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Post-event Processing in Children with Social Phobia

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Abstract In the aftermath of a distressing social event, adults with social phobia (SP) engage in a review of this event with a focus on its negative aspects. To date, little is known about this post-event processing (PEP) and its relationship with perceived performance in SP children. We measured PEP in SP children (n=24) and healthy controls (HC; n=22), aged from 8 to 12 years, after the Trier Social Stress Test for Children (TSST-C). Children also rated their performance immediately after the TSST-C and 2.5 h later. SP children reported more negative and less positive PEP than controls. Regression analyses indicated that negative PEP was associated with social anxiety and perceived task performance independent of comorbid depression. The SP group rated their performance immediately after the TSST-C as worse compared to HCs and ratings remained stable over the following 2.5 h. Results are discussed in relation to current theories of SP.

Keywords Social phobia · Children · Post-event processing · Cognition · Psychopathology

Introduction

Social phobia (SP) describes a persistent fear of humiliation and rejection by others, leading to the avoidance of social situations. Prevalence rates of up to 7% place it among the most frequent mental disorders in children and adolescents (Chavira et al. 2004). Due to its early onset, SP causes significant impairment in social and academic functioning and is a potential risk for normal development (Beidel et al. 1999).

In adulthood, SP is associated with dysfunctional information processing (Clark and Wells 1995; Rapee and Heimberg 1997). The cognitive model of SP by Clark and Wells (1995) delineates several cognitive processes that might be involved in the initiation and maintenance of social fears. Besides negative self images, dysfunctional thoughts, and safety behaviors, Clark and Wells (1995) propose that *ruminative processes* which follow social situations play a key role in the maintenance of the disorder. During this so called *post-event processing* (PEP), individuals with SP review the distressing event with a focus on its negative aspects and re-experience associated feelings and cognitions. PEP is thought to lead to a negatively biased view of the social situation and a confirmation of negative self beliefs. Furthermore, the model postulates a relationship between the appraisal of one's own performance and the frequency of dysfunctional PEP: The more negatively individuals perceive their own performance in social situations, the more frequent their subsequent PEP. Thus, PEP can be interpreted as the reoccurrence of self-focused dysfunctional attention as seen in socially anxious individuals during social interactions, with similarly damaging effects on self-evaluation (Rachman et al. 2000).

A growing number of studies on adults with social anxiety have provided evidence for the relevance of PEP in this disorder (for a review see Brozovich and Heimberg 2008). Rachman et al. (2000), for example, found that socially anxious students were more likely to report PEP on the Post-Event Processing Questionnaire (PEPQ), developed by the authors of this study. The rumination quality was rated as intrusive, recurrent, and interfering with the individual's concentration. The PEPQ score was linked to measures of social anxiety even when depressive symptoms were statisti-

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cally controlled. The latter aspect is considered crucial, because rumination is also associated with depression (for a review see Thomsen 2006) and comorbid depression is frequently present in SP (Chartier et al. 2003). However, the retrospective nature of this study limits its conclusiveness. It might, for example be the case that individuals with SP experience more distressing events than controls, which might account for their more negative PEP. Exposing individuals to a standardized social stressor in the laboratory and measuring subsequent PEP provides a more stringent test of Clark and Wells' assumptions. Further, the relationship of PEP with perceived performance can be assessed.

Along these lines, Abbott and Rapee (2004) exposed adults with SP and healthy controls (HC) to an impromptu speech task and had them rate their own performance in it (T1). One week later (T2), participants filled out the Thoughts Questionnaire (TQ), a measure for negative and positive PEP developed by Edwards et al. (2003), and a second retrospective performance rating. The SP group reported higher levels of negative PEP, but no group differences were found in the amount of positive PEP. The authors conclude that positive and negative PEP are more or less unrelated, "virtually orthogonal" dimensions, which is supported by the findings of two other recent studies (Dannahy and Stopa 2007; Edwards et al. 2003). It seems likely then that dysfunctional PEP in SP adults is characterized particularly by the presence of more negative but not by less positive cognitions, compared to HCs. Regarding self-rated performance, the SP group gave lower ratings than the HC group at T1 and T2, without much change between the two measurements. HC participants, by contrast showed an increase of self-rated performance from T1 to T2. Following up on their hypothesis that PEP might be responsible for this lack of improvement in the performance ratings within the SP group, the authors performed a set of regression analyses. As could be expected from Clark and Wells' model (1995) which postulates that perceived performance is linked to PEP, T1 performance ratings predicted negative PEP. Negative PEP, in turn was associated with negative T2 performance ratings. In line with two other studies (Dannahy and Stopa, 2007; Perini et al. 2006), these results emphasize the link between negative performance ratings and the extent of PEP. It thus seems that the evaluation of one's performance within a social situation is a potent predictor for the extent of following ruminative processes.

