

Social Cognition in Social Anxiety: First Evidence for Increased Empathic Abilities

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ABSTRACT

Background: Individuals with social phobia (SP) show sensitivity and attentiveness to other people's states of mind. Although cognitive processes in SP have been extensively studied, these individuals' social cognition characteristics have never been examined before. We hypothesized that high socially anxious individuals (HSA) may exhibit elevated mentalizing and empathic abilities.

Methods: Empathy was assessed using self-rating scales in HSA individuals (n=21) and low socially anxious (LSA) individuals (n=22), based on their score on the Liebowitz social anxiety scale. A computerized task was used to assess the ability to judge first and second order affective vs. cognitive mental state attributions.

Results: HSA individuals exhibited elevated affective empathy tendencies. However, controlling for the general anxiety variable revealed that social anxiety was related to cognitive empathy measures, rather than affective empathy. In addition, compared with LSA participants, HSA participants exhibited higher accuracy levels on the affective mental state attribution conditions, but were less accurate than LSA individuals on the parallel cognitive mental state attribution conditions.

Limitations: Additional research with larger samples and clinically diagnosed individuals is required.

Conclusions: Results support the hypothesis that high socially anxious individuals may demonstrate a unique social-cognitive abilities profile with elevated cognitive empathy tendencies and high accuracy in affective mental state attributions.

INTRODUCTION

Attention processes such as hypervigilance to threatening social information and self-focused attention are assumed to play an important role in the maintenance of social phobia (SP) (1, 2). Although cognitive biases in SP have been extensively documented in the literature (3-6), these individuals' social cognition capacities have never been examined before. Individuals with SP are preoccupied with the impression they make, and place fundamental importance to being positively appraised by others. As a result of their social concerns, they may ambivalently tune themselves to obtain insight into others' state of mind, displaying heightened self-awareness and excessive alertness to social signals. These (internal and external) attentional biases which influence the perceptiveness of social stimuli in SP may overall be manifested in a unique social-cognitive abilities profile.

One cardinal aspect of social cognition is the ability to empathize (7). Empathy, in its broadest sense, refers to the reactions of one individual to the observed experiences of another (8). While some investigators have emphasized empathy as the ability to engage in the cognitive process of adopting another's psychological point of view ("cognitive empathy"), others stressed its emotional facets ("affective empathy"), referring to the capacity to experience a vicarious response to another person (9).

In addition to the cognitive perspective taking component of empathy, another perspective taking type is referred to as visual perspective taking; the ability to take an others' perspective visually (10). Interestingly, the state of visually taking an observer perspective is a common imagery phenomenon in SP (2, 11-13). The assumption that self-focused attention and social evaluative concerns increase the likelihood to adopt an observer perspective has gained support in non-anxious (14, 15) and socially anxious individuals as well (12, 13, 16).

It had been suggested that the visual perspective ability may not be restricted to adopting an external viewpoint, but it may be related to the capacity to adopt mental perspectives in healthy subjects (17) and schizotypic individuals (18). Considering their vigilance with regard to social cues, increased other-awareness and self-monitoring in social situations, it was speculated that individuals with SP will show increased empathic tendencies.

Empathy is thought to require not only adequate social perception (19), but also entails the capacity to comprehend complex mental states (20). Taking the others' external vantage point in SP might also indicate increased mentalizing abilities.

Theory of Mind (ToM), the ability to make inferences regarding the mental state, desires and intentions of other individuals, is another major component of social cognition (21). This ability to infer others' mental states (mentalizing) is closely linked to the ability of empathizing, since failure to represent other persons' beliefs and intentions may result in failure to see things from another person's perspective and, thus, interfere with the empathic response (20, 22).

Similarly to empathy, a dual feature of cognitive and affective ToM has been suggested. The first emphasizes the capacity to represent mental states of others that are manifested in their thoughts and beliefs (23), whereas the affective aspect of ToM includes the inferences one makes regarding others' emotional states and feelings.

