Temperament, Anxiety, and Depression in School-Age Children Who Stutter

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Abstract

Purpose: The main aim of this study was to gain insight into whether temperament and/or stuttering severity were associated with anxiety and depression in children who stutter. Additionally, the study also provided an indication into the prevalence of anxiety and depression in children who stutter in a clinical cohort.

Method: The participants were 132 English-speaking children (105 boys and 27 girls) between 9;0 and 14;11 years old (M = 11;8, SD = 1;10) and their mothers. At their first visit to a specialist centre for children who stutter, mothers and children completed the relevant versions of the Early Adolescent Temperament Questionnaire-Revised (EATQ-R; Ellis & Rothbart, 2001) and a screening of children's anxiety and depression, using the Revised Children's Anxiety and Depression Scale (RCADS; Chorpita et al., 2000). Stuttering was evaluated using the Stuttering Severity Instrument Fourth Edition (SSI-4). Correlations were conducted between child and parent versions of the EATQ-R and RCADS; EATQ-R and RCADS; as well as the SSI-4 and RCADS. A comparison was made between those children who scored below the clinical threshold for anxiety and depression, and those who scored above.

Results: Significant correlations were found for all mother and child EATQ-R factors and RCADS scales (except for Obsessive Compulsive Disorder). Correlations were also found between the child- and mother-reported temperament factors of positive reactivity, negative reactivity, and self-regulation and anxiety and depression. Children who scored above the clinical threshold for any category of anxiety or depression had significantly lower positive reactivity and higher negative reactivity scores, compared to those who scored below the threshold. There were no differences between the two groups with regard to SSI-4 scores.

Conclusions: This is the first study to evaluate associations between temperament and anxiety and depression in children who stutter. Higher negative reactivity scores and lower positive reactivity and self-regulation scores are associated with elevated levels of anxiety and depression in children who stutter. Further, those who score above the clinical threshold have significantly higher levels of negative reactivity and lower levels of positive reactivity compared to those scoring below the threshold. Findings suggest that levels of anxiety that reach clinical threshold are more prevalent in children who stutter than would be

expected based on population data. Current findings have implications for both the assessment and therapy of children who stutter presenting at clinics for support.

Keywords: temperament, stuttering, anxiety, depression, school-age children

Introduction

The American Psychiatric Association (2016) differentiates between various anxiety disorders, including Separation Anxiety Disorder, which refers to considerable fear around being separated from major attachment figures; Social Anxiety Disorder (formerly Social Phobia), defined as fear leading to avoidance of social situations which may expose the individual to scrutiny and negative evaluation; Generalized Anxiety Disorder which denotes excessive worry over several aspects of life, persisting for at least 6 months; and Panic Disorder, characterized by panic attacks of a recurring and unpredictable nature. Depression is characterized by depressed mood or loss of interest or pleasure, with at least five symptoms (which may include physical symptoms) persistent for at least two weeks. Different anxieties have differing correlates, predictors and courses across childhood and adolescence (Costello et al, 2011).

Over the last ten to fifteen years or so there has been considerable interest in the relationship between stuttering and emotional disorders (anxiety and depression), both clinically and from a research perspective, with a particular focus on social anxiety and stuttering (Blumgart et al., 2010; Mulcahy et al., 2008; Smith et al, 2014). People who stutter report negative thinking about speaking, make predictions about other peoples' responses and views, experience fear and anxiety about engaging socially and therefore avoid social situations (e.g., Gerlach et al., 2021). These cognitive components of stuttering have been recognized for decades, but in more recent years, the similarities between these components and the factors underpinning social anxiety have prompted considerable interest into the link between social anxiety and stuttering (Alm, 2014; Iverach & Rapee, 2014).

There is some consensus that children, adolescents and adults who stutter are at greater risk than population statistics would predict, of experiencing and exhibiting behaviors that are characteristic of Social Anxiety (also referred to as Social Phobia) (Craig & Tran, 2014; Iverach et al., 2016; Smith et al., 2014). The co-existence of stuttering and anxiety has implications for assessment and therapy and has led to the development of a number of therapy programs which incorporate strategies to manage and/or reduce anxiety associated with stuttering (e.g., Harley, 2018; Kelman & Wheeler, 2015; Menzies et al., 2019).

However, other than elevated prevalence and incidence levels, little else is known about the factors that mediate the relationship between anxiety and stuttering. Understanding more about how anxiety develops in people who stutter, the factors that influence it, and consideration of whether and how it differs to anxiety in other populations, will help further the development of effective therapeutic interventions and to individualize therapy according to need.

The Development of Anxiety

As part of their review of the literature, Beesdo et al (2009) concluded that it is usual and appropriate for children and adolescents to experience anxiety. Anxiety is adaptive in many circumstances and it is helpful when it facilitates the avoidance of danger. Many children experience fear and anxiety as part of typical development which is usually transient. However, if anxiety becomes excessive in terms of frequency, severity or persistency, if it extends beyond the expected developmental period, and/or when it interferes with participation and functioning, the anxiety may be considered problematic. The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) states that "anxiety disorders differ from developmentally normative fear or anxiety by being excessive or persisting beyond developmentally appropriate periods. They also differ from, often stress-induced, transient fear or anxiety by being persistent (e.g., typically lasting 6 months or more)" (p.1). So, for instance, it is usual for children in late infancy and toddlerhood to be fearful of strangers and to be upset at separation from parents, and while expected in the early years, if persistent or extreme, these behaviors form part of the diagnostic criterion for separation anxiety. It is usual for children aged five to seven to experience school anxiety or performance anxiety and for adolescents to fear negative evaluation and rejection from peers, but again, when extreme or persistent, become characteristics of Social Anxiety Disorder (Beesdo et al., 2009).

The result of Costello et al.'s (2011) meta-analyses indicate the prevalence of any anxiety disorder in children aged 6 to 12 is 12.3% and 11.0% in 13- to 18-year-olds. Approximately one third of children will experience an anxiety disorder before adulthood (Costello et al., 2011). Anxiety disorders are classified along domains of fear inducing stimuli (e.g., social situations; separation), and manifestations of anxiety (e.g., physical/autonomic arousal; persistent worry). Some findings suggest that the onset of an

anxiety disorder may be in childhood, although studies also report onset of anxiety in late adolescence and early adulthood (Kessler et al., 2009). From their review of the literature, Beesdo et al., (2009) conclude that Separation Anxiety Disorder has the earliest age of onset, typically before the age of 12. According to a study of over 18,000 children and young people, separation anxiety is evident in 0.7% of 5- to 19-year-olds, and more common in 5- to 10-year-olds (1.1%) than in 11- to 16-year-olds (0.4) (Vizard et al., 2018). Social Phobia is reported to emerge in late childhood and early adolescence (Beesdo et al., 2009; Essau et al., 2018), with low prevalence rates in childhood (0.2%) compared to older children and adolescents (1.3%) (Vizard et al., 2018). Panic Disorder and Generalized Anxiety Disorder tend to emerge in later adolescence and into adulthood (Beesdo et al., 2009) with prevalence rates in 5- to 19-year-olds 1.1% and 1.5% in the UK population respectively.