To date, relatively little is known about PEP in SP children and whether Clark and Wells' model (1995) can be applied to younger populations. This model assumes relatively complex cognitive operations and self-referential thinking which might not yet be developed at younger ages. Recently, Hodson et al. (2008) examined PEP in secondary school pupils aged 11–14 years, classified as having either low, medium, or high social anxiety, according to the Social Phobia and Anxiety Inventory for Children (SPAI-C; Beidel et al. 1995). Children high in social anxiety scored significantly higher on the PEPQ, compared to the low anxiety group. The medium and low anxiety group did not differ. These results support the assumption that PEP is associated with social anxiety in this age group, and that this aspect of the Clark and Wells' model can be applied to non-adult populations. However, as indicated above, the retrospective nature and the lack of an experimental control of the social situation that this PEP referred to, as well as the uncertainness about clinically relevant social fears within the sample, limit the conclusiveness of this study.

The present study thus aimed to understand how PEP, performance ratings and social anxiety interact in a sample of SP and HC children at the ages of 8–12 years. The Trier Social Stress Test for Children (TSST-C; Buske-Kirschbaum et al. 1997) was used because it is a well-validated experimental task for the elicitation of social evaluative stress in children (Dorn et al. 2003; Gilissen et al. 2008). Self-rated performance and self-rated anxiety were measured directly after the stress task. Based on Dannahy and Stopa's (2007) results showing that the most intense PEP takes place in the immediate aftermath of social situations, PEP and an additional performance rating were assessed 2.5 h after the end of the stressor. We examined three hypotheses: (1) Negative PEP is higher in the SP group compared to HCs, groups do not differ regarding positive PEP (Abbott and Rapee 2004; Dannahy and Stopa 2007; Edwards et al. 2003). (2) Negative PEP is related to social anxiety and initial performance ratings even when comorbid depression is statistically controlled (Abbott and Rapee 2004; Rachman et al. 2000). (3) Based on Clark and Wells' (1995) assumption, that negative PEP may lead to degraded self-appraisals of performance, we hypothesized that performance ratings in the SP group become more negative over time but remain unchanged in the HC children.

Method

Participants

Children aged 8–12 years were recruited from the community through an advertising campaign offering treatment and remuneration (€25—approx. $35—for parents and €25 in vouchers for children) for participation in a three-session study series. The study was approved by the local ethics committee for psychological research. Full data was available for 24 SP children (12 boys and 12 girls; *M* (SD) age: 10.2 (1.53)) fulfilling a principal DSM-IV diagnosis of social phobia and 22 HC children (12 boys, 10 girls; *M* (SD) age: 9.77 (1.19)) who did not meet diagnostic criteria for any lifetime Axis I disorder.

Exclusion criteria for anxious children were severe depression or a psychotic disorder. Exclusion criteria for all children were medical conditions like asthma or use of medication that could alter physiological responses.

Following a telephone screening, participants were assessed by two doctoral students or two advanced graduate students in clinical psychology who had been specifically trained in the administration of the "Kinder-DIPS" (Schneider et al. 2009). The Kinder-DIPS is a structured psychiatric interview that codes for mental disorders in children and adolescents according to criteria of both the International Classification of Mental and Behavioral Disorders (ICD-10; WHO 1992) and the DSM-IV (APA 1994). It consists of two separate structured interviews for child and parent. All diagnostic sessions were videotaped and any uncertainties discussed and clarified with two experienced clinical psychologists. After the interview, participants filled out several questionnaires on demographics and psychopathology. The following comorbid conditions were found in the SP group: attention deficit hyperactivity disorder (n=5), specific phobia (n=4), enuresis (n=1), oppositional defiant disorder (n=1), and major depression (mild single episode; n=1).

