

## SOCIAL ANXIETY AND MEMORY BIASES IN MIDDLE CHILDHOOD: A PRELIMINARY STUDY

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**Abstract:** Studies on selective memory conducted with adult and child populations have provided mixed results and appear to suggest that controlling for comorbid depressive symptoms, including a high social-evaluative condition, and encouraging deep processing during the encoding might be crucial for demonstrating memory biases in anxiety. These issues were addressed in a preliminary study, which aimed at investigating selective memory in primary school students. Fifty seven high and low socially anxious children encoded positive and negative trait words in a public self-referent way. Half they were told they would soon have to give a social performance. Compared to low socially anxious children, high socially anxious children recalled less positive self-referent words. However, this effect did not interact with social threat manipulation. Results are discussed in the light of past research and information-processing theories of anxiety.

**Key words:** Social anxiety, Shyness, Memory, Children, Cognitive processes

### INTRODUCTION

Social anxiety (and its overlapping construct of social phobia - see McNeil, 2010), the most common of anxiety disorders, is defined as a cognitive, behavioural and affective experience that is triggered by the perception of (negative) evaluation by others (Schlenker & Leary, 1982). It affects about 2 – 15 % of children and adolescents (Rapee, Schniering, & Hudson, 2009) and, if left untreated, can persist into adulthood, resulting in marked impairment in academic, occupational and social functioning.

During the last three decades many information-processing theories of social anxiety have been proposed. These theoretical models attempted to link social anxiety (and childhood anxiety) with distortions in social information processing such as selective attention, encoding and retrieval of emotional information (e.g., Beck, Emery,

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& Greenberg, 1985; Clark & Wells, 1995; Muris & Field, 2008). Specifically, they predict that when socially anxious individuals are threatened by the prospect of negative evaluation and rejection by others, they become automatically vigilant to threat-related cues and tend to selectively remember and brood about negative self-relevant aspects of social events compared to nonanxious individuals (Clark & Wells, 1995; Rapee & Heimberg, 1997). This preferential allocation of attention to social threat cues together with the negative recollections may combine to disrupt performance in environmental tasks and elicit negative evaluation, perpetuating thus a self-defeating cycle in which avoidance strategies are strengthened and negative beliefs about the self are maintained. However, although there is considerable empirical evidence suggesting that social anxiety is characterized by an interpretation and attentional bias for threat-relevant information, studies of memory bias are less conclusive (see Amir & Bomyea, 2010, for a recent review). The present study<sup>1</sup> further explored the link between childhood social anxiety and memory for threat-relevant information.

### *Memory bias in adult social anxiety*

Research examining explicit and implicit memory biases<sup>2</sup> in socially anxious adults is relatively scarce and appears to have produced inconsistent results. While some studies have found that individuals high in social anxiety (Claeys, 1989; O' Banion & Arkowitz, 1977) or social phobics (Lundh & Ost, 1996) display enhanced memory for threat-relevant information, others failed to find any memory biases (Rapee, McCallum, Melville, Ravenscroft, & Rodney, 1994). Claeys (1989), for instance, measured the recall of likable and unlikable trait words encoded in a self-descriptive condition. He found that individuals high in social anxiety exhibited better recall of unlikable trait words than did individuals low in social anxiety. In contrast, Rapee et al. (1994) reported four studies, which consistently failed to demonstrate a memory bias for social threat information in social phobics.

How can these apparent discrepancies between existing studies on memory bias in social anxiety be understood? One possibility is that the samples of the various studies could have varied in the extent of comorbid depression, with only the more highly depressed samples showing a globally negative pattern of information processing. This seems plausible if we consider the fact that the link between depression and selective

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<sup>1</sup> Parts of this paper (data collection) are based on an undergraduate thesis of N. Papadogeorgaki completed under my supervision.

<sup>2</sup> According to Schacter (1992, p. 559), "Implicit memory is an unintentional unconscious form of retention that can be contrasted with explicit memory, which involves conscious recollection of previous experiences. Explicit memory is typically assessed with recall and recognition tasks that require intentional retrieval of information from a specific prior study episode, whereas implicit memory is assessed with tasks that do not require conscious recollection of specific episodes."

memory biases is well established (Muris & Field, 2008). However, this possibility cannot account for the null findings reported by Rapee et al. (1994). Nevertheless, the level of participants' depressive symptoms was measured in the current study in order to control for this variable in the analyses. This is important since researchers have highlighted the need to exclude the possibility that memory biases in social anxiety are due to the presence of comorbid depressive symptoms rather than elevated anxiety levels (Coles & Heimberg, 2002; Morgan & Banerjee, 2008).

