The Effects of Age and Pubertal Changes on Cognitive Appraisal Biases in Youth with Social Anxiety Disorder

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Abstract

Cognitive-behavioral models of Social Anxiety Disorder (SAD) have posited cognitive appraisal biases as an underlying causal factor in the development and maintenance of the disorder; studies have suggested that age and pubertal status moderate the presence of cognitive biases in children with SAD. The present study aims to examine age and pubertal changes in cognitive appraisal biases on a social-evaluative task in youth with SAD. In this single-session exposure study, youth with SAD and non-anxious controls (aged 8 to 14) were compared on various self-report measures of anxiety. They also rated their perception of performance after giving a speech before and after receiving positive feedback. Additionally, an observational coding system was developed to assess valence and content of children's utterances during a cognitive restructuring task. Results showed that age and pubertal status were significant negative predictors of self-ratings on speech performance both pre-feedback and post-feedback. However, age and pubertal stage were not significant predictors of negative performance cognitions, but they were significant positive predictors of the total number of cognitions related to performance. The current findings suggest that there are developmental effects on cognitive appraisal biases in youth with SAD, such that older children with SAD have more negative biases when evaluating their performance on a social evaluative task post-feedback. Additionally, cognitive components of treatment may want to focus more on rationalizing and generalizing exposures with younger children instead of restructuring and modifying cognitive biases given that younger children with SAD did not exhibit the same cognitive appraisal biases as older children with SAD.

The Effects of Age and Pubertal Changes on Cognitive Appraisal Biases in Youth with Social Anxiety Disorder

Adolescence is a time during development marked by an increase in social fears and sensitivity to evaluation. These social fears may include worries about adequacy of own behavior, appearance, and performance (Westenberg, Siebelink, & Treffers, 2001). Studies have suggested that the development of social evaluative fears coincide with cognitive development in children. Around the age of 12, children learn to reason deductively and learn about perspective-taking skills (Piaget, 1972; Vasey, 1993). Studies have shown that children only start to incorporate social comparisons around the age of seven, and social-evaluative cognitions are more likely to be present during adolescence (Vasey, 1993; Westenberg, Gullone, Bokhorst, Heyne, & King, 2007). Rosso, Young, Femia, and Yurgelun-Todd (2004) also found significant links between the maturation of abstract reasoning and social anxiety in non-clinical populations.

In a review written by Westenberg, Siebelink, and Treffers (2001), it was suggested that the onset of Social Anxiety Disorder (SAD) overlaps with the developmental time period of normative social fears (i.e. 13 to 17 years old). SAD has been found to be the most common anxiety disorder in children and adolescents, with an estimated lifetime prevalence of 12.1% (Ruscio et al., 2008). Children as young as age seven can be diagnosed with SAD (Beidel, Turner, & Morris, 1999), and the average age of onset is age 13 (Kessler et al., 2005). Given the prevalence of young children who are diagnosed with SAD, it is extremely important to examine the ways in which developmental trajectories may interact with negative social evaluative cognitions that have been theorized to maintain the disorder (Rapee & Heimberg, 1997; Clark & Wells, 1995). What differentiates the teenager who wants to fit in and be liked by her peers, and the teenager who avoids school and extracurricular activities altogether because she is afraid of

interacting with her peers? By examining the interaction between development and negative social evaluative cognitions, we may be able to illuminate the processes through which normative development goes awry.

One specific social evaluative cognition that many theories of SAD have posited as a core feature of social anxiety is fear of negative evaluation (Clark & Wells, 1995; Rapee & Heimberg, 1997). Adult models of the disorder suggest that individuals with SAD are hyperaware of how they look and appear to external observers, and hold themselves to an impossibly high standard (Beck, Emery, & Greenberg, 1985; Clark & Wells, 1995). In particular, Rapee and Heimberg (1997) suggested that there is a maladaptive feedback loop that is created: individuals with SAD focus attentional resources on monitoring the social environment for negative evaluation, and perceived negative evaluation causes an increase in anxiety and negative cognitive appraisal biases. Interestingly, studies have shown that there are normative developmental trends in social evaluation fears in children, such that as children get older, they endorse higher levels of fear of negative evaluation (Westenberg et al., 2007). In addition, Alfano, Beidel and Turner (2006) found that adolescents with SAD had more negative thoughts related to their performance on a role-play task and a read aloud task compared to both younger children with SAD and non-anxious controls, suggesting that age moderates negative cognitive appraisal biases in children with SAD. Given that no developmental models of SAD exist, it is unclear how the normative fear of negative evaluation and appraisal plays a role in the etiology and maintenance of the disorder in younger populations.

Ollendick and Hirschfeld-Becker (2002) suggest that SAD develops when normative social fears goes awry, and considerable distress and impairment occur when periods of social anxiety do not dissipate over time. Research has shown that SAD is a disorder that young people

do not recover from if left untreated (Beidel et al., 1999), highlighting the importance of implementing effective treatments for youth with SAD. Cognitive-behavioral therapy (CBT) is one of the most effective treatments for children with SAD (Silverman, Kurtines, Ginsburg, Weems, Lumpkin, & Carmichael, 1999). CBT for SAD generally includes a combination of cognitive restructuring, social skills training, exposure and psychoeducation (Seligman & Ollendick, 2011). It has also been found that children and adolescents are able to maintain treatment gains two to five years post-treatment, supporting the long-term benefits of CBT (Kendall & Southam-Gerow, 1996).

Given that cognitive biases have been suggested to contribute to the etiology and maintenance of SAD, cognitive restructuring is an effective method to help individuals learn to cope with anxiety (Mattick & Peters, 1988; Mattick, Peters, & Clarke, 1990). Cognitive restructuring consists of the identification of automatic cognitive biases, the situations that elicit them, and modifying the maladaptive thinking styles and cognitions (Leahy & Rego, 2012; Kendall et al., 2005; Seligman & Ollendick, 2011). For example, a child may have the cognitive bias that that she will fail her exams regardless of how much she studies, and the teacher will think that she is incompetent. During cognitive restructuring, the child will first recognize the cognitive bias, and understand that it is elicited by her exams. Modifying the negative cognition includes challenging the child's assumptions, and helping her internalize coping thoughts such as "the teacher will be able to see that I tried my best, and won't think that I am stupid". Cognitive restructuring is particularly crucial to the treatment of SAD given that biases in cognitive processing of information is one of the most important factors contributing to the etiology (Beidel, Turner, & Morris, 1999). Examples of maladaptive thoughts may include "I must always sound intelligent and fluent or people will think that I am stupid," and, "If my hands

shake or show any other signs of anxiety, people can tell that I am nervous" (Clark, 2001; Rapee & Heimberg, 1997), and are representative of some of the different cognitive biases that people have proposed in adult cognitive-behavioral models of SAD.

Although cognitive restructuring is effective in treating individuals with SAD, there have been suggestions that it may not be as effective for younger children as cognitive restructuring components of treatments are adapted from adult practices (Spence, 1994; Alfano et al., 2002). It has been reported that younger children, aged 7-9, experienced difficulty with cognitive restructuring as they had difficulty understanding the concept of cognitive challenging and negative cognitions (Spence et al., 2000). Cognitive challenging focuses on challenging the child's prior assumptions, and ensuring that the child learns the skills needed to challenge maladaptive cognitions in the future (Spence, 1994). Spence and colleagues (2000) suggested that the time spent on cognitive restructuring might have been better spent on more behavioral interventions such as exposures. Limitations in meta-cognitive awareness could be part of the reason why cognitive restructuring may not be as efficacious for younger children, as they were unable to identify specific cognitive biases that were related to their anxiety. From an information-processing perspective, metacognitive skills and the ability to evaluate one's own cognitions emerge during late childhood, and adolescents become more aware of their own cognitions (Siegler, 1998; Keating, 1990). Another possibility is that adult models of SAD do not apply to younger children due to the differences in meta-cognitive awareness and perspective-taking skills (Vasey, 1993). Younger children with SAD may not have the same maladaptive appraisal biases as adults and adolescents with SAD when it comes to evaluating their own social interactions and inferring what others may think.

Current Study

The current study was designed to examine developmental factors that influence cognitive appraisal biases in youths aged 8 to 14 with SAD. In particular, the cognitive biases involved in appraising one's performance on a social evaluative task were examined. This allowed us to assess whether or not adult cognitive-behavioral models of SAD are applicable for children with SAD, and how normative development of social evaluative fears may overlap with the development of maladaptive appraisal biases that serve to maintain SAD. In particular, this will also give insight to whether or not cognitive components of treatments, such as cognitive restructuring tasks, are developmentally appropriate for younger children with SAD.

Age and pubertal stage were used as constructs to examine development in the current study. Although there has been lots of research on the normative development of fear and cognitive development in relation to age, it has been noted that age is only a rough estimate of the developmental stages and does not accurate reflect the child's developmental level (Kazdin, 1989; Bokhorst & Westenberg, 2011). Age, however, allows us to examine the variability that is present within each age cohort (Bokhorst & Westenberg, 2011), and acts a proxy for cognitive development. Pubertal stage, on the other hand, has often been used as a measure of development in relation to the development of secondary sex characteristics, Pubertal stage may be linked to biological changes in the body given that it is a time when there is an increase in hormones which influence brain structures and cognitions (Forbes & Dahl, 2010; Blakemore & Choudhury, 2006).

We hypothesized that increasing age and pubertal status will predict (1) lower self-ratings when appraising performance on a social-evaluative task in youth with SAD only, and (2) increased negative cognitions during a cognitive restructuring task in youth with SAD only.

Previous research suggested that age moderates cognitive biases in childhood anxiety such that adolescents with SAD exhibit more negative cognitive biases compared to younger children with SAD and age-matched controls (Weems et al., 2001; Alfano et al., 2006). The presence of these cognitive biases may lead children with SAD to rate themselves lower when appraising their performance on a social evaluative task. Similarly, studies have also measured pubertal status to examine developmental changes in cognitive biases in social anxiety, and have found that increasing pubertal status predicted levels of social anxiety (Dahl, 2004; Deardorff, Hayward, Wilson, Bryson, Hammer, & Agras, 2007).