Demographics and Symptom Measures

Demographics and results from the psychometric questionnaires are reported in Table 1. The SP and HC groups did not differ in age or school level and SP children showed significantly higher scores in all symptom measures than the HCs. The mean SPAI-C score in the experimental group was above the cut off (20) for a clinically relevant SP.

Procedure and Experimental Measures

Figure 1 presents an overview of the procedure. Following the diagnostic interviews, a laboratory session was scheduled. The 90-min laboratory session began between 3 and 4 pm for all participants. During the lab session several subjective, psychophysiological and endocrine measures (5 saliva samples for cortisol and alpha-amylasis) were assessed, the results of which will be presented in a different publication (Krämer et al., in preparation). In addition, seven anxiety ratings were obtained. Children were seated in a comfortable armchair in a sound attenuated room. 10 min after attaching the electrodes the baseline (5 min.) period began. Subsequently, a TSST-C, which consisted of a preparation phase (5 min.) and two stress phases (5 min. each), was conducted in front of a two-person adult committee. In the speech task, children are instructed to finish telling a story in an as exciting as possible way. In the mental arithmetic (math) task which follows, children have to do a successive mental subtraction. To equate groups on the amount of received error feedback in the math task, observers gave error feedbacks once a minute ("There was an error in your last calculation steps, please start over again"). Immediately after each task, max. anxiety in the last five minutes was self-rated on a 0 (no anxiety) to 10 (very high anxiety) scale (ANX_{speech}, ANX_{maths}). In addition, participants rated their own performance in both tasks immediately following the TSST-C (T1: $PERF_{speech\_1}$, $PERF_{maths\_1}$) on a 1 to 6 scale (corresponding to the grades in German schools; the scale was then inverted so that higher scores indicated higher performance). The stressor was followed by three resting periods (10 min. each) during which the children completed a short interview on mental images and then watched pictures of landscapes on a computer screen for relaxation. After the end of the resting phases, the electrodes were removed.

At the end of the experimental session, the TQ-C, which assessed positive and negative PEP in the aftermath of the TSST-C, and a second performance rating, asking the children for a retrospective appraisal of their performance on speech and the math task ($PERF_{speech\_2}$, $PERF_{maths\_2}$), were given to the accompanying parent in a sealed envelope. Two hours later (T2), the experimenter called the child's parent and asked them to have their child complete the questionnaires. It was further emphasized that parents should be available for assistance with the questionnaires, but that they should refrain from exercising any influence on the child. Participants were debriefed after a second lab session one week later, during which an experimental paradigm on visual attention was conducted.

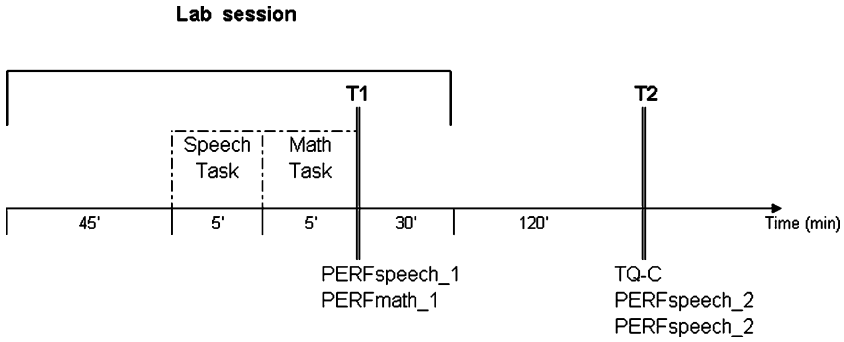
Table 1 Participant Characteristics

	Social phobia *M* (SD)	Healthy controls *M* (SD)	Statistic
n in sample	24	22	
Age (years)	10.2 (1.53)	9.77 (1.19)	$t(44)=1.68$
% Female	45.5	50	$\chi^2(1)=0.09$
% Primary school	40.9	58.3	$\chi^2(1)=1.39$
SPAI-C	21.1 (8.15)	5.82 (7.83)	$t(44)=6.49$***
SASC-R-FNE	23.5 (7.10)	13.4 (5.50)	$t(44)=5.34$***
SASC-R-SAD	23.6 (5.88)	13.4 (3.18)	$t(44)=7.43$***
CDI	12.0 (5.13)	7.68 (2.76)	$t(44)=3.62$**