Abu-Akel (24) has suggested that mentalizing deficits in developmental and psychiatric populations may be viewed as lying on a continuum, in which at one end ToM deficits stem from lack the awareness of others' mental state (e.g., people with autistic spectrum disorders), whereas the other end of this range includes individuals whose abnormal ToM abilities are the consequence of a tendency to over attribute mental states to others (e.g., people with paranoid thinking). Although they were not placed on this ToM range, the basic ability of individuals with SP to represent others' mental states is manifested in their concern about others' attitudes towards them. However, their excessive alertness to the social world and the sense their worries are being "seen through" by others (11) might be associated with a tendency to over attribute mental states to others.

Although empathic and ToM abilities have been extensively documented in several disorders such as anti-social personality disorders (25), autism (26), Asperger's syndrome (27), and schizophrenia (28, 29), no reported study has explored these abilities in individuals with

social anxiety disorder. Taken together, the purpose of the present study was to examine the hypothesis that socially anxious individuals may exhibit elevated empathic tendencies and emotional ToM abilities, based on their sensitivity and attentiveness to others' state of mind.

The first goal of the present study was to characterize the relationship between cognitive and affective empathy and social anxiety in sub-clinical socially anxious individuals. The second goal was to compare mentalizing abilities of individuals with low and high social anxiety. Finally, the relative contribution of trait/general anxiety on empathy was also examined to assess the specificity of the contribution of the social component in social anxiety as compared with the general tendency of participants to be anxious.

METHOD

SUBJECTS

Subjects were 87 volunteers (age ranged from 19 to 53) who responded to an advertisement. A trained clinical psychologist administered a demographic and clinical questionnaire which included questions regarding demographic details as well as physical and mental health questions. Individuals suffering from neurological problems or a major physical illness, alcohol or substance abuse were excluded from the study. All participants completed the self-report format of the Liebowitz Social Anxiety Scale (LSAS) (30). This version of the LSAS translated into Hebrew was reported to demonstrate high test-retest reliability in a sample of patients with SP ($r=0.87$ and $r=0.91$ for the LSAS anxiety and avoidance scales respectively). In addition, the LSAS also demonstrated high internal consistency for both the anxiety and avoidance subscales, and good treatment sensitivity (31). In our sample, scores ranged from 0 to 84, Mean= 35.75, SD=18.19. All participants were fluent in Hebrew, and testing was conducted individually in two sessions.

CLINICAL ASSESSMENT

Additionally to the LSAS, participants completed the Beck Anxiety Inventory (BAI) (32) and the Trait version (will be referred to as trait anxiety inventory; TAI) of the State-Trait Anxiety Inventory (33).

Subjects were further assigned to either low or high social anxiety (LSA, HSA) groups according to their total LSAS scores. The LSA group consisted of subjects who scored lower than 25 (lower quartile) on the LSAS

($n = 22$; 12 males, 10 females), whereas the HSA group included subjects who scored higher than 45 (upper quartile) on the LSAS ($n = 21$; 6 males, 15 females).

MATERIALS

Assessment of empathic abilities

Two self-report scales were used to assess empathic abilities. *Affective* empathy was evaluated by the Questionnaire Measure of Emotional Empathy (QMEE) (34) – a widely utilized instrument that evaluates the affective role taking ability, tapping the likelihood of the tendency to react emotionally to the observed experiences of other people in a variety of contexts.

Both affective and cognitive empathy were further assessed using the Interpersonal Reactive Index (IRI) (35). This instrument consists of four seven-item subscales each tapping a separate component of empathy. The perspective taking scale (PT) measures the reported tendency to spontaneously adopt the psychological point of view of others in everyday life. The fantasy scale (FS) measures the tendency to imaginatively transpose oneself into fictional situations. Those two scales are considered to tap the cognitive facet of empathy. On the other hand the two other empathy scales measure an affective facet of empathy: the empathic concern (EC) scale assesses the tendency to experience feelings of sympathy and compassion for others and the personal distress scale (PD) taps the tendency to experience distress and discomfort in response of others' observed distress. It has been suggested that while the PT and the FS subscales of the IRI assess cognitive empathy, the PD and EC subscales tap affective empathy. Therefore we used the sum of the PT and FS as a cognitive empathy index and the sum of the PD and EC as affective empathy indexes.

