety. Following Birmaher et al. (2009), results are presented separately for those aged 12-18 years and younger participants. All forms of anxiety apart from separation anxiety increased with age. Separation anxiety was more common in participants under 12 years of age, and decreased with age. The age difference was only statistically significant for generalized anxiety disorder (χ^2 = 9.76, df = 1, p = 0.002) and separation anxiety (χ^2 = 3.90, df = 1, p = 0.048).

Table 1. Percentage of participants at or above cutoff for SCARED scales.

SCARED Scale	Under 12 (n=35)	12-18 years (n=33)	All ages (N=68)
Grand total	28.6	42.4	35.3
Panic/Somatic	25.7	39.4	32.4
Generalized anxiety disorder	5.7	36.4	20.6
Separation anxiety	40.0	18.2	29.4
Social phobia	22.9	36.4	29.4
School avoidance	14.3	27.3	20.6

In total, 67 mothers and 47 fathers completed the parental SCARED questionnaire about the clients' anxiety. Mothers' scores correlated significantly with their child's score and with the father's score for all anxiety categories, whereas fathers' scores correlated significantly with their child's only for separation anxiety, social phobia and school avoidance (see Table 2). Agreement between mothers and clients in terms of classification (anxious or non-anxious) ranged from 68.7% to 77.6%, and between fathers and clients from 60.4% to 81.3%.

Table 2. Correlation coefficients for SCARED scores from different respondents.

SCARED Scale	Mum & client	Dad & client	Mum & Dad
Grand total	.516**	.248	.707**
Panic/Somatic	.385**	.001	.338*
Generalized anxiety disorder	.381**	.111	.452**
Separation anxiety	.498**	.412**	.639**
Social phobia	.520**	.311*	.767**
School avoidance	.586**	.319*	.490**

**p<.01 *p<.05

Table 3 shows the mean bias scores for angry, happy and sad emotion faces. Only trials on which the participant made the correct response to the arrow probe were included. As noted above, a positive value indicates a bias towards that emotion, and a negative value indicates a bias away from the emotion.

Table 3. Mean bias scores for angry, happy and sad emotional stimuli.

SCARED Scale	Angry	Happy	Sad
Grand total			
Below cutoff	-10.1	-1.9	-17.5
At or above cutoff	16.1	6.7	4.1
Panic/Somatic			
Below cutoff	-7.2	-2.4	-12.7
At or above cutoff	11.0	8.1	-5.1
Generalized anxiety disorder			
Below cutoff	-1.2	-0.3	-14.7
At or above cutoff	-2.4	6.9	9.7
Separation anxiety			
Below cutoff	2.9	1.7	-4.8
At or above cutoff	-12.8	-1.0	-24.9
Social phobia			
Below cutoff	2.8	-3.3	-19.5
At or above cutoff	-11.8	11.5	12.3
School avoidance			
Below cutoff	0.2	1.0	-12.0
At or above cutoff	-8.5	0.9	-2.6

Analysis using MANOVA indicated that the only SCARED scale that yielded a significant difference in terms of bias scores was the social phobia scale ($F_{[1,64]}=3.077$, $p=.034$); only the contrast for the sad stimuli was statistically significant ($p=.010$).

4. Discussion

The first aim of the present study was to investigate the point prevalence of different types of anxiety in a sample of children and young people attending clinic for an assessment of their stuttering, with a view to treatment. The results suggest that a high percentage of this client group may experience anxiety disorders, and particularly in the 12-18 age group. In the general population of adolescents, the lifetime prevalence of the forms of anxiety explored here ranges from 2.2% to 9.1% (Merikangas, He, Burstein, Swanson, Avenevoli, Cui, Benjet, Georgiades & Swendsen, 2010), much lower percentages than are reported here. Point prevalence (the proportion of a population experiencing a condition at any given time) is by definition lower than lifetime prevalence (the percentage of a population experiencing the condition at any time in their lives), and therefore it may be speculated that among children and young people attending stuttering therapy, the lifetime prevalence of anxiety will be many times greater than that found in the general population.

