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## Social anxiety and perceptions of likeability by peers in children

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The current study aimed to investigate the discrepancy between self-reported and peer-reported likeability among children, and the relation with social anxiety, depression, and social support. In total, 532 children between 7 and 12 years completed questionnaires about social anxiety symptoms, depressive symptoms, and social support, estimated their own likeability, and indicated how much they liked their classmates. Children with higher levels of social anxiety or depression overestimated their likeability less or even underestimated their likeability. Social anxiety symptoms, but not depressive symptoms, were significant predictors of the discrepancy. Social support was positively related to likeability and negatively related to social anxiety, but did not moderate the association between social anxiety symptoms and perception accuracy of likeability. These results are in line with cognitive theories of childhood social anxiety, and they stress the importance of using multi-informant measures when studying the relation between social anxiety and social functioning in children.

### Statement of contribution

#### What is already known on this subject?

- Socially anxious children are afraid to be rejected and less liked by their peers.
- Socially anxious children rate themselves as less liked by their peers.
- It is unclear whether peers actually rated socially anxious children as less liked.

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**What does this study add?**

- Children with high levels of social anxiety overestimated their likeability less or even underestimate their likeability.
- Social support is positively related to likeability by peers and negatively to social anxiety symptoms, but does not moderate the relation between social anxiety and estimation accuracy.
- Treatment should focus on this self-perceived negative likeability

Social anxiety disorder is among the most common anxiety disorders in children and is characterized by a persistent fear of social and/or performance situations in which one can be evaluated in a negative way (American Psychiatric Association, 2013). Socially anxious children experience emotional distress and impairments in their social and academic functioning and avoid social activities, which can result in loneliness (Beidel, Turner, & Morris, 1999; Hofmann, 2007). If left untreated, childhood social anxiety often continues into adolescence or adulthood and is associated with an increased risk for depression and substance abuse (Keller et al., 1992). Children with social anxiety often also have other comorbid problems, such as other anxieties or depression (Luebbe, Bell, Allwood, Swenson, & Early, 2010; Rapee, Schniering, & Hudson, 2009). Childhood anxiety problems are most often treated with cognitive behavioural therapy, sometimes combined with medication (Beidel & Alfano, 2011). Even though these treatments are well established (James, James, Cowdrey, Soler, & Choke, 2013), various studies indicate that the treatment effectiveness for social anxiety is lower compared to other types of childhood anxiety (Beidel & Alfano, 2011; Hudson *et al.*, 2015). In order to improve treatment, it is important to study the factors underlying social anxiety.

One of the factors that is proposed to play a central role in the maintenance and aetiology of social anxiety is biased cognitive processing (Klein, 2016; Muris & Field, 2008; Ollendick & Hirshfeld-Becker, 2002; Spence & Rapee, 2016). Socially anxious children are found to have negative cognitive biases related to their anxiety whereby threat-consistent information is more readily processed and attended to than inconsistent information (e.g., Bögels & Zigtermann, 2000; Klein *et al.*, 2018; for a meta-analysis: Stuijzand, Creswell, Field, Pearcey, & Dodd, 2018). For example, it has been reliably shown that children with social anxiety have the tendency to overestimate their anxious appearance, underestimate the quality of their own social appearance (Clark, 2001), and rate their own social performance lower than objective observers do (Cartwright-Hatton, Tschernitz, & Gomersall, 2005; Van Niekerk *et al.*, 2017).

Cognitive theories suggest that biased perceptions of social functioning in socially anxious children are the result of repeated exposure to unpleasant social interactions or the absence of positive interactions (e.g., Spence & Rapee, 2016). These children are thought to be stuck in a vicious cycle whereby they have negative thoughts about their social functioning and make negative interpretations of peer responses, which then leads to avoidance, and delayed development of social skills, all of which contributes to more social anxiety (Blöte, Miers, Heyne, & Westenberg, 2015; Greco & Morris, 2005; Miers, Blöte, & Westenberg, 2011). However, having positive or supportive interactions with peers may be seen as a protective factor that could break this vicious cycle and could help socially anxious children towards a more realistic perception of their own social functioning. Research has shown that experiencing higher levels of social support – like having a friendship of high quality – is positively related to self-esteem (Bishop & Inderbitzen, 1995; Keefe & Berndt, 1996), and a supportive friendship can act as a protective factor in stressful situations (Sandler, Miller, Short, & Wolchick, 1989). Thus,

social support may act as a buffer against negative thinking about one's own social functioning, and therefore, be an important moderating factor of the relation between social anxiety and accurately estimating the quality of one's own social functioning.

