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The Effect of Facial Expression Recognition & Autistic Traits on the Recognition of the Emotional Content of Body Postures

Athierah Nisa Binti Amat Jafri[1]

[1] Cardiff University, United Kingdom

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Autistic-related traits are often associated with a reduced ability to integrate visual stimuli with other sensory information, leading to challenges in processing and responding to the environment. Based on previous literature, it is known that during emotion recognition processes, body posture influences facial expression processing. However, there is little research on the opposite effect. Therefore, this study investigates if facial expression stimuli have an effect on body posture stimuli processing with regard to recognition of emotional expression in the neurotypical population. 70 participants took part in the study. They were required to complete a perceptual task and the Autism Spectrum Quotient (AQ-50) questionnaire. Firstly, this study hypothesised the recognition of emotion through facial expression stimuli has an effect on the body as a contextual cue. Secondly, this study also hypothesised a negative correlation between the AQ-50 scores of neurotypical university students and the influence of facial expressions on the recognition of the emotional content of body postures. The study's result suggests there is a perceptual bias of facial expression on the interpretation of the emotional states conveyed by body posture. However, no significant relationship was found between autistic traits (measured by an AQ-50 score) and the influence of facial expression on judgement of body posture (measured via point of subjective equality; PSE) shift.

INTRODUCTION

Emotion recognition

Humans often convey their emotion in a social context through language, vocal and facial expression. Emotion recognition can be defined as the attribution of emotional states obtained from visual and nonverbal cues (Bänziger, 2014). Emotion recognition serves a variety of functions including allowing mutual understanding and trust in a social setting (Elfenbein & Ambady, 2002). Nonverbal signals can be obtained from expressions on a person's face, and gestures when communicating. Suslow et al. (2020) concluded that facial expressions contain many emotional cues that can reflect mental states. According to Song (2021), language, vocal expression, and facial expression contributed 7%, 38%, and 55% respectively, of information during emotion processing. This shows that non-linguistic cues are significantly more effective than linguistic cues in conveying information. To understand how emotional cues are communicated, we must first understand how emotion is perceived.

Context-dependency of emotion recognition

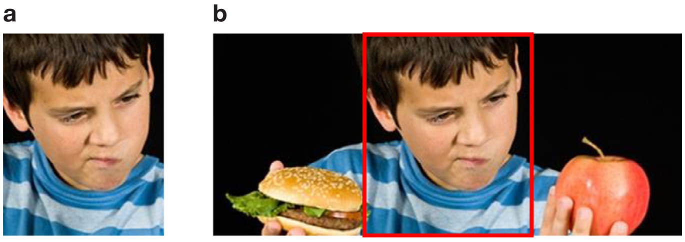
There are several processes involved in emotion recognition. Adolphs (2002) outlined different parts of the brain that were activated when emotion is perceived, and each brain part processes different functions in their role in emotion perception. For example, the fusiform face area (FFA) is activated as it recognises the face of a subject, the superior temporal sulcus (STC) is activated in response to eye gaze (Adolphs, 2002), and the amygdala plays a role as a danger detector or a socio-emotional processing submodule (Zalla & Sperduti, 2013). All of these functions have direct or indirect roles in early visual processing to perceive emotion. Early visual processing involves global and local aspects. Typically, information is processed through global processing as it is more automatic and schematic, while local processing requires more effort. In emotion recognition, it is important to understand and integrate all emotional cues such as facial expression and body posture.

Research shows it is difficult to perceive emotion solely depending on facial expression or body context in isolation. For example, in Wang et al. (2022), when participants were shown the same facial expression in different contexts, different emotions were categorised by the observer. In **Figure 1a**, the facial expression that is shown by Wang et al. (2022) can be perceived as vague, and thus categorised as either anger or confusion; however, when the stimulus is paired with a bodily context, where one hand is holding an apple and the other is holding a hamburger (**Figure 1b**), then it becomes obvious to say that the expression conveyed is one of confusion. In **Figure 1b**, the shoulder also plays a role as an environmental cue to categorise the emotion.

This argument is supported by findings in Hassin et al. (2013), where body posture has a strong influence on facial expression in recognising emotion. They argue that configurations of facial muscles are ambiguous and emphasise that context not only modifies but can lead to radical categorical changes in emotion perception. The influence of body posture is an automatic process in perceiving emotion (Brewer et al., 2017). This outlined that the global processing style is performed when emotional cues were perceived; however, this challenges the traditional idea that emotions can be directly read from facial muscle configurations (Nakamura et al., 1990). This paper also suggested that emotion categorisation is more complex and context-dependent than previously assumed.