Alternatively, inconsistencies could arise from methodological features, such as variations in the number and type of information to be recalled (e.g., word lists, experimenter feedback), valence (neutral versus positive or negative) the manipulation of social evaluation and the nature of the encoding task (see Coles & Heimberg, 2002; Morgan, 2010). As far as the encoding task is concerned, Lundh and Ost (1996) have long stressed the importance of experimentally controlling the encoding activities in studies on cognition and psychopathology, since the encoding tasks are expected to activate different emotional concerns in participants (see also a review by Coles & Heimberg, 2002). Additionally, in their study of memory biases in depressed and anxious youths (described below), Dalgleish, Taghavi, Neshat-Doost, Moradi, Canterbury, and Yule (2003) appear to have arrived at a similar conclusion. Therefore, a public self-referent encoding task (How well does the word describe what someone who knows you would think of you) was employed in the present study as a valid encoding task to activate emotional concerns of negative evaluation and public self-image.

A third possibility is that social-threat manipulation is critical for activating maladaptive cognitive processes in childhood social anxiety. According to Beck (Beck et al., 1985) cognitive biases in anxiety remain dormant until activated in the presence of the fear-eliciting stimuli. Similarly, Hirsch and Clark (2004) suggested that experiments exploring retrieval biases for negative information in social anxiety should employ a social-evaluative task (see also Morgan, 2010).

There is good reason to believe that social-threat induction is necessary to observe a memory bias in socially anxious individuals. Mansell and Clark (1999) carried out an experiment in which high and low socially anxious adults encoded positive and negative words in three different encoding conditions: public self-referent (describe what someone who knows you, or who has just met you, would think of you), private self-referent (describe how you think about yourself), and other-referent (describe your next-door neighbour). Next participants were threatened with giving a speech or not threatened and, shortly afterwards, were required to recall the words. The results showed that the high socially anxious individuals, compared to the low socially anxious individuals, recalled less positive public self-referent words and tended to recall more negative public self-referent words, but only when both groups were anticipating giving a speech. Vassilopoulos (2005a) conducted a similar study and arrived at similar results. It therefore appears that anticipation of a stressful social performance activates selective retrieval of negative information about one's

perceived, observable self. Thus, one of the aims of the present study is to evaluate whether social-threat manipulation is critical for activating maladaptive cognitive processes in childhood social anxiety.

### ***Memory bias in children***

Theory and research on information-processing biases in childhood anxiety have closely paralleled the adult literature (Hadwin, Garner, & Perez-Olivas, 2006). However, to the best of our knowledge, studies directly examining childhood social anxiety and the recall of emotional information are not presently available. Nevertheless, studies of children suffering from other internalising problems (e.g., depression, posttraumatic stress disorder) suggest that children's emotions may relate to their memory functioning –although some discrepant findings which characterized the adult literature were observed– and highlight the need to explore how anxiety may influence memory functioning and how biased memory processing may maintain anxiety (Daleiden, 1998; Dalgleish et al., 2003; Moradi, Taghavi, Neshat-Doost, Yule, & Dalgleish, 2000; Zupan, Hammen, & Jaenicke, 1987). For example, Zupan et al. (1987) found that nondepressed children recalled more positive words and depressed children recalled more negative words under self-referent encoding instructions. Dalgleish et al. (2003), on the other hand, examined specificity of memory for visually presented threat, depression-related and neutral words in clinically depressed and clinically anxious children and adolescents. No disorder-specific effects were found on the memory task, although all participants showed better recall of depression-related words. The authors suggest that the results may be due to methodological limitations such as the absence of a self-referent encoding task.

### ***The present study***

In sum, research conducted with adult (and child) populations have not provided unequivocal findings and appear to suggest that controlling for comorbid depressive symptoms, including a high social-evaluative condition, and encouraging deep processing during the encoding might be crucial for demonstrating memory biases in social anxiety. The main aim of this study was to address these issues by further exploring memory biases in high and low socially anxious children. Therefore, in line with an analogue research strategy, children scoring in the upper and bottom quartile of the student sample on the Social Anxiety Scale for Children-Revised (LaGreca & Stone, 1993) were selected for the high social anxiety and low social anxiety groups. An adapted version of the Mansell and Clark's (1999) encoding task was employed, in which children were asked to encode in a public self-referent fashion (How well does the word describe what someone who knows you would think of you?) and later retrieve a carefully selected list of words.

