Original Papers

Polish Psychological Bulletin
2025, vol. 56 160–170
DOI: 10.24425/ppb.2025.153988

Zuzanna Szpak[1),2)], Aleksandra Tyrzyk[2)], Michał Parzuchowski[2)]

[1)]*Università degli Studi di Padova, Italy*
[2)]*SWPS University, Sopot, Poland*

Corresponding author – Michał Parzuchowski – mparzuchowski@swps.edu.pl

Look into my eyes: Attentional bias to facial expressions predicts mechanisms of gullibility

Abstract: This eye-tracking study aimed to explore the relationship between levels of gullibility and attentional allocation to threatening facial expressions. Using a dot-probe paradigm with concurrent eye-tracking, we found a distinct dissociation in how gullible versus non-gullible individuals process angry and neutral faces. While non-gullible participants demonstrated typical avoidance behaviors toward angry expressions, highly gullible individuals exhibited prolonged fixation on these social threat signals. These contrasting attentional patterns suggest that gullibility may fundamentally involve an insensitivity to cues of untrustworthiness rather than merely susceptibility to persuasion. Gullible individuals appear to lack the typical protective response of looking away from threatening social signals. These findings reveal how individual differences in gullibility shape basic attentional processes during social threat processing.

Keywords: *gullibility, attentional bias, social threat processing, eye-tracking, cognitive vulnerability, trustworthiness perception*

Humans rapidly detect threats in their environment and typically respond by avoiding them (Becker & Detweiler-Bedell, 2009). Our visual system quickly recognizes emotional signals such as anger and sadness of other people through automatic bottom-up processes that help prioritize critical stimuli. At the same time, top-down mechanisms - shaped by dispositional factors such as interpersonal trust (Takao & Ariga, 2016) and individual differences (Kaspar & König, 2012) in social perception – also influence attentional patterns relevant to gullibility. Our study aimed to extend this body of literature on the interplay between top-down and bottom-up attention. Using an eye-tracking dot-probe paradigm, we investigated whether gullibility moderates attentional responses to emotional faces. Specifically, we examined whether gullible individuals spend more time viewing angry faces (i.e., untrustworthy, Engell et al., 2010), which would suggest they lack the typical pattern of early threat avoidance. Prolonged attention to such cues would indicate reduced sensitivity to signals of untrustworthiness, aligning with the conceptualization of gullibility as insensitivity to information revealing untrustworthiness (Yamagishi et al., 1999). This atypical attentional bias may help to explain why highly gullible individuals are vulnerable to manipulation in real-world social contexts.

FACIAL CUES OF UNTRUSTWORTHINESS

Humans can process only a limited amount of sensory information, so attention is used to efficiently allocate mental resources by focusing on relevant inputs and ignoring others. Important or surprising visual stimuli are selectively processed, with their perception encoded in neuronal activity (Becker & Detweiler-Bedell, 2009). This process is driven by what is known as bottom-up attention, which allows one to focus on the most relevant stimuli based on any threats in the organism's environment (Katsuki & Constantinidis, 2014). From an evolutionary

perspective, selective attention to emotional stimuli provides an adaptive advantage — emotional stimuli (such as cues for imminent danger or safety) are crucial, as prioritizing attention toward them enhances survival and adaptability to the environment. Negative emotional stimuli play a particularly significant role, as failing to notice them can lead to severe consequences (Öhman et al., 2001).

Becker and Detweiler-Bedell (2009), using an eye-tracker, established that negative facial expressions are indeed immediately detected. However, rather than attracting attention, these faces are actively avoided. This rapid avoidance behavioral pattern aligns with findings by Willis and Todorov (2006) who demonstrated that judgments of trustworthiness occur within 100 milliseconds, reinforcing the idea that facial processing is both fast and automatic.

This avoidance response, related to trustworthiness judgments, is also reflected in the work undertaken by Engell et al. (2010), who documented that angry faces are rated as less trustworthy than happy or neutral expressions. Similarly, Oosterhof and Todorov (2009) demonstrated that evaluations of trustworthiness are systematically linked to structural similarities between facial expressions and social judgments. In their study, trustworthy faces expressing happiness were perceived as happier than untrustworthy ones, whereas untrustworthy faces expressing anger were perceived as angrier than trustworthy faces expressing the same emotion.

This behavioral evidence converges with electrophysiological findings by Schupp et al. (2004) showing that neural responses to trustworthy and untrustworthy faces parallel those elicited by happy and angry expressions, respectively. Untrustworthy faces tend to elicit stronger late positive potentials, resembling the enhanced processing of angry faces, whereas trustworthy faces evoke responses similar to those observed for happy faces. This suggests that judgments of trustworthiness are based on the same perceptual mechanisms that underlie emotion recognition. Structural features associated with happiness are perceived as trustworthy, while features associated with anger are perceived as untrustworthy (Oosterhof & Todorov, 2008, 2009). Taken together, these findings support the view that judgments of trustworthiness reflect an overgeneralization of valence processing, whereby the perceptual system uses subtle facial cues to rapidly infer whether others pose a potential threat or are safe (Todorov, 2008; Todorov et al., 2008). Again, from an evolutionary standpoint, avoiding angry-looking individuals is adaptive as interactions with those may lead to harmful consequences (Pelešková et al., 2024).

These perceptual mechanisms help explain why untrustworthy faces may influence attentional processes (Oosterhof & Todorov, 2009). Namely, research shows that faces signaling untrustworthiness receive significantly less attention than trustworthy ones, a pattern observed even in infants (Sakuta et al., 2018). The automatic processing of trustworthiness operates through a bottom-up attentional mechanism, as demonstrated by Lischke et al. (2018), who showed that faces contain distinct trustworthiness cues that are processed in this manner.

Taken together, the perception of faces is shaped by subtle structural cues that rapidly signal trustworthiness and emotional valence. These cues guide attention in adaptive ways: untrustworthy or threatening faces trigger avoidance, while trustworthy or positive faces support approach-oriented processing. Consequently, attentional processes are not merely reactive but are strategically tuned to infer potential risks or opportunities in the social environment.

PERSONALITY AND DISPOSITIONAL VARIABLES MODERATE ATTENTION ALLOCATION

While low-level features of stimuli can modify bottom-up attentional processes, attention is also modified by top-down processes, which operate as deliberate processes based on the previous experiences, knowledge (Kveraga, et al., 2007), intentions, and current goals (Buschman & Miller, 2007). Many studies highlight that certain personality traits and dispositional variables can systematically change patterns of how attention is directed toward emotionally charged stimuli (Kaspar & König, 2012). This growing body of research has explored differences in attention to threat-related stimuli, for example in gaze patterns, while accounting for moderating effects of personality traits.