The potential consequences of anxiety disorders can be far reaching and have been associated with early withdrawal from school (Van Ameringen et al., 2003) and poor health related quality of life in adolescents (Raknes et al., 2017). Children with emotional disorders are more likely to avoid attending school and be excluded (Papachristou & Flouri, 2020). While periods of anxiety may fluctuate and tend to be transient, persistence into adulthood is common (Ginsberg et al., 2018).

Anxiety and Stuttering

There is evidence that different types of anxiety disorder are more prevalent in the population of people who stutter than people who do not stutter. In their study of 75 children who stutter aged 7-12 years, Iverach et al. (2016) found that compared to 150 non-stuttering controls, the stuttering group had six-fold increased odds for Social Anxiety Disorder, seven-fold increased odds for subclinical Generalized Anxiety disorder, and four-fold increased odds for any anxiety disorder. McAllister et al. (2015) identified levels of Separation Anxiety in children who stutter aged 8-12 and levels of Generalized Anxiety in 13- to 18-year-olds who stutter were higher than that of the general population.

This elevated rate of social anxiety amongst school aged children has also been identified in teenagers and adults who stutter, based on the results of social anxiety questionnaires and psychiatric

diagnostic assessments (Gunn et al., 2014; Iverach & Rapee, 2014; Iverach et al., 2016; McAllister, et al., 2015). The relatively consistent findings across studies suggest that anxiety develops in childhood and either persists or re-emerges over time in children and adolescents who stutter.

Iverach et al. (2017) describe five key features of Social Anxiety that may be involved in the maintenance of social anxiety in stuttering. These features are regularly reported by people who stutter, those with and without levels of anxiety that would reach the clinical threshold for social anxiety. They describe socially anxious individuals as: 1) assuming that they will be negatively evaluated by others and overestimating the consequences of negative evaluation; 2) forming negative mental representations of the self as seen by the audience; 3) engaging in negative self-focused attention and demonstrating attentional biases towards social threat; 4) engaging in cognitive and behavioral strategies to temporarily reduce anxiety and, 5) engaging in anticipatory and post event processing.

Manning and Beck (2013) did find a significant positive correlation between anxiety and stuttering impact as indicated by the self-reported Overall Assessment of the Speaker's Experience of Stuttering (Yaruss & Quesal, 2008). This association has also been demonstrated in relation to adolescents (Mulcahy et al., 2008). The association between anxiety and stuttering frequency and/or severity is less clear (Iverach et al., 2011). Manning and Beck (2013) found that stuttering frequency and severity measured through the Stuttering Severity Instrument (SSI; Riley & Bakker, 2009) were not significantly related with measures of anxiety in a group of adults who stutter. Mulcahy et al., (2008) did not find a relationship between stuttering frequency and anxiety in a group of adolescents, and while Gunn et al. (2014) did find a relationship between self-rated stuttering severity and anxiety in a group of adolescents, there was no relationship identified from the multivariate analyses.

Depression in Childhood

Childhood depression is characterized by sad or irritable mood, anhedonia, decreased capacity to have fun, decreased self-esteem, sleep disturbance, social withdrawal or impaired social relationships and impaired school performance (Pan & Brent, 2020). The DSM-5 categorizes depressive disorders in

children into major depressive disorder (MDD), persistent depressive disorder (dysthymia), disruptive mood dysregulation disorder, premenstrual dysphoric disorder, substance/medication-induced depressive disorder, depressive disorder due to another medical condition, other specified depressive disorder and unspecified depressive disorder. Costello et al. (2006) reported that the prevalence rate of depressive disorder among children under 13 years is estimated to be 2.8%, rising to 5.6% among children between 13 and 18 years. Rates are similar in boys and girls, but depression becomes twice as common in adolescent girls compared with adolescent boys. They also stated that childhood depression is a risk factor for developing other mental health conditions, and concluded that anxiety and depression often co-exist or follow on from each other.

In a recent study of emotional disorders in children and young people in the UK, approximately 1.5% of children aged 5-19 were considered to have depression, a rate that was lower in primary school aged children (0.3% in 5- to 10-year-olds) and rising to 2.7% in secondary school (age 11-16) (Vizard et al., 2018). The prevalence figures from this UK cohort are lower than those quoted elsewhere (e.g., Kessler et al, 2012), possibly because of the stringent methods adopted for categorization (parent report, child report, teacher report and professional evaluation) compared to single questionnaire methods adopted by others. Kessler and colleagues (2012) reported prevalence rates from a US national population survey as 1 to 2% in children and 3 to 8% in adolescence and Polanczyk et al.'s meta-analysis in 2015 reported a worldwide prevalence rate for any depressive disorder in children and adolescence to be 2.6%.

Depression and Stuttering

Gunn et al. (2014) studied depression in 37 adolescents who stutter aged 12 to 17 years who were waiting for therapy at two Australian university stuttering treatment clinics. They used the Children's Depression Inventory (CDI, Kovacs, 1992) to gain self-rated measures of depression. Participants were grouped into younger adolescents (12–14 years; $n = 20$) and older adolescents (15–17 years; $n = 17$). Findings showed a trend for the older adolescents (15–17 years) when compared to the younger adolescents (12–14 years) to have worsening scores on the CDI, although the mean total scores fell within the normal range.

Briley et al. (2021) investigated the relationship between depressive symptoms and suicidal ideation and living with stuttering, using data from a nationally representative, longitudinal survey study in the US (National Longitudinal Study of Adolescent to Adult Health) that followed 13,564 respondents aged 12–33 years over the course of 14 years. When compared with people who did not stutter, both males and females who stuttered (n = 261) reported elevated levels of depressive symptoms. Although symptoms of depression among males who stutter were stable over time, depressive symptoms among females who stutter increased with age.

Factors That Influence the Development of Emotional Disorders

There are a number of factors that have been identified as contributing to the development of anxiety disorders (Wong & Rapee, 2016). Anxiety disorders typically occur more frequently among females than males and these sex differences appear to increase with age (Beesdo et al., 2009). Most epidemiological studies find higher rates of anxiety disorders among those with lower education as well as in households with lower incomes (Wittchen et al., 1998). Parenting style, in particular over-protectiveness, has been associated with Social Phobia (Rapee, 1997). Childhood adversity and having a parent with an anxiety disorder (Hudson et al., 2011) are also factors that have been identified as influential across studies. Child temperament is considered to shape how a child interprets and processes events and has also been found to be an important factor in the development of emotional disorders (Biederman et al., 2001; Kagan, 1989; Strelau & Zawadzki, 2011; Wong & Rapee, 2016).

Temperament and its Role in Emotional Disorders

Temperament relates to an individual's emotional reactivity and emotional regulation and by definition is an innate tendency (Rothbart & Bates, 2006; Rothbart & Derryberry, 1981). Temperament is relatively stable over time but is influenced by genetics, maturation, and experience (Rothbart et al, 2001). So, temperament evolves from a predominantly reactivity-driven concept in infants to a structure with more emphasis on self-regulatory processes in older children (Putnam et al., 2001). Reactivity refers to

how easily an individual's emotions, motor activity and attention are aroused, whilst self-regulation refers to the ability to regulate (increase or decrease) reactivity (Rothbart, 2011; Rothbart, 2015).