A potential consequence of these cognitive biases may be that children with high levels of social anxiety have trouble with accurately estimating the quality of their own social functioning, for example, likeability. That is, children with higher levels of social anxiety might underestimate their own likeability in comparison with children with lower levels of social anxiety. To date, there have been several studies that focused on the relation between likeability and social anxiety (e.g., Kingery, Erdley, Marshall, Whitaker, & Reuter, 2010; Verduin & Kendall, 2008). However, there are only a few studies that focused on the accuracy of socially anxious individuals in estimating their likeability relative to estimates by others (Baartmans *et al.*, 2019; Klein *et al.*, 2018; Strauman, 1989; Voncken & Bögels, 2008). One study focusing on adults investigated the discrepancy between self-perceptions of social performance, and how others perceived their social performance during a speech and a conversation task. It was found that adults with social anxiety disorder had actual performance deficits in the conversation task (and thus an accurate perception of their performance), but not in the speech task where a discrepancy between their own thoughts and the observer-rated performance was found, indicating a perception bias (Voncken & Bögels, 2008).

Only two studies have compared the self- and other-ratings of social functioning (likeability) in children (Baartmans *et al.*, 2019; Klein *et al.*, 2018). In a sample of adolescents with a mild intellectual disability, it was found that adolescents with higher levels of social anxiety estimated their likeability to be lower than adolescents with lower levels of social anxiety (Klein *et al.*, 2018). Further, Baartmans *et al.* (2019) also found that pre-adolescent socially anxious children rated their own likeability (via self-ratings) as significantly lower than their less anxious peers. Yet, socially anxious children were named as 'liked' as often as less anxious peers. Moreover, they were less often named as 'disliked' when compared to less anxious peers (according to *other*-reports). In addition, (Baartmans *et al.*, 2019) not only tested the discrepancy between self-perceived likeability and peer-rated likeability, but also examined the unique relation of social anxiety and depressive symptoms with regard to self-ratings versus peer ratings due to the high comorbidity between these disorders found in the literature (e.g., Cole, Peeke, Martin, Truglio, & Seroczynski, 1998; Stein *et al.*, 2001). Testing symptoms of social anxiety and depression simultaneously may provide more insight into the overlapping and distinctive features of social anxiety and depression, which could shed light on different possible aetiological pathways underlying their frequent comorbidity (see also, Cummings, Caporino, & Kendall, 2014). In contrast to the findings regarding social anxiety where children were found to underestimate their own likeability, Baartmans *et al.*, 2019 found that children with higher levels of depressive symptoms had a more accurate perception of their own likeability by peers than children with lower levels of depressive symptoms (i.e., self-ratings indicated a lower likeability and they were also reported as being less liked by peers). It was also found that both social anxiety and depression had a unique relation with self-perceived likeability; depressive symptoms were the only significant predictor for *other*-rated likeability, and social anxiety symptoms were the only significant predictor for the discrepancy score between self- and other-ratings. This indicates that a higher level of social anxiety (and not depression) is the key factor driving the differences between self-perception of likeability and other perception of likeability.

A possible limitation of the study described above was the number of sociometric nominations used to measure likeability by peers whereby the children were asked to nominate only the six children they liked the most and the six children they liked least. This is potentially problematic as this provides no direct information about children who are socially withdrawn or neglected, as these children are often not nominated on either question (Bierman, 2004). Another limitation of this study was that children were asked to indicate how well they thought they were liked on a group level ('How much do you think you are liked by your classmates?'), whereas the other-ratings were based on reports on the individual level (name the six children you like most and like least). A better way to examine the accuracy of the perception of one's likeability would be to measure actual liking by peers and the perceived liking by peers on the same level (i.e., by having likeability estimates for each peer separately). Another advantage of asking children to estimate the likeability of each classmate separately instead of only asking to estimate the likeability of the entire class is that it is possible to create accuracy estimates for unique dyads. Investigating these different versions of self-estimates may provide more information on how to help socially anxious children to develop more accurate perceptions of their own likeability by peers in social anxiety treatments. For example, individual ratings (i.e., How much do you think X likes you?) as opposed to a group ratings (i.e., How much do you think you are liked by your peers?) force children to more objectively estimate the relationship with each specific peer, rather than give an answer that reflects their general belief about their standing in the peer group. These individual ratings might therefore result in more accurate estimations. Furthermore, the results of such studies could provide more useful information on differences in measurement methods for likeability in children.

The aim of the current study was to investigate the relation between social anxiety symptoms and the accuracy of self-estimates of likeability by peers (*self-ratings*) compared to one's likeability as reported by peers (*other-ratings*) in children and preadolescents. In the current study, we addressed the limitations of previous studies by using the same Likert scale for self-ratings and other-ratings. In addition, for the first time, two different *self-ratings* were included: (1) Children were asked to estimate how much they thought they were liked on average by their classmates ('How much do you think the children in the class like you?'), and (2) they were asked to estimate their likeability by each classmate separately ('How much do you think that child X likes you?'). The first goal of this study was to examine the relation between social anxiety symptoms, depressive symptoms, and the likeability measures. As part of this goal, we also examined how the different measures of likeability related to each other. The second goal of this study was to investigate whether social anxiety and depressive symptoms uniquely contributed to the discrepancy between self- and peer-rated likeability. The third goal was to examine the association between social support, likeability, and social anxiety symptoms, and whether having social support from a best friend had a moderating effect on the relation between the accuracy of likeability estimates and social anxiety symptoms. No other studies to our knowledge have examined the relations between likeability, social anxiety, depression, and social support using this approach.

