



Positive thinking in anxiety disordered children reconsidered

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ARTICLE INFO

Article history:

Received 24 May 2011

Received in revised form 6 September 2011

Accepted 11 September 2011

Keywords:

Anxiety disorders

Children

Cognition

Positive thoughts

Negative thoughts

CATS-N/P

ABSTRACT

Negatively valenced thoughts are assumed to play a central role in the development and maintenance of anxiety. However, the role of positive thoughts in anxiety is rather unclear. In the current study we examined the role of negative and positive self-statements in the anxiety level of anxious and non-anxious children. Participants were 139 anxiety disordered children and 293 non-anxious children (8–18 years). Compared to non-anxious children, anxious children reported more negative thoughts, less positive thoughts and lower State of Mind (SOM) ratios (ratio of positive to negative thoughts). Negative thoughts and SOM ratios were the strongest predictors of anxiety level in anxious children; whereas both negative and positive thoughts were the strongest predictors of anxiety level in non-anxious children. To conclude, a lack of positive thoughts might be more than just an epiphenomenon of anxiety level and might deserve a place in the cognitive model of anxiety.

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1. Introduction

Cognitions play an important role in theories about the development and treatment of anxiety disorders. The cognitive model was originally developed for adults and assumes that anxious individuals process external and internal stimuli in a biased way, resulting in a variety of cognitive errors (e.g. overgeneralization, personalizing, selective abstraction; Beck, 2005). Negatively valenced thoughts (exaggerated perception of danger and threat) and an underestimation of one's ability to cope with these threats (Kendall & Chansky, 1991) are associated with these biased interpretations. Cognitive therapy is based on the cognitive model and focuses on identifying and restructuring biased negative thoughts and interpretations.

The cognitive model has been adopted to explain the development of anxiety in children and adolescents (hereafter children) and cognitive-behavioral techniques are used in the treatment of childhood anxiety disorders. The main focus of studies examining the cognitive model in children has been on negative thoughts, and not on positively valenced thoughts. Kendall (Kendall, 1984) observed that "...various operationalizations of psychological adjustment are related not so much to positive thinking as to the

absence of negative thinking" (p. 61). In addition, he suggests that improvement during treatment is associated with a reduction of negative thoughts rather than an increase of positive thoughts. This phenomenon has been called the 'Power of Nonnegative Thinking' (Kendall & Chansky, 1991).

Indeed, studies have found a connection between the presence of negative thoughts and anxiety, for example in clinically anxious adults (Beazley, Glass, Chambless, & Arnkoff, 2001), in clinically anxious children (Kendall & Chansky, 1991; Schniering & Rapee, 2002) and in non-referred children (Muris et al., 1998). However, when both negative and positive thoughts are considered, results have been inconclusive (Alfano et al., 2002). Several studies support the Power of Nonnegative Thinking hypothesis and report that anxiety is associated with more negative thoughts, but not with less positive thoughts, for example in non-referred students (Calvete & Connor-Smith, 2005; Wong, 2010), in clinically anxious children (Kendall & Treadwell, 2007; Treadwell & Kendall, 1996) or in non-referred children (Brophy & Erickson, 1990; Prins, 1986; Prins & Hanewald, 1997). However, other studies have found that anxiety is associated with both more negative thoughts and less positive thoughts, for example in anxious children (Ronan & Kendall, 1997) or in normal children (Calvete & Cardenoso, 2002; Zatz & Chassin, 1985).

It may well be that not the absolute number of negative and positive thoughts are predictive of psychological well-being, but rather the relative balance of positive and negative thoughts, as Schwartz and Garamoni (Schwartz, 1986; Schwartz & Garamoni,

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Table 1
States of mind (SOM) categories with ranges of SOM ratios, set points and their meaning.

SOM category	Range	Set point	Meaning
Positive monologue	0.91–1.00	None	Unhealthy balance: excessive positivity, mania, unrealistic optimism
Positive dialogue	0.67–0.90	0.88 (super optimal) 0.81 (optimal) 0.72 (normal)	Most optimal balance: adaptive and flexible balance in healthy persons in neutral situations
Successful coping dialogue	0.59–0.66	0.63	Subnormal balance: realistic and positive balance in healthy persons in stressful situations
Conflicted dialogue	0.42–0.58	0.50	Associated with doubt, ambivalence and mild anxiety/depression
Failed coping dialogue	0.34–0.41	0.38	Associated with moderate anxiety/depression, worry, guilt
Negative dialogue	0.10–0.33	0.28 (low negative) 0.19 (moderate) 0.13 (high negative)	Associated with hopelessness and severe anxiety/depression
Negative monologue	0.00–0.09	None	Unstable ratio, associated with pure and immediate panic and profound anxiety/depression.