Children who are prone to greater negative reactivity are at greater risk of developing anxiety, along with those with greater behavioral inhibition. In other words, children who are shy with strangers and fearful in unfamiliar situations, with a tendency to avoid situations, are at greater risk of developing anxiety (Biederman et al., 2001; Perez-Edgar & Fox, 2005).

The role of behavioral inhibition in how children shape and respond to their social environments is explained by Fox and Pine (2012). When experiencing novelty and heightened sensitivity to stimuli, infants and toddlers with higher inhibition will withdraw from novel or unfamiliar social situations. As they repeat these withdrawal behaviors, and the tendency to withdraw evolves, the child becomes less assertive and more likely to be rejected by their peers. This starts and reinforces the development of negative self-perception as the inhibited child is more likely not only to experience more social rejection, but also to interpret ambiguous social encounters as negative. This further fuels the tendency to avoid social situations and social stressors. Fox and Pine argue that by shaping personal relationships in early and middle childhood, behavioral inhibition may contribute to the development of social anxiety in early adolescence, when peer approval and acceptance become more important.

While temperament is considered to be a contributing factor in the development of anxiety in the non-stuttering population, it is not known whether the same temperament factors are influential or relevant in relation to the development of anxiety in the population of children who stutter. Although such a link was previously suggested (Eggers, et al., 2010; Eggers, 2012), others like Alm (2014), concluded that children who stutter are not more shy than children who do not stutter, and so there may be other factors playing a role to explain the higher prevalence rates.

In light of this, it is relevant to highlight the major findings of the growing body of research in temperament and stuttering based on caregiver reports, behavioral and psychophysiological measures (for an overview see Jones et al., in press). Most results have indicated that children who stutter, as a group, are more emotionally reactive, exhibit more negative emotions (e.g., Eggers et al., 2010; Johnson, et al.,

2010; Ntourou et al., 2013; Zengin-Bolatkale et al., 2018) and have lower emotional regulation (e.g., Anderson et al., 2003; Jones et al., 2014; Karrass et al., 2006) or difficulties in the processes that support emotional regulation (e.g., Eggers et al., 2012). Several studies have also shown that increased stuttering frequency and/or severity is associated with increased reactivity (Choi et al., 2013; Johnson, et al., 2010; Jones et al., 2014) or decreased regulation (Arnold et al., 2011; Kraft et al., 2014, 2019; Ntourou et al., 2013).

The main aim of this study therefore was to gain more insight into whether temperament and/or stuttering severity were associated with anxiety and depression in this population. With regard to temperament, we hypothesized that higher scores on negative reactivity and lower scores on positive reactivity and self-regulation would be associated with higher anxiety and/or depression scores. Since previous findings regarding stuttering severity were not unequivocal and based on adults and adolescents rather than children, it was less clear to make any predictions about the presence or direction of any association between stuttering severity and anxiety and depression. It might be predicted that increased stuttering could result in increased avoidance behaviors or withdrawal, which would be reflected in higher scores on social phobia and depression. In contrast, those children more likely to engage in avoidance behavior, may also avoid stuttering, thereby reducing any overt stuttering frequency and severity measures. With regard to separation anxiety, it might be predicted that children who stutter more severely would be more dependent on others to support them and fearful to be in situations without that support, reflected in higher separation anxiety scores.

A secondary aim was to consider whether the prevalence of anxiety and depression in this clinical population is consistent with prevalence data for the population at large.

Methods

Participants

The participants were 132 English-speaking children (105 boys and 27 girls) between 9;0 and 14;11 years old (M = 11;8, SD = 1;10) and their mothers. All participants were referred to a specialist center for children who stutter. Children who attend this center for an evaluation of their stuttering and the factors that influence it complete a battery of assessments. Since it was a clinical population, there were no exclusion criteria. All participants self-identified as having a stutter and were described as stuttering by their parent(s). This was confirmed by a speech and language therapist specialized in stuttering. The average time since reported stuttering onset was 6;5 years (SD = 2;11). Stuttering severity was determined by the Stuttering Severity Instrument-4 (SSI-4; Riley & Bakker, 2009) based on a speech sample of a minimum of 300 syllables during both reading and conversation activities. Sound, syllable and monosyllabic word repetitions, prolongations and blocks were included as stuttered events (Conture, 2001). The average percentage of stuttered syllables was 9.10 (SD = 8.80). Fifteen percent of the participants were classified on the SSI-4 as very mild, 27% as mild, 23% as moderate, 24% as severe and 11% very severe.

As a study utilizing clinical data, not all data were available for all demographic variables. For those where data were available (n = ???): 75.7% had attended therapy for stuttering in the past; 72.8% had sought advice from an SLT regarding speech sound development in the past; 1% had a diagnosed hearing impairment; 8% had a mother with persistent stuttering (5.6% had a mother who no longer stutters); 13.8% had a father with persistent stuttering (5.7% had a father who no longer stutters); and, 19.3% spoke a language in addition to English. For those for whom data were available (n = 100), 25% had a co-existing diagnosed condition. These included: ASD (13%); Dyspraxia (5%); Developmental Delay (4%); Cerebral Palsy (2%); Dyslexia (1%); Attention Deficit and Hyperactivity Disorder (1%).

The study was approved by Thomas More's research council. All data were collected at the participants' first visit to the center before starting treatment. This study is part of an ongoing series of studies into the relationship between temperament, anxiety, and the impact of stuttering. Some of the participants were also included in a previous study (Eggers et al., 2021) examining the relation between temperament and the impact of stuttering.

299

300 **Measures**

301 ***Early Adolescent Temperament Questionnaire-Revised (EATQ-R)***

302 Temperament was evaluated by means of the Early Adolescent Temperament Questionnaire-
303 Revised (EATQ-R; Ellis & Rothbart, 2001), a self- and parent-report measure for 9- to 15-year-olds,
304 based on Rothbart's temperament model. Both child and parent versions were administered. The child's
305 version consists of 12 temperament scales clustering under four factors, i.e. Surgency (or positive
306 reactivity), Negative Affect (or negative reactivity), Effortful Control (or self-regulation) and
307 Affiliativeness (see Table 1). The 65 items are scored on a Likert scale ranging between 1 (almost never
308 true) and 5 (almost always true). The average internal consistency for the instrument is .73 with two scales
309 scoring above .80 (Shyness and Aggression), six scales scoring between .60 and .70 (Activation Control,
310 Affiliation, Frustration, High Intensity Pleasure, Perceptual and Pleasure Sensitivity) and between .65 and
311 .70 for the other scales (Ellis & Rothbart, 2001). The parent's version consists of 62 items and does not
312 include the Perceptual Sensitivity and the Pleasure Sensitivity scales. The average internal consistency of
313 the parent's version is .73 with two scales scoring above .80 (Affiliation and Inhibitory Control), four
314 scales between .70 and .80 (Frustration, Shyness, Aggression, and Depressive Mood), and the others
315 scoring between .65 and .70.