However, based on previous studies regarding likeability, we expected that children in general would overestimate their likeability, as theories of self-enhancement state that people, in general, have the tendency to focus on their positive characteristics and exaggerate them to maintain their self-esteem (Alicke & Sedikides, 2011). In contrast, we expected that children with higher levels of social anxiety and/or depression would estimate their own likeability by peers lower than children with lower levels of social anxiety and/or depression, thereby not showing the overestimation, or even

underestimating their likeability (e.g., Klein *et al.*, 2018). This bias might be less apparent when children are asked to indicate their own likeability on an individual level when compared to a group level, as children are then forced to think in a more multidimensional way. Furthermore, as shown in previous research, we expected that symptoms of social anxiety would be the only significant predictor of the discrepancy between self- and other-likeability ratings. We also expected that social support would be positively linked to both self-perceived and peer-perceived likeability, and negatively associated with social anxiety symptoms. In addition, we expected that social support would moderate the relation between social anxiety symptoms and the discrepancy score of self-reported likeability and other-reported likeability. That is, children with better social support would have a lower discrepancy score (e.g., Bishop & Inderbitzen, 1995; Keefe & Berndt, 1996; Sandler *et al.*, 1989). Finally, we explored the relation between gender, age, social anxiety, and the perceptions. We expected that the levels of social anxiety would be higher in girls (Essau, Conradt, & Petermann, 1999; Wittchen, Stein, & Kessler, 1999). With regard to age, we expected to find a positive relation between age and social anxiety symptoms and we expected to find more negative biases in older children, since negative interpretation biases increase with age (e.g., Fehm, Beesdo, Jacobi, & Fiedler, 2008; Stuijzand *et al.*, 2018).

## Methods

### Participants

Following active parental consent (69.2% of all children in the participating schools were given active consent by their parents to participate in the study), 532 children (girls:  $n = 267$ , 50.2%) from 11 government-funded schools in the Netherlands participated in the current study. The number of participating classes in each school varied from one to five classes ( $M = 2.72$ ,  $SD = 1.35$ ). The average number of children that participated in each class was 18 ( $SD = 5.03$ ; min. = 7, max. = 28). All children were between 7 and 12 years old ( $M = 9.84$ ,  $SD = 1.11$ ), had between 0 and 5 siblings ( $M = 0.76$ ,  $SD = 0.86$ ), and 94.7% were born in the Netherlands. Although no specific socioeconomic data were collected, participants were drawn from regular elementary schools in both urban and rural parts of the country suggesting that the sample may be representative of the broader population. The current study was part of a larger study on childhood anxiety (Mobach *et al.*, 2019; Verpaalen *et al.*, 2019) and was approved by the Ethical Committee of the Social Sciences Department of Radboud University Nijmegen in the Netherlands.

### Measures

#### Social anxiety symptoms

Social anxiety symptoms were measured with the Social Anxiety Scale for Children – Revised (SASC-R; La Greca & Stone, 1993). The SASC-R is a self-report questionnaire to measure social anxiety symptoms. It consists of 18 items and 4 filler items on a 5-point scale ranging from *never* to *always*. The internal consistency and cross-validation of the SASC-R are satisfactory (La Greca & Stone, 1993). Internal consistency in the current sample was excellent ( $\alpha = .91$ ).

#### Depressive symptoms

Depressive symptoms were measured with the Children's Depression Inventory (CDI; Kovacs, 1983). The original questionnaire consists of 27 items with each item

containing three statements about depressive symptoms. Participants were instructed to indicate which statement best described how they felt over the past two weeks. Each item consists of a negative, neutral, and positive statement. Due to ethical reasons, the item concerning suicide was removed. The internal consistency of the original scale is good; retest reliability is moderate (Kovacs, 1983; Reynold, Anderson, & Bartell, 1985). The internal consistency in the current sample was good ( $\alpha = .87$ ).

#### *Social support by best friend*

Perceived social support by a best friend was measured with the Child and Adolescent Social Support Scale (CASSS; Malecki & Demaray, 2002). This scale includes 12 questions about perceived social support by a best friend. For each statement, children are asked to choose an answer on a 5-point scale ranging from *not at all* to *always*. The CASSS has been shown to be a valid measure of perceived social support in children and adolescents, and it has good internal consistency (Malecki & Demaray, 2002). In the current sample, it was excellent ( $\alpha = .90$ ).