1989) suggest in their States of Mind (SOM) model. In the original SOM model, the optimal balance between positive and negative thoughts (amount of positive thoughts divided by the sum of positive and negative thoughts) was 0.62, in a theoretical range of 0–1.00. In a reformulated version of the model (Schwartz, 1997) seven distinct SOM categories are included that differentiate between optimal, healthy, subnormal and pathological balances of positive and negative thoughts (see Table 1 for an overview). The Positive dialogue, with a ratio between 0.67 and 0.90 is considered the most optimal ratio. The Conflicted dialogue, with a ratio between 0.42 and 0.58 is supposed to be associated with anxiety and depression. The SOM ratio has several advantages over the use of separate negative and positive thoughts: it examines the relative balance of positive and negative thoughts, fewer variables (i.e. just one composite score) are needed in statistical analyses and the ratio is standardized (Amsel & Fichten, 1998).

Studies have supported the SOM model in a range of adult samples including healthy students or adults (Calvete & Connor-Smith, 2005; Garamoni et al., 1991), people with test-anxiety (Diaz et al., 2001) or subclinical social fear (Sturmer et al., 2002); but also in adult clinical samples with social phobia (Beazley et al., 2001), agoraphobia (Michelson, Schwartz, & Marchione, 1991) or depression (Garamoni et al., 1991). These studies have consistently shown that lower SOM ratios (in the Conflicted dialogue, Failed Coping dialogue or Negative dialogue, see Table 1) are associated with more psychological problems, that SOM ratios can differentiate between clinical and control samples (e.g. Garamoni et al., 1991; Nasby & Russell, 1997), and that SOM ratios are treatment sensitive (Bruch et al., 1991; Garamoni et al., 1992; Michelson et al., 1991).

As far as we know, the SOM model has been tested seven times in children or adolescents: in five non-referred samples (Calvete & Cardenoso, 2002, 2005; Daleiden et al., 1996; Prins & Hanewald, 1997; Ronan & Kendall, 1997) and in two clinically anxious samples (Kendall & Treadwell, 2007; Treadwell & Kendall, 1996). The results were similar to adult studies: all found a significant relation between SOM ratios and internalizing problems. SOM ratios of the two clinically anxious samples were 0.59 in one study (Kendall & Treadwell, 2007) and 0.58 in the other (Treadwell & Kendall, 1996), which is on the boundary between the Successful Coping dialogue and the Conflicted dialogue category. SOM ratios of non-anxious or low-anxious children ranged between 0.61 and 0.73, which is in the Successful Coping dialogue or the Positive dialogue (see Table 1). However, all studies with clinical samples only included children with a restricted age range, e.g. 8–13 years old. Further, most studies used a questionnaire that measures affect and therefore fail to distinguish between thoughts and anxiety symptoms. This is important as the overlap in item content might artificially inflate the correlation between the ‘cognition’ measure and the symptom

measure, especially for negative thoughts as most symptom measures do not incorporate positively valenced items. Finally, the SOM ratios in some studies (including those with clinical child samples) were restricted to a range of 0.17–0.83 (instead of 0–1) because SOM ratios were not based on an answering scale with an end point of 0. Amsel and Fichten (1998) proved that answering scales with end points of 1–5 restrict the range of the SOM ratio. They therefore recommended calculating the SOM ratio based on an answering scale with an end point of 0–4.

To summarize, there are only a few studies that examined the role of both negative and positive thoughts and the SOM ratio in clinically anxious children and most of these used a questionnaire that measured affect instead of thoughts. In the present study we investigated the role of positive and negative thoughts in anxiety by comparing a large group of anxiety disordered children with a non-anxious control sample on negative and positive thoughts and SOM ratio. We used a questionnaire with an answering scale between 0 and 4 that measured different negative and positive thoughts. First, following the cognitive model and the Power of Nonnegative Thinking hypothesis we expected anxious children to have more negative, but not less positive thoughts than normal controls. Second, we expected anxious children to have a lower SOM ratio than normal controls. In addition, for anxious children we expected SOM ratios to fall in the ‘Conflicted dialogue’, associated with anxiety or depression. For the control sample we expected a SOM ratio in the ‘Positive dialogue’ or ‘Successful Coping dialogue’, associated with healthy psychological adjustment or coping with stressful situations. Finally, we expected that in both groups negative thoughts and SOM ratios would be better predictors of anxiety level than positive thoughts.

2. Method

2.1. Participants

The anxious group consisted of 140 children (mean age 12.55, SD = 2.84, range 8–18 years) referred to one of two centers for child and adolescent psychiatry in the Netherlands (UCKJP/Accare and AMC/de Bascule). They participated in a larger study on the mechanisms of change of cognitive behavioral therapy (CBT) in childhood anxiety disorders. Children were included in the study when they were diagnosed with a primary anxiety disorder according to the Anxiety Disorders Interview Schedule for Children (ADIS-C; Silverman & Albano, 1996) with exception of OCD or PTSS. Exclusion criteria were suicidal ideation, use of an SSRI, earlier CBT in the previous half year, an IQ below 80, or problems with drugs or alcohol. Written informed consent was obtained from all parents, and

children older than 11 years. Informed assent was obtained from children younger than twelve years.