A well-known example of this process is the work of Ellingsen et al. (2019) who used high-precision eye-tracking to examine differences in visual attention to facially expressed emotions between extraverts and introverts. Their findings indicate that extraverts exhibited a selective attentional bias toward positive expressions, particularly in the mouth region. These results suggest that extraversion moderates the visual processing of emotional stimuli through attentional mechanisms that favor selective focus on positive social cues.

Extending this line of evidence, Shore and Heerey (2013) demonstrated that social evaluations can systematically influence attentional allocation. Using the attentional blink paradigm, where detection of a second target is impaired if it closely follows a first target due to temporary attentional limitations, they found that faces deemed trustworthy through direct behavioral experience were more likely to be identified even during the attentional blink. This finding indicates that socially meaningful evaluations can modulate pre-attentive processing. In their first experiment, appearance-based impressions of trustworthiness influenced later recognition accuracy but did not allow faces to overcome the attentional blink. Overall, these results suggest that while early judgments based on appearance may affect memory, attentional processes toward socially and emotionally salient stimuli can be shaped by social experience.

In addition, emotional intelligence (EI) has also been shown to shape visual attention to emotional stimuli. Nicolet-dit-Félix et al. (2023), using the dot-probe task

procedure, found that individuals with high emotional intelligence, particularly in emotion understanding, exhibit a stronger attentional bias toward emotional faces, responding faster to emotional than neutral stimuli.

Another well-known application of the dot-probe task comes from the field of psychopathology, where research has shown that social anxiety can moderate attentional patterns. A systematic review of social anxiety eye-tracking studies concluded that socially anxious individuals show early vigilance toward threat cues, especially angry faces (Bantin et al., 2016). At the same time, the review emphasized the need for standardized protocols and multi-method approaches to provide greater clarity and comparability across findings.

These findings underscore that attention allocation is influenced not only by bottom-up processes, such as stimulus-driven features, but also by top-down factors, including personality traits and individual differences. Inter-individual variability plays a crucial role in shaping attentional processes and should be systematically considered in their analysis. This interplay between the bottom-up and top-down mechanisms might explain why attention is not a uniform process across all individuals (Corbetta & Shulman, 2002).

GULLIBILITY AND ATTENTIONAL PROCESSES

Variations in attentional processing can have important consequences for social judgment and decision-making. While most individuals automatically detect cues of trustworthiness or threat, some are less sensitive to these signals, making them more gullible in social interactions.

Trust and gullibility, while often discussed together, are conceptually distinct constructs (Yamagishi et al., 1999). Trust refers to a general expectation that others are reliable and honest in the absence of contrary evidence, whereas gullibility reflects a lack of sensitivity to cues that signal untrustworthiness. In this sense, trust involves an openness to others while still remaining cautious to the information about potential deception. Gullibility, on the other hand, indicates a failure to detect or act upon such information (Teunisse et al. (2020)).

Yamagishi and colleagues (1999) demonstrated that individuals with higher levels of trust, as measured by a General Trust Scale, tend to be more sensitive to cues indicating possible untrustworthiness in others and make more accurate judgments of others' choices in a one-shot prisoner's dilemma game. These findings also suggest that people who are trusting are not inherently naive or easily deceived.

This conceptualization underscores the critical role of attentional mechanisms in the perception of deceitfulness among gullible individuals. Such insensitivity may explain why gullible people fail to detect warning signals that others readily perceive.

Building on this work, Teunisse et al. (2020) developed a self-report scale that distinguishes two core dimensions of gullibility. The first, persuadability, reflects a general tendency to be easily influenced by others. The second, insensitivity to untrustworthiness cues, captures difficulties in recognizing signals of deceit or manipulation. Higher scores on the second dimension predicted greater engagement with scam messages, suggesting that failure to detect untrustworthiness may play a more central role in gullible behavior than persuadability alone.

STUDY

Building on Becker & Detweiler-Bedell (2009) finding that negative facial expressions are rapidly detected but actively avoided, this study aimed to replicate and extend this work by further investigating early threat processing in facial perception. To our knowledge, no previous research has directly explored the link between gullibility and responses to emotional facial expressions. We hypothesized that individuals with higher levels of gullibility would exhibit prolonged attentional engagement with angry faces, reflected in longer fixation times (Hypothesis 1). We also expected that gullibility would be associated with slower reaction times in tasks involving emotional face processing (Hypothesis 2).

METHOD

Participants. 73 students took part in this study, recruited from the first year psychology students at SWPS University via the SONA Participant's pool. Two participants were excluded due to problems with tracking their pupils (atypical eye-tracking patterns resulted in failed calibration procedures), hence the final sample included 71 individuals, 15 male, 55 female, and 1 nonbinary participant (M_{age} = 22.94, SD = 6.13). No a priori power analysis was conducted to determine the sample size for this study as the number of participants was constrained by the availability of first-year psychology students completing research participation requirements. After data collection, we performed a post hoc sensitivity analysis using the G*Power 3.1 (Faul et al., 2009) for a repeated-measures (within-subjects) design with two conditions, α = .05, and power $(1-\beta)$ = .80. The results indicated that the study was adequately powered to detect effects of f = 0.15 (equivalent to η^2 = .022 or Cohen's d = 0.30), corresponding to small-to-medium within-subject effects. This level of sensitivity is typical for eye-tracking studies using trial-level data analyzed with mixed-effects models.

Materials and Procedure. Participants completed the procedure at the eye-tracking laboratory at SWPS University in Sopot. All procedures were conducted in accordance with the ethical standards of the Declaration of Helsinki (2013 revision). Written informed consent was obtained from each participant on paper before the start of the procedure. Participants were informed about the general aim of the study (measurement of attentional processes), the confidentiality of their data, and their right to withdraw at any stage without penalty. Next, participants took part in the dot-probe procedure and then

completed the follow-up questionnaires (described below). After completing the experiment, participants were fully debriefed, informed about the true purpose of the study, and given the opportunity to ask questions.

Dot-Probe Task. Participants completed a dot-probe procedure to assess attentional biases in responses to emotional facial expressions. As presented in Figure 1 on each trial, a pair of faces (one angry and one neutral) of the same individual was presented side by side (with randomized presentation order). After a brief display, a target dot appeared in the location of either the angry (congruent trial) or the neutral face (incongruent trial). Participants responded to the dot's position as quickly and accurately as possible using a response pad.

Fixations and reaction times of each trial were recorded using an Eyelink 1000 Plus eye-tracking system recording dominant eye gaze at 60 Hz following a H/9 calibration procedure (1000 ms interval). Stimuli appeared on a 1024×768 resolution display. Participants sat 88 cm from the computer screen with their heads stabilized via chin-rest and forehead bar to minimize movement. Facial emotion stimuli consisted of 30 black and white images (15 angry, 15 neutral) of 15 individuals, each photographed with both expressions (Olszanowski et al., 2015). To control for lateral bias, the position of the angry faces was counterbalanced across trials.