Method

Participants

42 parent-child dyads were recruited from the Greater Boston Area. 25 children had a primary diagnosis of SAD and 17 children were non-anxious, psychopathology-free controls. The age range for all children was 8-14 years, and the mean age was 11.05 years (*SD*=2.12). Children with SAD and non-anxious controls were age-matched. Fifteen participants were male (36%).

Measures

Anxiety Disorders Interview Schedule for DSM-IV: Child and Parent Versions (ADIS-IV-C/P). The SAD module of the ADIS-IV-C/P 9 (Silverman & Albano, 1996) was administered separately to the parent and child, assessing fear of 22 social situations. The diagnosis is made taking into account both symptom count and impairment level. Test-retest reliability of the social

phobia module indicated excellent levels of reliability, with intra-class correlation of 0.89 (Silverman, Saavedra, & Pina, 2001).

Social Anxiety Scale for Children – Revised (SASC-R). The SASC-R (La Greca & Stone, 1993) is a self-report measure that assesses levels of social anxiety in children. There are 18 items and 4 filler items rated on a 5-point Likert scale that evaluate Fear of Negative Evaluation from peers, Social Avoidance and Distress around New Peers or in New Situations, and Generalized Social Avoidance and Distress. All subscales had acceptable internal reliability; for Fear of Negative Evaluation, $r = 0.86$, Social Avoidance and Distress around New Peers or in New Situations, $r = 0.78$, and Generalized Social Avoidance and Distress, $r = 0.69$ (La Greca & Stone, 1993).

Tanner Stages of Pubertal Development. Tanner stages of pubertal development was used to measure a child's current stage of pubertal development (Marshall & Tanner, 1969; 1970). Parents report or estimate their child's stage of pubertal development using gender-appropriate depictions of secondary sex characteristics representing five stages of pubertal development for boys and girls. In a study conducted by Rasmussen and colleagues (2015), 86.2% of parents estimated the onset of puberty correctly in girls, $r = 0.71$, and 68.4% of parents estimated the onset of puberty correctly in boys, $r = 0.37$.

Perception of Performance Questionnaire (POP). The POP is a self-report measure that was created specifically for this study. The child makes a brief speech evaluation of their own performance consisting of two questions. Question 1 is "How do you think you did on the speech?" and the rating is made an 11-point Likert Scale (0 = Very badly, 5 = So-so, 10 = Very well). Question 2 is "How much do you think the committee liked your speech?" and the rating is made on an 11-point Likert Scale (0 = Not at all, 5 = Somewhat, 10 = Very much). The child

completes this questionnaire twice: once immediately after giving the speech, before receiving feedback, and once more after receiving feedback from the committee.

Subjective Units of Distress (SUDS). SUDS ratings are used to measure anxiety levels during the exposure on a rating scale from 0 to 8, where 0 is "not anxious at all" and 8 is "very, very much anxious" (Kendall, Robin, Hedtke, & Suveg, 2005). Children were asked to report their SUDS ratings at 11 different time points, and they were given an image of a thermometer as a visual aid for the rating scale.

Procedures

Baseline. Parent and child filled out self-report questionnaires individually in different rooms. A graduate student administered the SAD module of the ADIS-IV-C/P to the parent and child separately.

Social Evaluative Task. A child-friendly version of the Trier Social Stress Task (TSST; Kirschbaum, Pirke, & Hellhammer, 1993) was used as a graduated exposure to a social evaluative task. The child was asked to give a speech on one of five child-friendly topics in front of three committee members. The child was given five minutes to prepare the speech with their parent. The child then gave a five-minute speech in front of one of the committee members before giving the same speech to three committee members. If the child stopped talking before the time is up, the committee members would give the child a standard prompt such as "you still have some time left, please continue." After the speech, the committee gave one minute of only positive feedback on the child's speech performance. Examples of positive feedback are "Good job speaking for the entire five minutes, which is extremely challenging for other kids your age" and "You made really great eye-contact and had good voice projection during your speech."

Cognitive Restructuring Task. After the TSST, the graduate student and the child were given time (8 minutes) to have a cognitive restructuring discussion based on common CBT practices. During the task, the child is asked to identify "worry thoughts," negative self-evaluations they experienced during the speech task. There is a discussion on coping thoughts, attempting to modify some of the negative cognitions the child may have had. For example, a child said, "I was saying um a lot, and sounded unsure" as one of her worry thoughts, and her coping thought was, "the committee did not even notice it, and thought I sounded very confident." The graduate student discussed how people are their own worst critic, and notice details about their speeches that others may not be aware of. In addition, the graduate student also rationalizes the exposure, and helps the child generalize the exposure to other social situations in his or her life. Examples of rationalizing may include discussing anticipatory anxiety and facing fears head on, and examples of generalization include practicing social skills in other contexts such as making new friends.

Coding of Cognitive Restructuring Task. Coders blind to study condition watched video-recordings of the cognitive restructuring discussion and coded each utterance made by the child based on both valence (i.e. negative, neutral or positive) and content (i.e. emotion or performance), adapted from the coding used by Alfano and colleagues (2006) to study a role play task and a read aloud task. Emotion was coded based on how the child expresses how he/she was feeling before, during, or after the speech, and valence was determined based on the Positive and Negative Affect Schedule - Expanded Form (PANAS-X), which assesses distinguishable affective emotional states (Watson & Clark, 1994). Performance was coded when children made explicit references to performance evaluation or social skills in relation to worries or thoughts before, during or after his/her speech performance. For example, "I was terrified" would be

coded as negative emotion, and "I was very articulate" would be coded as positive performance. One person coded all of the videos, and 25% of videos were also rated independently by a second rater based on the Coding Manual (see Appendix B) to determine inter-rater reliability. The codes of the rater who coded all of the videos were used for analysis.

Results

Youth Self-Report

Social Anxiety

Multiple analyses of covariance (ANCOVA) were conducted to examine the differences between children with SAD and non-anxious controls on the subscales of the SASC-R, Fear of Negative Evaluation, Social Avoidance and Distress around New Peers or in New Situations, or Generalized Social Avoidance and Distress, with age or pubertal status as a covariate. There were no significant differences between the scores of children with SAD and non-anxious controls on the Fear of Negative Evaluation subscale after controlling for age, $F(1, 39) = 2.58, p$ = N.S. The covariate, child's age, was significantly related to children's scores on the Fear of Negative Evaluation subscale, $F(1, 39) = 12.45, p = 0.001$. Similarly, there were also no significant differences between the scores of children with SAD and non-anxious controls on Fear of Negative Evaluation after controlling for pubertal stage, and pubertal stage was significantly related to all children's scores, $F(1, 39) = 9.71, p = 0.003$.

An ANCOVA showed that there were significant differences between children with SAD and non-anxious controls after controlling for age and pubertal stage on the subscales of Social Avoidance and Distress around New Peers or in New Situations, $F(1, 39) = 4.26, p = 0.046$, and Generalized Social Avoidance and Distress, $F(1,39) = 3.67, p = 0.063$. Children with SAD endorsed higher levels of social avoidance and distress in new situations, as well as general

social avoidance and distress compared to non-anxious controls. The child's age did not have a significant effect as a covariate.

In a linear regression model, group, pubertal status and their interaction were entered as variables to predict Social Avoidance and Distress scores on the SASC-R. Group was a significant positive predictor of Social Avoidance and Distress around New Peers or in New Situations, $\beta = 0.31$, $t(37) = 2.13$, $p = 0.04$. The interaction, group X pubertal status, was also a significant predictor of Social Avoidance and Distress around New Peers or in New Situations, $\beta = 0.440$, $t(37) = 2.02$, $p = 0.05$. Similarly, when group, pubertal status and their interaction were entered as predictors of Generalized Social Avoidance and Distress in a linear regression model, group was a significant positive predictor, $\beta = 0.32$, $t(37) = 2.27$, $p = 0.029$. The interaction, group X pubertal status, was also a significant predictor of Generalized Social Avoidance and Distress, $\beta = 0.54$, $t(37) = 2.58$, $p = 0.015$.

Anxiety during Social Evaluative Task and Cognitive Restructuring

A paired samples t-test showed that there was a significant increase in SUDS ratings from baseline ($M = 1.93$, $SD = 1.84$) to TSST ($M = 5.21$, $SD = 2.38$); $t(41) = -9.03$, $p < 0.001$ (see Figure 1). However, there were no significant differences between children with SAD and non-anxious controls, $F(1, 40) = 0.065$, $p =$ N.S., suggesting that the TSST was as effective for non-anxious controls compared to children with SAD.

An ANCOVA showed that there were no significant differences between groups on SUDS ratings pre- and post-feedback and after feedback. However, the difference in SUDS ratings made by children with SAD and non-anxious controls before the cognitive restructuring task was trending towards significance, $F(1, 40) = 3.15$, $p = 0.083$. Prior to the cognitive

restructuring task, children with SAD reported higher ratings of anxiety, $M = 1.59$, $SD = 1.76$, compared to non-anxious controls, $M = 0.76$, $SD = 0.93$. There was also a significant difference between the SUDS ratings made by children with SAD and non-anxious controls after the cognitive restructuring task, $F(1, 40) = 6.32$, $p = 0.016$. However, both age and pubertal status as covariates did not have a significant effect on SUDS ratings, and there were no significant age X group or pubertal status X group interactions.

A paired samples t-test was used to examine differences in SUDS before and after feedback from the committee. The results showed that for all participants, there was a significant decrease in SUDS ratings from pre-feedback ($M = 4.68$, $SD = 2.50$) to post-feedback ($M = 1.79$, $SD = 1.83$). Similarly, a paired samples t-test showed that there was a significant difference between the SUDS ratings before and after the cognitive restructuring task. Ratings decreased significantly from before the task ($M = 1.26$, $SD = 1.52$) to after the cognitive restructuring task ($M = 0.45$, $SD = 0.89$).