The control group initially consisted of 554 children and adolescents from several public secondary schools and elementary schools in rural and urban areas of the Netherlands. This group participated in a validation study of the Children's Automatic Thoughts Scale–Negative/Positive (CATS–N/P). Detailed sample characteristics of this group are described elsewhere (Hogendoorn et al., 2010). Children in this group were screened for emotional problems with the SDQ (Strength and Difficulties Questionnaire, Goodman, 1997; Dutch version Van Widenfelt et al., 2003) and the STAIC–trait (Spielberger State Trait Inventory for Children–trait subscale; Spielberger, Edwards, Lushene, Montuori, & Platzek, 1973). Children with a clinical score on the Emotional subscale or the Total problems scale of the SDQ and/or who scored in the highest range of the STAIC trait (decile 9 or 10) were excluded. The SDQ and STAIC were available for 399 children (72.0%). Of those, 62 children received a clinical score on the SDQ and 39 children scored in decile 9 or 10 on the STAIC–trait. Consequently, the final control sample consisted of 298 children with a mean age of 12.57 years ($SD = 2.13$, range 8–18 years), of whom 142 (47.7%) were boys.

2.2. Measures

2.2.1. Anxiety disorders interview schedule for DSM-IV–child version (ADIS-C; Silverman & Albano, 1996)

All children in the anxious sample were diagnosed with the ADIS-C. The ADIS-C is a widely used, reliable and valid semi-structured interview that assesses the prevalence and severity of different DSM-IV disorders, with a focus on anxiety disorders. Children and parents were separately interviewed by trained and experienced psychologists. Clinicians rated severity of symptoms based on interference with daily life and internal distress on a 9-point scale, ranging from 0 to 8. A CSR (Clinician Severity Rating) of four or higher is indicative of a clinical diagnosis.

2.2.2. Spielberger state trait inventory for children–trait subscale (STAIC–trait; Spielberger et al., 1973)

The STAIC trait subscale has 20 items and measures trait anxiety level in children aged 7–14 years old. The adult version of the scale (STAI–trait; Spielberger, 1983) was used in the current study with children aged 15 years and older. Scores on the STAIC–trait range from 20–60. On the STAI–trait the range is 20–80. Higher scores reflect higher levels of trait anxiety in both scales. The STAIC–trait and STAI–trait have been widely used and shown to have satisfactory psychometric properties (see for the Dutch versions respectively Bakker et al., 1989 and Van der Ploeg, 2000). The Cronbach's alphas in the current study were 0.85 (anxious sample) and 0.71 (control sample) for the STAIC–trait and 0.93 (anxious sample) and 0.78 (control sample) for the STAI–trait.

2.2.3. Revised child anxiety and depression scale–child version (RCADS; Chorpita, Yim, Moffitt, Umemoto, & Francis, 2000)

The original RCADS is a 47-item self-report questionnaire which measures anxiety and depression symptoms in children and adolescents. The RCADS possesses good internal reliability (with Cronbach's alphas of 0.73–0.82), moderate to good one-week test-retest reliability, and good convergent and discriminant validity (Chorpita et al., 2000, 2005). We adapted the RCADS for this study in two ways. First, we only used the subscales that reflected the primary anxiety diagnoses of the children (Separation Anxiety Disorder, Social Phobia, Generalized Anxiety Disorder and Panic Disorder). The subscales Obsessive Compulsive Disorder and Major Depressive Disorder were not used. Second, a 'cognition free' version of the RCADS was used, because there is a substantial overlap in item content between the RCADS and CATS–N/P (see below). Four

authors (SH, EdH, PP, FB) independently classified each item of the RCADS as being an anxious thought or a symptom of anxiety. Next, items were discussed until agreement was reached. The resulting 'cognition free RCADS scale' consists of 19 items. Higher scores (range 0–57) reflect more anxiety symptoms. Cronbach's alpha in the current sample was 0.88 for the anxious children and 0.81 in the control group.¹