Even more fundamentally, however, this experiment was conducted to evaluate whether social-threat manipulation is critical for activating maladaptive cognitive processes in childhood social anxiety. Mansell and Clark (1999) found that high socially anxious individuals, compared to the low socially anxious individuals, recalled less positive public self-referent words and tended to recall more negative public self-referent words, but only when both groups were anticipating giving a speech. The present experiment was thus a replication and extension of the Mansell and Clark's (1999) study to childhood social anxiety. The study's hypothesis was the following: Compared to low socially anxious participants, high socially anxious children in anticipation of giving a social performance (threat-induction condition) are expected to recall more negative and less positive words associated with their public self-image. In view of suggestions that inconsistencies in previous results could be the result of differences in the extent of comorbid depression (Coles & Heimberg, 2002; Morgan & Banerjee, 2008), we controlled for depressive symptoms in our analyses. Finally, because gender differences may exist among individuals with social anxiety symptoms (Turk, Heimberg, Orsillo, Holt, Gitow, Street, et al., 1998; Vassilopoulos, Moberly, & Douratsou, in press), potential effects of gender were also controlled in the analyses.

## METHOD

### *Participants*

The sample consisted of 57 children who were recruited from four regular primary schools in the south west of Greece. Mean age of the children was 10.5 years ( $SD = 0.5$ , range 10-11 years). All children were White Europeans. Participants were recruited from a larger sample of 94 children who had filled in the Social Anxiety Scale for Children-Revised (SASC-R; LaGreca & Stone, 1993). Children who scored in the upper quartile ( $\geq 17$ ) and bottom quartile ( $\leq 8$ ) of the student sample on the SASC-R were selected for the high social anxiety and low social anxiety groups, respectively. There were 28 individuals in the low social anxiety group (11 girls, 17 boys) and 29 individuals in the high social anxiety group (16 girls, 13 boys). There was no significant difference in the balance of sexes in the two groups,  $\chi^2(1, N = 57) = 1.44, ns$ . The participants were randomly assigned to either the social threat or no-threat conditions, giving four experimental conditions of 13-15 participants in each group.

### *Instruments*

#### *Social Anxiety Scale for Children-Revised (SASC-R; LaGreca & Stone, 1993)*

The SASC-R is a 22-item scale assessing children's subjective feelings of social anxiety (and its correlates, such as avoidance and inhibition) in the context of various

interpersonal situations. It contains 18 descriptive self-statements (e.g., "I worry that other children don't like me") and four filler items reflecting children's activity preferences (e.g., "I like to play sports"). In the original study using the SASC-R (LaGreca & Stone, 1993), children were asked to rate how true each statement was for him or her on a 5-point Likert-type scale. However, in the present study the 3-point scale (0 = *never true*, 1 = *sometimes true*, 2 = *always true*) was used to make it more straightforward for children. The SASC-R was translated into Greek by the author and back-translated by another bilingual psychologist. A panel of experts including two psychologists and a psychiatrist confirmed the SASC-R's face validity. Satisfactory psychometric properties of the 5-point SASC-R (e.g., internal consistency, discriminant and concurrent validity, test-retest reliability) have been demonstrated in numerous primary school samples (e.g., La Greca, Dandes, Wick, Shaw, & Stone, 1988; La Greca & Stone, 1993).

Factor analysis of the SASC-R (LaGreca & Stone, 1993) with fourth through sixth grader students ( $n = 495$ ) yielded three factors: The first factor, Fear of Negative Evaluation from Peers (FNE), includes eight items (e.g., "I worry about what other children think of me"). The second factor, social Avoidance and Distress Specific to New Situations (SAD-New) reflects social avoidance and distress with new social situations or unfamiliar peers and includes six items (e.g., "I get nervous when I talk to new children"). Finally, the third factor, Generalized Social Anxiety and Distress (SAD-General), reflects more generalised or pervasive social distress and inhibitions and includes four items (e.g., "I am afraid to invite others to my house because they might say no"). Factor analysis with a larger Greek sample (see Vassilopoulos, 2009), in general, has confirmed its three-factor structure. Each child's social anxiety score was obtained by summing across items. In the present sample, total scores ranged from 0 to 24 ( $M = 12.15$ ,  $SD = 7.21$ ), and did not differ as a function of age, gender or their interaction. Cronbach's alpha for the SASC-R in this sample was .86.