Recent research into anxiety and stuttering has been heavily focused on the relationship between stuttering and social anxiety disorder (social phobia). It is clear from these findings that young people who stutter also exhibit high levels of other anxiety disorders. Of particular note is the high level of separation anxiety in the younger group of participants. This might be expected given the difficulty that these children have communicating, though it is no longer evident in the older group. By contrast, social phobia was more common in the older group, although the percentage of adolescents in this study with social phobia (36.4%) was lower than that reported by Gunn et al., (2014) who found that 50% of a sample of a similar age could be diagnosed with social phobia using the *Diagnostic Interview Schedule for Children*.

This is a cross-sectional study which compares the incidence of anxiety in clients seeking therapy for stuttering across two age groups. A longitudinal study of anxiety through childhood and adolescence would provide greater insight into the development of anxiety across the ages. For instance, it is not possible to determine from the current study whether it is the children who exhibit separation anxiety in early adolescence who go on to exhibit behaviours consistent with social anxiety at a later age. Neither is it possible to identify whether it is possible to identify which children who stutter are at greater risk of experiencing high levels of anxiety of one form or another.

The second aim of this study was to explore the extent to which these young people and their parents agree in their reporting of clients' anxiety. Gunn et al. (2014) suggest that adolescents have a tendency to provide a more positive view of themselves than is the reality and so recommend that self-report anxiety measures provided by children and young people need to be corroborated by others, e.g. parents. In the present study, parental SCARED scores correlated highly with those of their children, suggesting that parents, particularly mothers, are sensitive to their children's anxiety. The high correlation also indicates that data obtained from adolescents who stutter themselves is reliable in relation to the presence of anxiety.

The third aim of this study was to explore the association between anxiety and cognitive (attentional) bias in these young clients. Much recent research has indicated that anxiety disorders are characterized by attentional bias towards threat stimuli such as negative facial expressions (e.g. Weissman et al., 2012). The present study explored attentional bias by using schematic facial stimuli in a probe detection task. Compared with non-anxious participants, those with SCARED scores indicating social phobia were significantly biased towards negative (sad) facial expressions. This is consistent with Rapee and Heimberg's (1997) model of social anxiety which considers that people with social anxiety pay greater attention to faces with negative affect.

There are various clinical implications that could be drawn from these findings. It is clear that there are some children who stutter who experience clinical levels of anxiety which may be associated with or independent of their stuttering. Therefore, clinicians need to consider this possibility within the assessment process and as part of therapy and be aware of the differing ways in which anxiety is experienced. Helping a child to manage their anxiety will be a critical part of the therapy process. Further, being able to identify those who may be at risk of later social anxiety or other anxiety disorder would support a focus on prevention and early intervention. There are a number of therapy programmes that include the management of the cognitive-affective aspects of the disorder, but the finding that adolescents with social phobia were significantly biased towards negative (sad) facial expressions might indicate that attentional bias modification could be an additional therapy worth exploring with this client group. Interpretation bias modification has also been effective in reducing maladaptive reactions to negative experiences in adults (Woud et al., 2013), and has even been shown to be effective when used pre-emptively. Further exploration of the link between social phobia and cognitive bias in people who stutter may lead to effective forms of intervention using cognitive bias modification.

5. Conclusion

This study has demonstrated that a clinical population of 12-18-year olds who stutter exhibits higher than expected levels of anxiety. The findings also demonstrate that there are differences in the types of anxiety experienced by younger and older clients. Younger clients who stutter were more likely to experience separation anxiety, while the older group were more likely to experience generalized anxiety disorder. Compared with non-anxious participants, those with high levels of social anxiety exhibited attentional bias towards negative (sad) schematic faces. A longitudinal study would help to shed light on the development of anxiety through childhood and adolescence and to determine whether there are risk factors that would help identify those children who stutter who are at risk of developing clinically significant levels of anxiety.

Acknowledgements

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