Each trial began with a central fixation cross (800 ms) to standardize gaze position, followed by a face pair displayed for 600 ms—showing angry and neutral expressions of the same individual in frontal view, side by side. Immediately after stimulus offset, a target dot appeared at the location of either the angry face (congruent trial) or neutral face (incongruent trial). Participants responded to the dot's location as quickly and accurately as possible using a response pad. The probe task terminated after 2000 ms or upon button press. Emotional face and probe positions were fully counterbalanced and randomized across trials. Participants viewed 32 face pairs (from 15 individuals) across 32 experimental trials, with a 1000 ms blank screen following each dot-probe.

For the analysis, we exported only trials with correct responses to dot location (2222 out of 2272 trials; 97.79% of registered data). Response times and eye-tracking fixations were aggregated and exported using *Eyelink SR Research Data Viewer Software*. We measured fixation durations within each area of interest (time spent looking at angry versus neutral faces) and reaction times (ms) by condition (dot probe appearing after angry versus neutral face). To improve readability, during raw data export we combined congruent trials (where the dot appeared in the same location as the emotional face) and incongruent trials (where the dot appeared opposite to the emotional face) to focus solely on how participants responded to the emotional content of the stimuli.

After the dot-probe procedure participants answered demographic questions and questions about factors known to influence fixation patterns, including: eye dominance, use of contact lenses or vision correction, hand dominance, current makeup application (mascara, artificial lashes, eyeliner, and eyeshadow), and recent consumption of physiologically active substances (caffeine, nicotine, alcohol, cannabinoids, or other stimulants). Then we measured the psychological measures described below.

Generalized Anxiety Disorder. Anxiety symptoms were measured using the *Generalized Anxiety Disorder 7-item scale* (Spitzer et al., 2006).. The scale consists of 7 items (e.g., "Feeling nervous, anxious, or on edge") that assess how often individuals have experienced core symptoms of generalized anxiety over the past two weeks. Participants responded using a 4-point Likert scale ranging from 0 (not

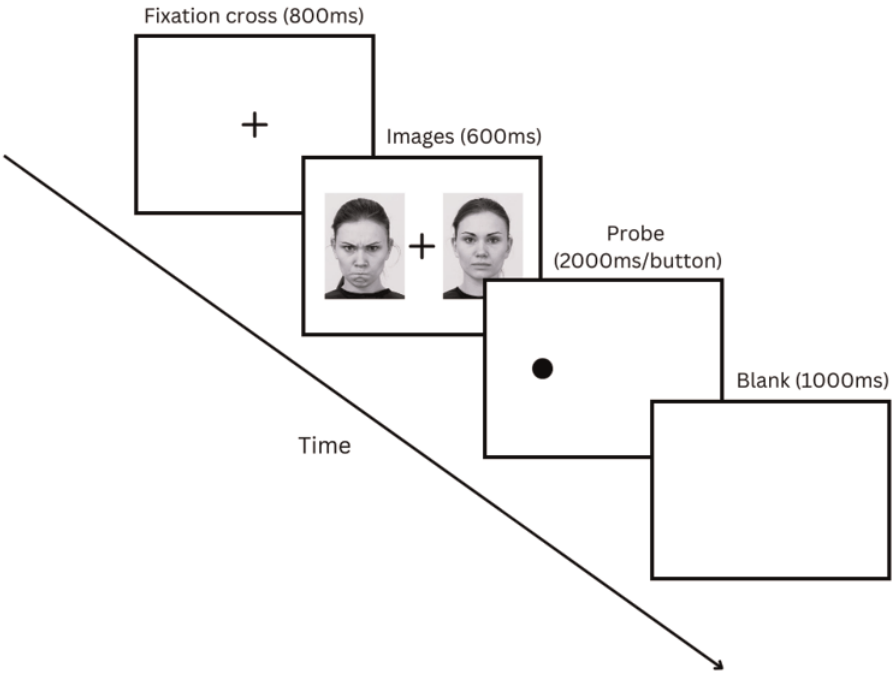

Figure 1. Design of dot-probe task (a congruent trial).

at all) to 3 (nearly every day), with higher total scores indicating greater symptom severity. The GAD-7 has demonstrated excellent psychometric properties, including high internal consistency (α = .92) and good construct validity. In the present study, a back-translated Polish version of the scale was used (α = .83). Anxiety was measured to assess whether it moderated attentional patterns, given its known influence on attentional bias toward threat-related stimuli (Bantin et al., 2016).

The Belief in Unjust Social World Scale. The perception of social injustice was measured using the Belief in Unjust Social World Scale (Baryła & Wojciszke, 2005). This 10-item scale assesses the conviction that the world is fundamentally unjust, virtue goes unrewarded, and misconduct remains unpunished. Participants rated their agreement with statements concerning social inequality, corruption, and unfairness on a 5-point Likert scale ranging from 1 (disagree) to 5 (agree). The scale includes items such as "*Success in life depends more on elbowing one's way through than on merit*" and "*There is no justice in the contemporary world*". Higher scores indicate stronger beliefs that the social world operates in an unjust manner, particularly regarding wealth distribution, punishment avoidance by the privileged, and the devaluation of honest behavior. The scale demonstrated good internal consistency (Cronbach's α = .85 in a nationwide Polish sample collected in 2004) and α = .74 in the current sample. Belief in an unjust social world was measured to assess whether individual differences in social worldview would influence judgments of trustworthiness and susceptibility to manipulation (Zuckerman & Gerbasi, 1977).

Social Desirability Questionnaire. Social desirability was measured using the *Polish Social Desirability Questionnaire* (KAS; Drwal & Wilczyńska, 1995), which is based on the Marlowe-Crowne Social Desirability Scale (1964). The questionnaire consists of 29 items saturated with social approval content, rated on a dichotomous scale (true–false). The total score is the sum of diagnostically relevant responses. In the current study, we used a shortened 16 item version with reliability of α = .69. Social desirability was measured as a potential moderator, given its relevance for self-report measures of gullibility and potential response bias.

Gullibility Scale. Gullibility was measured using a Polish version of the *Gullibility Scale* developed by Teunisse et al. (2020). The scale comprises 14 items measuring two subdimensions: *Persuadability* (e.g., "People think I'm a little naive"; α =.81) and *Insensitivity to cues of untrustworthiness* (e.g., "I'm not that good at reading the signs that someone is trying to manipulate me"; α =.89). Participants rate their agreement with each item on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), with higher scores indicating greater gullibility. The scale has shown good psychometric properties (α = .91). Exploratory factor analysis (EFA) using minimal residuals extraction and Varimax rotation confirmed that those two factors are indeed separate. The K-M-O measure of sampling adequacy was .80, and Bartlett's test of sphericity was significant, $\chi^2(66) = 326.49$, $p < .001$, indicating the data were suitable for factor analysis. *Insensitivity to cues of untrustworthiness* explained 30.94% of the variance while *Persuadability* explained 25.35% of variance, for a total of 56.29% of variance explained. Scale had excellent reliability ($\alpha = .91$).