Figure 1

The illustration of facial expression in emotion recognition



Note. This figure is obtained from Wang et al. (2022).

The discussion about the confusability effect implies that similar facial expressions may be easily influenced by contextual cues. Processing the facial features is an important aspect of emotion recognition however it is not always sufficient to generate information about what emotion is conveyed.

However, under certain circumstances, local processing will take place. Local processing is more detail-oriented, where a specific detail of a stimulus is focused on rather than the whole stimulus. People with autism spectrum disorder (ASD) demonstrate more local processing styles compared to the neurotypical population (Happé, 1999). Happé (1999) also outlines that people with ASD neurotypically show greater attention to detail compared to the neurotypical population. They tend to employ a bottom-up strategy where individual cues are perceived to create a whole perspective. The bottom-up strategy indicates that the processing starts from the basic sensory data and progresses upward through the brain's neural pathways. People with ASD may experience sensory overload, which can interfere with the ability to process and interpret emotional cues in a social context (McRae et al., 2011). Bottom-up processing involves directing attention to salient social cues in the environment. People with ASD may have a limited social attention span, focusing more on local specific details or objects rather than the global broader social context, which can affect their ability to pick up on emotional cues from others (McPartland et al., 2010). Consequently, this often causes delays in social communication.

Autistic traits in neurotypical populations

In the typical population, people with autistic-related traits are distributed on a continuum, where ASD represents the extreme end of this range (Koolschijn et al., 2015). The main autistic-related traits that have been usually observed are deficits in social behaviour and communication (McPartland et al., 2010). As long as the traits do not disrupt ordinary mental and physical function, they will be considered subclinical.

According to the latest edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-5), this impairment is caused by poor integration between eye contact and body gesture resulting in a lack of awareness of facial expressions (American Psychiatric Association, 2022). Individuals with ASD were found to be less likely to look at faces in social scenes, making emotion recognition difficult (Riby & Hancock, 2008). Previous research also found that people with ASD showed a reduced preference in attending to global properties (Koldewyn et al., 2013). Global processing plays a role in social cognition, including understanding social cues and intentions. When global processing is reduced, individuals may have difficulty integrating complex social cues, such as eye contact and body gestures. Individuals may pay more attention to local details, such as specific body gestures or facial expressions, rather than integrating these cues with the broader context of eye contact.

However, McKenzie et al. (2018) replicated the study with 256 participants (75 males, 117 females, 5 bi-gender/transgender, 59 did not respond). They studied the relationship between autistic-related traits, measured using AQ–50 score (Baron-Cohen et al., 2001), and Emotion Recognition (ER) task variables. During the ER task, participants were presented with a list of emotions depicted in photographs. Participants were required to name the emotion depicted to respond to each question

Figure 2

Facial expression of one male identity presented in face-only condition

Note. (**a**) indicating 100% angry facial expression and (**b**) indicating 100% disgust facial expression from the NimStim (Tottenham et al., 2009).

as "happy", "sad", "worried", "afraid", "angry", "surprised", "disgusted", "bored", or "neutral". McKenzie et al. (2018) found that participants with higher autistic-related trait scores were associated with reduced accuracy in general ER tasks; however, while the overall AQ-50 score was associated with ER performance, the AQ-50 score was not associated with processing style, and processing style was not associated with ER performance.

This lack of association however could have resulted from the study conditions, under which there is no time limit given while performing the ER task. This could allow individuals with ASD or high autistic-related traits to switch from local to global processing. Further research has compared the nature of processing style or emotion recognition with and without time limits using both static and dynamic stimuli. Besides, more females than male participants took part in this study. In the general population, females are known to perform better in emotion recognition tasks compared to males (Kret & de Gelder, 2012). Therefore, a higher sample size of male participants in further research may have increased the power to identify if the effects are varied by sex. Specifically, the study shows people with autistic-related traits are associated with poor emotion recognition in the general population, not just in individuals who have been diagnosed with ASD.