2.2.4. Children's automatic thoughts scale–negative/positive (CATS–N/P, Hogendoorn et al., 2010)

The CATS–N/P was used to measure negative and positive thoughts across both internalizing and externalizing problems. The CATS–N/P is an adaptation of the CATS developed by Schniering and Rapee (2002). The self-report questionnaire consists of 50 items which are scored on a five-point scale from "not at all" (0) to "all the time" (4). Four subscales (ten items each) represent negative thoughts with different cognitive content corresponding to Physical threat, Social threat, Personal Failure and Hostility. The original CATS was composed of these four subscales. For the CATS–N/P we added ten items with positive thoughts (see Hogendoorn et al., 2010), which form the subscale Positive thoughts. The positive thoughts were selected from the Flemish PNG–k (Positieve en Negatieve Gedachten bij kinderen; Bracke & Braet, 2000). The subscales Physical threat, Social threat and Personal failure are summed up to form a Total score (CATS–N/P Total score). The Positive thoughts subscale is independent of the other four subscales and of the CATS–N/P Total score. The SOM ratio was calculated by dividing the amount of positive thoughts by the amount of positive and negative thoughts (positive/positive + negative thoughts). We did this separately for the three anxiety related subscales with negative thoughts (SOM–Physical threat, SOM–Social threat and SOM–Personal failure). The same positive thoughts (from the CATS–N/P Positive subscale) were used in the calculation of each SOM ratio. As is recommended by Amsel and Fichten (1998), a score of 1 was added to the subscale when children reported neither positive nor negative thoughts. Otherwise, the ratio would be restricted to 0 (when there are zero positive thoughts) or 1 (when there are zero negative thoughts).

The CATS–N/P possesses good internal reliability (Cronbach's alphas range from 0.83 to 0.94), moderate to good test–retest reliability (Pearson's $r = 0.61$ – 0.77 for the Total score) and satisfactory convergent validity (Hogendoorn et al., 2010). Cronbach's alphas in the current sample ranged from 0.86 to 0.94 in the anxious group and from 0.79 to 0.89 in the control group.

2.3. Procedure and data analysis

Anxious children and their parents were interviewed with the ADIS–C/P by experienced psychologists. Children filled out the questionnaires under supervision, prior to the start of their treatment. Children in the control group completed the questionnaires in their classroom under supervision of research assistants. Supervision entailed an instruction how to complete the questionnaires and explaining unknown words when necessary. Their parents completed the SDQ and a demographic questionnaire at home.

Prior to analysis, data were screened for outliers and violations of normality, including skewness, kurtosis, and homogeneity of variance. When data were not normally distributed, nonparametric tests were used. A Bonferroni correction was applied to avoid inflation of the type I error rate. Alpha was set at 0.0083 when comparing the different subscales of the CATS–N/P and it was set at 0.017 when

¹ Correlations between the cognition free RCADS and the CATS–N/P were lower than between the original RCADS and CATS–N/P, decreasing the problem of multicollinearity. However, all results were the same for both RCADS versions.

Table 2
Sample characteristics, anxiety level and CATS-N/P scores for the anxious and the control sample.

	Anxious (n = 139)		Control (n = 293)		Difference test, effect size
	n	(%)	n	(%)	
Nationality	138 Dutch 1 Other	99.3% 0.7%	278 Dutch 14 Other	95.2% 4.8%	$\chi^2(4) = 5.27, V = 0.11$
Educational level					
Mother	33 Low 58 Medium 39 High	25.4% 44.6% 30.0%	73 Low 101 Medium 108 High	25.3% 34.9% 37.4%	$\chi^2(3) = 6.75, V = 0.13$ $\chi^2(3) = 3.99, V = 0.10$
Father	31 Low 42 Medium 45 High	26.3% 35.6% 38.1%	69 Low 80 Medium 130 High	24.5% 28.4% 46.1%	
Gender	61 boys M (SD)	43.9% Mdn	140 boys M (SD)	47.8% Mdn	$\chi^2(1) = 0.58, V = 0.04$
Age	12.55 (2.84)	12.00	12.55 (2.14)	13.00	$U = 20276.50, d = 0.00$
RCADS	29.62 (17.73)	27.00	15.29 (10.00)	13.00	$U = 9758.00^{**}, d = 1.11$
STAI(-C) ^a					
STAI	48.39 (11.90)	51.00	32.51 (5.94)	32.00	$U = 647.50^{**}, d = 1.94$
STAI-C	35.40 (7.26)	36.00	27.32 (4.12)	27.00	$U = 3063.00^{**}, d = 1.51$
Decile	7.30 (2.92)	8.00	3.62 (2.12)	3.00	$U = 6935.50^{**}, d = 1.53$
CATS-N/P					
Physical threat	6.96 (7.03)	5.00	3.66 (4.11)	2.00	$U = 14612.50^{**}, d = 0.63$
Social threat	8.08 (8.06)	6.00	5.23 (4.40)	4.00	$U = 17065.50^*, d = 0.49$
Failure	7.56 (7.53)	6.00	3.61 (3.74)	3.00	$U = 14003.50^{**}, d = 0.75$
Hostility	7.91 (7.03)	6.00	9.91 (6.60)	8.00	$U = 16084.00^{**}, d = -0.30$
Positive	15.92 (8.84)	15.00	23.05 (7.51)	24.00	$U = 10868.00^{**}, d = -0.90$
Total score	22.62 (19.27)	17.00	12.50 (10.31)	20.00	$U = 14035.50^{**}, d = 0.73$
SOM ratios					
SOM-Ph	0.70 (0.22)	0.74	0.86 (0.12)	0.91	$U = 11192.00^{**}, d = -1.00$
SOM-Soc	0.67 (0.25)	0.73	0.81 (0.14)	0.83	$U = 13749.50^{**}, d = -0.78$
SOM-Fail	0.68 (0.24)	0.73	0.86 (0.12)	0.89	$U = 11333.50^{**}, d = -1.06$

SOM-Ph, SOM ratio for physical threat; SOM-Soc, SOM ratio for social threat; SOM-Fail, SOM ratio for failure; *d*, Cohen's *d*; *V*, Cramer's *V*.