The selection of the IRI scales was based on a pretest designed to evaluate the Hebrew version of these instruments, reliability analysis of the Hebrew versions of these empathy scales yielded high reliability coefficients for both the cognitive empathy scale ($\text{Alpha} = 0.79$) and the affective empathy scale ($\text{Alpha} = 0.82$) (36).

ToM Task: Cognitive and affective mental inference and a mentalistic significance of eye direction:

This computerized task (programmed using E-prime) is based on a task described previously by Baron-Cohen (37) and involves the ability to judge mental states based on verbal and eye gaze cues. The task consists of 64 trials, each showing a cartoon outline of a face (named Yoni) and four colored pictures of either objects belong-

ing to a single category (e.g., fruits, chairs) or faces, one in each corner of the computer screen. The subject's task is to point to the correct answer (the image Yoni is referring to), based on a sentence that appears at the top of the screen and available cues such as Yoni's eye gaze, Yoni's facial expression or the face's (the one Yoni is referring to) eye gaze and facial expression (Figure 1). There are three main conditions: "cognitive" (24 trials), "affective" (24 trials) and "physical" (16 trials), each requiring either a 1st (32 trials) or a 2nd (32 trials) order inference. The cognitive and the affective conditions involve mental inferences whereas the physical condition requires a choice based on a physical attribute of the character (thus serving as a control condition, to ensure that the subject understands the task). In the first order cognitive conditions (Figure 1a), both Yoni's facial expression and the verbal cue are neutral, whereas in the affective conditions (Figure 1a), both cues provide affective (For example: Yoni is thinking of ___ [Cog 1. condition] vs. Yoni loves ___ [Aff 1. condition]). Each ToM condition had a control physical condition to control for errors made due to attention and working memory deficits. The control physical conditions also served as a test of the ability to understand the instructions and follow the task demands and assess basic visual scanning abilities.

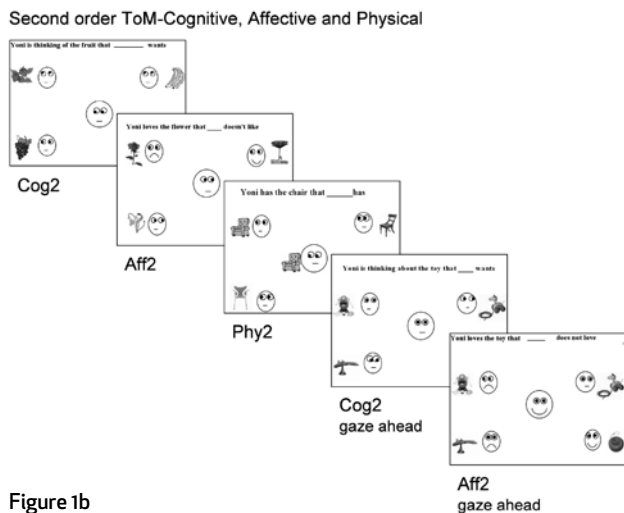
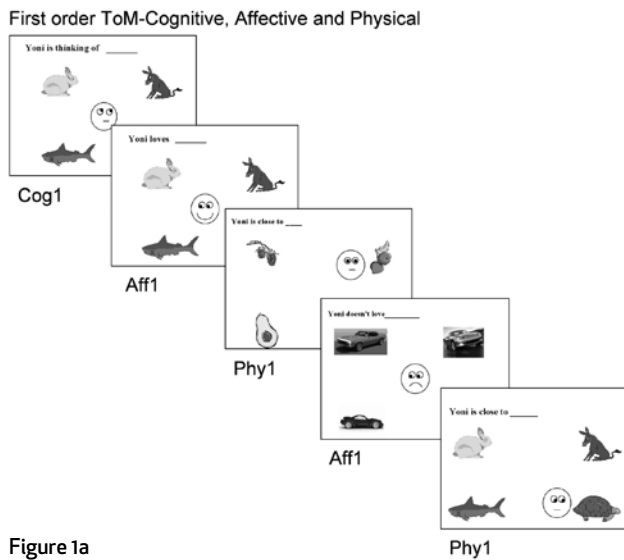
In the 2nd order condition (Cog2, Aff2, Phy2) the four stimuli consist of face images and the choice of the correct response requires understanding of the interaction between each of these figures and Yoni's mental state (Figure 1b). In 70% of the 2nd trials Yoni's eye gaze is directed at one of the four faces stimuli (the correct answer) and in 30% trials Yoni's gaze is directed straight ahead. (This was done after a pilot study that demonstrated that some subjects responded automatically to the stimuli to which the Yoni's gaze was directed and avoided reading the sentences.) When Yoni's gaze is directed straight ahead the decision must be based on the verbal cue and the face's gaze. Subject's performance was rated for accuracy and reaction time.