#### *Children's Depression Inventory-short form (CDI; Kovacs, 1992)*

The CDI (short form) is a 10-item questionnaire designed to assess the presence of depressive symptoms in children and adolescents aged between 7 and 17. Normative data on gender and age are available (Kovacs, 1992). Each item on the CDI consists of three choices scored at 1 (absence of symptom), 2 (mild symptom), or 3 (definite symptom). The respondent chooses the option that best describes him or her during the past two weeks. Total scores ranged from 10 to 20 ( $M = 12.57$ ,  $SD = 2.37$ ), and did not differ as a function of age, gender, or their interaction. We followed the same translation and adjustment procedures for the CDI as for the SASC-R. Both scales have been used successfully in many studies with Greek participants (e.g., Vassilopoulos, 2009; Vassilopoulos & Banerjee, 2008; Vassilopoulos et al., in press). Coefficient alpha for the CDI in this sample was .63.

*Encoding task*

The children were asked to rate a list with thirty Greek trait words in a public self-referent fashion. In the context of this research, public self is the image one believes others have of oneself. It is closely related with and depends on the image persons have for themselves (private self), however these two concepts (private and public self) are not identical (Bauermeister, 1986). Participants rated each word in the list according to "How well does the word describe what someone *who knows you* would think of you?" The wording for public self-referent encoding was very similar to that used by Mansell and Clark, (1999). The children used a 4-point scale ranging from 0 (very unlike) to 3 (very like) to make the ratings.

Following the procedure suggested by Mansell and Clark (1999), the first and last two words were the same for each participant and served as primacy and recency buffers which were excluded from the analysis. The remaining 26 words were drawn from two word lists, X and Y, each containing equal numbers of positive and negative words (see Table 1). The negative words were social-threat words selected from previous studies of memory bias in social anxiety (Mansell & Clark, 1999; Vassilopoulos, 2005a), and additional words considered to be particularly relevant to concerns of socially anxious individuals (e.g., ridiculous), whereas the positive words were associated with social success. The two lists were equated for word length and word frequency. Within each experimental group, equivalent numbers of students rated each list in a public self-referent fashion. Words from the two lists were interspersed and order of presentation of positive and negative words followed a randomly generated template in which there were 8 positive and 7 negative words (or 7 positive and 8 negative words) in the list with no more than four positives or negatives in a row. Children received the word lists in a counterbalanced order.

*Table 1. Word lists X and Y*

| X           |            | Y           |            |
|-------------|------------|-------------|------------|
| Positive    | Negative   | Positive    | Negative   |
| competent   | annoying   | relaxed     | tense      |
| creative    | nervous    | popular     | stupid     |
| interesting | inadequate | educated    | foolish    |
| attractive  | vulnerable | sociable    | failure    |
| cheerful    | awkward    | responsible | indecisive |
| courageous  | ridiculous | mature      | inept      |
| rational    | timid      | clever      | rude       |
| pleasant    | boring     |             |            |

*Anxiety*

Self-report ratings of anxiety were measured on a 4-point rating scale ranging from 0 ("not at all anxious") to 3 ("extremely anxious"). This scale was administered before and after the social-threat manipulation.

*Procedure**Session 1*

Children were taken in small groups from their classroom to a quiet room. In this session children completed the SASC and the CDI. The tasks were introduced to the children one at a time following the standard protocol. For the CDI, they were told "children have different feelings and ideas. This form lists the feelings and ideas in a group. For each group of three sentences pick one sentence that describes you best for the last two weeks". For the SASC they were told "Think about your self and decide whether or not the following sentences are true. There are three possible answers for each question: never true, sometime true, always true". Before the testing began, children were told that they could stop the session at any time if they did not want to carry on. This session lasted approximately 10-15 min.

*Session 2*

The second session took place approximately one hour after the first. Here children were again taken in small groups from their classroom to a separate quiet room at school. Children rated first their anxiety and completed the encoding task. They were not told that memory for the trait words would be tested later. Half the participants in each social-anxiety group were then given the social-threat induction:

"In a while, a teacher will enter the class to check your reading ability. So you will be asked to approach the blackboard and read aloud a passage from a children's book, in front of the class. At the same time, the teacher will make ratings of the performance of each of you individually. Now, please sit here for 5 minutes and try to think about how you might perform in this specific task."