Self-Appraisals of Performance on a Social-Evaluative Task

In four different ANCOVA models, all analyses showed that there were no significant group differences on POP ratings both pre-feedback and post-feedback after controlling for both the child's age and pubertal stage. Pubertal stage was also not significantly related to POP scores both pre-feedback and post-feedback. However, child's age was significantly related to self-ratings pre-feedback, $F(1, 39) = 11.10$, $p = 0.002$, and post-feedback, $F(1, 39) = 8.57$, $p = 0.006$.

In a linear regression model, group, child's age and their interaction were entered as independent variables to predict POP scores pre-feedback. Both group and age did not significantly predict POP scores pre-feedback. However, the group X age interaction

significantly predicted POP scores pre-feedback, $\beta = -0.47$, $t(38) = -2.07$, $p = 0.045$ (see Figure 2). When group, child's pubertal status and their interaction were entered as predictors in a linear regression model, none of the variables and their interaction significantly predicted POP scores pre-feedback.

Group, age and their interaction were also entered as predictors for POP scores post-feedback in a linear regression model. Similarly, group and age were not significant predictors of POP scores post-feedback, but the group X age interaction was a significant predictor, $\beta = -0.49$, $t(38) = -2.12$, $p = 0.041$ (see Figure 3). When group, pubertal stage and their interaction were entered as predictors for POP scores post-feedback in a Linear Regression model, group and pubertal stage were not significant predictors of POP scores post-feedback. However, their interactions, group X pubertal stage, was a significant predictor of POP scores post-feedback, $\beta = -0.61$, $t(38) = -2.78$, $p = 0.009$.

Observational Coding of Cognitive Restructuring Task

Inter-Rater Reliability

Inter-rater reliability (IRR) was assessed using a one-way mixed, absolute value, single-measures ICC (Hallgren, 2012) to assess the degree that coders provided consistency in their ratings of children's statements during the cognitive restructuring task. Table I shows the ICC for each of the codes. The resulting ICC were in the good (0.60-0.74) to excellent (0.75-1) range (Cicchetti, 1994), indicating that codes had a high degree of agreement. Observational codes were therefore deemed suitable for hypothesis testing in the present study.

Observational Coding

Multiple one-way ANOVA showed that there were no significant differences in the content or valence of statements made during the cognitive restructuring task by children with SAD and non-anxious controls after controlling for age and pubertal status. However, linear regression analyses showed that for children with SAD, age was a significant negative predictor of statements that contained positive emotion, $\beta = -0.55$, $t(23) = -3.133$, $p = 0.005$. Age also explained a significant proportion of variance in positive emotion, $R^2 = 0.27$, $F(1, 23) = 9.82$, $p = 0.005$. For non-anxious controls, age was not a significant predictor for positive emotion. Regression analyses of negative emotion and neutral emotion with either age or pubertal status as predictors were not significant.

In addition, linear regression analyses showed that for children with SAD, age was a significant positive predictor of frequencies of performance-related statements, $\beta = 0.50$, $t(23) = 2.74$, $p = 0.012$ (see Figure 4). Age also explained a significant proportion of variance in statements containing performance, $R^2 = 0.21$, $F(1, 23) = 7.51$, $p = 0.012$. Age was not a significant predictor of performance-related statements in non-anxious controls. Similarly, increasing pubertal stage was also a significant positive predictor of performance statements, $\beta = 0.51$, $t(23) = 2.78$, $p = 0.011$ (see Figure 5). Pubertal status also explained a significant proportion of the variance in frequency of statements related to performance, $R^2 = 0.23$, $F(1, 23) = 7.71$, $p = 0.011$. Linear regression analyses showed that age and pubertal status were not significant predictors of the number of statements containing negative performance.

Correlations Across All Variables

Table II shows the bivariate correlations between SAS subscales and POP scores before and after feedback. The Fear of Negative Evaluation subscale on the SAS was significantly negatively correlated to all ratings of speech performance before receiving feedback on the POP, $r(42) = -.35$, $p = 0.025$. On the other hand, ratings of speech performance on the POP after receiving positive feedback were significantly correlated with the SAS Social Avoidance and Distress around New Peers or in New Situations, $r(42) = -.39$, $p = 0.011$.

Discussion

This study examined the age and pubertal changes in cognitive appraisal biases in children with and without Social Anxiety Disorder. The results suggest that there are developmental effects on components of social evaluative fears in both clinical and non-clinical populations, such as fear of negative evaluation, as both age and pubertal stage predicted fear of negative evaluation scores in all participants. This is consistent with prior studies that have suggested that social evaluative fears are part of the normal developmental trajectories, and emerges during late childhood and early adolescence (Westenberg, 2001; Vasey, 1993; Miers et al., 2013). Both age and pubertal stage were significant predictors of fear of negative evaluation. In addition, the significant differences between the scores of children with SAD and non-anxious controls on social avoidance and distress in new situations, and in general, suggest that it may be these specific domains of social anxiety that contribute to the maintenance of the anxiety disorder in children of all ages. Miers and colleagues (2013) found that social anxiety was significantly related to increased avoidance in a longitudinal study of social anxiety in children aged 9 to 21, suggesting that avoidance plays a key role in the maintenance of SAD during late

childhood and adolescence. However, given that age and pubertal status did not predict social avoidance and distress in non-anxious controls, the current study is not consistent with Deardorff and colleagues (2007), who found that pubertal development was related to social anxiety in non-clinical samples.

Despite no significant differences between youth with SAD and age-matched controls in fear of negative evaluation, results showed that with increasing age, children with SAD are more likely to negatively appraise their performances on a social evaluative task such as public speaking. This finding was inconsistent with other empirical studies that suggest that there are negative cognitive biases in children with SAD compared to non-anxious controls regardless of age (e.g. Alfano et al., 2006, Spence, Donovan, & Brechman-Toussaint, 1999). In addition, the relationship between increased social avoidance and distress around new peers or in new situations and lower appraisals of performance post-feedback suggest that there may be cognitive biases that underlie both constructs.

Furthermore, there was an interaction between age and group for self-ratings post-feedback. The self-ratings of SAD were predicted by age, whereas the self-ratings of non-anxious controls were not. This suggests that increasing age is a predictor of negative biases in the perception of performance in youth with SAD only. In particular, the results for the item on the POP asking the child to rate how much they think the committee liked their speech supports the hypothesis that age would negatively predict self-ratings, and supports the claim that older children with SAD may perceive the committee having a very high standard that the children feel they are unable to live up to. This is consistent with theoretical models of SAD (Rapee & Heimberg, 1997; Clark & Wells, 1995). However, given that younger children did not have lower self-ratings in comparison, this also implies that adult cognitive-behavioral models of SAD

may not be entirely applicable for younger populations with the disorder. One other possible interpretation of this finding, given that these lower ratings are made after receiving positive feedback, is that older children with SAD may experience fear of positive evaluation, which has been posited as a factor that contributes to the maintenance of SAD in adults (Weeks et al., 2008). Studies have shown that individuals with SAD who received positive feedback consequently worried that others would expect more of them and they would not be able to meet people's increased expectations (Wallace & Alden, 1997; Weeks et al., 2008). This may contribute to the cognitive error of *disqualifying the positive*, which occurs when an individual rejects a positive experience (Beck, 1976). Given that older children with SAD seemingly do not take into account the positive evaluation when they rate their speeches again after feedback, it may be that older children believe that the positive feedback is insincere or develop explanations for their successes that have little to do with their own abilities. Given that older children with SAD express significantly less positive emotion during the cognitive restructuring task, it could be that even after receiving positive feedback during the TSST, they feel less positive about their speech performance compared to younger children with SAD due to disqualifying the positive.

From the observational coding of the cognitive restructuring task, the hypothesis that older children with SAD would make more negative statements during the cognitive restructuring task was not supported. The results are inconsistent with the findings of Alfano and colleagues (2006), as there were no differences between children with SAD and non-anxious controls, and age did not play a role in the number of statements made. However, older children with SAD discussed their performance in relation to their worry thoughts and coping thoughts more than younger children with SAD. One possible interpretation of this finding is that older children with SAD may be much better at linking their emotions with their performance on a

social evaluative task, whilst younger children with SAD are unable to connect the two or discuss the two in relation with each other. Children with internalizing disorders, such as SAD, have been suggested to have lower levels of emotion awareness compared to children who are psychopathology-free (Rieffe & Rooij, 2012; Kingery et al., 2006; Southam-Gerow & Kendall, 2000). Southam-Gerow and Kendall (2000) found that emotional understanding plays an important role in children's report of cognition. This could potentially explain why younger children with SAD discussed their performance less during the cognitive restructuring task.

Given that the present study found differences in what age and pubertal stages would predict, one could infer that the two constructs are examining different elements of social cognitive development. It is particularly interesting that age was linked to fear of negative evaluation but not to social avoidance and distress, whereas pubertal status was linked to both fear of negative evaluation and social avoidance and distress. This may be due to the fact that determining the child's pubertal status gives insight to the biological changes that are occurring during this time of development. During puberty, there is hormonal activation of social and motivational behaviors, such as increased interest in interacting with peers and establishing an individual identity (Forbes & Dahl, 2010). In addition, pubertal maturation is also closely linked to heightened stress response and emotional reactivity, which may explain the links between pubertal status and social avoidance in distress (Dahl & Gunnar, 2009). Although age seems to be a good estimate of the developmental stage in relation to cognitive processes, pubertal status may differ due to the links to biological processes that influence behaviors that may contribute to the maintenance of SAD. Many social experiences, such as schooling, are determined based on age and not pubertal status, which could explain some of the effects of age changes but not pubertal changes on cognitive appraisal biases.