316 *TABLE 1 ABOUT HERE*

317 ***Stuttering Severity Instrument Fourth Edition (SSI-4)***

318 The stuttering severity was measured using the SSI-4, based on conversational speech and reading
319 samples video recorded at the initial in-clinic assessment. This instrument evaluates stuttering severity in
320 terms of frequency; duration; physical concomitants and naturalness of the individual's speech. Frequency
321 is expressed in the percentage of syllables stuttered and converted to scale scores of 2-18. Duration

(average duration of the three longest stuttering moments) is timed to the nearest one tenth of a second and converted to scale scores of 2-18. The four types of physical concomitants, i.e., distracting sounds, facial grimaces, head movements, and movements of the extremities, are scored on a 6-point scale ranging from 0 (none) to 5 (severe and painful looking), converted to scale scores of 0-20. The summation of all the scale scores results in a total score (naturalness is not factored into the severity score), which is converted to a severity equivalent ranging from very mild to very severe.

Revised Children's Anxiety and Depression Scale (RCADS)

Anxiety was measured using the Revised Children's Anxiety and Depression Scale (RCADS; Chorpita et al., 2000). This measure assesses the extent of anxiety and depression symptoms in 8- to 18-year-old children and adolescents, has a self-report and a parent version, and consists of 47 items. The RCADS is composed of 6 scales, 5 of which are related to anxiety (Separation Anxiety Disorder, Social Phobia, Generalized Anxiety Disorder, Panic Disorder, Obsessive Compulsive Disorder) and another one related to Major Depressive Disorder (see Table 2). The development of the scales was based on the DSM-IV criteria for anxiety and depression diagnosis. Answers are rated on a 4-point Likert scale ranging between 0 (never) to 3 (always). Raw scale scores are converted into T-scores, based on gender and age. The assessment is not diagnostic, but T-scores above 65 are borderline clinically significant whereas those greater than 70 are considered clinically significant (i.e., indicating that the response reflects anxiety and depression-related symptoms very similar to those of individuals who meet diagnostic criteria for that particular disorder or syndrome). Internal consistency values range from .78 for Social Anxiety Disorder to .88 for Panic Disorder (Chorpita et al., 2005). The RCADS is widely used and the psychometric properties examined (Ebesutani et al., 2011), translated and validated in different languages (e.g. Gormez et al., 2017; Kösters et al., 2015). For both the EATQ-R and the RCADS, the parent versions were completed by the mothers.

TABLE 2 ABOUT HERE

Data Analyses

The Shapiro-Wilk test was used to test the normality of the different participant variables. Correlations between child and parent versions of the EATQ-R were evaluated using Pearson r coefficients. This was done for all temperament factor scales (i.e., Surgency, Negative Affect, Effortful Control, and Affiliation for the child's version; the mother's version does not include the latter scale). In order to correct for multiple comparisons, a Bonferroni correction (4 child EATQ-R factors and 3 parent EATQ-R factors) was used, resulting in an alpha level of .05/12 = .004. Similar correlations were evaluated for the child and mother versions of the RCADS. For the Bonferroni correction (6 child and 6 mother scales), an alpha level of .001 (.05/36) was used.

Correlations between the SSI-4 (Frequency, Duration, Physical Concomitants and overall score) and the child and parent versions of the RCADS were also evaluated by Pearson r coefficients for normally distributed variables and Spearman Rank coefficients for non-normally distributed variables. The alpha level was adjusted to .05/24 = .002 (4 SSI and 6 RCADS scores).

Correlations between the child and mother versions of the EATQ-R and respectively the child and mother version of the RCADS were evaluated by Pearson r coefficients for normally distributed variables and Spearman Rank coefficients for non-normally distributed variables. For the child version, the alpha level was adjusted to .002 (.05/24), for the mother version to .003 (.05/18).

Using the RCADS threshold score of percentile 70 (Chorpita et al., 2000), the participant group was divided into children scoring above the clinical threshold and those scoring below the threshold, both for the self-report and parent version. Possible differences between both groups on the EATQ-R were investigated using ANOVA, with the participant group as the independent variable and composite factor scores as the dependent variables. This was also done for the SSI-4-scales.

All statistical analyses were performed using the SPSS statistical software package version 25 (IBM Corp., 2017).

Results

Table 3 gives an overview of the means and standard deviations for each of the variables.

TABLE 3 ABOUT HERE

Testing of normality

The Shapiro-Wilk test showed that the SSI-4 Physical Concomitants score ($p < .05$) was not normally distributed. For the mother version of the RCADS, the scores for Separation Anxiety Disorder, Panic Disorder, Obsessive/Compulsive Disorder, and Depression, and for the child version of the RCADS, the scores on Separation Anxiety Disorder and Panic Disorder were also not normally distributed ($p < .05$). Therefore, Spearman Rank coefficients were used to evaluate the associations with these variables.

Correlations between child- and mother-reported EATQ-R

Significant correlations were found between the child and mother EATQ-R factor scores for Surgency ($r = .60$, $p < .004$), Negative Affect ($r = .53$, $p < .004$), and Effortful Control ($r = .52$, $p < .004$). Table 4 provides an overview of all the correlation coefficients. Higher EATQ-R factor scores for the child-version were also reflected in higher scores for the mother-version.

Correlations between child- and mother-reported RCADS

Significant correlations were found for all similar mother and child RCADS scales except for the Obsessive Compulsive Disorder scales. So, higher RCADS scores for the mother-version correlated with higher scores for the child-version. Also, several other significant correlations were found at the adjusted alpha level (see Tables 5).

TABLE 4 ABOUT HERE

TABLE 5 ABOUT HERE

Correlations between SSI-4 and RCADS scores

No correlations were detected between the child or parent RCADS scores and any of the SSI-4 scale scores, i.e., Frequency, Duration, Physical Concomitants or the Overall score (see Table 6).

TABLE 6 ABOUT HERE

Correlations between EATQ-R and RCADS scores

Several significant correlations were found at the adjusted alpha levels between the EATQ-R factors of Surgency (both the child and parent versions) and Negative Affect (primarily the child version) and the RCADS scales (see Table 7 and 8). Both for the child- and mother-rated versions, Surgency correlated negatively with all RCADS scales; the correlations with Panic Disorder and Major Depressive Disorder were nonsignificant. In other words, higher Surgency scores were associated with lower anxiety scores.

An opposite pattern was seen for the child-rated version of Negative Affect. Negative Affect correlated positively with all anxiety and depression scales (the correlation with Separation Anxiety Disorder was nonsignificant). For the mother-rated version, this positive correlation was only significant with the Social Phobia and Major Depression Disorder scales.

Finally, for the children, higher scores on Effortful Control correlated significantly with lower Depression Disorder scale scores whereas for the mother version this correlated significantly with lower Separation Anxiety Disorder scale scores.