The other half of the students in the control condition were instructed to fully concentrate on a distraction task for the same amount of time, which involved reading a passage from the school text and filling the gaps with the correct letter. Next, the research assistant left the room for 5-6 minutes. When he returned, children reported their anxiety again and were given four minutes to recall the words which they had previously rated.



## RESULTS

### *Participants' characteristics*

Independent samples *t* tests were used to compare the mean scores on SASC-R and CDI for the high and low socially anxious children. As expected, the high social-anxiety group had higher scores than the low social-anxiety group on social anxiety scores,  $t(55) = 22.34$ ,  $p < .001$ , Cohen's  $d = 6.02$ . However, no significant difference between the two groups on depression scores or age was observed.

Each of the participants' characteristics was submitted to a two-way Social Anxiety (high - low) X Induction (threat, no-threat) ANOVA. With the exception of one variable<sup>3</sup>, there were no significant interactions or main effects involving social threat manipulation, as would be expected from the random allocation of the participants to each experimental group.

### *Descriptiveness ratings for trait words*

The mean descriptiveness ratings (Table 2) for the positive and negative trait words were submitted to a three-way Social Anxiety (high, low) X Induction (threat, no-threat) X Valence (positive, negative) ANOVA with the last factor as within subjects. There was a significant main effect of valence,  $F(1, 53) = 365.65$ ,  $p < .001$ , partial  $\eta^2 = .87$ , indicating that positive words were rated as more descriptive than negative words. In addition, there was a significant interaction between social anxiety and valence,  $F(1, 53) = 5.11$ ,  $p < .05$ , partial  $\eta^2 = .09$ . Independent samples *t*-tests indicated that negative words were rated as more descriptive by the high social anxiety group, compared to the low social anxiety group,  $t(55) = 2.41$ ,  $p < .05$ , Cohen's  $d = .64$ . The difference between the two groups in endorsement of positive words about their public self was in the opposite direction but not significant,  $t(55) = -1.56$ ,  $p = .12$ .

As expected, there were no main effects or interactions involving threat induction (the social-threat manipulation occurred after the participants had rated the words). In particular, there was no three-way interaction,  $F(1, 53) = 0.01$ , *ns*.

*Table 2. Mean (and SD) descriptiveness ratings of trait words for each social-anxiety group*

| <i>Valence</i> | Low Social Anxiety |               | High Social Anxiety |               |
|----------------|--------------------|---------------|---------------------|---------------|
|                | <i>M</i>           | ( <i>SD</i> ) | <i>M</i>            | ( <i>SD</i> ) |
| Positive words | 36.50              | (6.26)        | 33.79               | (6.85)        |
| Negative words | 5.10               | (4.27)        | 9.20                | (7.98)        |

<sup>3</sup> The one exception was age, for which there was a significant interaction between social anxiety and threat manipulation,  $F(1, 53) = 8.22$ ,  $p < .01$ , partial  $\eta^2 = .13$ . Where possible, the following analyses were repeated using age as a covariate but it did not change the pattern of results.

### *Effectiveness of the social threat manipulation*

To determine the effects of social threat manipulation on state anxiety levels, pre- and post-manipulation anxiety ratings were subjected to a three-way Social Anxiety (high, low) X Induction (threat, no-threat) X Time (before induction, after induction) ANOVA with the last factor as within subjects. The predicted three-way interaction was significant,  $F(1, 53) = 4.24, p < .05$ , partial  $\eta^2 = .07$ . To explore the change in these ratings over time, the interaction between induction and time was investigated separately for each social anxiety group. The interaction was significant for the high social anxiety group,  $F(1, 27) = 7.77, p = .01$ , partial  $\eta^2 = .22$ , but not for the low social anxiety group,  $F(1, 26) = 0.85, ns$ . Inspection of the mean ratings (see Table 3) revealed that high socially anxious participants in the threat-induction group increased their ratings of anxiety with time,  $t(14) = 4.05, p = .001$ , Cohen's  $d = 2.16$ , whereas high socially anxious participants in the non-threat group did not change significantly their initial ratings,  $t(13) = 0.62, ns$ .