Clinical Implications

From the present study, the results suggest that adult models of SAD are not entirely applicable for younger children, whereas adolescents with SAD exhibit some of the same biases as adults with SAD. The findings that younger children did not exhibit the same biases when appraising their performance suggests that exposure alone may serve as an effective treatment for younger children with SAD. In addition, older children with SAD were more likely to discuss their thoughts related to their performance whereas younger children with SAD did not, suggesting that younger children may not have been able to link their anxious feelings to specific cognitive biases related to performance.

Nevertheless, given that the current study showed that social avoidance and distress is strongly linked to SAD in youth regardless of age or pubertal status, it may be more important to help a child rationalize the behavioral components of therapy, such as exposure, and generalize the experience to other social situations in his/her life during cognitive components of therapy. By rationalizing the exposure and generalizing the experience to other situations, children with SAD may learn to stop avoiding these situations, and confront them even when they are feeling anxious. This suggests that there should be more focus on rationalizing and generalizing the exposure as opposed to identifying cognitive biases that younger children with SAD may not have, or may not understand.

Strengths and Limitations

Some strengths of the present study include using both age and pubertal status as measures of development, the use of a TSST as a social evaluative task to examine children's appraisal biases and the observational coding of a cognitive restructuring task. The use of age

allows us to compare the findings from the current study with prior studies that have examined normative development of social evaluative fears, cognition, and cognitive biases in childhood anxiety (e.g. Westenberg et al., 2004; Miers et al., 2013). On the other hand, pubertal stage, in relation to the development of secondary sex characteristics, has often been used as a proxy for biological development. This is due to the fact that puberty is a time when there is an increase in hormones that influence brain structures and brain development (Forbes & Dahl, 2010; Blakemore & Choudhury, 2006). The present study evaluates these cognitive biases using both age and pubertal stage as a measure of development, and directly compares and contrasts the use of these two constructs.

Although there have been many studies that have been used to examine cognitive biases in children, such as a role-play task and read aloud task (Alfano et al., 2006), the use of the social evaluative task incorporates a formal evaluative component, which allows us to explicitly examine if there are any differences between children's self-appraisals compared to what they perceive an audience may expect, both before and after receiving positive feedback. In addition, this study uses observational coding of a cognitive restructuring task after an exposure to examine cognitive biases, which provides insight to the different types of cognitive biases that children may discuss or be able to identify during treatment, such as being worried about the committee not liking their speech, or that they would make a mistake and stumble over their words.

However, one potential limitation when using the cognitive restructuring task as a way to examine appraisal biases in children may be due to the fact that the cognitive restructuring task itself is a social interaction, and for children with SAD, the task could be anxiety provoking. This could affect the amount of statements that were made and the types of statements, as children

with SAD could be assuming that they were being evaluated or judged by the types of statements they made. It may be interesting for future studies to include a method for children to write down what their worry thoughts were before, during, and after the exposure on a worksheet, in addition to articulating them to a researcher during the cognitive restructuring task. This would allow the researcher to examine children's cognitive appraisal biases without any social interaction. Furthermore, there were no self-ratings made on speech performance after the cognitive restructuring task, so we could not assess if children's self-ratings increased after identifying and modifying some of their negative cognitive appraisals.

One other limitation is that the two groups, children with SAD and non-anxious controls, were not gender matched, although some findings have suggested there may be gender differences in the development of cognitive biases during puberty (Dahl, 2004). Prior studies have found that girls in middle childhood and adolescence exhibit greater concerns about peer evaluation and social evaluation compared to boys, but there are no clear developmental effects (Liu & Kaplan, 1999; Rudolph & Conley, 2005). Given these findings, it may have been better to gender match in addition to age match non-anxious controls and children with SAD.

Future Directions

Given the findings of this study, future research may improve upon our understanding of cognitive appraisal biases in children and adolescents with SAD by breaking down the different types of cognitive biases. Weems and colleagues (2001) found that increasing age moderated the relation between types of cognitive biases and social anxiety in children with anxiety disorders, such as catastrophizing. This would complement the findings of the current study, as it may

highlight specific types of maladaptive appraisal biases for clinicians to target in treatment for specific age groups.

In addition to the use of age and pubertal stage as measures of development, an additional measure of cognitive abilities or assessment of social cognition could be included. For example, Rosso et al. (2004) administered part of the Wechsler Adult Intelligence Scale to measure abstract reasoning ability. This would allow researchers to more comprehensively explore the links between the maturation of social cognition and cognitive appraisal biases. Although age and pubertal status have been widely used as constructs to measure development, both are indirect measures of the developmental stage that a child or adolescent is at. Incorporating a measure that directly assesses a child's cognitive capabilities would shed light on how cognitive capabilities are related to social evaluative fears and cognitive appraisal biases.

As pubertal stage has been found to be a significant predictor for self-reported social anxiety in children with SAD, it would also be interesting to examine sex differences in children with SAD, and whether or not there are differences between girls and boys in the development of social anxiety. There have been many studies that have proposed that puberty-related changes in the brain might create greater stress sensitivity and greater vulnerability to negative social evaluation (Dahl, 2004; Dahl & Gunnar, 2009, Nelson, Leibenluft, McClure, & Pine, 2005). However, it is unclear how sex differences may interact with greater stress sensitivity during development (Deardorff et al., 2007; Borkhorst & Westenberg, 2002). Studies on gender differences in subjective distress suggest that adolescent girls and women manifest higher levels of subjective distress compared to adolescent boys (Liu & Kaplan, 1999). It would be interesting to see if there are sex differences on a cognitive level in youth with SAD.

Conclusions

Our findings confirmed the hypothesis that increasing age and pubertal status would predict lower self-ratings when children with SAD appraised their own performance on a social-evaluative task. In addition, results suggested that older children with SAD were more likely to discuss their performance during a cognitive restructuring task compared to younger children with SAD. These findings are consistent with prior studies that suggest older children with anxiety have more negative cognitive biases compared to younger children (e.g. Alfano et al., 2006). This may indicate that development interacts with SAD when examining the cognitive biases that may later maintain the disorder.

The findings from the present study propose that it may be beneficial for children with SAD to have a cognitive component of treatment that rationalizes and generalizes behavioral components such as exposures. Based on prior studies and results from the present study, it is evident that younger children with SAD do not have the same negative cognitive biases as older children with SAD, as they do not seem to assume there is an impossibly high standard to which they are being evaluated. This implies that there may be other factors contributing to the etiology and maintenance of the disorder. However, as social avoidance and distress were linked to both negative appraisals of performance post-feedback and SAD, clinicians seeing younger patients with SAD may want to focus more on generalizing exposures and encouraging children to stop avoiding social evaluative tasks and face their fears head on. In contrast, adolescents may benefit more from cognitive restructuring and cognitive challenging. Cognitive restructuring may help modify adolescents' beliefs and maladaptive cognitive appraisal biases, for example that the audience is comparing them to an unrealistically high standard that they will never be able to reach.

It is also interesting to think about the ways in which the normative development of fear may interact with, or contribute to the development of clinical levels of fear and anxiety. Given that older children endorse higher levels of fear of negative evaluation, it can be inferred that adolescence and pubertal maturation may be a time of vulnerability for youth to develop SAD. However, the fact that younger children do not seem to have the same cognitive biases that maintain SAD, there is a need for models of SAD for both children and adolescents. By understanding what the developmental trajectories of SAD look like in children and adolescents, clinicians may be able to improve cognitive components of treatment so they can be effective for children at different developmental stages.

References

Albano, A. M., Chorpita, B. F., & Barlow, D. H. (2003). Childhood anxiety disorders. In E. J. Mash and R. A. Barkley (Eds.), *Child psychopathology* (2nd ed., pp. 279-329). New York: Guilford.

Alfano, C. A., Beidel, D. C., & Turner, S. M. (2002). Cognition in childhood anxiety: conceptual, methodological, and developmental issues. *Clinical Psychology Review*, *22*(8), 1209-1238.

Alfano, C. A., Beidel, D. C., & Turner, S. M. (2006). Cognitive Correlates of Social Phobia Among Children and Adolescents. *Journal of Abnormal Child Psychology, 34*(2), 189-201.

Beck, A. T. (1979). *Cognitive therapy and the emotional disorders*. New York, NY: Penguin.

Beck, A. T., Emery, G., & Greenberg, R. L. (Eds.). (1985). *Anxiety Disorders and Phobias: A Cognitive Perspective*. Basic Books.

Beidel, D. C., Turner, S. M., & Morris, T. L. (1999). Psychopathology of childhood social phobia. Journal of the American Academy of Child and Adolescent Psychiatry, 38, 643 – 650.

Beidel, D. C., Turner, S. M., & Morris, T. L. (2000). Behavioral treatment of childhood social phobia. Journal of Consulting and Clinical Psychology, 68, 1072 – 1080.

Blakemore, S. J., & Choudhury, S. (2006). Development of the adolescent brain: implications for executive function and social cognition. *Journal of child psychology and psychiatry, 47*(3-4), 296-312.

Bokhorst, C.L., & Westenberg, P.M. (2011) Social Anxiety Disorder: a normal fear gone awry? In W.K. Silverman & A.P. Field (Eds.), *Anxiety Disorders in Children and Adolescents* (pp. 90-102). Cambridge, UK: Cambridge University Press.

Cartwright-Hatton, S., Reynolds, S., & Wilson, C. (2011). Adult models of anxiety and their application to children and adolescents. In W.K. Silverman & A.P. Field (Eds.), *Anxiety Disorders in Children and Adolescents* (pp. 129-158). Cambridge, UK: Cambridge University Press

Cicchetti, D. V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. Psychological assessment, 6(4), 284-290.

Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. *Social phobia: Diagnosis, assessment, and treatment*, *41*(68), 00022-3.

Clark, D. M. (2001). A cognitive perspective on social phobia. In Crozier, W.R., & Alden, L.E., *International Handbook of Social Anxiety: Concepts, Research and Interventions Relating to the Self and Shyness* (405-430). New York: Wiley.