Shortcomings in emotion recognition

Recent studies address the role of body posture as a contextual cue in emotion recognition (Brewer et al., 2017; Buisine et al., 2014). There are some studies (Adolphs, 2002; Bänziger, 2014) focused on how facial expression influences emotion recognition; however, these studies often neglect further contextual factors such as posture, movement, speech, and environment, leading to debate about their validity. Previous researchers (Teufel et al., 2019; Brewer et al., 2017) found that emotion recognition is context-dependent and often involves holistic processing, but there are not many results that directly address the role of facial expression as the contextual cue in emotion recognition. A study by de Gelder et al. (2006) showed that facial expression is a salient contextual clue and is not standalone in its importance. Facial expression usually occurs within a context of head and body orientations, body movements, posture changes, and other object-related actions with similar meanings. The author suggested that cues from the environment or context in which a facial expression occurs may directly relate to the displayed emotion. For example, a frightened face might be accompanied by corresponding withdrawal movements of the head and shoulders when confronted with external danger. Therefore, this study is particularly interested in exploring if there is a relationship between facial expression as contextual cues within the context of emotional recognition.

This study is also interested in measuring emotion recognition in people with autistic traits. Brewer et al. (2017) carried out several studies focusing on how the body as a contextual cue influences the recognition

PSYCHOLOGY

Figure 3

Body posture of one male identity presented in body-only condition

Note. Body postures drawn from a morph continuum blending angry and disgust emotions in 10% increments using FantaMorph Pro (Version 5).

of emotions in facial stimuli among people with and without ASD. The researchers aimed to investigate whether individuals with ASD, who are thought to have difficulties integrating information from different visual regions, exhibit diminished integration of emotion cues from faces and bodies. The result from the study shows the reverse of the proposed hypothesis. Individuals with ASD show typical integration of emotion cues from the face and body. Brewer et al. (2017) concluded that the body as a contextual cue in emotion recognition has influence on facial expression recognition in ASD, despite the use of local processing in such individuals. Therefore, in accordance with Brewer et al. (2017), I would like to explore the emotion recognition of individuals with high and low autistic traits within the neurotypical population and reach more general conclusions on the importance of facial stimuli as a contextual cue.

Aim of this study

This study investigates the relationship between autistic-related traits and emotion recognition in neurotypical university students. The aim of this study is to investigate if facial expression stimuli have an effect on body posture stimuli processing with regard to recognition of emotional expression in individuals with a broad range of autistic traits in the neurotypical population. This study hypothesised that **1)** facial expression stimuli have an effect on body posture. Specifically, we predict that an angry facial expression will lead to the recognition of anger regardless of when a participant is presented with an angry or disgusted body posture. And **2)**, the influence of facial expression on body posture in emotion recognition is correlated with autistic traits in the neurotypical population.

METHODS

Participants

Seventy undergraduate students (59 females, 11 males) at the School of Psychology from Cardiff University ranging in age from 18 and 23 years old (M = 19.74, SD = 2.62) voluntarily participated in this experiment. The participants were recruited online through Experimental Management System (EMS): an online tool that allows undergraduate students to volunteer to sign up and participate in experiments for course credit. They were granted research credits as compensation for their participation. All participants gave their digital informed consent via Qualtrics before the experiment took place. The study was approved by the School Research Ethics Committee (SREC).

Apparatus/materials

The study was conducted online through a Qualtrics survey (https://www.qualtrics.com). Participants in this research were required to complete perceptual tasks, as well as a questionnaire assessing ASD traits. In the perceptual task, participants were shown facial and bodily expression stimuli. This was used to measure how adept the participants were at discriminating emotion on the basis of different contextual information. The perceptual task stimuli were presented in Psychopy v2022.2.5 (Version 3.8; Peirce et al., 2019) and online through Pavlovia, on the participants' screen one at a time. The questionnaire task assessed ASD-related traits. The ASD-related traits were measured using the Autism-Spectrum Quotient (AQ-50; Baron-Cohen et al., 2001). The experiments were all conducted on laptop or PC.

Methodological overview

This study assessed participants' ability to distinguish between two basic emotions, anger and disgust, using a morph continuum. These emotions were selected because they both exhibit high arousal and negative valence. By measuring these emotions within the same quadrant, the study explores how context and situational factors influence their perception and processing. High arousal emotions, which involve heightened physiological responses and increased attention, can blur the distinctions between different emotions within this category. Additionally, emotions with similar negative valence can be more easily confused due to their shared unpleasant tone. In real-life situations, emotions are often experienced as blends rather than in isolation. Thus, high arousal and negative valence emotions may be interpreted interchangeably due to their overlapping characteristics. Participants were also given Autism Spectrum Quotient 50 items (AQ-50) to measure the level of autistic traits. The AQ-50 score will aid to find the correlation between the influence of facial expression on emotion recognition and the autistic traits.