TABLE 7 ABOUT HERE

TABLE 8 ABOUT HERE

Differences between children scoring above and below the RCADS clinical threshold

The mean RCADS-scores, both child- and mother-reported, are well below the clinical threshold (See Table 3) but closer observation of the individual RCADS scores, showed that 15.9% of the child-rated scores were above RCADS clinical threshold (Pc 70) on one or more of the subscales, and 31.7% of the mother-rated scores.

When the participant group was divided into children scoring above and below the RCADS clinical threshold, a similar pattern emerged for both the self-report and parent-report version on th eEATQ-R (see Table 9). CWS scoring above the clinical threshold, in comparison to those scoring below, had significantly lower Surgency scores and higher Negative Affect scores. No between-group differences were found on the SSI-4-scales.

TABLE 9 ABOUT HERE

Discussion

The aim of the current study was to examine whether there was a relationship between temperament, anxiety and depression. We also sought to explore whether stuttering severity was associated with anxiety and depression in this clinical population of school-aged children. As part of this process, we investigated whether child and mother ratings of temperament, anxiety and depression were aligned. Finally, we explored differences between children who scored above and below the clinical threshold for anxiety and depression with regard to temperament and stuttering severity.

Parent and Child Ratings

Child and parent scores on the relevant version of both the EATQ-R and the RCADS were significantly moderately correlated. The correlation between parent and child ratings of temperament on the EATQ-R replicate the findings of Eggers et. (2021). In other words, children who rated themselves higher on Surgency, Negative Affect, or Effortful Control were also rated similarly by their mothers on the same constructs.

The significant moderate correlations found between mothers and children for all of the different anxiety subgroups on the RCADS meant that, for example, when children rated themselves highly on Separation Anxiety, the mothers will have done so too, a finding commensurate with that of Gunn et al. (2014). The exception was for the Obsessive-Compulsive Disorder subscale, which ceased to be significant once corrected for multiple comparisons. Correlations between child and parent reports in mental health questionnaires are known to fall in the low to moderate range (De Los Reyes et al., 2015) and the current finding is in line with the existing RCADS literature in typically developing children (e.g., Chorpita et al., 2005; Ebesutani et al., 2010; Ebesutani et al., 2011; Gormez et al., 2017), providing support for the convergent validity of both measures. Levels of child-parent correspondence usually increase when informants have relatively greater opportunities to observe (e.g., externalizing versus internalizing behaviors) or observe within the same context (e.g., younger children are more at home versus older children) (De Los Reyes et al., 2015).

There were a number of significant correlations between subsections on the RCADS within both the child and parent versions. For example, mothers' ratings of Social Phobia correlated with almost all of the child ratings of the different anxiety disorder categories. These findings indicate that children who were rated highly in one type of anxiety are likely to be highly rated in another.

Anxiety, Depression and Stuttering Severity

Previous research using a sample drawn from the same population as this current study, demonstrated no relationship between temperament and stuttering severity (Eggers et al. 2021) and so this was not explored further. Gunn et al. (2014) explored the relationship between self-rated stuttering severity, social anxiety and depression, however, there has been no study to date that has explored whether there is an association between observable overt stuttering and the range of anxiety disorders and depression in the pre- and early teenage population specifically. We did hypothesize that children who stutter more could experience increased avoidance behaviors (higher social phobia) or could be more dependent on others to support them and fearful to be in situations without that support (higher separation anxiety). In the first instance, the latter appeared to be supported, with children who were stuttering more,

scoring themselves more highly on Separation Anxiety, but this did not hold with the corrections for multiple comparisons.

Overall, no correlations were detected between the child or parent RCADS scores and any of the SSI-4 scale scores (Frequency, Duration, Physical Concomitants) or the Overall Score, indicating that there is not necessarily a relationship between the covert and overt aspects of stuttering, at least with regards to anxiety. Children with mild overt stuttering symptoms might have substantial anxiety whereas there are also children with more severe overt stuttering and less anxiety. Studies that have explored anxiety and stuttering in adolescents have also failed to find an association (e.g., Blood et al., 2007; Craig & Hancock, 1996; Mulcahy et al., 2008). Our findings do seem to corroborate Manning and Beck's (2013) results, namely that clinician measured levels of overt stuttering severity (e.g., stuttering frequency, SSI) are no indicators for anxiety and are not capturing the psychosocial impact experienced by the person who stutters.

Temperament, Anxiety, and Depression

There is evidence from Health psychology literature that temperamental characteristics are related to disorder development by predisposing the susceptibility for, or moderating the development of, certain disorders such as anxiety disorders (e.g., Beesdo et al., 2009; Kubzansky et al., 2009; Smith & Williams, 1992; Williams et al.,1992). Temperament trait vulnerabilities are viewed to play an important role in anxiety disorders and are often seen as a precursor condition to the occurrence of anxiety disorders (Beesdo et al., 2009). This is the first study to evaluate associations between temperament and anxiety and depression in children who stutter, although it is not possible to determine whether the temperament is a precursor to anxiety or whether the anxiety (and possibly the stuttering) impacts on the temperament ratings. Significant correlations were found between the child- and mother-reported temperament factors of Surgency, Negative Affect, and Effortful Control and anxiety and depression. No correlations were found with Affiliation.

Higher scores on both child- and mother reported Surgency were negatively correlated with all RCADS scales with the exception of Panic Disorder and Major Depressive Disorder. In other words, children who reported to be less outgoing, shy, fearful, less adventurous/risk-taking are the ones to more likely experience any type of anxiety. One could argue that this is in part due to the fact that both instruments are measuring related concepts and therefore some agreement would be expected. On the other hand, it seems logical to assume that children who stutter with a temperamental constellation of being shy, having fear, and less novelty-seeking, are more prone to anxiety in different social situations or when thinking about being separated from their parents.

Higher scores on both child- and mother reported Negative Affect were positively correlated with Social Phobia and Major Depression. Moreover, children who score themselves high on Generalized Anxiety Disorder, Panic Disorder, and Obsessive-Compulsive Disorder also score high on Negative Affect. These findings support the literature beyond stuttering which indicates that children with high Negative Affect are more prone to internalizing disorders, such as anxiety (Rothbart and Bates, 2006) and depression (Johnson et al., 2003; McFarland et al., 2006).

Interestingly, the mothers' ratings of Generalized Anxiety, Panic and Obsessive-Compulsive Disorder did not correlate with Negative Affect, and therefore differed to the children. One explanation is that some symptoms of anxiety are more externalized and are therefore more easily observed by others and influence the ratings. Another possible explanation is that of parental bias, in that parents might be rating their children in a more favorable light. It is also possible that children might not have the same frame of reference as their parents and may rate themselves more highly than a parent would; for instance, a child might consider themselves as being more angry than their peers, but their parents might not because they are ranking the child in comparison to a much broader range of individuals, using a broader framework developed over time and influenced by different experiences. Whatever the reason for the differences between the mother and child associations, as with the Eggers et al. (2021) study, these differences reinforce the need to include both parent and child ratings, despite the evidence that parent and child versions of these assessments are in themselves highly correlated for this population.