CDI Child Depression Inventory, *SPAI-C* Social Phobia and Anxiety Inventory for Children, *SASC-R-FNE* Social Anxiety Scale for Children: Subscale Fear of Negative Evaluation, *SASC-R-SAD* Social Anxiety Scale for Children: Subscale Social Avoidance and Distress, *M* mean, *SD* standard deviation

** $p<0.01$ *** $p<0.001$

Fig. 1 Procedure



Psychometric Measures

The Social Phobia and Anxiety Inventory for Children (SPAI-C; Beidel et al. 1995)

This 26-item instrument measures different physical, cognitive and avoidant symptoms of social anxiety according to the criteria of the DSM-IV (APA 1994). A total score between 0 and 52 is calculated. The German SPAI-C (Melfsen et al. 2001) has excellent internal consistency (α=0.92) and high test-retest reliability (r=0.85). It discriminates well between socially and non-socially phobic individuals with a recommended cut-off score at 20. The high level of internal consistency was confirmed in our sample (α=0.96).

The Social Anxiety Scale for Children—revised (SASC-R; La Greca and Stone 1993)

This instrument is designed to assess symptoms of social anxiety in children aged between 6 and 12 years. Factorial analyses of the German version of the SASC-R (Melfsen and Florin 1997) revealed two factors: Fear of Negative Evaluation subscale (FNE; 8 items) and Social Avoidance and Distress subscale (SAD; 10 items). In comparison to the SPAI-C, the FNE scale focuses more strongly on evaluative fears. The second subscale assesses social avoidance and distress in various situations. Total scores may range from 18 to 90. Like the original scale, the German version of the SASC-R shows satisfactory reliability (r=0.57–0.81) and internal consistency (α=0.63–0.83) (Melfsen and Florin 1997). In our sample, FNE and SAD scale showed excellent internal consistency (α=0.87 and α=0.84, respectively).

Thoughts Questionnaire for Children (TQ-C)

The TQ-C was developed on the basis of the TQ (Edwards et al. 2003). The validity and comprehensibility of the items were reviewed by a committee of two clinical psychologists and three doctoral students in clinical psychology, all of whom were highly experienced in diagnostic assessment of SP in children. The TQ-C measures specific cognitions which children experienced in the aftermath of the TSST-C ("How often did you think…"). It consists of 16 items, 8 positive and 8 negative cognitions, referring to the performance on the tasks (e.g. "I did well on the tasks", "I made too many mistakes on the math task"); cognitions regarding the observers (e.g. "The observers thought of me as self-confident", "The observers didn't like me"); and cognitions referring to feelings experienced (e.g. "I felt good", "I felt anxious"). Children respond to all items on a 6-point Likert-scale ranging from "never" to "very often". All items are additionally illustrated by pictures with thought bubbles as suggested by Alfano et al. (2002). The two subscales for negative and positive PEP have a maximum score of 48 each. Cronbach's alpha indicated excellent internal consistency for both the negative and the positive PEP scale (α=0.91 and 0.93, respectively) in the current sample. There was no significant correlation between the two subscales (r=−0.267; p=0.072).

Child Depression Inventory (CDI; Kovacs 1985)

The CDI assesses the cognitive, affective, and behavioral symptoms of depression. Total scores range from 0 to 52. The German CDI (Stiensmeier-Pelster et al. 2000) has demonstrated good internal consistency (α=0.84) and distinguishes children with major depression from non-depressed children. In the current sample, the CDI showed good internal consistency (α=0.75).