Perceptual task

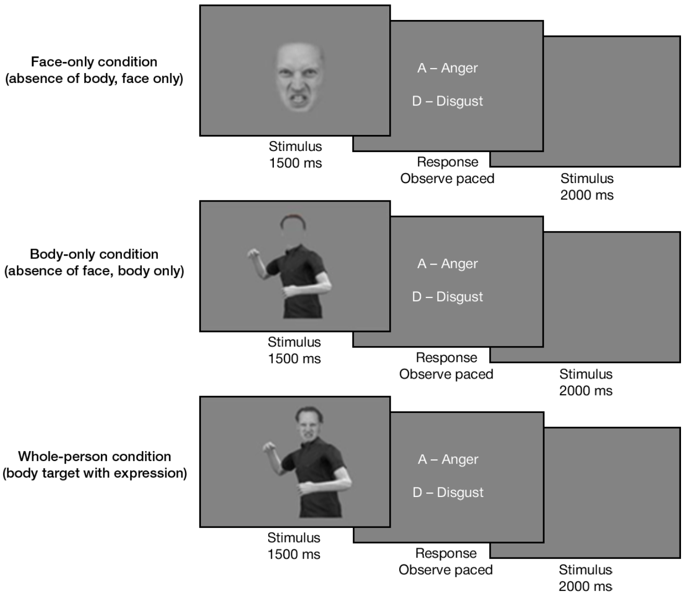
In the perceptual task, there were 3 tasks: the face-only condition task, body-only condition task, and whole-person condition task. In the face-only condition task, there were four white male identities displaying both disgust and angry facial expression from the NimStim, a series of photographs depicting actors portraying various facial expressions representing basic emotions such as happiness, sadness, anger, fear, disgust, and surprise (Tottenham et al., 2009) for eight trials in random order. Radboud Faces Database (Langner et al., 2010) were used to validate and generate the stimuli. The images of the face stimuli were presented in oval, greyscale images of faces with the absence of external information such as ears and hairs (**Figure 2**). In this task, only facial expressions of 100% anger and 100% disgust from the NimStim database were displayed in the absence of a body posture. The value corresponds to the intensity of the morph range. After the participants were shown the stimulus for 1500 ms, a response page then appeared. Participants were required to press either the "A" key on their keyboard indicating anger or the "D" key for disgust within 2000 ms or the page will show the next stimulus. This task acted as a baseline and helped to provide a measure of the facial expression recognition ability of participants.

Next, for the body-only condition, the body posture morphs were weighted averages of two motion-captured 3D body avatars expressing anger and disgust. The visualisation was carried out in the Unity 3D game engine. There were four body identities with different clothing and slightly different postures. The body morphs changed in 10% increments therefore there were a total of nine morph levels (10–90%). This morphing corresponds to the intensity of the emotion. The morphing between 100% angry and disgusted body posture from the continuum was carried out using FantaMorph Pro (Version 5). The images of the body postures were presented in grayscale with an oval window covering the facial expression (**Figure 3**). Other elements such as hair, ears and neck remained visible. Participants were required to press the "A" key for anger or the "D" key for disgust on their keyboard within 2000 ms. This task provides a measure of body posture recognition ability. There were 108 trials in face-only and body-only conditions.

In the last perceptual task, the whole-person condition presented stimuli including face and body posture. The 100% angry or fully disgusted face and the body posture obtained from the morph continuum were merged as a whole-person stimulus. Participants were required to press the "A" key for anger or "D" key for disgust on their keyboard once the stimulus was presented. Participants were required to respond

Figure 4

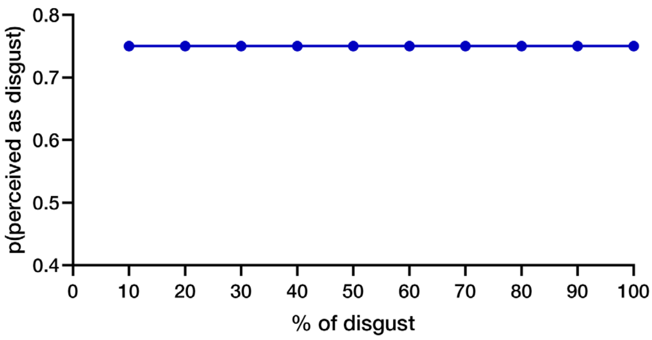
Three perceptual tasks on one emotion identity



Note. All tasks are counterbalanced between participants.