*Table 3. Reported feelings of anxiety, divided by social-anxiety group and threat manipulation. Standard deviations appear in parentheses.*

| Social-Anxiety Group    | <i>n</i> = 28       |                     | <i>n</i> = 29 |             |
|-------------------------|---------------------|---------------------|---------------|-------------|
|                         | Low Social Anxiety  | High Social Anxiety | Threat        | No Threat   |
|                         | Threat              | No Threat           | Threat        | No Threat   |
|                         | Feelings of anxiety |                     |               |             |
| Before the manipulation | 0.23 (0.43)         | 0.06 (0.25)         | 0.73 (0.88)   | 0.92 (1.26) |
| After the manipulation  | 0.53 (0.66)         | 0.20 (0.41)         | 1.93 (1.16)   | 1.07 (1.26) |

### *Effects on recall of public self-referent words*

The mean number of words recalled under threatening and non-threatening conditions for each social anxiety group is shown in Table 4. Gender was initially included as a between-subject factor in the analysis, but this variable failed to yield any significant main effects or interactions so we collapsed across gender in the reported analysis. The data was submitted to a three-way Social Anxiety (high, low) X Induction (threat, no-threat) X Valence (positive, negative) ANOVA with the last factor as within subjects. A main effect of valence,  $F(1, 53) = 5.83, p < .05$ , partial  $\eta^2 = .10$ , was qualified by a significant interaction between social anxiety and valence,  $F(1, 53) = 8.60, p < .006$ , partial  $\eta^2 = .14$ . Independent samples t-tests indicated that the high social anxiety group recalled significantly less positive words about their public selves than the low social anxiety group,  $t(55) = 2.67, p = .01$ , Cohen's  $d = .72$ . The difference between the two groups in recall of negative words about their public self was in the opposite direction but not significant,  $t(55) = -1.12, p = .26$ . The three-

way interaction was not significant,  $F(1, 53) = 1.09$ , ns, indicating that the effects of social anxiety on selective memory for public self-referent information did not differ significantly between the social threat and no threat conditions.

**Table 4. Recall of trait words by each social-anxiety group under threatening and non-threatening conditions**

| Trait words    | Low Social Anxiety |               | High Social Anxiety |               | <i>t</i> |
|----------------|--------------------|---------------|---------------------|---------------|----------|
|                | <i>M</i>           | ( <i>SD</i> ) | <i>M</i>            | ( <i>SD</i> ) |          |
|                | <i>Threat</i>      |               |                     |               |          |
| Positive words | 3.46               | (1.66)        | 2.00                | (1.00)        | 2.86**   |
| Negative words | 3.00               | (2.12)        | 2.66                | (1.67)        | 0.46     |
|                | <i>No Threat</i>   |               |                     |               |          |
| Positive words | 4.66               | (2.28)        | 3.57                | (1.98)        | 1.37     |
| Negative words | 1.93               | (1.03)        | 3.21                | (1.76)        | 2.41*    |

\* $p < .05$ . \*\* $p < .01$ .

In addition to the selective effect of social anxiety on memory for public self-referent words, there was also a significant interaction between valence and induction,  $F(1, 53) = 7.61$ ,  $p < .01$ , partial  $\eta^2 = .13$ . Exploration of this interaction indicated that both the high and low social anxiety groups recalled less positive public self-referent words in the social threat condition than in the no threat condition,  $t(55) = 2.92$ ,  $p < .01$ , Cohen's  $d = .78$ . This effect did not occur with the negative public self-referent words. No other significant interaction was found.

#### ***Recall of public self-referent words and depression***

It is well established that depression is associated with a memory bias favouring negative information about the self (Blaney, 1986). Given that anxiety symptoms are highly comorbid with depressive symptoms, this raises the possibility that the group differences in selective memory for public self-referent words could be simply a function of comorbid depression. To investigate this possibility, bias scores (positive words minus negative words) were calculated for recall of public self-referent words in both manipulations and subjected to a one-way (high vs. low social anxiety) analysis of covariance with depression scores (CDI) as the covariate. There was a significant group difference,  $F(1, 54) = 6.24$ ,  $p < .02$ , partial  $\eta^2 = .10$ , indicating that the selective memory effect was a function of social anxiety rather than depression.

## DISCUSSION

The findings reported here are the first to provide preliminary evidence for a memory bias in childhood social anxiety. Specifically, they show that children in the high social anxiety group recalled significantly less positive public self-referent encoded words than the low social anxiety group and tended, non-significantly, to recall more negative public self-referent encoded words. However this effect did not interact with anticipation of a social performance. Therefore, the study's hypothesis was only partially confirmed.