#### *Self-perceived likeability*

Self-perceived likeability was measured in two ways. First, children were asked to indicate how much they thought their classmates liked them on a 7-point scale ranging from *not at all* to *a lot*. This score was the *self-group score*. Second, children were provided with a list of all of their classmates' names (both the children that participated in the study and the children that did not) and were asked to indicate the extent to which they thought that each individual classmate liked them, using the same 7-point scale. The mean of these ratings was the *self-individual score*.

#### *Peer-reported likeability*

To measure peer-reported likeability, children were presented with a list of each of their classmates' names. They were asked to indicate how much they liked each of their classmates, using the same 7-point scale as for the self-reported likeability. The average received peer-reported likeability functioned as the *other-score*.

#### *Perception biases on likeability*

The scores for the perception biases in likeability were derived by computing discrepancy scores. The first discrepancy score (*discrepancy group*) was computed by subtracting the average received *other-score* from the *self-group score*. For computing the second discrepancy score (*discrepancy individual*), the differences between self-assessed and peer-assessed likeability were first computed for each child and by each peer separately. That is, the peer assessment score of a child by its peer (determined with the question for child X: 'How much do you like Y?') was subtracted from the self-assessment score for that same peer (determined with the question for child Y: 'How much do you think X likes you?'). The *discrepancy individual score* was the mean of all dyadic discrepancy scores for each individual child.

### **Procedure**

Children first completed the questionnaires followed by the likeability measures in their regular classroom environment accompanied by a trained research assistant. Children were allowed to stop at any time during the data collection, and they received a debriefing after the data collection was completed. In one of the schools, data were collected with pre-programmed questionnaire software on laptops. Due to technical difficulties, children in the other schools completed all the measures on paper. No significant differences in results were found between the participants that completed the measures digitally or on paper. The children received a certificate and a small gift for their participation. The schools received a report on the aggregated results and were offered a workshop on childhood anxiety.

### **Data analysis**

To address the first aim, a repeated-measures ANOVA was performed to investigate whether there were any significant differences between the different measures of likeability (*self-group* score, *self-individual* score, *other*-score). To examine whether children are significantly biased in their interpretation of liking by their peers, two *t*-tests were conducted to explore whether the discrepancy scores were statistically different from zero. If the discrepancy score is significantly larger than zero, this would indicate that children overestimate their likeability, while if the discrepancy score is significantly smaller than zero (negative value), this would indicate that children underestimate their likeability.

To address the second aim, two multilevel analyses with maximum likelihood estimations and random intercepts were performed with social anxiety symptoms and depressive symptoms as simultaneous predictors and the two discrepancy scores as the dependent variable. Age and gender were included as covariates in the analyses, and all data were nested within classes. Continuous scores were transformed into standard normal scores. Therefore, the parameter estimates can be interpreted as Cohen's *d* (for dichotomous predictors) or *r* (for continuous variables) effect sizes. The model with data nested in classes and nested within schools did not have a better fit, and therefore, we used the model where data were nested within classes only; thus, the latter was used in all analyses. Assumptions of normality and homoscedasticity were checked and deemed satisfactory.

To address the third aim, correlations between social support, social anxiety symptoms, depressive symptoms, likeability measures, age, and gender were computed to explore the relations between the variables. Additionally, moderation effects were tested in two multilevel models. Social anxiety symptoms, social support, and the product of those two variables (i.e., interaction term), as well as age and gender, were used as predictors in both models. The first model included the *discrepancy group score* as the dependent variable, and the second model used *discrepancy individual score* as the dependent variable.

## **Results**

### **Comparing different measures of likeability**

Descriptive statistics are presented in Table 1. Not every child was able to complete all measures because of technical problems or because they did not finish the session (missing values: self-perceived likeability question group:  $n = 34$ ; self-perceived

**Table 1.** Descriptive statistics of the likeability measures, social anxiety, and depression

Measure	M (SD)	Range	N
Self-other group score	5.76 (0.89)	[1.00; 7.00]	498
Self-other individual score	4.97 (0.85)	[2.22; 7.00]	527
Other-score	4.96 (0.65)	[2.58; 6.50]	532
Discrepancy group score	0.79 (0.99)	[-4.29; 4.04]	498
Discrepancy individual score	0.05 (0.06)	[-2.33; 2.93]	521
Social anxiety score	2.07 (0.67)	[1.00; 4.44]	522
Depression score	0.34 (0.27)	[0.00; 1.35]	522
Social support	3.72 (0.87)	[0.33; 5.00]	521

likeability question individual:  $n = 5$ ; SASC-R:  $n = 10$ ; CDI:  $n = 10$ ; CASSS:  $n = 11$ ). We decided to analyse all available data. Skewness and kurtosis scores were all within the acceptable range ( $\pm 3$ ).