Figure 5

Three perceptual tasks on one emotion identity



Note. An example of the slope shape that serves as the exclusion cut-off point was obtained from Psychopy v2022.2.5 (Version 3.8).

to the option within 2000 ms before the next stimulus appeared. These stimuli were generated in GIMP (GNU Image Manipulation Program, Version 2.10). All of the stimuli were presented as grayscale images on a grey background (**Figure 4**). All tasks are counterbalanced between participants to minimise the influence of other extraneous factors such as practice or fatigue on the experimental results. There were 216 trials in the whole-person condition where 108 trials came from body posture morph on a 100% angry face and 108 trials from body posture morph on a 100% disgusted face.

Questionnaire task

Participants were required to complete Autism-Spectrum Quotient 50 questions (AQ-50; Baron-Cohen et al., 2001). AQ-50 was used to measure the autistic traits in a neurotypical population. The higher the AQ-50 score, the more ASD traits. People with ASD have higher scores compared to the neurotypical population (Brewer et al., 2017). The exclusion cut-off point depends on the shape of the plots and the PSE slope value generated from Psychopy v2022.2.5 (Version 3.8; Peirce et al., 2019, see **Figure 5**). Participants with extreme PSE value compared to the others were excluded from the analysis. AQ-50 is a self-report questionnaire measuring five domains: Attention to detail, Attention switching, Communication, Imagination and Social skills. 24 items were normally scored (1 = Definitely Agree, Slightly Agree and 0 = Slightly Disagree, Definitely Disagree) with "agree" indicating the highest concordance with an autistic trait, and 26 were reverse-scored items (1 = Slightly Disagree, Definitely Disagree and 0 = Definitely Agree, Slightly Agree). All items were required to be answered before moving on to the debrief form.

Procedure

After giving online consent to participate via Qualtrics participants were automatically directed to Pavlovia (https://run.pavlovia.org/evondemhagen/fb-bm_e1/html) to start the perceptual task. Before starting the task participants read the instructions. In each trial of the experiment, the participants were presented with a perceptual task first. However, the order of the tasks (face-only, body-only, whole-person) and stimuli presented within each task were randomised and counterbalanced between participants. Next, participants were automatically directed to Qualtrics to complete the AQ-50 questionnaire as part of a questionnaire task. At the end of the task, participants received a debrief about the experiment and were granted 3 course credits as participation compensation. They were also given practice trials before the start to ensure instructions were understood perfectly.

For every participant, the psychometric function for all three task conditions was obtained. Each function illustrated the percentage of disgust responses, reflecting the propensity to identify disgust cues in the stimulus presented (Brewer et al., 2017). Two main parameters can be extracted from the psychometric function: Decision noise and point of subjective equality (PSE). These two measures are important in answering the hypotheses of this study.

Decision noise can be understood as a measure of the precision of the stimuli being categorised as angry or disgusted (Brewer et al., 2017). This indicates the ability to recognise facial expressions and body postures without having any influence from the context and environment. As decision noise increases, participants' ability to discriminate between face or body postures decreases. Conversely, lower decision noise indicates that participants can perceive even small changes in stimuli in the face or body postures. Decision Noise can be calculated from the inverse of the slope obtained from the psychometric function. Therefore, the steeper the slope, the smaller the decision noise, resulting in better categorisation of anger stimuli as an angry facial expression and the disgust stimuli as disgusted facial expression.

PSE refers to the point at which participants are equally likely to identify bodily expressions as anger and disgust. The difference between the PSE value for body postures on a 100% angry face and body postures on a 100% disgusted face is a measure of the influence of facial expression on body posture perception. A larger PSE shift between the two measures reflects a larger influence of facial expression on body posture recognition (**Figure 6**).

RESULTS

Some participants were excluded from the analysis because the psychometric functions could not be modelled, as they did not engage well with the perceptual task. This could be observed from psychometric function output when the slope value is an extreme outlier from other responses or has a negative value. In the face-only condition and body-only condition, eight participants and four participants were excluded respectively from the sample. In the whole-person condition, after calculating the change in PSE, ten participants were outliers and excluded from the analysis.