The vulnerability to anxiety with regard to temperament, is not limited to reactive components; regulation or self-control also plays a crucial role (Bijttebier & Roeyers, 2009). With regard to Effortful Control, higher child-reported scores correlated with lower Depression Disorder, higher mother-reported scores on Effortful Control correlated with lower Separation Anxiety Disorder. These findings suggest that children's ability to manage their reactions and emotions is a protective factor with respect to Depression and Separation Anxiety. Effortful Control (or self-regulation) supports children in using more positive alternatives (e.g., compliance, empathy, social competence) to problematic behaviors and to inhibit tendencies toward avoidance or anger. The child's self-regulatory capacities thus seem to help protect against the effects of high levels of positive or negative reactivity at an early age (Rothbart, 2011).

CWS Scoring above the Clinical Threshold for Anxiety and Depression

The findings discussed so far refer to the correlations between all the children and mothers included in the study, whether or not the child's level of anxiety or depression is at a level for clinical concern. While the study was not developed to explore this question specifically, the prevalence of clinically significant levels of anxiety and depression in this clinical population is of interest. The RCADS is not diagnostic in itself, rather it is an indicator that further assessment and monitoring should take place. Scores over 70 are considered to be clinically significant (Chorpita et al., 2021) and so the cohort was divided into those with clinically significant levels of anxiety or depression and those scoring below the threshold.

While both the child- and mother reported mean RCADS-scores are well below the clinical threshold, closer observation of RCADS scores, showed that 15.9% of the child-rated scores were above Percentile 70 on one or more of the subscales, with 31.7% of the mother-rated scores above the threshold. This is higher than the prevalence rates reported by Costello et al. (2011) for this age group (approximately 11-12% ages 6-18 years). The differences between the mother and child ratings in this subgroup is considerable and interesting. It is possible that there are some children who score themselves more positively in order to present themselves in a more positive light and therefore 'more socially desirable' a term discussed and identified in some adolescents who stutter by Gunn et al., (2014). Further

exploration is needed as to why these parent-child differences exist and/or which of the scores is more valid.

Among the different anxiety disorders, Social Anxiety Disorder (or Social Phobia) seems the most prevalent with a life-time incidence around 8-13% (Iverach & Rapee, 2014; Kessler et al., 2005). In this study, 3.79% of children scored above the clinical threshold for Social Phobia using the child versions, with 18.69% above threshold in the mothers' version. The lower child rated prevalence level is within the range reported in population studies (0.2 – 5% in 5-18 year olds; Costello et al., 2011; Vizzard et al., 2018), but the mother prevalence score is considerably higher and is in line with previous stuttering population related data reported by Craig et al. (2003) and Iverach et al. (2016).

The scores for Separation Anxiety were similar for the mother- and child-reported versions (7.31% and 7.57% respectively) but higher than the expected levels reported by Vizzard et al., (2018) which ranged from 1.1% in 5- to 10-year-olds and 0.4% in 11- to 16-year-olds. The higher rates in the stuttering population is in line with previous findings by McAllister et al. (2015). Combined, these two studies suggest that children who stutter are at risk of Separation Anxiety.

The child rating prevalence figure (1.51%) for Generalized Anxiety is the same as that reported by Beesdo et al., (2009), although the 11.38% reflected in the mothers' ratings is substantially higher. Both child and parent prevalence of Panic Disorder (6.81% and 8.13%) is considerably higher than the level of 1.1% reported by Beesdo and colleagues. The prevalence of Obsessive Compulsive Disorder (3.79% and 5.69%) in the current study is higher than that found by Heyman and colleagues (2001) in their UK-based population study (range 0.026% - 0.21% across ages 8-15).

The prevalence of Major Depressive Disorder (3.79% child ratings and 9.76% in parent ratings) appears to be higher than the levels reported by Vizard et al., (2018) (0.3% in 5- to 10-year-olds rising to 2.7% in 11- to 16-year-olds). However, it is important to note, that the figures reported by Vizard et al. reflect diagnoses based on parent, child and teacher reports as well as a professional evaluation. Based on their meta-analysis of five longitudinal epidemiological studies, Costello et al., (2011) reported the

prevalence of depression in children under 13 to be 2.8% and 5.6% in those aged 13-18 years. The data in the current study are based on a screening tool, not professional diagnosis, with methods and outcomes more akin to those reported by Kessler et al., (2012) indicating 3-8% of children experiencing depression. The differences across the studies reporting population data for depression are inconsistent and so it is difficult to compare and draw a conclusion about whether this clinical population of children who stutter experience depression to a greater or lesser extent than the population at large.

While the data in this study would seem to support higher than expected levels of anxiety and some of the specific types in particular, it is difficult to draw strong conclusions. It is important to note again that the RCADS is not in itself diagnostic and it would be necessary to obtain data from multiple sources over time before a diagnosis would be made (Beesdo et al., 2009). Therefore, some children scoring above the threshold on the RCADS in this cohort would not receive a diagnosis if a more extensive evaluation were to be conducted. The difference between the mother and child prevalence figures adds to the confusion and the differing ranges reported across previous studies makes the interpretation more complex. Nevertheless, whether or not the individual subtypes of anxiety and depression are above the population rates expected, it is clear that anxiety exists in this group of children who stutter to such a degree that clinicians need to take this into account both in assessment and therapy.

Clinical implications

Assessment. These findings underline the need to explore whether a child who stutters is experiencing anxiety and/or depression. Given the association between Surgency, Negative Affect and Effortful Control with anxiety and depression, it is relevant to gather information about a child's tendency to be shy, fearful, risk-averse, less outgoing, as this information may indicate the child's vulnerability to developing or experiencing anxiety in social situations or when they are separated from their parents. There is also evidence to indicate that children who are experiencing elevated levels of anxiety characteristic of one anxiety type are more likely to experience/demonstrate characteristics of other anxiety types. It is evident from this study that it is important to gather information from both child and parents because they each carry a unique and valid perspective (see also De Los Reyes et al., 2015).

Whilst formal temperament measures such as the EATQ-R may be freely accessed and used in clinical settings, therapists can also use case history questions with the child and parents, together with observations of the child's behavior, to gather an informal assessment of the child's temperament (Brundage et al., 2021).

Stuttering severity. The lack of a relationship between stuttering severity and anxiety in this study underlines the importance of a therapist making no assumptions about the emotional impact, emotional of stuttering on a child, based on the amount or nature of the stuttering behavior. Assessment of stuttering in isolation is insufficient for clinical decision making, regarding the potential long-term consequences for stuttering, or the need / focus of therapy (Brundage et al., 2021).