Dahl, R. E. (2004). Adolescent brain development: a period of vulnerabilities and opportunities. *Annals of the New York Academy of Sciences, 1021*(1), 1-22.

Dahl, R. E., & Gunnar, M. R. (2009). Heightened stress responsiveness and emotional reactivity during pubertal maturation: implications for psychopathology. *Development and psychopathology, 21*(01), 1-6.

Deardorff, J., Hayward, C., Wilson, K. A., Bryson, S., Hammer, L. D., & Agras, S. (2007). Puberty and gender interact to predict social anxiety symptoms in early adolescence. *Journal of Adolescent Health, 41*(1), 102-104.

Fischer, K. W., & Farrar, M. J. (1987). Generalizations about generalization: How a theory of skill development explains both generality and specificity. *International Journal of Psychology, 22*(5-6), 643-677.

Forbes, E. E., & Dahl, R. E. (2010). Pubertal development and behavior: hormonal activation of social and motivational tendencies. *Brain and Cognition, 72*(1), 66-72.

Hallgren, K. A. (2012). Computing inter-rater reliability for observational data: An overview and tutorial. *Tutorials in quantitative methods for psychology, 8*(1), 23-24.

Heimberg, R. G., Brozovich, F. A., Rapee, R. M. (2010). A cognitive-behavioral model of social anxiety disorder: Update and extension. In S. Hofmann & P. DiBartolo (Eds.), *Social anxiety: Clinical, developmental, and social perspectives,* 395-422. Burlington, MA: Elsevier.

Kashdan, T. B., & Herbert, J. D. (2001). Social anxiety disorder in childhood and adolescence: Current status and future directions. *Clinical Child and Family Psychology Review, 4*(1), 37-61.

Keating, D. P. (1990). Adolescent thinking. In S. Feldman & G. Elliot (Eds.), *At the threshold: The developing adolescent* (pp. 54-89). Cambridge: Harvard.

Kendall, P. C., & Southam-Gerow, M. A. (1996). Long-term follow-up of a cognitive–behavioral therapy for anxiety-disordered youth. *Journal of Consulting and Clinical Psychology*, *64*(4), 724-730.

Kendall, P. C., Robin, J. A., Hedtke, K. A., Suveg, C., Flannery-Schroeder, E., & Gosch, E. A. (2005). Considering CBT with Anxious Youth? Think Exposures. *Cognitive and Behavioral Practice*, *12*(1), 136-148.

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Archives of general psychiatry, 62(6), 593-602.

Kingery, J. N., Roblek, T. L., Suveg, C., Grover, R. L., Sherrill, J. T., & Bergman, R. L. (2006). They're Not Just "Little Adults": Developmental Considerations for Implementing Cognitive-Behavioral Therapy with Anxious Youth. *Journal of Cognitive Psychotherapy, 20*(3), 263-273.

Kirschbaum, C., Pirke, K. M., & Hellhammer, D. H. (1993). The 'Trier Social Stress Test'–a tool for investigating psychobiological stress responses in a laboratory setting. *Neuropsychobiology*, *28*(1-2), 76-81.

La Greca, A. M., & Stone, W. L. (1993). Social anxiety scale for children-revised: Factor structure and concurrent validity. *Journal of Clinical Child Psychology, 22*(1), 17-27.

Leahy, R.L. and Rego, S. (2012) Cognitive restructuring. In W. O'Donohue and J. Fisher (Eds.), *Cognitive Behavior Therapy: Core Principles for Practice.* (pp.133-158). Wiley: Hoboken, NJ.

Liu, X., & Kaplan, H. B. (1999). Explaining gender differences in symptoms of subjective distress in young adolescents. *Stress Medicine, 15*(1), 41-51.

Magnúsdótir, I., & Smári, J. (1999). Social anxiety in adolescents and appraisal of negative events: Specificity or generality of bias? *Behavioural and Cognitive Psychotherapy, 27*(3), 223-230.

Marshall, W. A., & Tanner, J. M. (1970). Variations in the pattern of pubertal changes in boys. *Archives of disease in childhood, 45*(239), 13-23.

Marshall, W. A., & Tanner, J. M. (1969). Variations in pattern of pubertal changes in girls. *Archives of disease in childhood, 44*(235), 291-303.

Mattick, R. P., & Peters, L. (1988). Treatment of severe social phobia: effects of guided exposure with and without cognitive restructuring. *Journal of Consulting and Clinical Psychology, 56*(2), 251.

Mattick, R. P., Peters, L., & Clarke, J. C. (1990). Exposure and cognitive restructuring for social phobia: A controlled study. *Behavior therapy, 20*(1), 3-23.

Miers, A.C., Blote, A.W., Rooij, M., Bokhorst, C.L., & Westenberg, P.M. (2013). Trajectories of Social Anxiety during adolescence and relations with cognition, social competence, and temperament. *Journal of Abnormal Child Psychology, 41(1),* 97-110.

Morris, T. L., Hirshfeld-Becker, D. R., Henin, A., & Storch, E. A. (2005). Developmentally sensitive assessment of social anxiety. *Cognitive and Behavioral Practice, 11*(1), 13-28.

Nelson, E. E., Leibenluft, E., McClure, E., & Pine, D. S. (2005). The social re-orientation of adolescence: a neuroscience perspective on the process and its relation to psychopathology. *Psychological medicine, 35*(2), 163-174.

Ollendick, T. H., & Hirshfeld-Becker, D. R. (2002). The developmental psychopathology of social anxiety disorder. *Biological Psychiatry, 51*(1), 44-58.

Piaget, J. (1972). Intellectual evolution from adolescence to adulthood. Human *development*, *15(1)*, 1-12.

Rasmussen, A. R., Wohlfahrt-Veje, C., de Renzy-Martin, K. T., Hagen, C. P., Tinggaard, J., Mouritsen, A., ... & Main, K. M. (2015). Validity of self-assessment of pubertal maturation. *Pediatrics*, *135*(1), 86-93.

Rapee, R. M., & Heimberg, R. G. (1997). A cognitive-behavioral model of anxiety in social phobia. *Behavior Research and Therapy*, *35*(8), 741-756.

Rieffe, C., & De Rooij, M. (2012). The longitudinal relationship between emotion awareness and internalising symptoms during late childhood. *European child & adolescent psychiatry, 21*(6), 349-356.

Rosso, I.M., Young, A.D., Femia, L.A., & Yurgelun-Todd. A.D. (2004). Cognitive and emotional components of frontal love functioning in childhood and adolescence. *Annals of the New York Academy of Sciences, 1021*, 355-362.

Rudolph, K. D., & Conley, C. S. (2005). The Socioemotional Costs and Benefits of Social-Evaluative Concerns: Do Girls Care Too Much?. Journal of personality, 73(1), 115-138.

Ruscio, A. M., Brown, T. A., Chiu, W. T., Sareen, J., Stein, M. B., & Kessler, R. C. (2008). Social fears and social phobia in the USA: results from the National Comorbidity Survey Replication. *Psychological medicine*, *38*(01), 15-28.

Schmitz, J., Blechert, J., Krämer, M., Asbrand, J., & Tuschen-Caffier, B. (2012). Biased perception and interpretation of bodily anxiety symptoms in childhood social anxiety. *Journal of Clinical Child & Adolescent Psychology*, *41*(1), 92-102.

Seligman, L. D., & Ollendick, T. H. (2011). Cognitive-behavioral therapy for anxiety disorder in youth. *Child and adolescent psychiatric clinics of North America*, *20*(2), 217-238.

Siegler, R.S. (1998). *Children's Thinking* (3rd ed.). Upper Saddle River, NJ: Prentice-Hall.

Siess, J., Blechert, J., & Schmitz, J. (2014). Psychophysiological arousal and biased perception of bodily anxiety symptoms in socially anxious children and adolescents: a systematic review. *European child & adolescent psychiatry*,*23*(3), 127-142.

Silverman, W.K., Albano, A.M. (1996). The Anxiety Disorders Interview Schedule for Children for DSM-IV: Child and Parent Versions. San Antonio, TX: Psychological Corporation.

Silverman, W. K., Saavedra, L. M., & Pina, A. A. (2001). Test-retest reliability of anxiety symptoms and diagnoses with the Anxiety Disorders Interview Schedule for DSM-IV: child and parent versions. *Journal of the American Academy of Child & Adolescent Psychiatry*, *40*(8), 937-944.

Silverman, W. K., Kurtines, W. M., Ginsburg, G. S., Weems, C. F., Lumpkin, P. W., & Carmichael, D. H. (1999). Treating anxiety disorders in children with group cognitive-behavioral therapy: A randomized clinical trial. *Journal of consulting and clinical psychology*, *67*(6), 995.

Spence, S. H. (1994). Cognitive therapy with children and adolescents: From theory to practice. *Journal of Child Psychology and Psychiatry, 35*(7), 1191-1228.

Spence, S. H., Donovan, C., & Brechman-Toussaint, M. (2000). The treatment of childhood social phobia: the effectiveness of a social skills training-based, cognitive-behavioral intervention with and without parental involvement. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 41*, 713 – 726.

Turner, S. M., Beidel, D. C., Wolff, P. L., Spaulding, S., & Jacob, R. G. (1996). Clinical features affecting treatment outcome in social phobia. *Behaviour Research and Therapy*, *34*(10), 795-804.

Vasey, M. (1993). Development and cognition in childhood anxiety. The example of worry. *Advances in clinical child psychology*, *15*, 1-39.

Wallace, S. T., & Alden, L. E. (1997). Social phobia and positive social events: The price of success. *Journal of Abnormal Psychology, 106*(3), 416.

Weeks, J. W., Heimberg, R. G., Rodebaugh, T. L., & Norton, P. J. (2008). Exploring the relationship between fear of positive evaluation and social anxiety. *Journal of Anxiety Disorders, 22*(3), 386-400.