Results

Manipulation Check: Did the TSST-C Elicit Social-Evaluative Stress?

Results of a 2×2, Group (SP, HC) x Time (speech task, math task) analysis of variance (ANOVA) with repeated measures on the Time factor revealed a significant Group effect: SP children experienced significantly higher levels of anxiety than HCs (SP: $M_{ANXspeech}$=7.29, SD=2.49; $M_{ANXmath}$=5.70, SD=2.95; HC: $M_{ANXspeech}$=3.31, SD=

1.93; $M_{ANXmath}$=2.50, SD=1.94), $F(1,44)=37.4$, $p<0.001$, $\eta^2=0.459$. Furthermore there was a main effect of Time, $F(1,44)=9.48$, $p=0.004$, $\eta^2=0.177$, but no significant Group x Time interaction, $F(1,44)=0.96$, $p=0.33$. Both SPs and HCs reported more anxiety in the speech task compared to the math task.

Hypothesis 1: Negative PEP is higher in the SP group compared to HCs. Groups do not differ regarding positive PEP.

Post-event Processing

Negative and positive PEP in the HC and SP groups are shown in Fig. 2. A 2×2, Group (SP, HC) x PEP-Valence (negative, positive) ANOVA yielded neither a main effect of Group, nor a main effect of PEP-Valence, both *Fs* <*1.00*, but a significant Group x PEP-Valence interaction, $F(1,44)=25.3$, $p<0.001$, $\eta^2=0.366$. Post-hoc independent sample t-tests revealed higher scores in the SP group on the negative PEP scale, $t(1,44)=3.96$, $p<0.001$, $d=1.15$, and lower scores on the positive PEP items, $t(1,44)=3.33$, $p=0.002$, $d=0.99$, compared to HCs. A paired t-test indicated more negative cognitions in comparison to positive cognitions within the clinical group, $t(23)=4.08$, $p<0.001$, $d=1.19$. By contrast, controls reported more positive than negative cognitions $t(21)=3.08$, $p=0.006$, $d=0.96$.

A mediation analysis, according to Baron and Kenny's approach (1986), tested if the relationship between Group and negative PEP was mediated by CDI depression. The predictor Group accounted for a significant amount of variation in negative PEP ($\beta=-0.505$, $p<0.001$) and in the assumed mediator CDI depression ($\beta=-0.470$, $p=0.001$). When the mediator was added to the first model, its presence reduced the strength of the relationship between group and negative PEP ($\beta=-0.275$, $p<0.039$) and accounted for variation in negative PEP ($\beta=0.488$, $p<0.001$). CDI depression was a partial mediator for the relationship between Group and negative PEP. Both CDI depression and Group explained variance in negative PEP.

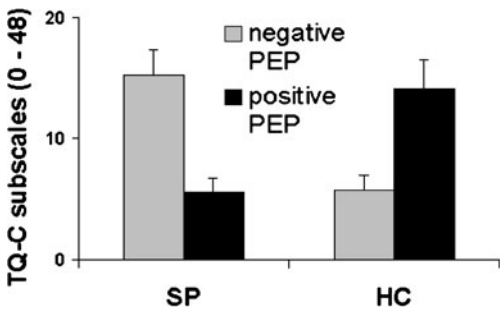


Fig. 2 Positive and negative PEP in SP and HC group

To investigate if negative and positive PEP were related to age, PEP and age were correlated separately for both groups. For the HC group there were no significant correlations of positive, $r=0.141$, $p=0.531$, or negative PEP, $r=0.188$, $p=0.402$, with age. In the SP group, age showed a significant correlation with negative, $r=0.528$, $p<0.001$, but not with positive PEP, $r=-0.061$, $p=0.778$. This correlation remained significant when symptom severity, measured by SPAI-C scores, was partialed out $r=0.502$, $p=0.015$. Older HC children did not report more or less negative cognitions than younger HCs, while older SP children reported more negative PEP but not more or less positive PEP than younger SPs.

Hypothesis 2: Negative PEP is related to social anxiety and T1 performance ratings even when comorbid depression is statistically controlled.