^a *n* for STAI: Anxious *n* = 46; Controls *n* = 103; *n* for STAI-C: Anxious *n* = 93; Controls *n* = 190.

* $p < 0.01$.

** $p < 0.001$.

comparing SOM ratios. Cohen's *d* is reported as an effect size for the between-group comparisons. Cohen's *d* of 0.20, 0.50 and 0.80 are considered as small, medium and large effects respectively.

3. Results

3.1. Sample descriptives

Inspection of the data revealed that there were six multivariate outliers (score > 3 SD) on different measures and subscales of the CATS-N/P: one in the anxious group and five in the control group. These cases were removed, which resulted in a sample size of 139 anxious children and 293 children in the control group. In general, data were positively skewed and homogeneity of variance was violated in most cases, therefore non-parametric tests were used.

All anxious children had an anxiety disorder according to the ADIS-C. Mean CSR score for the primary diagnosis was 6.33 (SD = 1.05), range 4–8. Primary diagnoses were Social Phobia (SP, 33.8%), Separation Anxiety Disorder (SAD, 11.5%), Specific Phobia (Phobia, 23.7%), Generalized Anxiety Disorder (GAD, 21.6%) and Panic Disorder with or without Agoraphobia (PD, 9.4%). The total number of diagnoses per child ranged from 1 to 6 (mean 2.23, SD 1.33). Fifty-four children (38.8%) had only one anxiety disorder; 66 children (47.5%) had one or more comorbid anxiety disorders, 12 children (8.6%) had a comorbid mood disorder (Major Depression or Dysthymia) and 7 children (5%) had a comorbid behavior disorder (ADHD).

There were no differences between the anxious group and the control group on age, gender, nationality or educational level of parents (see Table 2). Most children were Dutch; other backgrounds were Turkish or Moroccan. Anxious children had significantly higher anxiety scores on the RCADS and the STAI(-C) trait subscale.

3.2. Negative and positive thoughts in anxious and control children

Differences between anxious and control children on thoughts as measured with the CATS-N/P were analyzed with Mann-Whitney tests (see Table 2). Anxious children reported more negative thoughts concerning physical threat, social threat and failure, and more negative thoughts in general (total score). Further, anxious children reported less positive thoughts and less hostile thoughts than children in the control sample. The effect sizes were in the moderate to large range (see Table 2). We also examined the interaction with age level in multiple two-way factorial ANOVAs with CATS-N/P subscales as dependent variable and group (anxious/control) and age (<12 years/≥12 years) as independent variables. The interaction effect was not significant for physical threat, social threat and total negative thoughts, indicating that anxious children, independent of their age, reported more negative thoughts in total and concerning physical threat and social threat. However, the interaction effect was significant for the failure, hostile and positive subscales. Anxious children reported more failure thoughts and less hostile thoughts and less positive thoughts, but only when they were twelve years old or older. In younger children there were no differences between groups on these subscales.

Anxious children had lower SOM ratios on all subscales (physical threat, social threat and failure) than non-anxious children (see Table 2). Again, the interaction effect with age was significant: the difference between anxious and non-anxious children was larger in the older age group than in the younger group. The SOM ratios of anxious children ranged between 0.67 and 0.70, which corresponds to the Positive dialogue category. The SOM ratios of the non-anxious children (range 0.81–0.86) were significantly higher, but also in the Positive dialogue category. All scores (medians) were tested against three different set points within the

Table 3
Summary of hierarchical multiple regression analysis for variables predicting anxiety level in anxious and control children, $N=425$.