Weems, C. F., Berman, S. L., Silverman, W. K., & Saavedra, L. M. (2001). Cognitive errors in youth with anxiety disorders: The linkages between negative cognitive errors and anxious symptoms. *Cognitive Therapy and Research, 25*(5), 559-575.

Westenberg, P. M., Siebelink, B. M., & Treffers, P. D. (2001). Psychosocial developmental theory in relation to anxiety and its disorders. *Anxiety disorders in children and adolescents: Research, assessment and intervention*, 72-89.

Westenberg, P.M., Drewes, M.J., Goedhart, A.W., Siebelink, B.M., & Treffers, P.D.A. (2004). A developmental analysis of self-reported fears in late childhood through mid-adolescence: social evaluative fears on the rise? *Journal of Child Psychology and Psychiatry, 45,* 481-495.

Westenberg, P. M., Gullone, E., Bokhorst, C. L., Heyne, D. A., & King, N. J. (2007). Social evaluation fear in childhood and adolescence: Normative developmental course and continuity of individual differences. *British Journal of Developmental Psychology, 25*(3), 471-483.

Woody, S. R., & Rodriguez, B. F. (2000). Self-focused attention and social anxiety in social phobics and normal controls. *Cognitive Therapy and Research*, *24*(4), 473-488.

Appendix A.

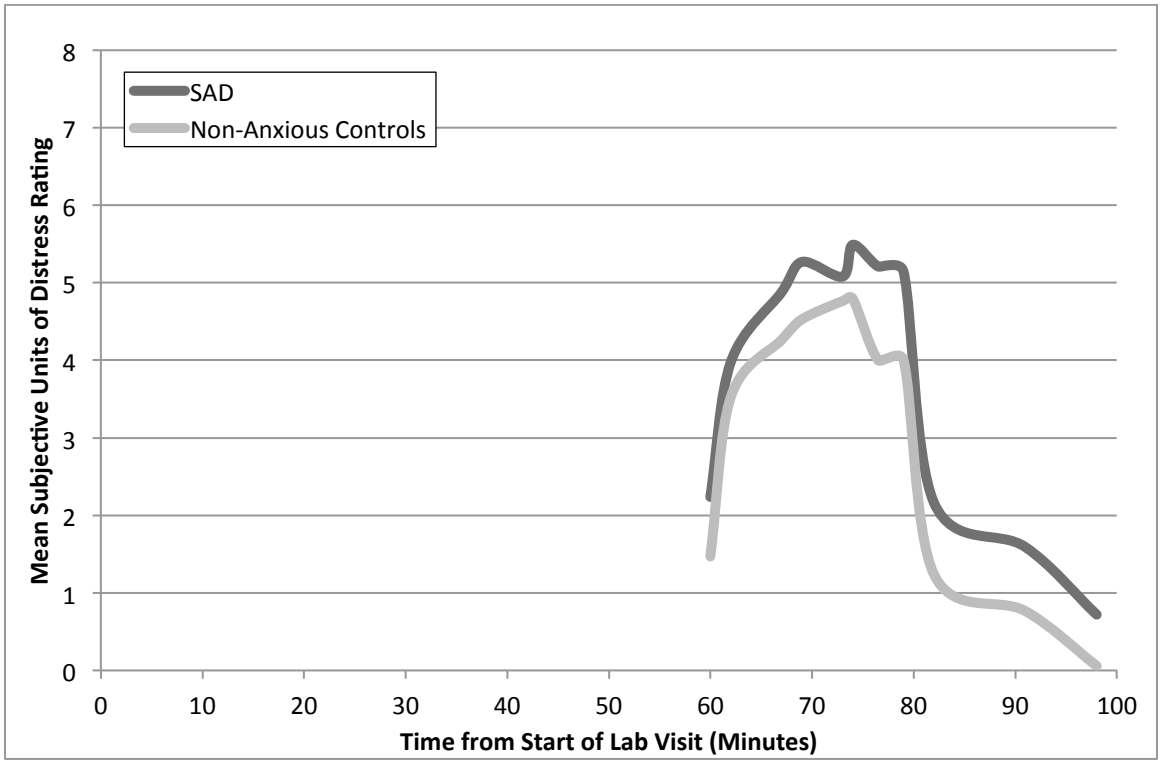

Figure 1. Line graph depicting SUDS ratings by group over the course of the lab visit. There were no significant differences by group during the TSST,

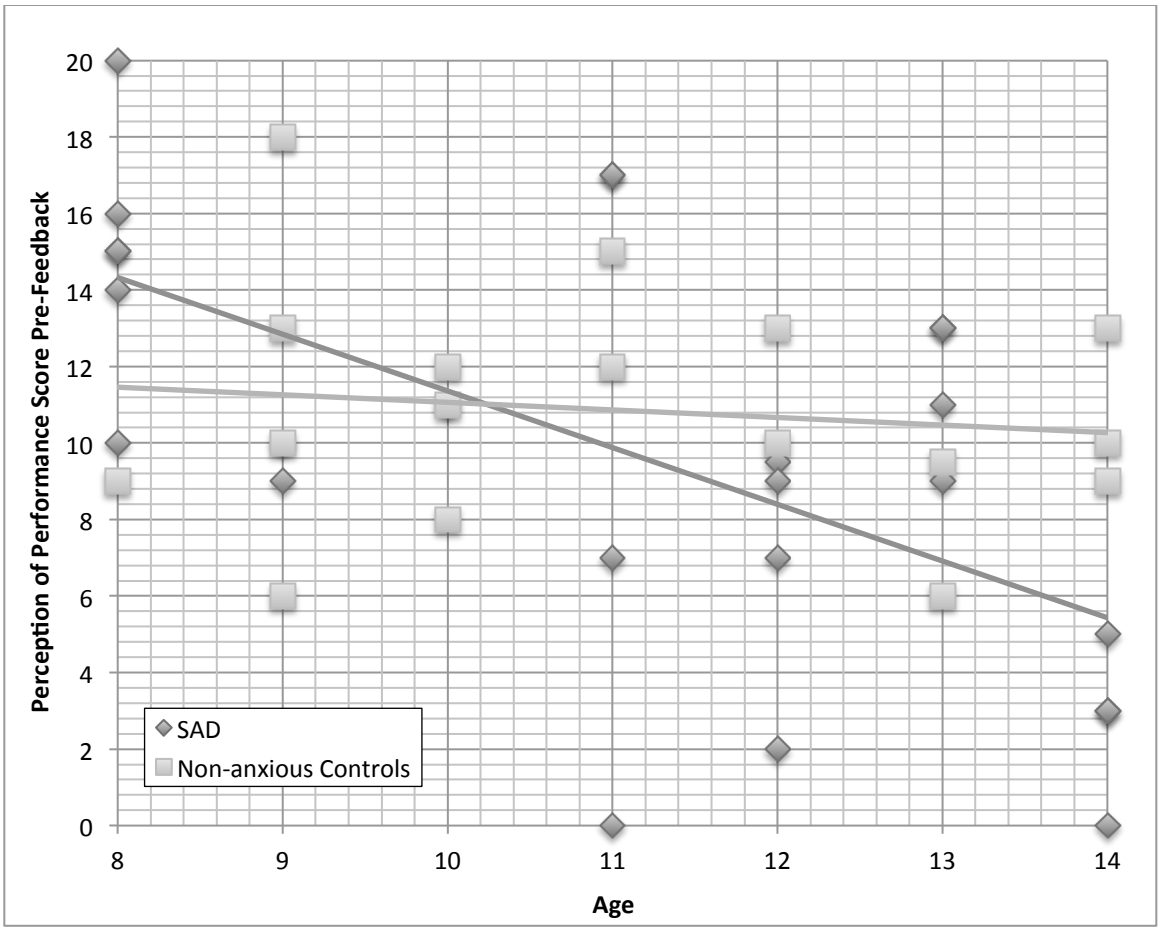

Figure 2. Scatter plot graph depicting Perception of Performance Scores post-feedback by group and age. Linear Regression model showed there was a significant group x age interaction, β = -0.47, $t(38)$ = -2.07, p = 0.045.