General trust. We used a translated version of the *General Trust Scale* developed by Yamagishi & Yamagishi (1994). The scale comprises 6 items (e.g., "Most people are basically honest") that assess the extent to which individuals believe others can generally be trusted. Participants rated their agreement with each statement on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating greater levels of general trust. The scale has demonstrated good psychometric properties (α = .84). General trust was measured as a potential moderator of attentional responses to threatening facial expressions.

RESULTS

The analyses were conducted using linear mixed-effects models to predict fixation and reaction time patterns using the *lme4* package (Bates et al., 2015) in *R* (Version 4.4.3; R Core Team, 2024). The specific models are described in detail below (The R code is available as online supplementary material). The *sjPlot* package (Lüdecke, 2024) was used for interaction visualization. As seen in Table 1, we first employed a nested correlational analysis to examine relationships between fixations, reaction times, and psychological variables.

As expected, reaction time was positively correlated with fixation ($r = .43$, $p < .01$), suggesting that longer response times were associated with increased visual engagement. Additionally, belief in an unjust social world showed a moderate positive correlation with generalized anxiety disorder (GAD; $r = .33$, $p < .01$), indicating that individuals who perceive the world as fundamentally unjust may also report more symptoms of anxiety. Social desirability was also positively associated with GAD ($r = .25$, $p < .05$), and negatively associated with general trust ($r = -.28$, $p < .05$). Importantly, the two subscales of gullibility (persuadability and insensitivity) were strongly positively correlated ($r = .91$, $p < .01$). Gullibility persuadability was also negatively associated with fixation ($r = .06$, $p < .05$), implying that more persuadable individuals may avoid visual attention to emotionally salient stimuli. Gullibility insensitivity correlated negatively with general trust ($r = -.29$, $p < .05$) and positively with belief in an unjust world ($r = .63$, $p < .01$).

Next, to investigate the impact of emotional facial expressions and gullibility on fixation duration we employed a linear mixed-effects model (LMM) with condition (angry vs. neutral faces) and two subscales of gullibility (persuadability, and insensitivity subscales), along with their interactions as fixed effects, and with participant ID as a random effect (for within-subject variability). We replicated the very same model separately for reaction times. The data file and R code and codebook

Table 1. Means, standard deviations, Cronbach's alpha and pooled within-person correlations

Variable	*M*	*SD*	α	1	2	3	4	5	6	7	8	9	10
1. reaction time	456.32	106.38											
2. fixation	0.21	0.13		.43**									
3. gender	1.24	0.46		.10	.06								
4. social desirability	3.37	0.54	.69	.02	-.17	.03							
5. generalized anxiety disorder	1.94	0.55	.83	-.14	-.13	.02	.25*						
6. belief in unjust social world	0.48	0.31	.74	-.19	-.10	.07	-.06	.33**					
7. general trust	1.94	2.03	.84	.04	.04	.04	.06	.01	-.28*				
8. gullibility persuadability	1.72	1.60	.81	-.19	-.28*	.04	.09	.18	.06*	-.19			
9. gullibility insensitivity	1.82	1.67	.89	-.11	-.02	-.06	.06	.05	.63**	-.29*	.91**		
10. emotional condition (1=angry, -1= neutral)	-0.01	0.06		-.04	.18	-.10	-.16	-.05	.03	.22	-.12	-.10	

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. **α** represents Cronbach's alpha. * indicates $p < .05$. ** indicates $p < .01$.

needed to reproduce our analysis is available at osf: https://osf.io/2ugmz

(1) fixations ~ 1 + emotion + gullibility_insensitivity + gullibility_persuadability + gullibility_insensitivity + gullibility_persuadability + (1 | participants_ID)

(2) RT ~ 1 + emotion + gullibility + gullibility_persuadability +gullibility +gullibility + (1 | participants_ID)

As presented in Table 2, R^2 values for both models (.447 for fixations and .534 for response time) explain a substantial portion of the variance when accounting for both fixed and random effects. The analysis of attentional patterns (percentage of fixations) yielded a significant main effect of emotional cue (β = -0.01, *SE* = .00, *t* = 2,53 p = .012) indicating that across all participants, there was an avoidance pattern - tendency to for fewer fixations towards angry faces when compared to neutral faces. Also, the main effect of gullibility insensitivity was not significant (β = .022, *SE* = .021, *t* = 1.055, p = .292), and the main effect of gullibility persuadability was significant (β = -0.043, *SE* = .022, *t* = -1.966, p = .049). Notably, the interaction between the emotional cue and persuadability was significant (β = .018, *SE* = .005, *t* = 4.091, $p < .001$). As presented on Figure 2, this interaction indicates that the effect of emotional cues (neutral vs. angry faces) on fixation depends on participants' level of persuadability. Specifically, participants low in persuadability (Mean-1SD) showed decreased fixation from neutral to angry faces, whereas those with high persuadability (Mean+1SD) displayed the opposite pattern with increased fixations toward the angry faces.

The interaction between condition and gullibility insensitivity was also significant (β = -0.014, *SE* = .004, *t* = -3.319, p = .001), indicating that emotional cues on fixation percentage are moderated by participants' level of insensitivity to deception, but the pattern was reversed. Participants with high insensitivity (Mean+1SD) demonstrated decreased fixation toward angry faces compared to neutral faces, while those with low insensitivity showed increased fixation toward angry faces. As insensitivity increases, there is a stronger tendency to avert visual attention from angry faces compared to neutral faces.

For response times (RT), the interaction effects between condition and gullibility insensitivity (β = -2.086, *SE* = 3.031, *t* = -0.688, p = .491) and between condition and gullibility persuasiveness (β = 3.648, *SE* = 3.156, *t* = 1.156, p = .248) were both non-significant. These non-significant t-values indicate that the emotional cue manipulation did not differentially affect response times based on participants' persuadability or insensitivity levels. This suggests that while visual attention patterns (fixation) were influenced by these gullibility subscales, the speed of participants' responses remained unaffected.

We also explored and tested alternative models which include each psychological measure and demographics as a separate covariate. We realized that tested covariates—the belief in unjust social world (p = .199), social desirability (p = .662), anxiety disorder (p = .617), and general trust (p = .811) did not demonstrate statistically significant effects on the model, as signalled by negative BIC improvement values for all variables. Nor did the demographic and confounding factors mascara/makeup use (p = .218), gender (p = .352), nicotine consumption (p = .559), caffeine intake (p = .621). Only participant's handedness emerged as a significant covariate (p = .003), but it provided little improvement of the model's fit (ΔAIC = 1.202, ΔBIC = -4.504) and for the sake of readability, we present the less complex model without this covariate in Table 1 (although we note that handedness plays a role where people fixate, Démuthová & Démuth, 2018; Galambos et al., 2018).