	B (SE)	β	Model	ΔR^2
Step 1				
Constant	-2.24 (2.01)		$F(3, 421) = 65.40^{***}$	0.32 ^{***}
Group	8.31 (0.68)	0.49 ^{***}		
Age	0.29 (0.13)	0.09		
Gender	3.89 (0.64)	0.25 ^{***}		
Step 2				
Constant	-4.64 (1.58)		$F(4, 420) = 146.72^{***}$	0.27 ^{***}
Group	5.38 (0.56)	0.32 ^{***}		
Age	0.35 (0.10)	0.11 ^{**}		
Gender	2.52 (0.51)	0.16 ^{***}		
CATS-N/P Negative	0.30 (0.02)	0.55 ^{***}		
Step 3				
Constant	-1.86 (1.96)		$F(5, 419) = 119.85^{***}$	0.01 [*]
Group	4.92 (0.59)	0.29 ^{***}		
Age	0.30 (0.11)	0.09 ^{**}		
Gender	2.31 (0.51)	0.15 ^{***}		
CATS-N/P Negative	0.29 (0.02)	0.53 ^{***}		
CATS-N/P Positive	-0.08 (0.03)	-0.09 [*]		
Step 4				
Constant	-2.06 (4.27)		$F(8, 416) = 77.87^{***}$	0.01 [*]
Group	4.75 (0.60)	0.28 ^{***}		
Age	0.30 (0.11)	0.09 ^{**}		
Gender	2.34 (0.51)	0.15 ^{**}		
CATS-N/P Negative	0.30 (0.05)	0.55 ^{***}		
CATS-N/P Positive	-0.11 (0.05)	-0.12 [*]		
SOM-Ph	-6.26 (2.93)	-0.14 [*]		
SOM-Soc	4.85 (2.55)	0.12		
SOM-Fail	2.77 (2.86)	0.07		

CATS-N/P Negative, CATS-N/P total score including negative thoughts concerning physical threat, social threat and personal failure; SOM-Ph, SOM ratio for physical threat; SOM-Soc, SOM ratio for social threat; SOM-Fail, SOM ratio for failure.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Positive dialogue with the Wilcoxon Signed Rank test. The SOM ratios for the anxious children were not significantly different from the normal set point (0.72): SOM-physical $W_s = 4607.00$, $p > 0.05$; SOM-social $W_s = 4173.00$, $p > 0.05$; SOM-failure $W_s = 4213.00$, $p > 0.05$. However, the ratios were significantly smaller than the optimal (0.81) and superoptimal (0.88) set point (all $ps < 0.001$). For the non-anxious group, SOM ratios were related to different set points. The SOM-physical and SOM-failure were not different from the superoptimal set point, respectively $W_s = 19986.00$, $p > 0.05$ and $W_s = 19986.00$, $p > 0.05$. They were larger than the normal and optimal set point (all $ps < 0.001$). The SOM-failure in the control group was not different from the optimal set point, $W_s = 23030.00$, $p > 0.05$. It was larger than the normal set point ($p < 0.001$) and smaller than the superoptimal set point ($p < 0.001$).

3.3. Predictors of anxiety level

To examine whether negative thoughts, positive thoughts or SOM ratios were predictive of anxiety level, three different regression analyses were performed. First, a hierarchical multiple regression analysis was performed with anxiety level (cognition free RCADS) as dependent variable. All children (anxious and control) were included in this study. To correct for the possible influence of group status, age and gender, these variables were entered in the first step. Negative thoughts (CATS-N/P Total score, composed of the subscales Physical threat, Social threat and Personal Failure) were entered in the second step; positive thoughts (CATS-N/P Positive thoughts) were entered in the third step and SOM ratios (SOM-physical threat; SOM-social threat; and SOM-personal failure) were entered in the fourth step. SOM ratios were entered together as we did not have a priori expectations of the importance of one SOM ratio over another. Results for the different models are displayed in Table 3. The final model

significantly predicted anxiety level, $F(8, 416) = 77.87$, $p < 0.001$ and explained 60% of the variance in anxiety level. Children with an anxiety disorder ($\beta = 0.28$), older children ($\beta = 0.09$) and girls ($\beta = 0.15$) had higher anxiety levels. However, controlling for these variables, higher anxiety level was predicted by more negative thoughts ($\beta = 0.55$), less positive thoughts ($\beta = -0.12$) and lower SOM ratios of thoughts concerning physical threat ($\beta = -0.14$).

To examine whether thoughts differentially predicted anxiety level in the clinically anxious or the non-anxious sample, two separate hierarchical multiple regression analyses were performed with anxiety level (cognition free RCADS score) as dependent variable. The predictors were the same, except for group status which was not added in the first step. The results are displayed in Table 4. In the anxious sample the final model explained 58% of the variance in RCADS scores, $F(7, 131) = 40.84$, $p < 0.001$. More negative thoughts ($\beta = 0.62$) and a lower SOM ratio of physical threat thoughts ($\beta = -0.31$) were significantly related to more anxiety symptoms. Positive thoughts were not predictive of anxiety level ($\beta = -0.03$). In the non-anxious sample the final model explained 33% of the variance in RCADS scores, $F(4, 281) = 33.91$, $p < 0.001$. Age and gender predicted anxiety level: older children ($\beta = 0.12$) and girls had higher scores ($\beta = 0.26$). More negative thoughts ($\beta = 0.44$) and less positive thoughts ($\beta = -0.15$) were also significantly predictive of anxiety level. The inclusion of SOM ratios had no additional value (β s ranged from -0.01 to 0.07).