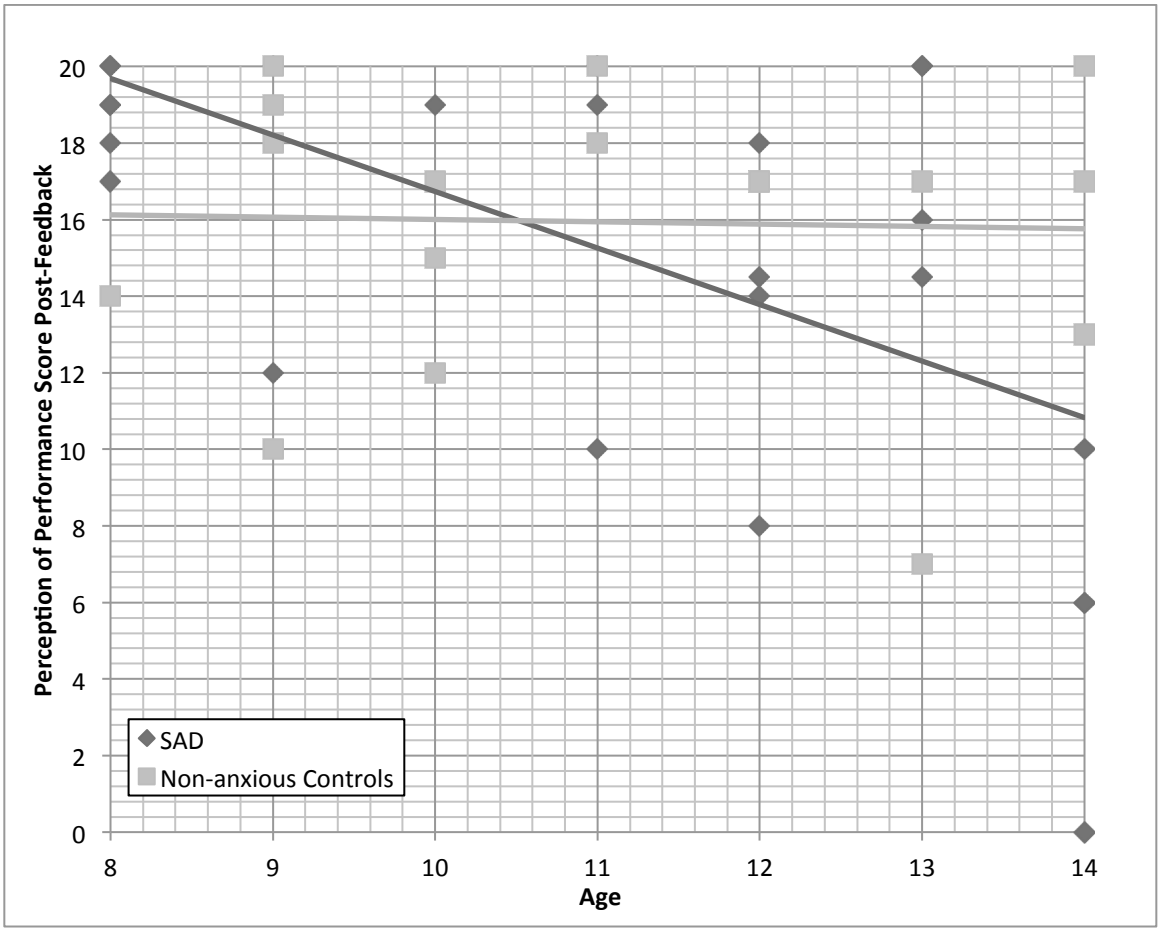

Figure 3. Scatter plot graph depicting Perception of Performance Scores post-feedback by group and age. Linear Regression model showed that there was a significant group X age interaction, $\beta = -0.49$, $t(38) = -2.12$, $p = 0.041$.

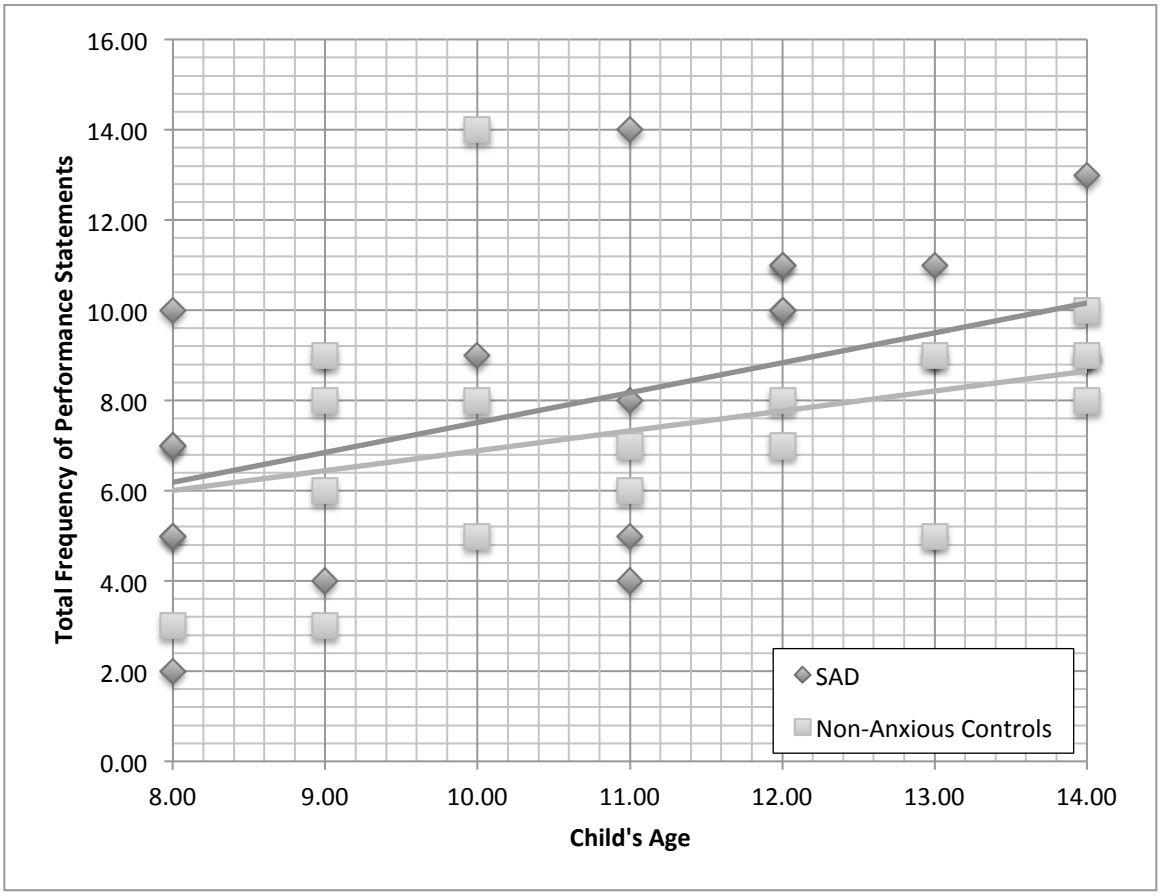

Figure 4. Scatter plot depicting Total Frequency of Performance Statements made by children during the Cognitive Restructuring Task by group and age. Linear regression model showed that age had a significant main effect in children with SAD.

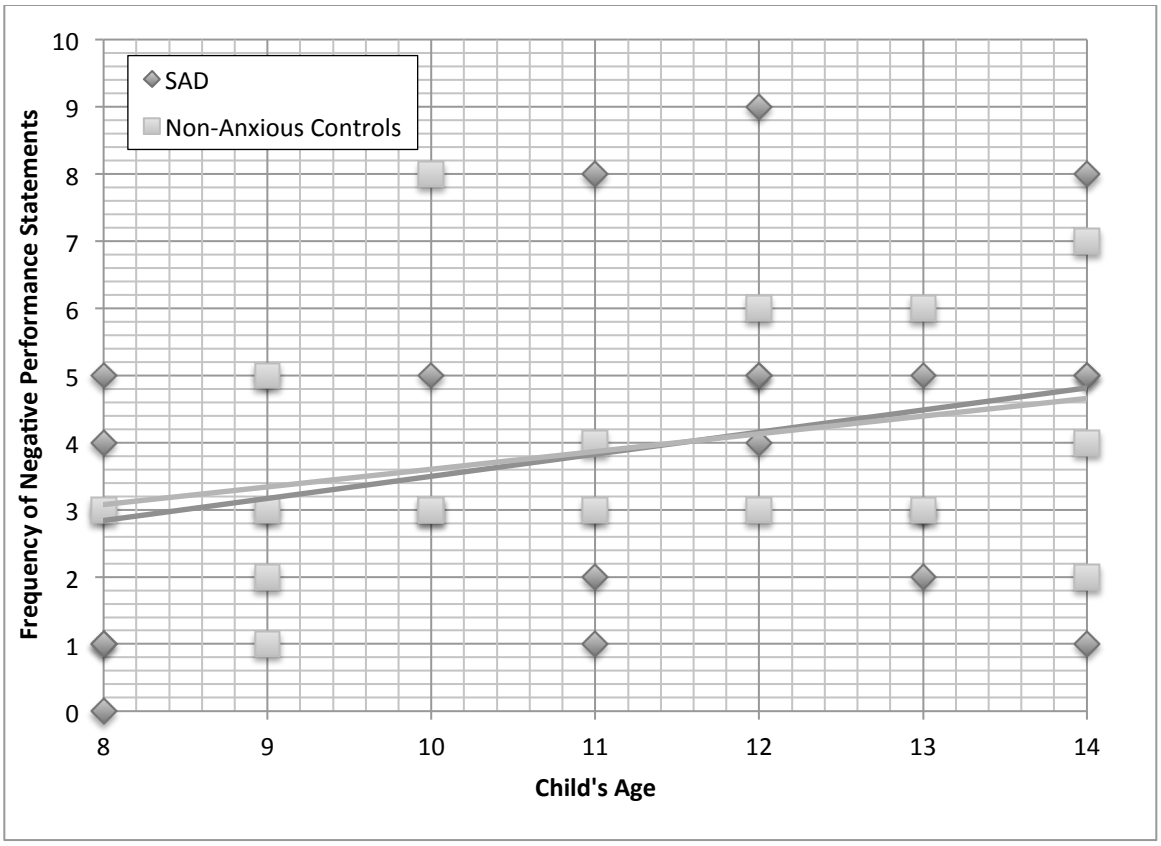

Figure 5. Scatter plot graph depicting Mean Frequency of Negative Performance Statements made by children during the Cognitive Restructuring Task by group and age. Univariate general linear model showed that age and group did not have any significant main effects.

Table I.

Intra-class Correlations between raters for Observational Coding of Cognitive Restructuring Task

Variable	Single Measures ICC	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Negative Performance	0.920	0.800	0.969	25.971	17	17	0.000
Neutral Performance	0.832	0.612	0.933	10.882	17	17	0.000
Positive Performance	0.767	0.489	0.905	7.688	17	17	0.000
Negative Emotion	0.897	0.748	0.960	17.773	17	17	0.000
Neutral Emotion	0.869	0.683	0.949	13.556	17	17	0.000
Positive Emotion	0.761	0.423	0.907	9.000	17	17	0.000

Note. ICC = Intra-class Correlation.

Table II.
Bivariate Correlations between Perception of Performance Scores and SASC-R Subscales.