Table 2. Linear Mixed-Effects Models Predicting RT and Fixation

	Reaction Time (ms)				Fixation in %			
Predictors	***Estimates***	***std. Error***	***Statistic***	***p***	***Estimates***	***std. Error***	***Statistic***	***p***
(Intercept)	473.57	18.64	25.41	<0.001	.24	.02	11.29	< .001
Emotional condition (1=angry, -1=neutral)	-4.07	3.12	-1.30	0.193	-.01	.00	-2.53	.012
Gullibility insensitivity	21.28	18.01	1.18	0.237	.02	.02	1.05	.292
Gullibility persuadability	-32.61	18.72	-1.74	0.082	-.04	.02	-1.97	**.049**
Emotional condition × Gullibility insensitivity	-2.09	3.03	-0.69	0.491	-.03	.01	-3.32	**.001**
Emotional condition × Gullibility persuadability	3.65	3.16	1.16	0.248	.02	.00	4.09	**< .001**
Random Effects								
σ^2	9748.44				.02			
$\tau_{00\ Session\_Name\_}$	10704.80				.01			
ICC	0.52				.42			
$N_{\ Session\_Name\_}$	71				71			
Observations	2222				2222			
Marginal R^2 / Conditional R^2	0.030 / 0.537				.046 / .450			
AIC	26947.395				-2168.784			

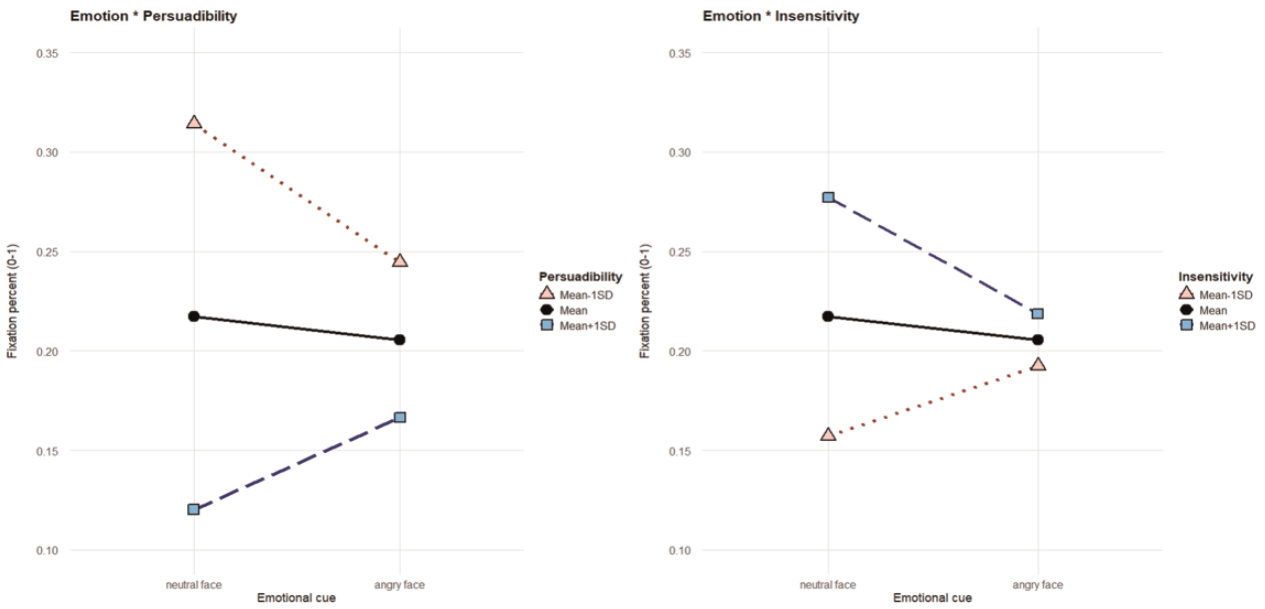

Figure 2. Attentional bias (% of time fixating on a face within each trial) when comparing between emotional cues for participants varying in gullibility levels of persuadability (left) and insensitivity (right).

GENERAL DISCUSSION

Building on Becker and Detweiler-Bedell's (2009) findings that negative facial expressions are rapidly detected but actively avoided, our study sought to extend their findings by examining the relationship between gullibility and attentional responses to emotional facial expressions. Specifically, the research aimed to determine whether gullible individuals differ in how they process threatening cues. It was hypothesized that higher levels of gullibility would be associated with longer fixation durations on angry faces (Hypothesis 1) and slower reaction times during emotional face processing tasks (Hypothesis 2).The results reveal a fundamental divergence in how gullible and non-gullible individuals engage with emotional faces, with gullible individuals showing

attentional responses suggestive of altered processing of social threat. These findings highlight the nuanced interplay between bottom-up, stimulus-driven processes and top-down, trait-based attentional mechanisms.

The two gullibility subscales interact differently with emotional cues for attentional allocation. The significant interactions produced very specific attentional patterns which, coupled with non-significant interactions for response time, suggest that gullibility traits primarily influence where people look rather than how quickly they respond, thereby highlighting potential attentional mechanisms underlying susceptibility to deception.

In line with prior work distinguishing between fixation duration and reaction time, our findings suggest that these two measures reflect different aspects of attentional and cognitive processing. Fixation time indexes the allocation of perceptual attention, revealing where participants direct their gaze and for how long, and, in our study, highlighted gullibility-related differences in sensitivity to social threat cues. In contrast, reaction time captures the speed of executing a behavioral response, integrating both perceptual and decisional processes (Sanders & Van Duren, 1998). This distinction is particularly relevant here - while gullibility traits significantly moderated fixation patterns in response to angry versus neutral faces, they did not influence response latencies. Thus, including both measures is not redundant but rather complementary, as fixation times provide a window into the perceptual mechanisms underlying attentional engagement, whereas reaction times reflect downstream decision-making and motor execution. Insensitivity to signs of untrustworthiness (Yamagishi et al., 1999) appears to operate as an early perceptual bias. Accordingly, the altered fixation times observed in gullible individuals may serve as a reliable indicator of attentional differences, though further research is needed to establish the precise underlying mechanism.

The dynamic interaction between bottom-up and top-down processes helps explain why attention operates differently across individuals (Corbetta & Shulman, 2002). A growing body of research indicates that personality traits can systematically influence how individuals attend to emotionally salient stimuli (Kaspar & König, 2012).

Previous research by Becker and Detweiler-Bedell (2009) demonstrated that negative expressions are analyzed rapidly and influence visual scanning patterns. However, instead of attracting attention, these faces tend to be actively avoided. Our findings are partially consistent with this pattern. While non-gullible participants in our study spent less time fixating on angry faces, gullible individuals showed prolonged fixation on them. This raises the possibility that highly gullible individuals interpret angry expressions differently, perhaps not consistently treating them as signals of potential untrustworthiness. This interpretation aligns with the definition of gullibility proposed by Yamagishi et al. (1999) which characterizes gullibility as an insensitivity to information signalling untrustworthiness. Such insensitivity may reflect a broader tendency to overlook trust-related facial signals, pointing to a distinct pattern of attentional processing and decision-making biases, though this interpretation remains one of several possible accounts of the attentional bias observed.