Relationships Between Demographics, Symptom Measures, Performance Ratings, and PEP

To follow up on the previous findings by Abbot and Rapee (2004) that performance ratings as well as social anxiety might predict negative PEP, we regressed negative PEP on performance ratings (averaged across both tasks: $PERF_{mean\_T1}$: Mean of $PERF_{speech\_1}$, $PERF_{math\_1}$), the two subscales of the SASC-R, the SPAI-C, and the CDI scores in a stepwise multiple regression analysis. Similar to previous research, age and sex were treated as control variables and were added in a first step, while all other predictor variables were entered simultaneously in a second step. Table 2 presents beta weights, explained variance, and simple correlations for the predictors.

The predictor age reached significance and the first step model explained 21.5% of variance, $F(2,43)=5.88$, $p=0.006$. After including all other predictors in the second step, the model accounted for an additional 54.6% of variance, $F(7,38)=17.2$, $p<0.001$. Only the SASC-R subscale FNE and the performance ratings were significant predictors for negative PEP in Step 2. Despite a robust simple correlation with negative PEP, CDI scores did not reach significance ($p=0.220$) when entered simultaneously with the other Step 2 predictors. These results suggest that social anxiety is a better predictor for negative PEP than depression. An increase of the FNE scale of 1 SD translates in an increase of negative PEP by 0.56 SD. Furthermore, the appraisal of performance during the TSST-C was linked to the extent of subsequent negative PEP: The worse children perceived their own performance, the more frequent their subsequent negative PEP.

Hypothesis 3: Performance ratings worsen over time in the SP group but remain unchanged in HC children

Table 2 Regression Model Predicting Negative Post-event Processing

Entry/ predictors	ΔR2 step	β	% explained variance	r
Negative PEP				
Step 1	0.215**			
Age		0.424**	17.9	0.449
Sex		0.119	1.31	0.207
Step 2	0.546***			
$PERF_{mean\_T1}$		0.386*	27.4	0.662
CDI		0.136	3.84	0.618
SPAI-C		0.045	0.25	0.467
SASC-R-FNE		0.563***	35.6	0.755
SASC-R-SAD		−0.158	2.89	0.422

Negative PEP Thoughts Questionnaire for Children: Subscale Negative Post-event Processing, $PERF_{mean\_T1}$ Mean performance rating score for the TSST-C, *CDI* Child Depression Inventory, *SPAI-C* Social Phobia and Anxiety Inventory for Children, *SASC-R-FNE* Social Anxiety Scale for Children: Subscale Fear of Negative Evaluation, *SASC-R-SAD* Social Anxiety Scale for Children: Subscale Social Avoidance and Distress

* $p<0.05$ ** $p<0.01$ *** $p<0.001$

Performance

To compare the course of the performance ratings over time between SP and HC children, a 2×2, Group (SP, HC) x Time (post-stress, follow up) ANOVAs with repeated measures on the Time factor was conducted. Therefore, follow-up performance ratings were also averaged across both tasks ($PERF_{mean\_T2}$: Mean of $PERF_{speech\_2}$, $PERF_{math\_2}$). For the speech task there was a main effect of Group (SP: $M_{Perfmean\_T1}$=2.50, SD=0.85; $M_{Perfmean\_T2}$=2.38, SD=0.92; HC: $M_{Perfmean\_T1}$=3.32, SD=0.64; $M_{Perfmean\_T2}$=3.48, SD=0.94), $F(1,44)=19.4$, $p<0.001$, $\eta^2=0.306$, but no main effect of Time $F(1,44)=0.18$, $p=0.839$, $\eta^2<0.001$, and no Group x Time interaction, $F(1,44)=1.26$, $p=0.268$, $\eta^2=0.028$. The SP group rated their performance as worse compared to HC children but there was no change over time in the ratings.

Discussion

To our knowledge, this is the first study of PEP and its relationship with self-rated performance after a well-controlled, experimental stressor in SP children. The results replicate and extend the previous findings by Hodson et al. (2008) which mainly relied on retrospective reports. The results can be summarized as follows: (1) 2.5 h after the TSST-C, children suffering from SP reported more negative and less positive PEP compared to HCs. Social anxiety contributed independently from levels of depression to negative PEP. (2) A stepwise multiple regression analysis indicated that negative PEP was linked to social anxiety and performance ratings but not to CDI-depression. (3) The SP group rated their performance as worse compared to the HC group but no significant change over time was found in the performance ratings in both Groups.