The repeated-measures ANOVA revealed a significant difference between the *self-group* score, *self-individual* score, and the *other-score*,  $F(2, 494) = 210.388$ ,  $p < .001$ ,  $\eta_p^2 = 0.460$ . Within-subject contrasts showed that the *self-group* score ('How much do you think your classmates like you?') was significantly higher than the *self-individual* score (average of 'How much do you think X likes you?'),  $F(1, 495) = 346.31$ ,  $p < .001$ ,  $\eta_p^2 = 0.412$ , indicating that children thought that they were significantly more liked by their peers when they were asked to rate their likeability at the group level than at the dyadic level. Furthermore, the *self-group* score was also significantly higher than the *other-score*,  $F(1, 495) = 319.06$ ,  $p < .001$ ,  $\eta_p^2 = 0.392$ , but the *self-individual* score and the *other-score* did not differ significantly from each other,  $F(1, 495) = 0.33$ ,  $p = .568$ ,  $\eta_p^2 = 0.001$ . This indicates that children overestimated the liking by their peers when they were making the estimation at the group level, but not when they estimated how much each specific peer liked them.

The  $t$ -tests revealed that the *discrepancy group* score was significantly larger than zero,  $t(497) = 17.86$ ,  $p < .001$ ,  $d = .800$ , indicating that on average, children have a positive bias of how much their peers like them on the *discrepancy group* score. The *discrepancy individual* score did not deviate significantly from zero,  $t(524) = 1.63$ ,  $p = .104$ ,  $d = .071$ , indicating that when measuring likeability via individual other assessments (*self-individual* score by X, 'How much do you think you are liked by Y?'), children's reports corresponded closely to their peers' ratings (*other-score* by Y, 'How much do you like X?'). This information is important to keep in mind when interpreting the correlations of the discrepancy scores with social anxiety symptoms and depressive symptoms presented below.

### **Relation between likeability, social anxiety symptoms, depressive symptoms, age, and gender**

The significant negative correlations between the two types of self-assessed likeability scores, social anxiety symptoms, and depressive symptoms indicated that children with higher levels of social anxiety or depression estimated their own likeability by peers significantly lower than children with lower levels of anxiety or depression (see Table 2). This finding was consistent across both the individual- and group-level likeability estimates. The significant negative correlations between the *other-score* and social

**Table 2.** Pearson correlations between the likeability scores, social anxiety symptoms, depressive symptoms, perceived social support, gender (0 = boys, 1 = girls), and age

	1	2	3	4	5	6	7	8	9
1 Gender									
2 Age	$r = -.02,$ $p = .639$								
3 Anxiety	$r = .24,$ $p < .001$	$r = -.10,$ $p = .026$							
4 Depression	$r = .08,$ $p = .054$	$r = -.13,$ $p = .004$	$r = .48,$ $p < .001$						
5 Self-group	$r = -.03,$ $p = .449$	$r = -.07,$ $p = .122$	$r = -.33,$ $p < .001$	$r = -.27,$ $p < .001$					
6 Self-individual	$r = -.05,$ $p = .291$	$r = -.03,$ $p = .567$	$r = -.29,$ $p < .001$	$r = -.18,$ $p < .001$	$r = .44,$ $p < .001$				
7 Other	$r = .07,$ $p = .090$	$r = .07,$ $p = .140$	$r = -.15,$ $p = .001$	$r = -.16,$ $p < .001$	$r = .20,$ $p < .001$	$r = .34,$ $p < .001$			
8 Discrepancy group	$r = -.08,$ $p = .075$	$r = -.12,$ $p = .009$	$r = -.21,$ $p < .001$	$r = -.14,$ $p = .002$	$r = .77,$ $p < .001$	$r = .18,$ $p < .001$	$r = -.47,$ $p < .001$		
9 Discrepancy individual	$r = -.08,$ $p = .067$	$r = -.09,$ $p = .054$	$r = -.16,$ $p < .001$	$r = -.07,$ $p = .140$	$r = .30,$ $p < .001$	$r = .69,$ $p < .001$	$r = -.37,$ $p < .001$	$r = .51,$ $p < .001$	
10 Social Support	$r = .14,$ $p = .002$	$r = .19,$ $p < .001$	$r = -.33,$ $p < .001$	$r = -.24,$ $p < .001$	$r = .19,$ $p < .001$	$r = .28,$ $p < .001$	$r = .17,$ $p < .001$	$r = .07,$ $p = .128$	$r = .14,$ $p = .002$

anxiety symptoms and depressive symptoms suggest that children with higher levels of social anxiety or depression were significantly less liked by their peers than children with lower levels of social anxiety or depression.