The observed attentional bias among highly gullible individuals –specifically, their increased fixation on threatening facial expressions – may have important real-world consequences. Rather than instinctively avoiding cues that signal potential danger or manipulation, gullible individuals appear to engage more deeply with them – an attentional pattern that might, under certain circumstances, increase vulnerability to interpersonal exploitation. By focusing on, rather than withdrawing from, threatening or untrustworthy signals, these individuals may be less likely to disengage from manipulative interactions and be more prone to complying with deceptive requests in socially risky contexts. They appear to lack a protective attentional strategy observed in non-gullible individuals. Supporting this interpretation, Teunisse et al. (2020) found that the *insensitivity* gullibility subscale was significantly associated with real-world behavior in judging the trustworthiness of suspicious messages, with higher scores predicting a greater likelihood of responding to scam content. This finding illustrates how reduced sensitivity to social threat cues can manifest as tangible behavioral vulnerability.

The *persuadability* subscale, as conceptualized by Teunisse et al. (2020), captures individuals' self-beliefs about their susceptibility to being manipulated or easily influenced by others. Rather than reflecting actual behaviors, this subscale centers on how people perceive their own vulnerability to persuasion, particularly in situations where they might accept false premises. In the context of our study, this dimension is especially relevant, as individuals who endorse such beliefs may approach social information differently – perhaps with less confidence or critical scrutiny. The significant link between persuadability and attentional allocation suggests that these self-perceptions may shape how individuals engage with emotionally salient cues, especially those with potential persuasive or manipulative intent. Thus, persuadability may serve as a cognitive-affective lens through which certain individuals process social threats, reinforcing patterns that make them more vulnerable to influence.

Our findings can also be better understood by considering the conceptual distinction between the two gullibility dimensions. *Persuadability* reflects a tendency to readily accept others' influence and arguments, whereas *insensitivity* refers to a reduced ability to detect and respond to cues of untrustworthiness. Although both dimensions contribute to overall gullibility, they are grounded in distinct mechanisms of vulnerability. This distinction helps explain why they interacted differently with attentional measures in our study: persuadability may relate more strongly to openness toward social manipulation and thus greater attentional engagement, whereas insensitivity may reflect a lack of protective detection mechanisms in response to potential social threat. By recognizing these separable pathways, the seemingly ambiguous pattern of fixation results becomes theoreti-

cally interpretable and aligns with the dual-structure conceptualization of gullibility.

There are also alternative theoretical frameworks that may explain the attentional differences obtained in our study. Angry faces are perceived as social threat signals associated with dominance and fear induction (Öhman & Mineka, 2001). Such stimuli can trigger automatic responses similar to the freeze reaction seen in animals when faced with a potential threat (Roelofs, Hagenaars, & Stins, 2010). Studies show that untrustworthy faces tend to provoke avoidance behaviors but also induce heightened vigilance and freezing behavior (Lischke et al., 2018). Thus, the prolonged gaze directed at angry faces by gullible individuals may not reflect heightened sensitivity but rather a defensive mechanism, where an instinctive freeze response enhances attentional focus instead of facilitating avoidance, as observed in non-gullible individuals.

Another alternative theoretical framework is based on the main findings of Stewart et al. (2012) which demonstrated that social evaluation of faces along the dimensions of trustworthiness and dominance occurs at a preconscious level. Dominant and untrustworthy faces took significantly longer to emerge into conscious perception compared to neutral faces. Researchers interpret this effect as a passive fear or threat response, slowing visual processing of socially threatening faces. Referring to our findings, the prolonged fixation on angry faces by gullible individuals may reflect a heightened unconscious sensitivity or threat response to socially negative cues. On the other hand, non-gullible individuals may unconsciously avoid such threatening stimuli, leading to shorter fixation times.

Another potential explanation for this mechanism is social information seeking. Prolonged fixation on angry faces may reflect an adaptive effort to gather additional cues needed to interpret others' intentions and guide appropriate responses, rather than a maladaptive hypervigilance to threat (Capriola-Hall et al., 2021). This perspective is particularly relevant for gullible individuals, who may compensate for subtle difficulties in detecting untrustworthiness by engaging more deeply with socially salient signals. The information-seeking interpretation gains further credibility when considering that angry faces convey rich social meaning beyond their immediate threat value, including dominance, relational dynamics, and behavioral predictability. Thus, extended fixations may represent a compensatory strategy to reduce uncertainty in social interactions.

LIMITATIONS

A limitation of the present study is the use of psychology students as "WEIRD participants" (Western, Educated, Industrialized, Rich, and Democratic; Henrich et al., 2010), representing a narrow segment of the population and limiting generalizability. Additionally, the sample was predominantly female, which may introduce gender-specific biases. Future research should aim for more diverse and gender-balanced samples to enhance both internal and external validity.

Also, research by Grady et al. (2007) highlights significant age-related differences in how attentional focus on faces and information processing are managed. Older adults demonstrate different patterns of brain activity and attentional engagement, specifically increased prefrontal cortex activation and altered sensitivity to facial features, which can affect their perception and memory of faces differently than younger individuals (Grady et al., 2007). Given that our sample consists primarily of young adults, it is possible that the results are influenced by age-related differences in attentional focus and information processing, which should be considered when interpreting the generalizability of the results.

Relatedly, Mattavelli et al. (2022) highlighted that context plays a significant role in face perception, particularly in forming trustworthiness judgments. Their research showed that faces presented in threatening or emotionally charged contexts are more likely to be judged as untrustworthy compared to faces shown in neutral or positive contexts. These findings suggest that contextual cues can alter social evaluations and influence behavioral decisions, such as whether to initiate approach or avoidance. Faces presented in our study were devoid of contextual cues, which may limit the ecological validity of trustworthiness judgments made by participants, because real-life interactions involve integrating both facial and contextual signals.

Additionally, our use of two linear mixed-effects models (one predicting fixation duration and one predicting reaction time) combined with testing multiple predictors and their interactions raises the possibility of an inflated Type I error rate. To address this concern, we also applied False Discovery Rate correction (Benjamini & Hochberg, 1995) across all fixed effects tests from both models (n = 10 tests, $\alpha = .05$). After FDR correction, three effects in the fixation model remained statistically significant: the main effect of emotional condition ($p\_FDR = .038$), the interaction between emotional condition and gullibility insensitivity ($p\_FDR = .005$), and the interaction between emotional condition and persuadability ($p\_FDR < .001$). These signals that the findings are robust and support our core hypothesis that gullibility dimensions systematically moderate attentional engagement with threatening facial expressions. Complete FDR correction analysis code for the corrected models are available in the online supplementary materials (OSF: https://osf.io/2ugmz). In contrast, none of the effects in the reaction time model survived FDR correction, reinforcing our interpretation that gullibility traits primarily influence where people look rather than how quickly they respond. The main effect of persuadability on fixation, which showed marginal significance at the uncorrected level ($p = .053$), did not survive FDR correction ($p\_FDR = .133$) and should be interpreted as an exploratory pattern requiring replication.