In line with our first hypothesis, children suffering from SP reported more negative PEP following the TSST-C compared to HC children. These results are in line with both current models of social anxiety (Clark and Wells 1995; Rapee and Heimberg 1997) and replicate findings in adult and child samples (e.g. Abbott and Rapee 2004; Dannahy and Stopa 2007; Hodson et al. 2008). Thus, they support the suggestion that children with SP—similar to SP adults—engage in a negatively focused review of past social situations that may lead to the confirmation of negative self images which are assumed to maintain the disorder.

Contrary to our expectation, the HC children reported more positive PEP following the lab session than SP children. In comparison, studies on adult samples did not find such group differences (Abbott and Rapee 2004; Dannahy and Stopa 2007; Edwards et al. 2003). A positive distortion is sometimes reported in adult studies investigating the interpretation of ambiguous stories (e.g. Hirsch and Mathews 2000). It is assumed that this *benign interpretation bias*, characterized by positive cognitions and expectations in relation to social events, could have a protective function which may help to sustain a positive feedback cycle and preserve positive self-esteem and low anxiety. For children, only a few studies exist which have reported the existence of a positive interpretation bias, but like in adults, this bias is discussed to be crucial for preserving high self-esteem (Bear and Minke 1996; Harter 1987; Spence et al. 1999). Further, low self-esteem is found to be a potential risk factor for the development of SP (Acarturk et al. 2009). It is conceivable that a similar bias could have led to an increase in the performance ratings in our HC group. Moreover, it may indicate that PEP in children shows a different pattern

regarding the ratio of positive and negative cognitions than it does in adults.

A correlation analysis on the relation between age and PEP underlined the fact that developmental factors must be considered in the discussion of our results. In line with preliminary research on the influence of developmental factors on the reporting of cognitions in anxious children, older children of our SP group reported more negative PEP than younger children of the same group (Alfano et al. 2006). This result was independent from symptom severity and could be owed to older childrens' higher metacognitive skills and enhanced ability to distinguish cognitions from emotions (Alfano et al. 2002). The development of cognitive and emotional understanding during childhood and youth could also explain the unexpected group differences in positive PEP. Younger children are generally found to be unable to experience opposing emotional reactions simultaneously, and this ability is usually not acquired until the age of 10–12 years (Caroll and Steward 1984; Harter 1986). For younger children, one is "all happy" or "all sad" (Alfano et al. 2002). It remains unclear how this inability to integrate emotions might affect the valence of cognitions, but in a study by Kendall and Chansky (1991), anxious children aged 9–14 tended to report either all negative, all positive, or all neutral cognitions when using a thought-listing technique. The authors suggest that this "one-track reporting" may not be specific for emotions but could also be relevant for cognitive contents and that the ability to integrate different emotional or cognitive states may be interpreted as a stage of higher cognitive development. One-track reporting could explain why HC and SP children in our sample reported mostly all positive or all negative PEP, resulting in the unexpected group difference regarding positive PEP. If the pattern of PEP becomes more adult like with further cognitive development, and if its quality in children is characterized by similar levels of intrusiveness and interference with concentration as reported by adult research (McEvoy and Kingsep 2006; Rachman et al. 2000), needs further investigation.