RESULTS

As Table 1 shows, the two groups did not differ in terms of age [$t(40) < 1$, ns], education [$t(39) < 1$, ns], or gender [$t(42) = 1.75$, ns].

Significant group main effects were evident on all social anxiety measures: LSAS- total [$t(31) = 15.45$, $p < 0.0005$], fear [$t(33) = 14.38$, $p < 0.0005$] and avoidance

Figure 1. Sample of Items: Figure 1a first order ToM; Figure 1b second order ToM



[$t(34)=10.49, p<0.0005$] as well as on measures of general anxiety: BAI [$t(15)=2.77, p=0.01$] and TAI [$t(14)=3.37, p=0.005$], and on a combined measure of general anxiety that is constructed from z-scores of the BAI and TAI: z-general anxiety [$t(15)=-3.90, p=0.001$].

COGNITIVE AND AFFECTIVE EMPATHY

Raw empathy scores were transformed into z scores, to allow direct comparison between cognitive and affective empathy scales. As shown in Figure 2, an independent t-test analysis revealed significant differences between social anxiety groups, in the QMEE [$t(40)=2.13,$

Table 1. Means and standard deviations of demographic variables and symptomatology measures

	Low Social Anxiety (N=22)	High Social Anxiety (N=21)
LSAS-total Mean (SD)	14.59 (6.72)	61.00 (12.09)*
LSAS- fear Mean (SD)	7.45 (4.05)	31.48 (6.55)*
LSAS- avoidance Mean (SD)	7.14 (5.28)	29.52 (8.31)*
Gender Male	12	6
Female	10	15
Age (y) Mean (SD)	25 (7.24)	25.33 (7.47)
Education (y) Mean (SD)	13 (1.22)	13 (1.49)
BAI Mean (SD)	6.71 (3.86)	14.9 (7.08)*
STAI-trait Mean (SD)	32.71 (5.4)	46.2 (10.86)*
Z general anxiety	-0.68 (0.41)	0.47 (0.69)

*Level of significance was set at $p<0.05$ (2-tailed)

$p=0.04$], the IRI total scores [$t(41)=2.08, p=0.04$], IRI affective [$t(41)=2.61, p=0.01$] and the personal distress scale of the IRI [$t(41)=3.02, p=0.004$]. In all of these empathy measures, HSA individuals scored higher than individuals in the LSA group. No differences between groups were evident in the IRI cognitive [$t(41)<1, ns$], the perspective taking, fantasy and empathic concern scales of the IRI [all $t(41)<1, ns$].

A paired t-test analysis was conducted with the cognitive and affective components of the IRI. Results indicated a significant difference between the cognitive and affective IRI components in the low social anxiety group [$t(21)=3.47, p=0.002$], suggesting they had significantly higher scores on the cognitive rather than affective empathy measures. However, the high SA group did not demonstrate any significant difference between the affective and cognitive components of the IRI [$t(20)=1.34, ns$] (Figure 3, 4).

RELATIONS BETWEEN SOCIAL ANXIETY, GENERAL ANXIETY AND EMPATHY

The relation between social anxiety (measured by LSAS-total) and empathy was further emphasized by correlation analysis, which indicates that social anxiety positively correlated with empathy measures, particularly with measurements of affective empathy (Table 2).

Figure 2. Empathy measures coded into z-scores, of individuals in the HSA group compared with individuals in the LSA group. Independent t-tests: QMEE [$t(40) = 2.13, p = 0.04$]; IRI [$t(41) = 2.08, p = 0.04$]; IRI cognitive [$t(41) < 1, ns$]; IRI affective [$t(41) = 2.61, p = 0.01$]. Individuals with high social anxiety (High SA) scored higher than individuals with low social anxiety (Low SA) on the QMEE, IRI and IRI affective scales.