Although we applied p-value corrections due to the exploratory scope of our analyses, we acknowledge that

this limitation requires careful interpretation. Rather than definitive evidence, our findings should therefore be viewed as preliminary, highlighting patterns that warrant replication and further investigation in larger samples. Additionally, readers should interpret marginally significant results with appropriate caution given the multiple tests performed. Future work should explicitly address error rate control, ensuring that observed effects reflect robust attentional mechanisms linked to gullibility rather than noise fluctuations.

Future directions

Future research should address the limitations of the current study by employing more diverse and representative samples. Including participants from various academic disciplines, age groups, and cultural contexts would provide a broader understanding of how gullibility and attentional mechanisms function across populations (Henrich et al., 2010). Moreover, balancing the gender composition of future samples is essential for testing whether gullibility interacts with sex in shaping attentional processes. A more even gender distribution would enhance the internal validity of the findings.

Based on the conclusions of Mattavelli et al. (2022), future studies should prioritize incorporating contextual cues when forming trustworthiness judgments based on face perception. Their research emphasizes that, especially under conditions of threat, context influences how faces are perceived and evaluated. In our study, faces were presented without contextual information which may limit the ecological validity and depth of trustworthiness assessments. Therefore, integrating multimodal context cues alongside facial stimuli will help create a more accurate understanding of the factors that influence individuals' assessments of trustworthiness.

Conclusions

In summary, our study demonstrates preliminary evidence that gullibility is associated with altered attentional responses to emotional facial expressions. While non-gullible individuals showed a typical pattern of avoidance toward angry faces, gullible individuals displayed prolonged fixation on them. This pattern may suggest that gullible individuals may be less sensitive to cues of untrustworthiness, typically conveyed by negative emotional expressions. Our findings support the view of gullibility as an insensitivity to deceit-related signals and demonstrate how personality traits can shape attentional allocation to emotional stimuli. These results contribute to a broader understanding of attentional mechanisms in social cognition, offering new insight into both the predictors and consequences of being gullible.

ACKNOWLEDGEMENTS

We are sincerely grateful to Kamil Izydorczak, Bogdan Wojciszke and one anonymous reviewer for their helpful comments on previous versions of this manuscript.

We have no known conflict of interest to disclose.

Correspondence concerning this article should be addressed to Michał Parzuchowski, Center for Research on Cognition and Behavior, Department of Psychology, SWPS University, Sopot, Poland | mparzuchowski@swps.edu.pl

REFERENCES

Bantin, T., Stevens, S., Gerlach, A. L., & Hermann, C. (2016). What does the facial dot-probe task tell us about attentional processes in social anxiety? A systematic review. *Journal of Behavior Therapy and Experimental Psychiatry*, *50*, 40–51. https://doi.org/10.1016/j.jbtep.2015.04.009

Baryła, W., & Wojciszke, B. (2005). Kwestionariusz Ruminacji. *Studia Psychologiczne*, *43*(4), 5–22.

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting Linear Mixed-Effects Models Using lme4. *Journal of Statistical Software*, *67*(1). https://doi.org/10.18637/jss.v067.i01

Baumert, A., Hangartner, M., Gollwitzer, M., & Schmitt, M. J. (2007). Attentional processes guided by justice sensitivity: Evidence from a modified Stroop task. *European Journal of Personality, 21*(5), 467–482. https://doi.org/10.1002/per.629

Becker, M. W., & Detweiler-Bedell, B. (2009). Short article: Early detection and avoidance of threatening faces during passive viewing. *Quarterly Journal of Experimental Psychology*, *62*(7), 1257–1264. https://doi.org/10.1080/17470210902725753

Benjamini, Y., Hochberg, Y. (1995). Controlling the False Discovery Rate: A Practical and Powerful Approach to Multiple Testing. *Journal of the Royal Statistical Society Series B: Statistical Methodology*, 57(1), 289-300. https://doi.org/10.1111/j.2517-6161.1995.tb02031.x

Capriola-Hall, N. N., Ollendick, T. H., & White, S. W. (2021). Attention Deployment to the Eye Region of Emotional Faces among Adolescents with and without Social Anxiety Disorder. *Cognitive Therapy and Research*, *45*(3), 456–467. https://doi.org/10.1007/s10608-020-10169-2

Corbetta, M., & Shulman, G. L. (2002). Control of goal-directed and stimulus-driven attention in the brain. *Nature Reviews Neuroscience*, *3*(3), 201–215. https://doi.org/10.1038/nrn755

Démuthová, S., & Démuth, A. (2018). Handedness and the Preference of the Visual Field in Face Perception. *European Scientific Journal*. https://doi.org/10.19044/esj.2018.c3p8

Ellingsen, E. F., Drevsjø, S., Volden, F., & Watten, R. G. (2019). Extraversion and focus of attention on facial emotions: An experimental eye-tracking study. *Current Issues in Personality Psychology*, *7*(2), 91–97. https://doi.org/10.5114/cipp.2019.85413

Engell, A. D., Todorov, A., & Haxby, J. V. (2010). Common Neural Mechanisms for the Evaluation of Facial Trustworthiness and Emotional Expressions as Revealed by Behavioral Adaptation. *Perception*, *39*(7), 931–941. https://doi.org/10.1068/p6633

Faul, F., Erdfelder, E., Buchner, A., Lang, A. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*(4), 1149-1160. https://doi.org/10.3758/brm.41.4.1149.

Galambos, Á., Turcsán, B., Oláh, K., Elekes, F., Gergely, A., Király, I., & Topál, J. (2018). Visual Fixation Patterns During Viewing of Half-Face Stimuli in Adults: An Eye-Tracking Study. *Frontiers in Psychology*, *9*, 2478. https://doi.org/10.3389/fpsyg.2018.02478

George, M. S., Teunisse, A. K., & Case, T. I. (2020). Gotcha! Behavioural validation of the Gullibility Scale. *Personality and Individual Differences*, *162*, 110034. https://doi.org/10.1016/j.paid.2020.110034

Grady, C. L., Hongwanishkul, D., Keightley, M., Lee, W., & Hasher, L. (2007). The effect of age on memory for emotional faces. *Neuropsychology, 21*(3), 371–380. https://doi.org/10.1037/0894-4105.21.3.371

Grieve, R., & Mahar, D. (2013). Can social intelligence be measured? Psychometric properties of the Tromsø Social Intelligence Scale –

English Version. *The Irish Journal of Psychology*, *34*(1), 1–12. https://doi.org/10.1080/03033910.2012.737758