4. Discussion

This study examined the role of negative and positive thoughts as incorporated in the Power of Nonnegative Thinking hypothesis and in the SOM model in anxious and non-anxious children. We found support for the role of negative thoughts in childhood anxiety: anxious children reported more negative thoughts than

Table 4
Summary of multiple hierarchical regression analyses for variables predicting anxiety level (RCADS scores) in an anxious sample ($n = 139$) and a control sample ($n = 286$).

	Anxious sample			Control sample		
	<i>B</i> (SE)	β	ΔR^2	<i>B</i> (SE)	β	ΔR^2
Step 1						
Constant	2.49 (4.13)		0.09**	0.99 (1.98)		0.11***
Age	0.45 (0.28)	0.13		0.11 (0.13)	0.05	
Gender	4.88 (1.60)	0.25**		3.25 (0.56)	0.33***	
Step 2						
Constant	1.65 (2.94)		0.46***	-3.74 (1.83)		0.20***
Age	0.32 (0.20)	0.09		0.31 (0.12)	0.13*	
Gender	1.40 (1.18)	0.07		2.94 (0.50)	0.30***	
CATS–Neg	0.35 (0.03)	0.70***		0.22 (0.02)	0.46***	
Step 3						
Constant	2.30 (3.55)		0.00	-0.22 (2.16)		0.02**
Age	0.30 (0.21)	0.09		0.27 (0.12)	0.12*	
Gender	1.43 (1.18)	0.07		2.53 (0.51)	0.26***	
CATS–Neg	0.35 (0.03)	0.69***		0.21 (0.02)	0.44***	
CATS–Pos	-0.02 (0.07)	-0.02		-0.10 (0.03)	-0.15***	
Step 4						
Constant	6.26 (6.60)		0.04**	-1.10 (6.91)		0.00
Age	0.31 (0.21)	0.09		0.26 (0.12)	0.11*	
Gender	1.47 (1.15)	0.08		2.49 (0.52)	0.25***	
CATS–Neg	0.31 (0.07)	0.62***		0.25 (0.08)	0.52**	
CATS–Pos	-0.03 (0.12)	-0.03		-0.13 (0.06)	-0.19*	
SOM–Ph	-13.55 (4.91)	-0.31**		2.22 (4.09)	0.06	
SOM–Soc	5.00 (4.37)	0.13		-0.17 (3.58)	-0.01	
SOM–Fail	4.32 (5.62)	0.11		2.81 (3.81)	0.07	

CATS–Neg, CATS–N/P total score including negative thoughts concerning physical threat, social threat and Personal failure; CATS–Pos, CATS–N/P positive thoughts subscale; SOM–Ph, SOM ratio for physical threat; SOM–Soc, SOM ratio for social threat; SOM–Fail, SOM ratio for failure. Anxious sample: Model 1: $F(2, 136) = 6.64, p < 0.01$; Model 2: $F(3, 135) = 53.66, p < 0.001$; Model 3: $F(4, 134) = 40.01, p < 0.001$; Model 4: $F(7, 131) = 40.74, p < 0.001$. Control sample: Model 1: $F(2, 283) = 16.80, p < 0.001$; Model 2: $F(3, 282) = 41.20, p < 0.001$; Model 3: $F(4, 281) = 33.91, p < 0.001$; Model 4: $F(7, 278) = 19.35, p < 0.001$.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

non-anxious children. Anxious children also reported less positive thoughts and lower SOM ratios than non-anxious children, but only when they were twelve years or older. Furthermore, negative thoughts and SOM ratios were the strongest predictors of anxiety level in anxiety disordered children; but both negative and positive thoughts were the strongest predictors of anxiety level in non-anxious children.

Contrary to what was expected based on the Power of Nonnegative Thinking hypothesis, anxious children reported both more negative and less positive thoughts than non-anxious children. This is in line with one earlier study (Ronan & Kendall, 1997), but not with two other studies (Kendall & Treadwell, 2007; Treadwell & Kendall, 1996). It is difficult to interpret the mixed evidence. It cannot be related to the choice of operationalization, as the three earlier studies (Kendall & Treadwell, 2007; Ronan & Kendall, 1997; Treadwell & Kendall, 1996) used the same questionnaire (the Negative Affectivity Self-Statement Questionnaire, NASSQ), and yet obtained different results. One possible explanation is the age of the participants. In the Kendall and Treadwell (2007) and Treadwell and Kendall (1996) studies the age range was 8–13 years. The larger age range of our sample (8–18 years old) allowed the finding that especially older anxious children are inclined to report less positive thoughts and lower SOM ratios, although Ronan and Kendall (1997) found a difference on positive thoughts in younger children (8–14 years old). The role of age and positive thoughts in the psychopathological model of childhood anxiety clearly needs further research attention.