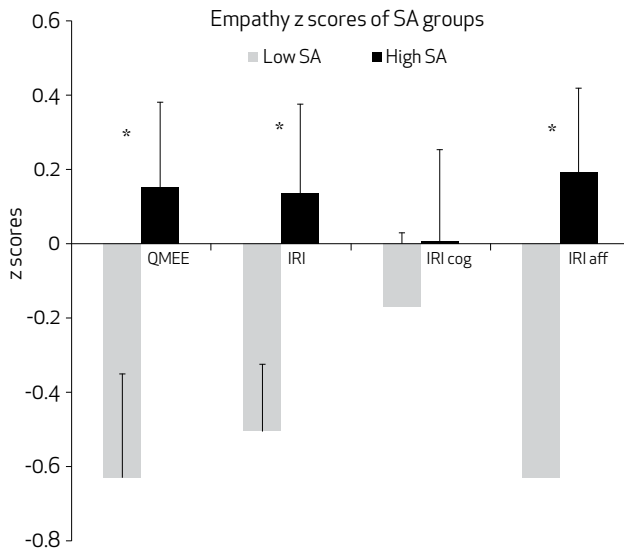


Figure 3. Cognitive and affective IRI scores, in individuals with high social anxiety (High SA) and low social anxiety (Low SA). Paired t-tests: LSA group [$t(21) = 3.47, p = 0.002$]; HSA group [$t(20) = 1.34, ns$]. Low SA individuals had significantly higher scores on the cognitive rather than the affective component of IRI. No differences between the IRI components were found in high SA individuals.

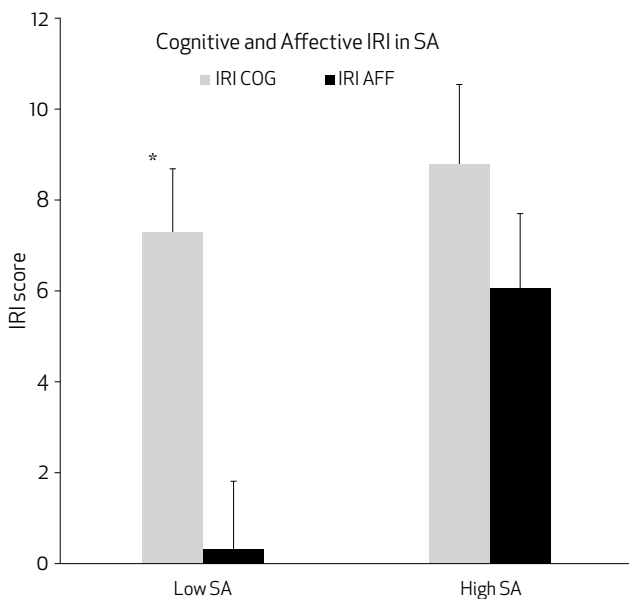


Figure 4. Cognitive and affective IRI scores in individuals with high social anxiety (High SA) and low social anxiety (Low SA), with trait anxiety scores measured by the STAI-T, as a covariate. A univariate analysis of variance: A significant difference between the groups emerged for the IRI-cog [$F(1,14) = 6.61, p = 0.02$], but not for the IRI-aff [$F(1,14) < 1, ns$].

