# The perception of emotional expressions in social anxiety and autism

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My research on the perception of expressions beyond the face shows that some standing assumptions regarding social anxiety were incorrect24 and therefore, urgently calls for a closer investigation of alternative expression modalities including full...

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| **Ethical review** | Approved WMO |
| **Status** | Pending |
| **Health condition type** | Other condition |
| **Study type** | Observational non invasive |

## Summary

### ID

NL-OMON52701

**Source**
ToetsingOnline

**Brief title**
The perception of emotional expressions in social anxiety and autism

### Condition

- Other condition
- Anxiety disorders and symptoms

**Synonym**
social anxiety and autism

**Health condition**

twee patientengroepen (2x N=60): angst en autisme

**Research involving**
Human

## Sponsors and support

**Primary sponsor:** Universiteit Leiden
**Source(s) of monetary or material Support:** NWO VIDI

## Intervention

**Keyword:** Emotional expression, mimicry, physiological linkage, pupil size, virtual reality

## Outcome measures

### Primary outcome

In all studies proposed, 60 ASD and 60 SAD patients are being compared with 120 carefully matched, healthy controls. In the dyadic interaction study we will have an additional 120 healthy subjects. The sample size is based on facial mimicry research9, and discussed with expert colleagues. Participants fill out questionnaires measuring empathy, anxiety and autistic traits. Subjects wear eye tracking glasses to measure gaze and pupil size, and electrodes to measure facial muscle movements. Psychophysiological measures, e.g., heart-rate and facial temperature give insight in arousal and blushing.

### Secondary outcome

n/a

# Study description

### Background summary

The ability to trust is pivotal to social life, yet many patients with mental disorders have difficulties trusting others1,2. In contrast to healthy individuals, they do not have the positive expectation that sharing emotions can lead to help, assistance and support. This is detrimental to their functioning as on a daily basis, quick evaluations of trustworthiness are common, especially in interactions with strangers. Patients therefore miss out on opportunities that interactions with people outside of their social network

can bring. Their lack of trust further prohibits them to reach out for the help they need or to put confidence in a therapist, which blocks therapeutic success3,4. Many patients, including those with ASD or SAD, show impaired social skills including the avoidance of eye contact5,6, hyper-arousal7,8, less emotional mimicry9,10, and deficits in emotion recognition11-14, and suffer from social isolation15,16. Their low level of trust seems related to their lesser ability to process signals of trust but in order to verify this presumption, it is essential to disentangle the distinct components constituting this putative relationship.

Humans* capacity to express, recognize and share emotions enables them to navigate their social worlds and forms a core component of what it means to be socially competent and healthy. In order to evaluate another*s trustworthiness, they rely on various indicators of a safe interaction including emotional expressions17-20. I recently proposed deficits in emotion processing as a liability spectrum underlying a range of mental disorders, explaining similarities in symptoms and high comorbidity rates. I concluded that research in this area can advance significantly by directly comparing different clinical groups with similar emotion deficits21. Comparing patients with ASD and SAD can provide key insights into which deficits are disorder-specific or shared, which is relevant for therapeutic interventions. The majority of research has focused on the perception of explicit, isolated facial expressions, expressions rarely seen in daily life22,23. My research on the perception of expressions beyond the face, which I will detail later, shows that some standing assumptions regarding social anxiety were incorrect24 and therefore, urgently calls for a closer investigation of alternative expression modalities including expressions of autonomic arousal, reflected in dilated pupils, tears and a blush22,24,25. I will study these phenomena in a controlled setting, but also during real life interactions.

The remainder of this section (a) provides a state-of-the art review of literature on emotional expressions, different forms of mimicry, and implications for the development of trust or distrust in patients with SAD and ASD. I highlight where the literature falls short and where my research comes in. This section is divided into three Work Packages (WP), each addressing different sub-components of the linkage between emotion perception and trustFig.1. WP1 focuses on emotional expressions, WP2 on mimicry and WP3 on trust and distrust. The overarching aim of all WPs is to investigate the linkage between mimicry, emotion recognition, and (dis)trust in patients with SAD and ASD, compared to matched controls.