The correlations between the two discrepancy scores and social anxiety symptoms were negative, meaning that when children have higher levels of social anxiety, they are more likely to have a negative (or less positive) bias of their own likeability by peers than their classmates with lower levels of social anxiety. The significant negative correlation between the *discrepancy group* score and depressive symptoms shows that children with higher levels of depression have a more negative (or less positive) bias of their own likeability by peers. The non-significant correlation between depressive symptoms and the *discrepancy individual* score means that there was no relation between the accuracy of self-estimates of likeability by peers and depressive symptoms. Thus, higher levels of social anxiety were related to a more negative bias in both methods (individual- and group-level discrepancy), while higher levels of depression were related to lower accuracy in group-level discrepancy only. Age had a significant negative correlation with social anxiety symptoms and depressive symptoms; older age was related to lower levels of social anxiety and depression. The positive correlation between age and social support suggests that older age was also related to more perceived social support from a close friend. Furthermore, the significant correlation between gender and social anxiety, and gender and social support, suggests that girls experienced more social anxiety and more social support than boys. There were no significant relations between gender, age, and the self- and peer-perceived likeability or discrepancy scores.

Next, we examined whether there was a difference between the relation of the two discrepancy scores with social anxiety symptoms and depressive symptoms. A comparison of the correlations between the *discrepancy group* score, the *discrepancy individual* score, and social anxiety symptoms revealed that there was no significant difference between the two correlations,  $z = -1.05$ ,  $p = .147$ . However, there was a significant difference between the correlations of the two discrepancy scores with depressive symptoms  $z = -1.68$ ,  $p = .047$ . This means that higher depression scores were associated with more negative (pessimistic) likeability scores when children estimated how much the group as a whole liked them, as compared to when children estimated how much each individual peer liked them.

Two multilevel analyses were performed to determine whether social anxiety symptoms and depressive symptoms could uniquely predict the *discrepancy group* score and the *discrepancy individual* score, respectively (see Table 3). The assumption of

**Table 3.** Multilevel linear models predicting discrepancy scores at the group level and the dyadic level

Criterion variable		Estimate	SE	t	p
Discrepancy group level	Intercept	1.06	.52	2.03	.042
	Gender	-.11	.09	-1.23	.218
	Age	-.10	.05	-1.96	.051
	Social anxiety symptoms	-.17	.05	-3.31	.001
	Depressive symptoms	-.09	.06	-1.70	.090
Discrepancy dyadic level	Intercept	.95	.40	2.39	.017
	Gender	-.11	.09	-1.19	.234
	Age	-.09	.04	-2.29	.023
	Social anxiety symptoms	-.16	.05	-3.16	.002
	Depressive symptoms	.01	.05	.14	.893

**Table 4.** Multilevel linear models predicting discrepancy scores at the group level and the dyadic level with social support as a moderator

Criterion variable		Estimate	SE	t	p
Discrepancy group level	Intercept	1.18	.53	2.23	.026
	Gender	−0.14	.09	−1.46	.144
	Age	−0.11	.05	−2.11	.035
	Social support	0.05	.05	1.06	.288
	Social anxiety symptoms	−0.19	.05	−4.05	<.001
	Support*Anxiety	0.04	.04	1.04	.300
Discrepancy dyadic level	Intercept	1.21	.40	3.01	.003
	Gender	−0.17	.09	−1.90	.058
	Age	−0.11	.04	−2.79	.005
	Social support	0.12	.05	2.51	.013
	Social anxiety symptoms	−0.11	.05	−2.27	.024
	Support*Anxiety	0.05	.04	1.17	.244

homoscedasticity was met in both analyses. In both models, social anxiety symptoms were significant predictors, showing that higher levels of social anxiety were associated with less overestimation or even with underestimation of likeability by peers. In both models, depressive symptoms were not significantly associated with estimation accuracy of likeability by peers. In the model with the *discrepancy individual* score as the dependent variable, age was a significant negative predictor, meaning that older children were more likely to underestimate their own likeability by peers. In both models, gender was not a significant predictor of discrepancy scores, meaning that gender was not related to the perception accuracy of likeability.

### **Relation with social support by a close friend**

As expected, social support was both negatively related to social anxiety symptoms and depressive symptoms, and positively associated with self-perceived likeability (both at the group level and the dyadic level) and other-perceived likeability (see Table 2). Social support was not significantly related to the *discrepancy group* score, but was significantly related to the *discrepancy individual* score. This means that experiencing more social support was related to a more optimistic estimation of one's own likeability, but only when they were asked to rate the self-perceived likeability of each classmate individually.

Next, two multilevel analyses were performed to investigate whether social support by a best friend had a moderating effect on the relation between social anxiety symptoms and both the *discrepancy group* score and the *discrepancy individual* score. We found no evidence for a moderating effect of perceived support from a best friend on the relation between social anxiety symptoms and discrepancy scores as evidenced by non-significant interaction terms in both multilevel models (see Table 4). Thus, the relation between social anxiety and the two discrepancy scores did not depend on perceived levels of social support.