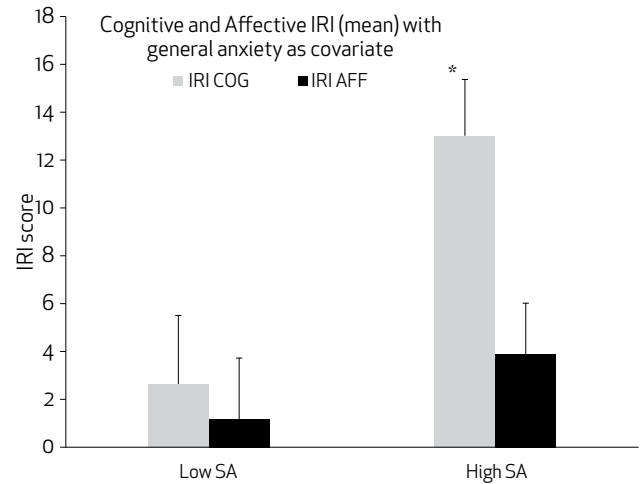


Table 2. Correlations between social and general anxiety and empathy

	LSAS general	LSAS fear	LSAS avoidance
QMEE (n=84)	0.27**	0.32**	Ns
IRI-total scores (n=86)	0.25**	0.31**	Ns
IRI affective (n=86)	0.29**	0.34**	Ns
IRI cognitive (n=86)	Ns	ns	Ns
Perspective Taking (n=86)	Ns	ns	Ns
Fantasy Scale (n=86)	Ns	0.24*	Ns
Empathic Concern (n=86)	Ns	ns	Ns
Personal Distress (n=86)	0.31**	0.37**	0.21*
TAI (n=30)	0.48**	0.44**	0.49**
BAI (n=30)	Ns	ns	Ns

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

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

As clearly observed in Table 2, a positive correlation between social anxiety and general anxiety, measured by the TAI, was also evident. In addition, the TAI measure of general anxiety was correlated significantly with the personal distress subscale ($r = 0.36, p = 0.05$). It is important to mention here that while the TAI measure correlated with measures of social anxiety, surprisingly, the BAI measure of general anxiety did not correlate with any measure of social anxiety and therefore it was not used for further analysis.

CORRELATION AND BETWEEN-GROUPS

ANALYSIS CONTROLLING FOR GENERAL ANXIETY

To control for the relative contribution of general anxiety, a partial correlation analysis was conducted.

Pearson correlation analysis controlling for general anxiety (TAI) revealed elimination of correlations between social anxiety and *affective* empathy. However, positive correlations between *cognitive* empathy (measured by the cognitive component of the IRI) and social anxiety were evident: LSAS-total ($r=0.32$, $p=0.04$, $n=28$); fear subscale ($r=0.35$, $p=0.03$, $n=28$).

To further investigate the possibility that the between-groups difference in empathy could be due to individual differences in propensity to anxiety in general, empathy analysis was reanalyzed with general anxiety (TAI) measures as covariate. A univariate ANOVA of IRI-cognitive indicated that general anxiety measured by the TAI did not have a significant effect on empathy [$F(1,14)=3.62$, ns], and significant differences between SA groups [$F(1,14)=6.61$, $p=0.02$] were evident (Figure 4). HSA individuals had higher scores than LSA individuals on the IRI-cognitive measure. Further analysis revealed that the above reported finding of the IRI-cognitive appears to stem from the fantasy scale and not the perspective taking scale that construct the IRI-cognitive. Univariate ANOVA indicated of significant differences between high and low SA individuals on the fantasy scale [$F(1,14)=15.21$, $p=0.002$] with the TAI as a covariate, but not on the perspective taking scale [$F(1,14)<1$, ns].

This was not the case for the affective empathy component of the IRI (IRI-affective), as results indicated that there was no differential effect between the SA groups in this affective empathy measure while general anxiety had a significant effect [$F(1,14)<1$, ns].

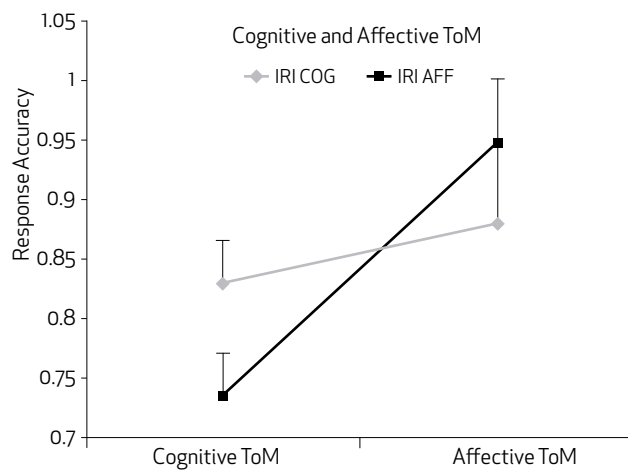
THEORY OF MIND

As presented above, the task involved three main conditions: “cognitive,” “affective” and “physical” and therefore, the primary variable of interest was the *type* of judgment. The first and the second order conditions (cognitive, affective, and physical) were summed into measures of total accuracy. In order to obtain measures of the trends and interactions over the different types of judgment, a repeated measures analysis of variance was conducted, with type as the within-subjects factor and group as the between-subjects factor. This analysis revealed a significant type effect [$F(1,25)=20.43$, $p<0.005$], indicating a significant difference in accuracy between types (cognitive, affective): subjects were more