In line with the results for socially anxious adults (Abbott and Rapee 2004), a regression analysis confirmed our assumption that social anxiety and performance ratings predicted negative PEP. This finding is in line with Clark and Wells' model (1995) which posits a direct relationship between negative appraisal of performance during social situations and the frequency of subsequent negative PEP. It seems that the more children perceive their own performance as negative, the greater the frequency of subsequent negative PEP. It should be noted here that the individual's self-evaluation of performance and subsequent PEP need not match an objective assessment of performance but are rather the result of a subjective perspective, which may be negatively biased in SP individuals (Clark and Wells 1995). Even though all measures for severity of social anxiety were linked to negative PEP, the FNE scale of the SASC-R showed the best predictability for subsequent negative cognitions, accounting for 35.6% of their variance. This is consistent with the idea that the TSST-C primarily evokes fear of negative evaluation which then gives rise to negative rumination after the stressor. Given that rumination is often found to be related to depression (Thomsen 2006), it is an important finding that FNE predicted negative PEP independently of CDI depression and underlines the results of the mediation analysis. Since depression and social anxiety scores both led to more negative PEP, the relation between the two disorders is of some interest. Several studies on adults and children found evidence that depression as well as anxiety disorders show overlapping characteristics such as anxiety sensitivity, negative assumptions about one's self, rumination tendencies and other cognitive biases. Despite these similarities, depression and anxiety disorders are regarded as distinct concepts (Murphy et al. 2000; Weems et al. 1997). In line with this argumentation and with previous studies (e.g. Rachman et al. 2000), we found that both depression and social anxiety independently predicted PEP. Thus, PEP might be a single end product of two conceptually different processing styles.

Contrary to our third hypothesis and to Clark and Wells' (1995) assumption that negative PEP may lead to degraded self-appraisals of performance, the ANOVA for the performance ratings failed to show a significant Group x Time interaction. While children of the SP group rated their performance during the TSST-C as generally worse than HC children, these ratings remained stable over time in both groups. Beside the possibility that PEP in children may simply not have a negative influence on self-rated performance, another explanation for this lack of change might be the relatively short period of time between the TSST-C and the follow-up assessment. Studies on adults that investigated the relationship between PEP and corresponding performance ratings have assessed these processes over the course of an entire week (Abbott and Rapee 2004; Dannahy and Stopa 2007). Future studies on SP children should use a similar duration of assessment when investigating a possible negative influence of PEP on self-rated performance.

For PEP in children the question remains if the tendency to negatively process past social events is cause or consequence of SP. Since our participants were already affected at the time of the study, our data do not really provide any clarification. It should also be considered that epidemiological data suggests that SP in childhood may remit (Lavigne et al. 1998). It would be interesting to know if elevated PEP is a maintenance factor in that its presence makes remission less likely. Evaluation of PEP as a risk factor would require longitudinal study designs. To our knowledge no study so far has dealt with this intriguing

question. However, there is evidence that a ruminative response style is a potential risk factor for the development of depression in both children and adults (Roelofs et al. 2006; Ziegert and Kistner 2002). In addition, in a non clinical sample, Joorman et al. (2006) found a "brooding response style" linked to cognitive biases that are typically found in anxiety disorders but not in depression. Another indication that the tendency to ruminate may exist prior to the onset of SP can be found in several studies on adults with high but not clinical levels of social anxiety, which have reported an elevated frequency of negative PEP in socially anxious individuals when compared to non anxious adults (Dannahy and Stopa, 2007; Edwards et al. 2003; Rachman et al. 2000).

The following limitations for this study apply. First, although it is likely that PEP is strongest in the hours immediately following the stressor, our data do not address the course of PEP and perceptions of performance over the course of several days. Multiple repeated measures would be necessary to determine when and for how long crucial PEP occurs in the aftermath of a stressful social event. Second, even though the scales of the TQ-C showed good internal consistency, the related psychometric properties have not been independently established. Specifically, due to insufficient sample size, the existence of the assumed two factor structure for negative and positive PEP could not be tested. Further, the adaptation of the TQ-C to the experimental task makes the generalization of the results across different situations difficult. In general, the results of the TQ-C might include the influence of various sources of errors which come with the use of retrospective self-reports in this population, such as response demand and memory biases (e.g. Coles and Heimberg 2002). A possible way for future studies to avoid the influence of such biases could be a methodology of continuous cognition recording in the aftermath of social situations.

In summary, our results support the assumption that PEP after social evaluative stress may be relevant for the understanding of SP in children. Children with SP reported more negative and less positive PEP compared to the HC group. The link between social anxiety, perception of performance and the extent of negative PEP is in line with current models of SP and previous adult research.

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