Therapy for school aged children who stutter. The association between temperament and anxiety (higher Negative Affect and lower Effortful Control) has implications for individualizing the therapy plan. In the first instance, the SLT can help the parents and child understand how the child's temperament is relevant to their reactions and responses to stuttering and that those temperamental traits make the child more likely to be anxious or depressed about their stuttering and the speaking experiences that they have. Once recognized and understood, the family can be supported to develop coping strategies, which may include problem solving, increasing self-regulation, confidence and resilience. Giving the child, family and teachers information and strategies to help them to recognize and manage these aspects of the child's temperament will help build understanding and confidence, based on the child's individual need. Programs described by Reardon-Reeves and Yaruss (2013) and Langevin, Kully and Ross-Harold (2007) are examples of those that include these components, along with those that integrate Cognitive Behavior Therapy, Acceptance and Commitment Therapy (Beilby & Yaruss, 2018; Harley 2015) and Solution Focused Brief Therapy (Nicholas, 2015) are all relevant and supported by these findings.

Limitations

This study included children who present at a specialist center for therapy and therefore represent a subset of children who stutter: those who are (or have parents who are) concerned enough to seek

support for the stuttering. As such, they may be a population who have greater reactivity or another variable that separates them from those who do not seek intervention. As with all retrospective studies utilizing clinical data, there were missing data within the database and so the cohort in this study does not include all children who attended the center. It is possible therefore that this is a biased clinical sample. Further, only data that are collected for the purposes of clinical care can be included. Yet, there are variables that have been found to be related to the development of anxiety but are not routinely collected for current clinical practice and which require specific investigation (e.g., parent education level; family history of anxiety disorders; income). Future studies that intend to make predictions about the relative contribution of different variables to the development of anxiety or depression would need to include these.

Conclusions

This study demonstrates an association between temperament and anxiety and depression in a clinical population of children who stutter aged 8-14. The findings show that higher levels of Negative Affect and lower levels of Effortful Control and Surgency are associated with increased anxiety and depression scores on one clinical tool. Therefore, the findings of this study seem to suggest that the temperamental traits that have been identified as predictive or risk factors for anxiety and depression in the psychological literature, are associated with higher scores on the RCADS for a clinical population of children who stutter. Further, children who score more highly on one category of anxiety are also likely to score highly on others. Mother and child ratings of temperament and anxiety and depression were moderately correlated, but the differences yielded different outcomes in terms of associations and prevalence rates. The study provides further evidence that the prevalence of anxiety in children who stutter appears to be higher than would be expected in the population as a whole. As a clinical study, these findings have implications for the assessment and therapy of children who stutter presenting at clinics for support.

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Table 1

Scale definitions of the Early Adolescent Temperament Questionnaire (EATQ-R) and sample items (Ellis, 2002).

Scale	Definition and sample item
Surgency	
1. High intensity pleasure	The pleasure derived from activities involving high intensity or novelty. *Sample item: I wouldn't be afraid to try something like mountain climbing.*
2. Fear (reverse score)	Unpleasant affect related to anticipation of distress. *Sample item*: I worry about getting into trouble."
3. Shyness (reverse score)	Behavioral inhibition to novelty and challenge, especially social. *Sample item: I am shy about meeting new people.*
Negative Affect	
4. Frustration	Negative affect related to interruption of ongoing tasks or goal blocking. *Sample item*: I get irritated when I have to stop doing something I'm enjoying.
5. Depressive mood	Unpleasant affect and lowered mood, loss of enjoyment and interest in activities. *Sample item*: My friends seem to enjoy themselves more than I do.
6. Aggression	Hostile and aggressive actions, including person- and object- directed physical violence, direct/indirect verbal aggression, and hostile reactivity. *Sample item*: I pick on people for no real reason.
Effortful Control	
7. Activation control	The capacity to perform an action when there is a strong tendency to avoid it. *Sample item*: If I have a hard assignment to do, I get started right away.
8. Attention	The capacity to focus attention as well as to shift attention when desired. *Sample item*: I pay close attention when somebody tells me how to do something.
9. Inhibitory control	The capacity to plan, and to suppress inappropriate responses. *Sample item*: It's easy for me to keep a secret.
Affiliativeness	
10. Affiliation	The desire for warmth and closeness with others, independent of shyness or extraversion. *Sample item*: It is important to me to have close relationships with other people.

11. Perceptual sensitivity	Detection or perceptual awareness of slight, low-intensity stimulation in the environment. *Sample item*: I tend to notice little changes that other people do not notice.
12. Pleasure sensitivity	Amount of pleasure related to activities or stimuli involving low intensity, rate, complexity, novelty, and incongruity. *Sample item*: I like the crunching sound of autumn leaves.

Table 2

Scale definitions of the Revised Children's Anxiety and Depression Scale (RCADS) and sample items (Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000).

Scale	Definition and sample item (child / parent version)
Separation Anxiety Disorder	Anxiety disorder occurring in childhood or adolescence that is characterized by developmentally inappropriate, persistent, and excessive anxiety about separation from the home or from major attachment figures. *Sample item: I would feel afraid of being on my own at home. / My child is afraid of being in crowded places.*
Generalized Anxiety Disorder	Difficult to control, long-lasting excessive anxiety and worry about a range of concerns (e.g., world events, finances, health, appearance, activities of family members and friends, work, school) accompanied by such symptoms as restlessness, fatigue, impaired concentration, irritability, muscle tension, and disturbed sleep. *Sample item: I worry that something bad will happen to me. / My child worries about what is going to happen.*
Panic Disorder	Anxiety disorder characterized by recurrent, unexpected panic attacks that are associated with (a) persistent concern about having another attack, (b) worry about the possible consequences of the attacks, (c) significant change in behavior related to the attacks (e.g., avoiding situations, engaging in safety behavior, not going out alone), or (d) a combination of any or all of these. *Sample item: When I have a problem, my heart beats really fast. / When my child has a problem, he/she feels shaky.*
Social Phobia	Anxiety disorder characterized by recurrent, unexpected panic attacks that are associated with (a) persistent concern about having another attack, (b) worry about the possible consequences of the attacks, (c) significant change in behavior related to the attacks (e.g., avoiding situations, engaging in safety behavior, not going out alone), or (d) a combination of any or all of these. *Sample item: I worry what other people think of me. / My child worries about making mistakes.*
Obsessive Compulsive Disorder	Disorder characterized by recurrent intrusive thoughts (obsessions) that prompt the performance of neutralizing rituals (compulsions). *Sample items: I can't seem to get bad or silly thoughts out of my head. / My child is bothered by bad or silly thoughts or pictures in his/her mind.*
Major Depressive Disorder	Mood disorder characterized by persistent sadness and other symptoms of a major depressive episode but without accompanying episodes of mania or hypomania or mixed episodes of depressive and manic or hypomanic symptoms. *Sample item: I feel worthless. / My child feels sad or empty.*

Table 3

Means and standard deviations of the scores of the Early Adolescent Temperament Questionnaire (EATQ-R), Stuttering Severity Instrument-4 (SSI-4), and Revised Children's Anxiety and Depression Scale (RCADS).