**Study objective**

My research on the perception of expressions beyond the face shows that some standing assumptions regarding social anxiety were incorrect24 and therefore, urgently calls for a closer investigation of alternative expression modalities including full body expressions and expressions of autonomic arousal, reflected in dilated pupils, tears and a blush22,24,25. I will study these phenomena in a controlled setting, but also during real life interactions. The overarching aim

of all WPs is to investigate the linkage between mimicry, emotion recognition, and (dis)trust in patients with SAD and ASD, compared to matched controls.

**Study design**

Method and techniques
In all studies proposed below, 60 ASD and 60 SAD patients are being compared with 120 carefully matched, healthy controls. Participants fill out questionnaires measuring empathy, anxiety and autistic traits. Subjects wear eye tracking glasses to measure gaze and pupil size, and electrodes to measure facial muscle movements. Psychophysiological measures, e.g., heart-rate and facial temperature give insight in arousal and blushing. This research consists of three components.

Component 1 Emotion Perception
Study 1 focuses on the face. 1a is a passive viewing task during which subjects view photos showing emotions expressed through different modalities (constricted/dilated pupils, tears, blush). With an eye-tracker, attention and avoidance patterns will be assessed. 1b investigates whether the groups differentially perceive the expressions. Specifically, subjects will choose amongst different emotional labels and rate the stimuli on valence and arousal levels. 1c uses the dot probe paradigm, implemented on a touch-screen. In this task, two photos are briefly presented. One of them is replaced by a dot, which participants have to tap. As attention is drawn towards relevant stimuli, this task typically shows faster reaction times when the dot replaces an emotional compared to neutral image. This task robustly reveals biases in immediate attention. Here, typical facial expressions will be used, in addition to expressions from the eye region including dilated/constricted pupils, tears or blushing faces.
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Study 2 focuses on emotional body expressions. 2a In this eye-tracking task, participants view expressions sent from the whole body including the face. In condition A, facial and bodily expression are congruent, e.g., a happy face above a happy body; in Condition B they express different emotions. I previously showed that non-clinically anxious individuals avoided eye contact but attended more to the hands, regardless of congruency. 2b investigates how patients* compared to controls recognize body language. In addition to photographs, short video clips will be shown. 2c uses the dot probe paradigm to measure attentional biases towards body expressions.

Predictions
SAD and ASD patients are expected to show heightened physiological arousal, avoid eye contact and, as a consequence, miss out on eye signals compared to controls. Since many SAD patients fear blushing, it is expected that they better notice this cue than ASD and controls and I expect this to be reflected in an attentional bias towards blushing others. Further, patients are expected to pay more attention to body language than controls. However, whereas for SAD

patients this can work as an adaptive coping-strategy, it is expected to be less of use to ASD patients as previous research has shown they have deficits in the recognition of body expressions.

Component 2 Emotional Mimicry

Study 3 compares patients* and controls* mimicry of expressions. 3a is a facial EMG mimicry study measuring congruent reactions to facial displays of emotions. This straightforward comparison between ASD and SAD has not been made previously. 3b focuses on pupil mimicry. Stimuli are images of faces in which the pupil sizes are manipulated to constrict or dilate. An eye-tracker measures subjects* pupil size. 3c This study investigates whether seeing someone cry is as contagious for patients as it is for healthy individuals. Stimulus materials are video fragments of crying people, made by collaborator Prof. A. Fischer. Participants are videotaped to detect tears and facial EMG is applied to measure expressions of sadness. Furthermore, a thermal camera measures nasal temperature, indicative of negative arousal. 3d studies contagious blushing. Subjects observe faces that have been subtly retouched to make the cheeks slightly redder or less red. The temperature of subjects* cheeks is indicative for contagion.

Predictions

SAD patients will show enhanced mimicry of negative compared to positive expressions and ASD patients are expected to mimic less. As there is no research on the mimicry of emotional cues or body language in either of these patients groups, this study is the first to explore whether the known facial mimicry deviances extend to other modalities.