	Child Pre-Feedback POP 1	Child Pre-Feedback POP 2	Child Pre-Feedback Perception of Performance	Child Post-Feedback POP 1	Child Post-Feedback POP 2	Child Post-Feedback Perception of Performance	SASC-R Fear of Negative Evaluation Subscale (Child Report)	SASC-RSocial Avoidance and Distress New Peers or Siutations	SASC-R General Social Avoidance and Distress
Child Pre-Feedback POP 1	1								
Child Pre-Feedback POP 2	.867**	1							
Child Pre-Feedback Perception of Performance	.972**	.960**	1						
Child Post-Feedback POP 1	.667**	.562**	.640**	1					
Child Post-Feedback POP 2	.575**	.652**	.631**	.793**	1				
Child Post-Feedback Perception of Performance	.658**	.638**	.671**	.953**	.941**	1			
SASC-R Fear of Negative Evaluation Subscale	-.313*	-.357*	-.345*	-0.121	-0.28	-0.207	1		
SASC-R Social Avoidance and Distress New Peers or Siutations	-0.249	-0.22	-0.244	-.380*	-.350*	-.386*	.619**	1	
SASC-R General Social Avoidance and Distress	-0.162	-0.103	-0.14	-0.233	-0.206	-0.232	.706**	.788**	1

Note: SASC-R = Social Anxiety Scale for Children - Revised (La Greca & Stone, 1993). POP 1 = Perception of Performance Questionnaire Item 1 (*How do you think you did on the speech?*). POP 2 = Perception of Performance Questionnaire Item 2 (*How much do you think the committee liked your speech?*).

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Appendix B.

Cognitive Restructuring Discussion Coding Manual

I. Description of the Graduate Student-Child Discussion

Graduate Student – Child Discussion (8-10 minutes)
Nancy and the child discuss the child's performance on the TSST, both the practice speech and the speech in front of the committee. The discussion is based on common cognitive restructuring techniques. Cognitive restructuring aims to reappraise negative cognitive biases. During the post-exposure discussion, the child is asked about his/her worry thoughts, and what he/she was nervous about when giving the speech. In addition, the child is asked about what he/she did well during the speech, and what coping thoughts he/she had. During this time, the child's negative cognitive biases are reappraised so that the child focuses less on the negative thoughts and more on the positive for the speech task and generalizing to future social situation so that the child understands how the experience may influence other aspects of his/her life.

II. Watching the Videos

Video Viewing Procedure
Each coder should watch the video **exactly two times**, except in the event of technical difficulties. Coders will only rewind the video if they are unable to hear what was said and/or missed what was said.

1. First Pass
    a. Coders should transcribe word for word the utterances on a word document
    b. After the first pass, coders should categorize utterances according to the separate categories defined in this coding manual
    c. Record phrases down in the "Cognitive Restructuring Coding Sheet" according to the categories.
        i. Each coder has their own coding sheet that is prefaced with their initials (e.g. Anna's coding sheet will be named "AZ_Cognitive Restructuring Coding Sheet (Updated 2.16.2015)"), which are found in Dropbox.
2. Second Pass
    a. Coders should verify the initial codes
    b. Add on any cognitions and utterances that were overlooked in the first pass.
    c. After the second pass, coders will then tally up the frequencies in each category.

Accessing video and coding files

- Map level 3 and level 4 drives to the computer
- Videos are located in L4 > NL Study folder > Videos
    - Only watch the GS-C Discussion videos
- Coding sheets are located in L3 > NL Study Folder > Video Coding > GS-C Coding > Coding Sheets

What part of the file should you watch?

- You should begin coding after Nancy sits down and starts the discussion

- You should stop coding after Nancy asks for a SUDS rating

III. Coding Components

A. Cognitions during Cognitive Restructuring Discussion

Each utterance or thought that the child describes on his/her own or indicates agreement with Nancy's affirmations during the cognitive restructuring discussion will be coded for:

(1) Content: what the child is describing or discussing that can be categorized as Performance and/or Emotion.
   a. *Performance*: when the child explicitly makes references to social skills or performance evaluation in relation to his/her speech performance, or worries about his/her speech performance.
   b. *Emotion*: how the child expresses he/she was feeling before, during or after his/her speech performance

(2) Valence: whether the content of an utterance is positive, neutral or negative

(3) Generalization: whether or not the child is able to apply the concept of the exposure to other aspects of the child's life now or in the future, or if Nancy compares the process of giving a speech to something else the child does in his/her life. Generalization includes the following concepts:
   a. The more you practice, the easier things will become
   b. If mention of other specific situations in the context of facing fears head on instead of avoiding them
   c. Other situations that are similar to the TSST

- When GS is explaining a concept, only code if the child is actively participating in the conversation by responding to GS's questions, nodding or verbally expressing agreement with what GS is saying (either "yeah" or "mhm"). However, if the child is responding, but GS is not
- If GS is explaining one concept, only code it once even if GS is using multiple sentences to explain it.
  - e.g. "Just like playing soccer or an instrument really well requires lots of practice, it's the same for giving a speech or doing certain things that make us anxious. The more you practice or do things like give a speech, the easier it becomes." would be coded once, even if the child is engaged throughout.
- If during a long explanation (i.e., consisting of multiple sentences), GS touches upon more than one concept and the child is actively participating in the conversation by responding to questions, nodding or verbally expressing agreement with GS (either "yeah" or "mhm"), code it per distinct concept.
- If the child actively shares another example that illustrates generalization (i.e. If GS is discussing facing fears head on, and the child discloses their fear of heights), give child credit for being able to generalize to other situations.

"Thoughts" or utterances in each category will be tallied up for frequency counts. To code statements containing emotion, refer to the following to determine valence:

Table 2 *Item Composition of the* PANAS-X *Scales*

General Dimension Scales	
Negative Affect (10)	afraid, scared, nervous, jittery, irritable, hostile, guilty, ashamed, upset, distressed
Positive Affect (10)	active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, strong
Basic Negative Emotion Scales	
Fear (6)	afraid, scared, frightened, nervous, jittery, shaky
Hostility (6)	angry, hostile, irritable, scornful, disgusted, loathing
Guilt (6)	guilty, ashamed, blameworthy, angry at self, disgusted with self, dissatisfied with self
Sadness (5)	sad, blue, downhearted, alone, lonely
Basic Positive Emotion Scales	
Joviality (8)	happy, joyful, delighted, cheerful, excited, enthusiastic, lively, energetic
Self-Assurance (6)	proud, strong, confident, bold, daring, fearless
Attentiveness (4)	alert, attentive, concentrating, determined
Other Affective States	
Shyness (4)	shy, bashful, sheepish, timid
Fatigue (4)	sleepy, tired, sluggish, drowsy
Serenity (3)	calm, relaxed, at ease
Surprise (3)	amazed, surprised, astonished

Note. The number of terms comprising each scale is shown in parentheses.

(Watson, & Clark, 1994)

IV. General Guidelines for Coding

- The child should be given credit for the valence and content of GS's statements if the child is indicating agreement with the content by nodding, or verbally agreeing with GS.

- The child should be given credit for the valence and content of the committee's comments if the child is able to describe and recall the committee feedback when GS prompts the child for strengths or feedback about the speech during the discussion.

- If children bring up the same topic/content at two different times, code it as two separate thoughts.
    - e.g. "I was really nervous that I would stutter." and "I know that I stuttered during my speech" would be coded twice for Negative Performance.

- If children bring up multiple codes as part of one utterance, code it as separate thoughts.
    - e.g. "I messed up so bad because I was nervous" would be coded separately as Negative Performance for "I messed up so bad" and Negative Emotion "I was nervous"
    - e.g. "Worried about talking in front of people" would be double-coded as both Negative Performance because "in front of people" suggests worries about negative performance and Negative Emotion because "worried" suggests emotions that are negative in nature

- Even if the child does not seem convinced by what he/she is saying based on hesitancy, pauses and vocal inflections, code it accordingly (e.g. "I guess…I spoke clearly?" would be coded as positive performance)

- If GS is repeating back to the child what he/she said because she is writing notes on the Cognitive Restructuring Handout they are working on together, do not code even if the child is verbally agreeing with what GS is saying or nodding. For example, if the child tells GS "I was scared because of the committee", this is coded as a negative emotion and performance. However, if GS then repeats, "because you were scared of the committee?" and the child says, "yes", this should not be coded. This utterance/behavior should not be coded because the child is only confirming that GS is writing down the correct thing rather than GS is interpreting their thoughts accurately.

- Take into account qualifying remarks as they could influence the valence of the phrase
    - e.g. "I was nervous" could be positively coded if the child follows up with the qualifying remark that suggests it was eager anticipation)

- If a child cannot name any strength about his/her speech, this should be coded as a negative performance. However, if the child is able to name one or two, and then cannot further name any, this should not be coded.
    - e.g. If GS asks "What were some strengths about your speech?" and the child answers "I don't know", this should be coded as a negative performance
    - e.g. If GS asks "Are there any other strengths of your speech?" after the child names a few, and the child says "no", this should not be coded as the child has already listed strengths about his/her speech.

Cognition Coding Categories

Adapted from Alfano et al. (2006)

Negative Performance	Utterances specifically related to the child's speech performance that are negative in nature e.g. I didn't do well at all I didn't make any eye-contact I stuttered throughout the speech
Neutral Performance	Utterances specifically related to the child's speech performance that are neither positive nor negative e.g. I talked about food
Positive Performance	Utterances specifically related to the child's speech performance that are positive in nature e.g. I spoke really well I made really good eye-contact I knew that I would do well
Negative Emotion	A feeling or emotion that is negative in nature e.g. I felt nervous I was really scared
Neutral Emotion	A feeling or emotion that is neither negative nor positive. e.g. I was not worried about the speech
Positive Emotion	A feeling or emotion that is positive in nature e.g. I feel happy I was proud of what I did I felt more comfortable
Generalization	Child applies the concept of exposure (i.e. facing fears to get used to doing it more) to other events or areas of their life e.g. It's like performing in front of an audience - the more times you perform in front of people, the less scary it is. The more times you practice, the easier it gets.