## **Discussion**

The main aim of this study was to investigate the relation between symptoms of social anxiety and self- and peer ratings of likeability to get a better understanding of perception

biases in children with symptoms of social anxiety. First, as predicted, we found that in general, children estimated their own likeability by peers as significantly higher than the actual peer ratings (overestimation). This expected result is in agreement with theories of self-enhancement that state that people generally have the tendency to focus on personal positive characteristics to maintain their self-esteem (Alicke & Sedikides, 2011). However, it is important to note that this difference was only evident when children were asked to estimate their own likeability by their peer group as a whole. When children were asked to estimate their own likeability by each peer separately, there was no difference between self-perceived likeability by peers (self-individual score) and actual likeability by peers (other-score). This suggests that asking children to estimate their own likeability by peers at a more detailed dyadic level yields a more accurate perception of their own likeability than when children are asked to estimate this likeability at a more general (group) level. This finding stresses the importance of being aware of how different measurement methods related to the detection and understanding of biases when studying the perception accuracy of peer likeability.

As expected, we also found that children with higher levels of social anxiety had a higher discrepancy score than children with lower levels of social anxiety, indicating that they had a less positive bias or even a negative perception bias. These findings were similar when children had to estimate their likeability by their peer group as a whole or for each peer separately. These results are in line with previous studies (Baartmans *et al.*, 2019; Klein *et al.*, 2018) and cognitive theories that state that children with high anxiety display more negative perceptions and interpretations related to their anxiety than their non-anxious peers (e.g., Spence & Rapee, 2016).

In contrast, for depressive symptoms we only found a significant relation with the discrepancy score when children were asked to indicate their own likeability at the group level. When we asked children to estimate their own likeability at the dyadic level, there was no evidence of a perception bias. These results could be explained by the theory that individuals suffering from depressive symptoms have general negative affect and an overgeneralized autobiographic memory (Voncken, Bögels, & Peeters, 2007). That is, they tend to remember more negative situations and to overgeneralize negative affect. In contrast, individuals suffering from social anxiety symptoms interpret only social situations and relations negatively, and thus have a more specific negative bias (Amir, Beard, & Bower, 2005; Voncken *et al.*, 2007). These results indicate that when children suffer from high levels of depression, they might benefit from cognitive techniques (like multidimensional evaluation) that help them focus on more specific aspects of estimating their likeability, while children with high levels of social anxiety might not necessarily benefit from this technique as they still showed a perception bias when measuring their likeability on a detailed, individual level. However, more research using clinical samples is needed to replicate these findings before drawing any firm conclusions.

Second, as expected, only social anxiety symptoms were a unique significant predictor of the discrepancy scores. These results are in line with previous studies (Baartmans *et al.*, 2019; Klein *et al.*, 2018) and indicate that social anxiety symptoms, but not depressive symptoms, are uniquely associated with a more negative perception bias. This difference in findings between social anxiety and depression suggests that children with high levels of depressive symptoms might benefit from treatment techniques focused on directing their attention to the relevant details instead of focusing on their general negative interpretation (overgeneralization) or focusing on decreasing their general negative affect, like activation techniques. Socially anxious children might benefit more from other techniques, for example, task concentration training, behavioural experiments, or

cognitive techniques aimed at restructuring their negative cognitions about themselves in specific social situations (Rey & Birmaher, 2009; Van Oppen & Bögels, 2004).

Third, as hypothesized, perceived social support was negatively associated with social anxiety and depressive symptoms and positively associated with likeability. These findings suggest that when children perceive higher levels of social support by their best friend, their ratings of their own likeability and peer-rated likeability were higher, and their levels of social anxiety and depression were lower. Although this result is purely correlational, it is consistent with previous research indicating that having a best friendship of high quality is a protective factor for social anxiety and depression (La Greca & Stone, 1993). This result thus stresses the importance of encouraging positive social interactions among peers and the development of close high-quality friendships for children with social anxiety symptoms. Unexpectedly, however, experienced social support did not moderate the relation between social anxiety symptoms and likeability perception accuracy. This finding suggests that perceiving high levels of social support by a best friend did not help socially anxious children to rate their own likeability more accurately. Thus, even though social support by a best friend seems to be a direct protective factor for one's likeability among peers, the current results do not suggest that experiencing social support helps to break socially anxious children's vicious cycle of negative perceptions. Although replication of these results is needed, particularly with longitudinal data, the current findings suggest that socially anxious children need more than just 'having a good friend' in order to change their negative perceptions of their own social standing.