Consistent with earlier research, anxious children had lower SOM ratios (0.67–0.70) than non-anxious children (0.81–0.86), indicating a lower ratio of positive to negative thoughts. This, again, was especially the case for older children. Contrary to our expectation, both anxious and non-anxious children had SOM ratios in the Positive Dialogue, which is the most optimal balance according to Schwartz (1997). However, SOM ratios of the anxious children

were related to a lower set point within the Positive Dialogue (0.72, the normal set point) than SOM ratios of non-anxious children, which were related to the optimal (0.81) or super optimal (0.88) set point. Moreover, older anxious children had SOM ratios in the Successful Coping Dialogue (0.59–0.66). The only studies that examined SOM ratios in clinically anxious children reported much lower SOM ratios (0.58 and 0.59) in the Conflicted dialogue and Successful coping dialogue (Kendall & Treadwell, 2007; Treadwell & Kendall, 1996). There are some possible explanations for these findings. First, in both studies Kendall and Treadwell used a questionnaire with item end points of 1 to 5, resulting in a theoretically smaller range of SOM ratios. Amsel and Fichten (1998) showed that end points of 1–5 instead of 0–4 impact SOM ratios dramatically. End points of 0–4 (as used in the current study) can substantially increase SOM ratios and standard deviations and widen the range of SOM ratios, resulting in a distribution that follows the theoretical model with negative skew (Amsel & Fichten, 1998). Another explanation is that the SOM model is not directly applicable to children. Children (and especially younger children) might under-report their negative thoughts and/or over-report positive thoughts, resulting in a generally elevated baseline mood as compared to adults, and thus higher SOM ratios (Kendall & Chansky, 1991). In our design we were only able to compare anxious and non-anxious children, but not children and adults. The SOM model should be studied more thoroughly in children, especially regarding the ranges of the different SOM categories.

Finally, negative and positive thoughts and SOM ratios differentially predicted anxiety level conditional upon group status. As expected, negative thoughts and SOM ratios (only concerning physical threat) were the strongest predictors of anxiety level in anxiety disordered children, with a large effect for negative thoughts and a medium effect for SOM ratio. This pattern was different for non-anxious children. In this group, both negative thoughts (large effect) and positive thoughts (small effect) predicted anxiety level. This

suggests that next to more negative thoughts, less positive thoughts are a first indicator of elevated anxiety level in normal children. As anxiety level increases and reaches the level of an anxiety disorder, negative thoughts might become more important and more interfering. However, at this point we cannot be certain of this, as we did not assess the temporal precedence of negative or positive thoughts and anxiety.

4.1. Clinical implications

Our study suggests that a lack of positive thoughts might not only be an epiphenomenon of anxiety. Although more research is needed, it cannot be ruled out that a lack of positive thoughts is equally important in the development or manifestation of anxiety as an excessive amount of negative thoughts. It should be noted however that our study was correlational and that we did not assess the temporal precedence of positive thoughts and anxiety. Another limitation of our study is our focus on cognitive content (i.e. expressed thoughts), leaving out cognitive processes and other components of the cognitive model (e.g. coping ability or cognitive coping). Further, another method to assess thoughts in children (e.g. thought listing) might have resulted in a different outcome. However, we chose to use a questionnaire approach because that is a more valid and reliable way to compare thoughts between different groups of children and because children (especially anxious children) tend to underreport positive thoughts when using thought listing (Kendall & Chansky, 1991; Prins & Hanewald, 1997).

When a lack of positive thoughts indeed is part of anxiety, this may also have implications for treatment. The Power of Non-negative Thinking hypothesis supposes that psychopathology is associated with more negative but not less positive thoughts, and the hypothesis also predicts that improvement in treatment is associated with a reduction of negative thoughts rather than an increase in positive thoughts (Kendall, 1984). Based on our results, restructuring negative thoughts and enhancing positive thoughts may both be important in the treatment of anxiety disordered children. On the other hand, enhancing positive thoughts might only be more effective in the prevention of anxiety disorders as the amount of positive thoughts were only predictive of anxiety level in our control sample. It remains unclear whether both negative and positive thoughts are important mechanisms of change in the treatment of anxiety disorders. Research in this area has been scarce, especially in children, but is needed to clarify this issue.

To conclude, in this study a cognition questionnaire was used to simultaneously measure the amount of negative and positive thoughts in two large samples of anxious and non-anxious children. Negatively and positively valenced thoughts and their ratio all seem to be related to the level of anxiety symptoms. However, negative thoughts and the SOM ratio are the strongest predictors of anxiety level in clinical anxiety, while both negative and positive thoughts are related to lower levels of anxiety. Future research should clarify which is most effective in treating anxiety: restructuring negative thoughts and/or enhancing positive thoughts. Further, more research is necessary concerning the validity of the SOM model in children. For now, it cannot be ruled out that a lack of positive thoughts is more than just an epiphenomenon of heightened anxiety and may deserve a place in the cognitive model of childhood anxiety.

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