The main aim of this study was to investigate if facial expression stimuli have an effect on body posture stimuli processing with regard to recognition of emotional expression. The two PSE values obtained from the PsychoPy output indicate two emotions measured (anger and disgust). Each PSE represents the stimulus intensity at which participants are equally likely to choose "anger" or "disgust" in response to the stimuli. This helps to assess potential biases in perception for different response alternatives. The data was readily available from the PsychoPy output and exported to Microsoft Excel. A paired sample *t*-test was conducted to compare the two measures of PSE 1 and PSE 2 when the body morph is at 100% angry face (**Figure 7**). There was a significant

Figure 6

The PSE of disgusted function and angry function of a participant

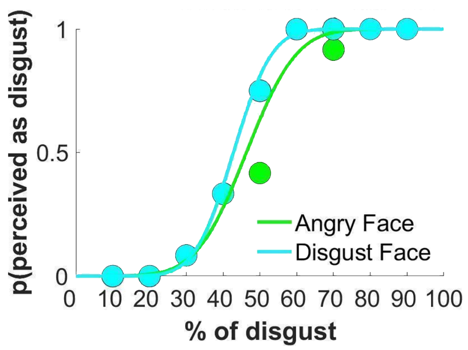
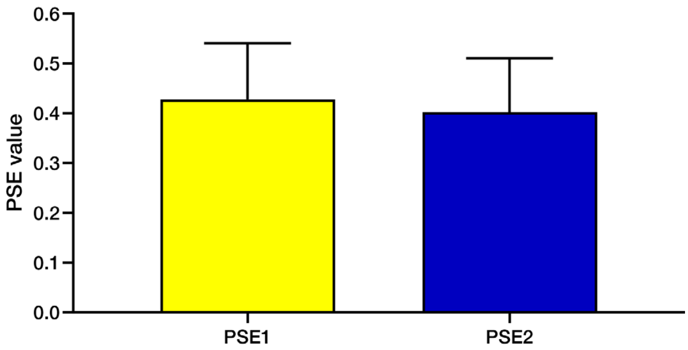


Figure 7

Mean PSE values



Note. Bar chart illustrating the mean of PSE 1 and PSE 2 when the body morph is at 100% angry face. Error bars represent the standard deviation..

difference in PSE 1 (M = 0.428, SD = 0.113) and PSE 2 (M = 0.402, SD = 0.108), where $t(59) = 2.713$, $p < 0.001$. The effect size for the difference in PSE value was calculated at Cohen's $d = 0.35$, which is considered a small to medium effect size. The finding shows that facial expression stimuli have a significant effect on the body posture as a contextual cue (refer to **Appendix E**). The high intensity of the angry facial expression stimulus made participants more likely to perceive various body postures as conveying higher levels of anger. This effect outlines how we respond to social cues in our environment.

To answer the second hypothesis, a normality test was first performed to determine if the data involved has a normally distributed population to determine the most appropriate choice of correlation coefficient. The data for the normality test is non-normally distributed, indicating that it should be treated as non-parametric data. Therefore, Spearman's rho correlation was used to carry out this analysis. The correlation was conducted between the AQ-50 score (minimum score = 3, maximum score = 43) and the PSE shift (%) of 60 participants (after exclusion). The PSE shift was obtained by finding the difference between PSE 1 and PSE 2. The value of the change in PSE was then calculated as a percentage. The results showed there was a non-significant, weak negative correlation between the AQ-50 score and the PSE shift, $r(60) = -0.155$, $p = 0.236$ (**Figure 8**). The negative correlation suggests that higher scores on the AQ-50 are associated with less influence of facial expression on body posture in the recognition of emotion.

An additional analysis was performed to provide insight into the relationship between autistic traits in relation to autistic traits measures (AQ-50) and inconsistency in decision-making. In this analysis, Spearman's rho correlation was used to analyse the total AQ-50 scores and decision noise in face-only condition and body-only condition. Examining correlations separately for the face-only and body-only conditions helps to understand if the relationship between autistic traits and decision noise differs depending on whether participants are making decisions based on facial expressions or body postures. The results show neither of the correlations showed a significant result, in face-only conditions, $r(62) = 0.069$, $p = 0.592$ and in body-only conditions, $r(66) = 0.157$, $p = 0.208$. Therefore, there is not enough evidence to conclude that individuals with higher autistic traits tend to exhibit more decision noise in their responses in both conditions.