No significant difference in depression scores was observed between the two social anxiety groups and the recall bias found with public self-referent words remained significant after controlling for depressive symptoms. Therefore, it appears that the memory bias observed was probably due to increased social anxiety levels, not concurrently increased levels of depressive symptoms. This finding is also in accord with the information-processing theories which suggest that memory biases play an integral role in the maintenance of childhood anxiety (Muris & Field, 2008) or social anxiety (Clark & Wells, 1995; Rapee & Heimberg, 1997). The social-threat manipulation was introduced after the encoding task. In line with previous research which highlighted the importance of the encoding task, the memory bias was not observed exclusively in children who thought they would have to give a social performance, suggesting that the bias occurred at encoding, rather than retrieval.

In the literature review it was described the only study that found an interaction between threat manipulation and valence for public self-referent words in adults (Mansell & Clark, 1999). Mansell and Clark (1999) also found that, the social anxiety group recalled significantly less positive public self-referent encoded words than the low social anxiety group and tended, non-significantly, to recall more negative public self-referent encoded words, which is similar to what we found in the current study. However, contrary to our null findings regarding the role of social-threat manipulation in selective memory, the memory bias in the Mansell and Clark (1999) study was observed only when both groups were anticipating giving a speech. How could we account for this partial discrepancy in the results?

There is one important difference between the two studies that could explain the mixed findings. In the study by Mansell and Clark (1999), the threat manipulation led to elevated anxiety levels, not only in high socially anxious participants, but also in low socially anxious individuals. The authors suggest that the results are probably due to a self-enhancing processing in low socially anxious individuals, which is not observed in high socially anxious individuals. In particular they point out that "...the memory bias largely occurred because the low social anxiety group recalled more favourable public self-referent information about themselves in the threat condition than in the no-threat condition. This suggests that low socially anxious individuals may have

prepared for the public speaking task by activating a more positive view of their social self" (Mansell & Clark, 1999, pp. 430-431).

In contrast, the threat induction in the current study increased anxiety levels only in high socially anxious participants, but not in low socially anxious individuals, as the interaction between social anxiety group and reported anxiety suggested, and as current theories of social anxiety might predict. Therefore the effects of the threat manipulation on both groups in the current study appear to be more ecologically valid. Moreover, the findings appear to suggest that a social-evaluative threat condition is not necessary to show a memory bias in anxiety, a result that is in line with earlier research on memory bias in social anxiety (e.g., Hope, Heimberg, & Klein, 1990). It is important to note here that two of the most influential cognitive models of social phobia do not consider social evaluation as a necessary condition for a memory bias to emerge. For example, both Clark and Wells (1995) and Rapee and Heimberg (1997) point out that socially anxious individuals tend to brood about negative recollections both before and after a social evaluative situation, suggesting that memory bias is possible well after the anxiety-provoking event is over. The current findings are in line with these models.

Finally, cognitive models of social anxiety have postulated that individuals high in social anxiety have a more negative mental representation of the self compared to non-anxious individuals (e.g., Rapee & Heimberg's model, 1997. See also Heimberg, Brozovich, & Rapee, 2010). Consistent with these cognitive models, this study found that children in the high social anxiety group rated words denoting negative personality traits as more self-descriptive and tended, non-significantly, to rate words denoting positive personality traits as less self-descriptive compared to those in the low social anxiety group. This finding is also consistent with past research that has shown that shyness and social anxiety are associated with lower scores on measures of general self-esteem (e.g., Cheek, Melchior, & Carpentieri, 1986; Jones, Briggs, & Smith, 1986; Kocovski & Endler, 2000), and that socially anxious adults are more likely to endorse negative characteristics as being self-descriptive or reject positive attributes as being self-descriptive, compared to non-anxious controls (Mansell & Clark, 1999; Wilson & Rapee, 2006). However, it may also be that socially anxious children may prefer to portray a negative image so that others will not hold high expectation of them (see also Wallace & Alden, 1997). More research is needed on this point.

While our findings need to be replicated, they do have a couple of interesting implications. First, they identify a cognitive process that could be responsible for maintaining childhood shyness and social anxiety. As Coles and Heimberg (2005) correctly observe, the world is a much friendlier place when one has a sense that others accept him and think positively of him. If one lacks this positive bias, "...the world is likely to be perceived as less friendly and social interactions may be perceived as more anxiety-provoking" (Coles & Heimberg, 2005, p. 118). According to the current study, high socially anxious children anticipating a stressful social event

appear to be less able than low socially anxious individuals to access positive information about how they are regarded by others. The cognitive pattern observed here could result in avoidance of (or escape from) the situation or in greater use of safety-seeking behaviours which could adversely affect other people's response to them (Clark & Wells, 1995; Rapee & Heimberg, 1997).