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences, 33*(2–3), 61–83. https://doi.org/10.1017/S0140525X0999152X

Kaminska, O., & Foulsham, T. (2016). Understanding sources of social desirability bias in different modes: Evidence from eye-tracking. *Sociological Methods & Research, 45*(2), 301–338. https://doi.org/10.1177/0049124115626179

Kaspar, K., & König, P. (2012). Emotions and personality traits as high-level factors in visual attention: A review. *Frontiers in Human Neuroscience*, *6*. https://doi.org/10.3389/fnhum.2012.00321

Katsuki, F., & Constantinidis, C. (2014). Bottom-Up and Top-Down Attention: Different Processes and Overlapping Neural Systems. *The Neuroscientist*, *20*(5), 509–521. https://doi.org/10.1177/1073858413514136

Lischke, A., Junge, M., Hamm, A. O., & Weymar, M. (2018). Enhanced processing of untrustworthiness in natural faces with neutral expressions. *Emotion*, *18*(2), 181–189. https://doi.org/10.1037/emo0000318

Mattavelli, S., Masi, M., & Brambilla, M. (2022). Untrusted under threat: on the superior bond between trustworthiness and threat in face-context integration. *Cognition and Emotion*, *36*(7), 1273–1286. https://doi.org/10.1080/02699931.2022.2103100

Nicolet-dit-Félix, M., Gillioz, C., Mortillaro, M., Sander, D., & Fiori, M. (2023). Emotional intelligence and attentional bias to emotional faces: Evidence of hypersensitivity towards emotion information. *Personality and Individual Differences*, *201*, 111917. https://doi.org/10.1016/j.paid.2022.111917

Öhman, A., Flykt, A., & Esteves, F. (2001). Emotion drives attention: Detecting the snake in the grass. *Journal of Experimental Psychology: General*, *130*(3), 466–478. https://doi.org/10.1037/0096-3445.130.3.466

Olszanowski, M., Pochwatko, G., Kuklinski, K., Scibor-Rylski, M., Lewinski, P., & Ohme, R. K. (2015). Warsaw set of emotional facial expression pictures: A validation study of facial display photographs. *Frontiers in Psychology*, *5*. https://doi.org/10.3389/fpsyg.2014.01516

Oosterhof, N. N., & Todorov, A. (2008). The functional basis of face evaluation. *Proceedings of the National Academy of Sciences, 105* (32), 11087–11092. https://doi.org/10.1073/pnas.0805664105

Oosterhof, N. N., & Todorov, A. (2009). Shared perceptual basis of emotional expressions and trustworthiness impressions from faces. *Emotion*, *9*(1), 128–133. https://doi.org/10.1037/a0014520

Papapicco, C., Lamanna, I., & D'Errico, F. (2022). Adolescents' Vulnerability to Fake News and to Racial Hoaxes: A Qualitative Analysis on Italian Sample. *Multimodal Technologies and Interaction*, *6*(3), 20. https://doi.org/10.3390/mti6030020

Peléšková, Š., Polák, J., Janovcová, M., Chomik, A., Sedláčková, K., Frynta, D., & Landová, E. (2024). Human emotional evaluation of ancestral and modern threats. *Frontiers in Psychology, 15*, 1321053. https://doi.org/10.3389/fpsyg.2023.1321053

Rauthmann, J. F., Seubert, C. T., Sachse, P., & Furtner, M. R. (2012). Eyes as windows to the soul: Gazing behavior is related to personality. *Journal of Research in Personality*, *46*(2), 147–156. https://doi.org/10.1016/j.jrp.2011.12.010

Sakuta, Y., Kanazawa, S., & Yamaguchi, M. K. (2018). Infants prefer a trustworthy person: An early sign of social cognition in infants. *PLOS ONE*, *13*(9), e0203541. https://doi.org/10.1371/journal.pone.0203541

Sanders, A. F., & Van Duren, L. L. (1998). Stimulus control of visual fixation duration in a single saccade paradigm. *Acta Psychologica*, *99*(2), 163–176. https://doi.org/10.1016/S0001-6918(98)00009-2

Schupp, H. T., Öhman, A., Junghöfer, M., Weike, A. I., Stockburger, J., & Hamm, A. O. (2004). The facilitated processing of threatening faces: An ERP analysis. *Emotion, 4*(2), 189–200. https://doi.org/10.1037/1528-3542.4.2.189

Shore, D. M., & Heerey, E. A. (2013). Do social utility judgments influence attentional processing?. *Cognition*, *129*(1), 114–122. https://doi.org/10.1016/j.cognition.2013.06.011

Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Löwe, B. (2006). A Brief Measure for Assessing Generalized Anxiety Disorder: The GAD-7. *Archives of Internal Medicine*, *166*(10), 1092. https://doi.org/10.1001/archinte.166.10.1092

Stewart, L. H., Ajina, S., Getov, S., Bahrami, B., Todorov, A., & Rees, G. (2012). Unconscious evaluation of faces on social dimensions. *Journal of Experimental Psychology: General, 141*(4), 715–727. https://doi.org/10.1037/a0027950

Takao, S., & Ariga, A. (2016). General trust is correlated with attentional orientation triggered by gaze direction. *Letters on Evolutionary Behavioral Science, 7*(2), 15–18. https://doi.org/10.5178/lebs.2016.48

Teunisse, A. K., Case, T. I., Fitness, J., & Sweller, N. (2020). I Should Have Known Better: Development of a Self-Report Measure of Gullibility. *Personality and Social Psychology Bulletin*, *46*(3), 408–423. https://doi.org/10.1177/0146167219858641

Todorov, A. (2008). Evaluating faces on social dimensions. *Social Cognitive and Affective Neuroscience, 3*(2), 119–127. https://doi.org/10.1093/scan/nsn010

Todorov, A., Said, C. P., Engell, A. D., & Oosterhof, N. N. (2008). Understanding evaluation of faces on social dimensions. *Trends in Cognitive Sciences, 12*(12), 455–460. https://doi.org/10.1016/j.tics.2008.10.001

Willis, J., & Todorov, A. (2006). First Impressions: Making Up Your Mind After a 100-Ms Exposure to a Face. *Psychological Science*, *17*(7), 592–598. https://doi.org/10.1111/j.1467-9280.2006.01750.x

Yamagishi, T., Kikuchi, M., & Kosugi, M. (1999). Trust, Gullibility, and Social Intelligence. *Asian Journal of Social Psychology*, *2*(1), 145–161. https://doi.org/10.1111/1467-839X.00030

Yamagishi, T., & Yamagishi, M. (1994). Trust and commitment in the United States and Japan. *Motivation and Emotion*, *18*(2), 129–166. https://doi.org/10.1007/BF02249397

Zuckerman, M., & Gerbasi, K. C. (1977). Belief in a just world and trust. *Journal of Research in Personality*, 11(3), 306–317. https://doi.org/10.1016/0092-6566(77)90039-3