DISCUSSION

The current study investigated the effect of facial expression on body posture recognition in the context of emotional expression in relation to autistic traits in a neurotypical population. The findings supported the first hypothesis, where facial expression stimuli have a significant effect on the recognition of the emotional states conveyed through body posture. Based on the finding, the disgusted facial expression stimuli lead to disgusted emotion recognition when presented with body postures across the intensity continuum. On the other hand, although the relationship between the AQ-50 score and the PSE shift did not reach statistical significance, the weak non-significant negative correlation suggests a potential relationship between higher autistic traits and reduced ability to discriminate between angry and disgusted expressions that may warrant further investigation with a larger sample size.

On the other hand, the result showed a non-significant weak negative correlation between the AQ-50 score and the PSE shift, indicating that participants with higher autistic traits have a slightly reduced ability to discriminate between angry and disgusted expressions compared to those with lower autistic traits.

Facial expression has a significant effect on the body posture

The results of this study suggest that facial expressions influence the perception of emotion recognition in body posture, leading to a perceptual bias. During the task, when a disgusted facial expression was paired with an angry body posture, participants tended to judge the emotion as anger compared to when it is paired with a disgusted body. This finding aligns with previous results from Teufel et al. (2019) and Hassin et al. (2013). This is what Teufel et al. (2019) refer to as a "biasing effect" (p. 141). This effect suggests that the contextual information provided by facial expressions systematically influence participants' perception of emotional expressions. In this study, the "effect" has been controlled by explicitly requesting that participants ignore the face and make judgements solely based on the body posture during the whole-person condition. This shows that facial expression and its context interplay during emotion recognition processes.

The result shows humans typically understand emotional expression by integrating cues from whole agents such as faces, postures and voice rather than treating them independently (Teufel et al., 2019). The result is also supported by the prior literature indicating that people quickly integrate emotional information from both facial expressions and body language, suggesting congruent pairs were categorised by participants more quickly and accurately than incongruent pairs (Meeren et al., 2005). They also suggested that the integration process is automatic and adaptive. Critically, this process of integration between facial and body cues occurs in early visual processing (Aviezer et al., 2008) even before the conscious awareness of stimuli reflecting global processing.

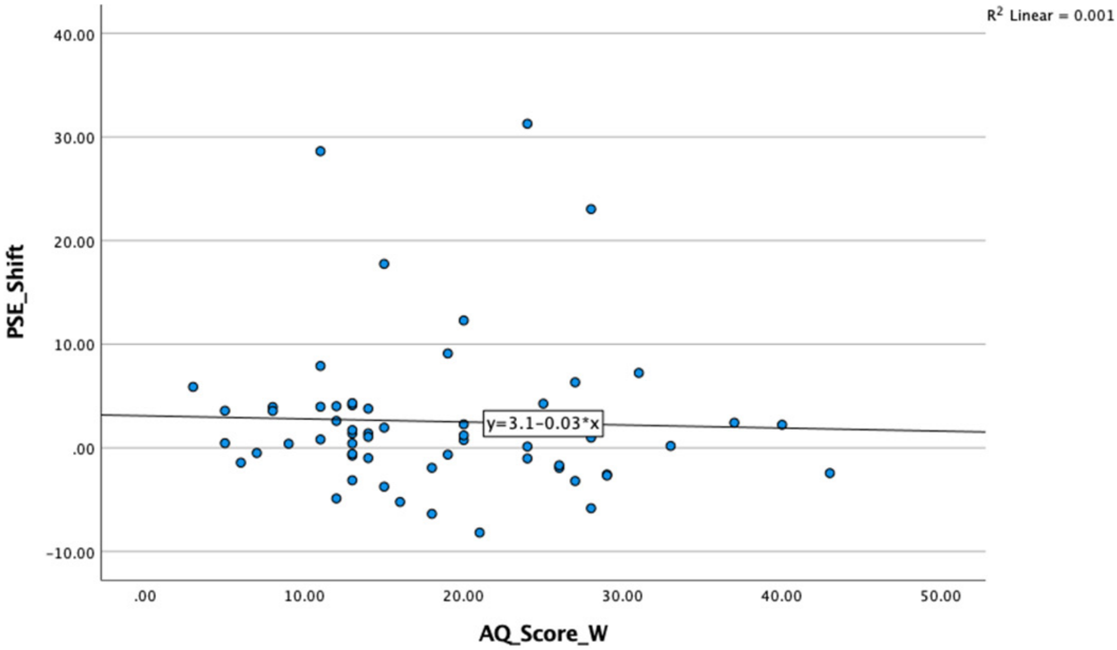
Facial expression has no effect on judgement of body morph