accurate in the affective ToM conditions (Mean=1.88, SD=0.13) as compared to the cognitive ToM conditions (Mean=1.75, SD=0.21). A significant group by type (interaction) effect [$F(1,25)=8.62$, $p=0.007$] indicated that the pattern of accuracy of types (cognitive, affective) differed between groups. Individuals with HSA were better at the affective ToM condition while individuals with LSA were better at the cognitive ToM condition. Nonetheless, follow-up t-tests indicated that the two groups did not differ significantly from each other in the affective [$t(25)=1.56$, ns] and cognitive conditions [$t(25)=1.07$, ns].

Finally we reanalyzed the data with the control physical condition as a covariate to control for potential impairments in basic visual scanning and task comprehension. Repeated measures analysis was additionally conducted with the total physical condition serving as a covariate, to examine whether the SA groups differed significantly from each other on cognitive and affective response accuracy. This analysis indicated that the accuracy in the physical condition did not have a significant effect [Hotelling's Trace; $F(1,24)<1$, ns] on affective and cognitive ToM accuracy. In addition, as observed in Figure 5, there was a significant group by type effect [Hotelling's Trace; $F(1,24)=8.19$, $p=0.009$] indicating that even when controlling for the physical condition, the HAS group was particularly better in the affective ToM condition.

Figure 5. Response accuracy scores at the combined first and second-order cognitive and affective ToM conditions in individuals with high social anxiety (High SA) and low social anxiety (Low SA). A repeated measures analysis with the combined first and second-order physical condition served as a covariate: a significant group (Low SA, High SA) by type (Cognitive ToM, Affective ToM) interaction effect emerged [Hotelling's Trace; $F(1,24)=8.19$, $p=0.009$].



DISCUSSION

In accordance with our hypothesis, overall, HSA individuals demonstrated elevated empathic tendencies compared to LSA individuals. The relation between social anxiety and empathy was further emphasized by correlation analysis which indicated that social anxiety positively correlated with empathy measures, particularly with measures of affective empathy. Measures of social and trait anxiety were also moderately correlated (ranged from 0.44 to 0.49) and HSA subjects displayed elevated trait anxiety compared to LSA ones. Overall, HSA individuals exhibited elevated affective empathy tendencies. However, controlling for general anxiety revealed that social anxiety was related to cognitive empathy measures, rather than affective empathy: HSA individuals depicted elevated scores on cognitive, but not affective empathy measures.

Elevated performance of HSA individuals on the cognitive empathy scale aligns with data regarding their attentional biases towards signals of social disapproval or criticism (38) as well as their enhanced vigilance towards social stimuli (5). Although HSA individuals demonstrated elevated cognitive empathy, their perspective taking score indicated of a lower non significant trend compared to LSA individuals. In addition, the perspective taking scores did not correlate with any of the social anxiety measures. Yet, controlling for general anxiety had revealed that on the second cognitive IRI component, the fantasy scale, HSA individuals had higher scores compared to LSA individuals. The essence of the fantasy scale is the tendency to imagine oneself in the circumstances of another, hence its role taking relevance (9). However, its uniqueness is that the objects of the role taking process are fictitious characters appearing in books and movies. It is possible that the differentiation reported here between perspective taking of real as opposed to imaginary people stems from the social fear and avoidance. These obstacles most likely do not exist in fictional characters and therefore, the actual role taking tendency of social anxious individuals may manifest itself in this particular scale.

Another interesting result indicated that the social anxiety component, rather than the avoidant behavior, is related with enhanced social cognition. Fear, but not avoidance (measured by LSAS) correlated with empathy measures. Avoidance scores positively correlated only with the personal distress subscale and general anxiety. This dissociation between fear and avoidance might imply

that anxiety-related biases (excessive vigilance or selective allocation of attention) but not its behavioral consequence (avoidance) are related to empathy abilities.