With regard to gender, we found that girls reported more social anxiety symptoms than boys, which was in line with our hypothesis (Essau *et al.*, 1999; Wittchen *et al.*, 1999). In our sample, social anxiety symptoms decreased with age, which was in contradiction with what we expected. This finding could be partly explained by the age of our sample. Social anxiety has an age of onset in the early to mid-adolescence, which suggest that at least the youngest half of our sample is before the average age of onset of social anxiety (Fehm *et al.*, 2008). Finally, we did find that the negative bias of children's own likeability increased with age, which was in line with our expectations (Stuijzand *et al.*, 2018). Nevertheless, more research is needed to gain a better understanding of age effects and social anxiety in relation to likeability since the children in the current study all attended elementary school. Adolescents in secondary school are closer to the age of onset of social anxiety disorder, and therefore, it would be good to include older children in the sample in future studies.

The current study had some limitations that are important to note. First, this study used a community sample, and the correlations between social anxiety symptoms, depressive symptoms, and the likeability scores were rather modest. In order to draw stronger conclusions about the relation between symptoms of social anxiety and likeability, as well as to be able to infer clinical implications, further studies with clinical samples are needed. Second, to complete the questionnaires, children had to be able to mentalize their own thoughts about their peers and their peers' thoughts about them. Even though children in this age group should have been able to mentalize about likeability, it might have been difficult for some children in the sample (Baron-Cohen, Tager-Flusberg, & Lombardo, 2013). In future studies, it might help to practise some examples prior to the study to familiarize children more with the procedure.

Third, the current study only focused on a small age range. It is known that levels of social anxiety vary for different age groups (Grant *et al.*, 2005) and that symptoms of social anxiety tend to increase during adolescence (Kashdan & Herbert, 2001).

Therefore, for future research it is important to include children and adolescents from a broader age range. Fourth, the current study focused only on likeability by peers within a familiar classroom context. The (perceptions of) social functioning of socially anxious children might differ in situations where they are surrounded by familiar people versus people they do not know. These perceptions, or the social functioning itself, might also differ between short-term social functioning (e.g., presenting or social skills in a one-time social situation) and long-term social functioning (e.g., in friendships or likeability by peers; Baker, 2011).

Fifth, self-perceived likeability was both measured on an individual and on a group level, while peer-reported likeability was only measured on an individual level. In future research, it might be useful to also include a group-level measure of the peer-reported likeability (e.g., 'How much do you like your classmates?') to investigate whether there are any discrepancies between those two measures in relation to social anxiety symptoms. Finally, the current study only investigated symptoms of social anxiety and likeability at one time point. Given that it is almost impossible to manipulate these variables experimentally, the biased perception of socially anxious children is a vicious circular phenomenon, which requires longitudinal studies to disentangle the effects of (and perceptions of) likeability and social anxiety. The cross-sectional nature of the current study could therefore not address these mutually reinforcing associations over time, and clearly, more research is needed to increase the understanding of the role these cognitive biases play in the aetiology and maintenance of social anxiety disorder.

To conclude, the current results indicate that, in general, children tend to overestimate their likeability. Children with higher levels of social anxiety showed a less positive bias or even a negative perception bias, as their self-perceived scores of likeability were lower than peer-rated scores. This result was found both when children were asked to estimate their likeability by their group of classmates, and for each classmate individually. In contrast, children with higher levels of depression only showed a less positive bias, or a negative perception bias, when they had to indicate their likeability by their group of classmates but not when they rated their self-perceived likeability by each classmate individually. These results stress the importance of including multi-informant and multi-contextual (i.e., group and individual level) measures of social functioning, like self- and peer measures, and objective raters, as socially anxious children in particular seem to have a more negative view of their likeability than their non-anxious peers. While more research in this area is needed, the present results indicate that it would be beneficial to focus treatment on the perceptive and interpretative cognitive biases of social functioning in socially anxious children.

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## **Conflicts of interest**

All authors declare no conflict of interest.

## Author contributions

Jeanine M. D. Baartmans (Conceptualization; Formal analysis; Methodology; Writing – original draft) Francisca J. A. van Steensel (Conceptualization; Formal analysis; Supervision; Writing – review and editing) Lynn Mobach (Investigation; Project administration; Writing – review and editing) Tessa A. M. Lansu (Conceptualization; Methodology; Supervision; Writing – review and editing) Geryly Bijsterbosch (Investigation; Project administration; Software; Writing – review and editing) Iris Verpaalen (Investigation; Project administration; Software; Writing – review and editing) Ronald M. Rapee (Conceptualization; Methodology; Supervision; Writing – review and editing) Natasha Magson (Conceptualization; Methodology; Supervision; Writing – review and editing) Susan M. Bögels (Methodology; Supervision; Writing – review and editing) Mike Rinck (Conceptualization; Data curation; Formal analysis; Methodology; Supervision; Writing – review and editing) Anke Klein (Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Project administration; Software; Supervision; Writing – original draft; Writing – review and editing).

## Informed consent

This study has been approved by the appropriate ethics committee and has therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

## Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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