Component 3 Trust and Distrust

WP3 studies the implications of mimicry for social decisions in VR and during real life interactions. Two economic games are used that measure trust and distrust. They are identical in their outcome spaces, with the only difference being in how outcomes are achieved. In the trust game, the investor allocates a certain amount to the trustee. Subjects are told that this will be tripled and sent to the trustee, who decides how much to return to the investor. The amount the investor invests is taken as a measure of trust. In the distrust game, Subject A starts with an empty pocket and Subject B with an endowment. Subject A decides how much of Subject B*s endowment he or she wants to take. The experimenter divides this amount by 3 and gives that to Subject A. Next, Subject B is asked to decide to send any possible amount to Subject A, and this amount is not altered. Subject A*s taking money is closely aligned with previous operationalisations of distrust as an action to mitigate one*s vulnerability to a counterpart. In particular, the desire to buffer oneself from the effects of others* actions is reflected in taking money in anticipation of Subject B not intending to share it. In this study we will have an additional group of control participants.

Study 5 investigates mimicry with help of virtual reality where in 5a an

embodied virtual agent real-time mimics the facial expression of the subject, or refrains from mimicry. In 5b, the virtual agent*s pupils either align with subject*s pupils, or not. 5c aligns or misaligns the blush on the cheeks of the avatar with subjects* facial temperature.
Study 6 is similar to Study 5 but participants play distrust rather than trust games.

Prediction
Whereas typically, mimicry boosts trust, a study in SAD suggests this might not work for patients. However, the head movements in that study were quite obvious and it remains to be investigated what influence another*s autonomic mimicry has on patients. As autonomic mimicry is an ancient bonding mechanism, this is expected to be intact in patients and foster trust. The mimicry of negative expressions, however, is expected to link with distrust decisions.
Study 7 Patients and controls sit opposite each other. In Condition A, they cannot see each other due to a screen separating them. In Condition B, they see each other directly. In Condition C they see each other live on a computer screen (Skype) and in Condition D, there is a slight visual delay. In 7a subjects play trust games and in 7b distrust games.

Prediction
Healthy subjects are expected to show more emotional signals such as smiles, when they can see (A) as compared to when they cannot see their partner (B). For ASD patients this difference is expected to be smaller. Patients will show hyper-arousal in the seeing versus no-seeing condition and avoid eye gaze. Levels of arousal, as well as emotional expressions are expected to be synchronized and mimicked less in ASD compared to SAD and controls. The visual delay will not hamper mimicry in the ASD group compared to SAD and controls. Both patients groups are expected to show less trust, and more distrust, but for different reasons. SAD patients are expected to mimic negative expressions more, and rely on their bodily feedback when making decisions. As these patients are often perceived more negatively by others, not trusting partners in sharing gains, might sadly be a socially wise decision. Patients with ASD are expected to mimic less overall and be somewhat more calculative.

### Study burden and risks

There are no risks for the patients or control participants. Because this is a thorough investigation into emotion processing, the only disadvantage is the time cost.

## Contacts

### Public

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# Trial sites

## Listed location countries

Netherlands

# Eligibility criteria

**Age**
Adults (18-64 years)

## Inclusion criteria

Inclusion criteria for patients: diagnosed with either autism spectrum disorder or social anxiety disorder.

## Exclusion criteria

Another comorbid disorder

# Study design

## Design

Study type: Observational non invasive

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| Intervention model: | Other |
| Allocation: | Non-randomized controlled trial |
| Masking: | Open (masking not used) |
| Control: | Active |
| Primary purpose: | Other |

### Recruitment

NL

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| Recruitment status: | Pending |
| Start date (anticipated): | 01-03-2020 |
| Enrollment: | 240 |
| Type: | Anticipated |

## Ethics review

Approved WMO

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| Date: | 04-10-2019 |
| Application type: | First submission |
| Review commission: | METC Leiden-Den Haag-Delft (Leiden)<br>metc-ldd@lumc.nl |

Approved WMO

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|---|---|
| Date: | 03-08-2020 |
| Application type: | Amendment |
| Review commission: | METC Leiden-Den Haag-Delft (Leiden)<br>metc-ldd@lumc.nl |

Approved WMO

| | |
|---|---|
| Date: | 22-07-2022 |
| Application type: | Amendment |
| Review commission: | METC Leiden-Den Haag-Delft (Leiden)<br>metc-ldd@lumc.nl |

# Study registrations

## Followed up by the following (possibly more current) registration

No registrations found.

## Other (possibly less up-to-date) registrations in this register

No registrations found.

## In other registers

| Register | ID |
| --- | --- |
| CCMO | NL67766.058.18 |