	M	*SD*
EATQ-R-mother		
Surgency	3.13	.66
Negative Affect	2.66	.56
Effortful Control	3.21	.66
EATQ-R-child		
Surgency	3.02	.57
Negative Affect	2.75	.55
Effortful Control	3.26	.52
Affiliativeness	3.31	.47
SSI-4		
Frequency	10.55	4.70
Duration	7.76	3.23
Physical Concomitants	4.06	3.75
Overall score	23.81	13.77
RCADS-mother		
Separation Anxiety Disorder	52.67	12.91
Generalized Anxiety Disorder	53.05	12.01
Panic Disorder	50.75	12.19
Social Phobia	57.28	13.50
Obsessive Compulsive Disorder	48.69	10.03
Major Depressive Disorder	52.40	12.66
RCADS-child		
Separation Anxiety Disorder	52.40	10.28
Generalized Anxiety Disorder	44.83	11.12
Panic Disorder	49.95	10.75
Social Phobia	47.76	12.20
Obsessive Compulsive Disorder	46.91	11.15
Major Depressive Disorder	46.79	11.76

Table 4

Pearson correlation coefficients between the child- and the mother-reported scores of the Early Adolescent Temperament Questionnaire (EATQ-R).

	EATQ-R-mother		
EATQ-R-child	Surgency	Negative Affect	Effortful Control
Surgency	.60*	-.23	.16
Negative Affect	-.08	.53*	-.27*
Effortful Control	.05	-.27*	.52*
Affiliativeness	-.13	.16	-.01

*p < .004

Table 5

Pearson or Spearman rank[a] correlation coefficients between the child- and the mother-reported scores of the Revised Children's Anxiety and Depression Scale (RCADS).

	RCADS-mother					
RCADS-child	SAD	GAD	PD	SP	OCD	MDD
SAD	.42[a]*	.35[a]*	.13[a]	.33*	.26[a]	.18[a]
GAD	.20[a]	.39*	.16[a]	.38*	.33[a]*	.37[a]*
PD	.20[a]	.35 [a]*	.25[a]*	.39*	.25[a]	.29[a]
SP	.20[a]	.39*	.16[a]	.44*	.27[a]	.30[a]*
OCD	.21[a]	.20	.01[a]	.15	.32[a]	.15[a]
MDD	.17[a]	.25	.14[a]	.35*	.20[a]	.42[a]*

Note. SAD = Separation Anxiety Disorder, GAD = Generalized Anxiety Disorder, PD = Panic Disorder, SP = Social Phobia, OCD = Obsessive Compulsive Disorder, MDD = Major Depressive Disorder

[a]Based on Spearman rank coefficients.
*$p < .001$

Table 6

Pearson or Spearman rank[a] correlation coefficients between the Stuttering Severity Instrument-4 scores (SSI-4) and the Revised Children's Anxiety and Depression Scale (RCADS) scores.

	SSI-4			
RCADS-child	Frequency	Duration	Physical Concomitants	Overall score
Separation Anxiety Disorder	.00[a]	-.00[a]	-.17[a]	.21[a]
Generalized Anxiety Disorder	-.01	.13	-.18[a]	.11
Panic Disorder	-.04[a]	-.10[a]	-.31[a]	.12[a]
Social Phobia	-.04	.20	-.12[a]	.11
Obsessive Compulsive Disorder	-.01	-.07	-.31[a]	.11
Major Depressive Disorder	-.19	.02	-.25[a]	.03
RCADS-mother				
Separation Anxiety Disorder	.06[a]	.14[a]	-.15[a]	.10[a]
Generalized Anxiety Disorder	-.21	.12	-.37[a]	-.03
Panic Disorder	-.23[a]	.13[a]	-.32[a]	-.08[a]
Social Phobia	.01	.24	-.07[a]	.12
Obsessive Compulsive Disorder	-.24[a]	-.11[a]	-.35[a]	-.13[a]
Major Depressive Disorder	-.06[a]	.09[a]	-.21[a]	.02[a]

[a]Based on Spearman rank coefficients.

Table 7

Pearson or Spearman rank[a] correlation coefficients between the child-reported scores of the Early Adolescent Temperament Questionnaire (EATQ-R) and the Revised Children's Anxiety and Depression Scale (RCADS) scores.

	EATQ-R-child			
RCADS-child	Surgency	Negative Affect	Effortful Control	Affiliativeness
Separation Anxiety Disorder	-.44[a]*	.19[a]	-.09[a]	.19[a]
Generalized Anxiety Disorder	-.27*	.46*	-.25	.12
Panic Disorder	-.22[a]	.28[a]*	-.08[a]	.10[a]
Social Phobia	-.41*	.41*	-.17	.12
Obsessive Compulsive Disorder	-.25*	.30*	-.13	.17
Major Depressive Disorder	-.14	.45*	-.29*	.02

[a]Based on Spearman rank coefficients.

*p < .002

Table 8

Pearson or Spearman rank[a] correlation coefficients between the mother-reported scores of the Early Adolescent Temperament Questionnaire (EATQ-R) and the Revised Children's Anxiety and Depression Scale (RCADS) scores.

	EATQ-R-mother		
RCADS-mother	Surgency	Negative Affect	Effortful Control
Separation Anxiety Disorder	-.55[a]*	-.19[a]	-.27[a]*
Generalized Anxiety Disorder	-.41*	.20	-.16
Panic Disorder	-.23[a]	.10[a]	-.14[a]
Social Phobia	-.43*	.26*	-.12
Obsessive Compulsive Disorder	-.27[a]*	.15[a]	-.04[a]
Major Depressive Disorder	-.20[a]	.32[a]*	-.29[a]

[a]Based on Spearman rank coefficients.

*p < .003

Table 9

Means, Standard Deviations, and between-group effect analysis of the EATQ-R factor scores and SSI-scale scores for children scoring below and above the RCADS clinical threshold.

	RCADS-mother					
	Below threshold		**Above threshold**			
	M	***SD***	***M***	***SD***	***F***	***p***
EATQ-R mother						
Surgency	3.19*	.67	2.86*	0.46	3.97	.04*
Negative Affect	2.59*	.55	3.10*	.46	13.90	.00*
Effortful Control	3.26	.68	2.98	.46	2.83	.09
SSI-4						
Frequency	10.63	4.91	9.67	1.53	.11	.74
Duration	7.93	3.30	6.00	2.00	.98	.33
Physical Concomitants	4.17	3.90	3.00	1.37	.26	.62
Overall Score	22.03	13.66	26.99	13.84	1.27	.26
	RCADS-child					
	Below threshold		**Above threshold**			
	M	***SD***	***M***	***SD***	***F***	***p***
EATQ-R child						
Surgency	3.15*	.53	2.80*	.58	10.94	.00*
Negative Affect	2.66*	.50	2.87*	.61	4.21	.04*
Effortful Control	3.29	.53	3.23	.52	.43	.51
Affiliation	3.29	.45	3.36	.50	.60	.44
SSI-4						
Frequency	10.82	5.19	10.43	4.55	.05	.82
Duration	7.41	3.45	8.57	3.98	.98	.33
Physical Concomitants	4.82	3.76	3.71	3.73	.67	.42
Overall Score	22.33	9.67	26.61	19.40	2.41	.12

* $p \leq .05$