Second, the findings presented could provide a possible explanation for the apparent failure of other studies to find a memory bias in socially anxious individuals. While – according to self-presentational theory (Schlenker & Leary, 1982) - socially anxious individuals are overly concerned about their public self-image, not all studies have made a clear distinction of this information from information about the private self. For instance, we mentioned in the introduction the study reported by Rapee et al. (1994) which measured standard recall and recognition of threat, neutral and positive words (Study 1) and assessed retrieval of these words through implicit and explicit tasks (Study 2). The researchers reported a null result for explicit or implicit memory. However, the words were not encoded with regards to the public self and it remains possible that these null findings are due to the word stimuli insufficiently priming concerns specific to the social anxiety.

It is important to recognize the limitations of the current study. To begin with, future research in the area may consider the use of more ecologically valid methodologies for investigating selective memory. The approach used in the current experiment examined selective memories by asking individuals to encode and retrieve a relatively meaningless word list. The key benefit of this approach is that it was better secured that the emotional stimuli would be elaboratively encoded in a public self-referent fashion. However, it may be that traditional laboratory methods used to investigate selective memory (e.g., words presented on a screen) create artificial conditions and findings obtained from them cannot be generalized to real life. Also, only selective memory for trait words was examined and future studies should investigate whether socially anxious children show recall advantage (or disadvantage) for different aspects of memory such as autobiographical memory (Vassilopoulos, 2008; see also Morgan, 2010). Moreover, as Lundh and Ost (1996) have suggested, nonverbal stimuli is not only externally valid but may be more salient to individuals with social anxiety. Nonlinguistic experimental stimuli such as facial expressions may be more suitable in the case of children for the additional reason that children in general are slower readers and have more language difficulties than adults. Additionally, the current study did not examine whether memory bias for interpersonal information is specific to social anxiety compared to other anxieties, such as generalized and separation anxiety, or panic disorder. Future research should adopt an approach that includes groups of children with different anxiety disorders and uses stimuli which are thematically relevant to these different types of anxiety. Another limitation is the use of an analogue sample for social anxiety and there is a need to replicate these results in clinically referred children with social anxiety

disorder in order to ensure the generalizability of the findings. Finally the results of the current study should be interpreted with some caution, given the small size of the subsamples ( $n = 13-15$ ).

These results could have interesting counseling and therapeutic implications. According to the model postulated by Rapee and Heimberg (1997; Heimberg et al., 2010) socially anxious individuals – before and during a social interaction – construct a mental representation of how their behavior and appearance are perceived by others. The mental representation is constructed using external and internal sources of information such as memories and interoceptive information (e.g., stammering, hands trembling, etc.) (Heimberg et al., 2010). This mental representation is assumed to be distorted and can impact on individuals' actual or perceived in-situation social performance, leading thus to confirmation of their negative beliefs about themselves and their social world (Vassilopoulos, 2005b). However, if socially anxious individuals are aware of these biased cognitions and attempt to suppress them or allow them to occur without making judgments about the self, it may help prevent these individuals from confirming their pre-existing beliefs of social inadequacy (see also Vassilopoulos & Watkins, 2009). Another technique that has recently gotten a lot of attention and has been used as a major component of cognitive-behavioral therapy programs is the rescripting technique that focuses on altering unpleasant memories of individuals through cognitive restructuring (Wild, Hackmann, & Clark, 2008). There is already preliminary evidence suggesting that rescripting distressing social memories can reduce the strength of patients' negative self-beliefs and their anxiety about feared social situations (Wild et al., 2008). However more research is needed to ascertain whether socially anxious children can benefit from this memory-focused technique. Clearly, research on biased retrieval of interpersonal information could further inform cognitive-behavioral treatment interventions.

In conclusion, these preliminary findings suggest that memory biases are also to be found in children high in social anxiety. This is extremely important given that information-processing theories of social anxiety (e.g., Clark & Wells, 1995; Rapee & Heimberg, 1997) suggest that biased retrieval processes in social anxiety play a role in the maintenance of the disorder, but no support for this assertion has been found in childhood social anxiety. Further work in this area seems promising for a better comprehension of the essence of child anxiety disorders as well as for the development of effective cognitive-behavioral treatments.

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