One may wonder how the process of being empathically tuned to others co-occurs with the known difficulty that HSA individuals have in the interpretation of others' signs (39). This dissonance could be resolved based on the distinction between empathic disposition and accuracy. According to Davis (9), cognitive IRI scales evaluate the likelihood to engage in the process of attempting to reflect on the point of view of others; they do not inquire about the outcome of that process (accuracy or social insight). Although empathically accurate perceivers are good at "reading" others' thoughts and feelings (20), empathy inaccuracy does not necessarily indicate minimal role taking effort. Therefore, it may be speculated that although socially anxious individuals tend to negatively misinterpret others' feedback, they may exhibit a facilitated tendency to adopt the psychological point of view of others. Although taking the others' external vantage point in SP may appear self-centered motivated as it stems from heightened self-consciousness, socially anxious individuals in fact vigorously engage in mentalizing activities. Considering their tuned senses with regard to social cues as well as increased other-awareness and self-monitoring in social situations, it is possible that individuals with SP will show increased empathic tendencies, particularly in the cognitive perspective domain, but decreased empathic accuracy.

Indeed, HSA individuals displayed elevated cognitive empathy scores; however they tended to be less accurate than LSA individuals on the cognitive mindreading task. It is possible that in "real-life" situations, for all their mentalizing attempts, their social perception is inaccurate because of their propensity to "over-mentalize."

It has been suggested that empathy depends on other-awareness (40), which might be achieved by using one's own knowledge as the primary basis for understanding others (41). This "self-orientation in service of the other" is consistent with the "simulation" theory (42) according to which we mentally attempt to mimic others' thought processes and feelings, using *our* own mental state as a model of theirs. It may be hypothesized that socially anxious individuals are prone to engage in simulation. For example, it has been reported that socially anxious individuals tend to use their own knowledge as a primary basis to gain insight into others' thoughts (43).

It was suggested that increased sensitivity to the subtle social cues is required to make theory of mind judg-

ments (44). This may be the case with socially anxious individuals which are characterized with exaggerated sensitivity to the implied threat in others' faces (45). Indeed, our results indicated a differentiated ToM accuracy pattern since HSA participants exhibited higher accuracy levels than LSA participants on the affective condition, but were less accurate than the LSA group on the cognitive condition. Although not formulated in terms of social cognition, mindreading abilities have been viewed as central to the development of SP, but the focus was on a self-consciousness construct of how they think they appear to other people (13) not on ToM in its broadest sense. Socially anxious people assume that others will have the same negative views of them as they construct about themselves (11). Indeed, this tendency to use one's own knowledge as a primary basis to gain insight into others' thoughts that was mentioned before characterizes SP (43).

Although we did not directly examine those relations, we found both cognitive empathy and affective mindreading to co-characterize HSA individuals. It seems that making inferences regarding one's emotional state (affective ToM) requires the involvement of processes which are cognitive by nature such as adopting another person's point of view (cognitive empathy). These results are in concordance with Shamay-Tsoory, et al. (46), who reported significant correlations between cognitive empathy (measured by the IRI) and "affective ToM" (measured by a faux pas task) in patients with frontal brain lesions.

To sum up, individuals with SP are preoccupied with the impression they make, and place fundamental importance on being positively appraised by others. They may be especially sensitive to social stimuli, but in real-life social situations, while bombarded with social information, the accuracy of their analysis of those stimuli is negatively affected. Thus, the mode of processing the external social environment as well as the tendency to self focus in SP may influence their perceptiveness of social stimuli, which overall may be manifested in a unique social-cognitive abilities profile.

Finally, it should be noted that although the study included individuals with sub-clinical social anxiety, their measured social anxiety levels were almost as high as scores obtained from social phobic individuals in the clinical literature (for example, 31, 47) which indicates that they experienced significant levels of social anxiety. Nonetheless, it seems worthwhile to further explore social cognitive abilities in clinical samples of social

phobic individuals, and maybe compare the general and more limited type.

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