Next, the result from this study shows there is a weak negative non-significant correlation between the AQ-50 score and the PSE shift. This is surprising, because the study did not find a significant effect despite suggestions of a significant directional effect in previous literature (Brewer et al., 2017; Heaton et al., 2012). The higher PSE shift in this study reflects a higher influence of facial expression on body posture recognition in the whole person condition, which is expected to be seen in people with high autistic traits. However, the results obtained are not significant. This may be because of the small sample size used in this study. Notably, individuals with ASD traits have a reduced ability to interpret cues that

PSYCHOLOGY

Figure 8

Scatter plot of AQ-50 scores vs. PSE shifts



Note. . The scatter plot illustrates the correlation between the AQ-50 score and the PSE shift.

are conveyed by facial expressions due to atypical neural processing of emotional information. This conclusion was supported by the finding of Happé (1996) that individuals with ASD traits were less likely to be influenced by, and have difficulty processing other available contexts (Wang et al., 2006). Based on **Figure 8** from the result section, we can see that participants with high AQ-50 scores exhibit a PSE shift value that is compatible with a low AQ-50 score. This further shows that individual variability in the association between AQ50 scores and PSE shifts is inconsistent across the group (Brewer et al., 2017; Harms et al., 2010).

This study also found no relationship between decision noise and autistic traits. Decision noise shows the ability of participants to discriminate facial expressions and body posture in stimuli presented. The result again shows individual variability in Decision Noise scores during the task observed from the PsychoPy output. Previous literature suggested that people with ASD are worse at discriminating facial expressions compared to the neurotypical population (Harms et al., 2010; Tanaka & Sung, 2013). Therefore, I also expected to see a significant positive correlation between the two covariables.

Moreover, limited literature also shows people with ASD are worse at interpreting body posture. De Gelder and van den Stock (2011) posited that people with ASD are less accurate in determining bodily expressive action when the facial expression is masked. Emotion recognition relies on semantic knowledge about whole body expression such as anger with a clenched fist and tensed muscle. Therefore, when body posture with 60% anger and 40% disgust (from NimStim database) is shown, the emotion is hard to be recognised, indicating that this bodily expression is ambiguous. People with autistic traits have reduced sensitivity to dynamic social stimuli in social settings due to difficulties in integrating emotional context (De Gelder & van den Stock, 2011). Therefore, a more apparent amount of disgusted expressive action is needed for discrete categorisation of disgusted emotion in these individuals. On the other hand, visual information processing also plays a crucial part in emotion recognition together with semantic knowledge mentioned in De Gelder and van den Stock (2011).

In this study, autistic traits in the neurotypical population are addressed critically to create a supportive environment that supports neurodiversity. Understanding emotional processing routes allows us to raise awareness about ASD to eliminate stigma and build inclusive environments to cater varied cognitive profiles. This approach not only improves early identification and assistance for individuals who may benefit, but it also allows for the customisation of educational and business settings to suit a wider diversity of learning and working styles. Accepting autistic traits in the general population helps to establish a more aware community, advances research to facilitate therapies and intervention for disabilities and aims to build a society that appreciates diversity and gives equal opportunity for all people, regardless of their neurodevelopmental profiles.

Overall, the present study contributes to the understanding of how facial expressions influence the recognition of the emotions conveyed through certain body postures; however, the study did not find a significant relationship between AQ-50 scores (a measure of autistic traits) and the influence of facial expression on body posture. This suggests that autistic traits may not significantly impact how facial expressions affect the recognition of the emotions conveyed through body postures.

Previous literature has shown that body posture can influence the recognition of emotions conveyed through facial expressions, but this study adds to the existing research by demonstrating that the relationship also holds in the reverse direction. These findings align with Aviezer et al.'s (2008) work, which highlighted the interplay between facial expressions and body posture cues in emotion recognition. Notably, this study focuses on ASD traits within the neurotypical population, providing valuable insights into how these traits may or may not affect the relationship between facial expressions and body posture in emotional processing.

Limitations

There are a few limitations in this study that impact the validity of the results. Firstly, the nature of the task required a minimum 40 minutes to be completed. There are 216 stimuli and a questionnaire at the end of the task. Participants could potentially start to lose focus and reduce their engagement in completing the task throughout the stimuli presentation, thus causing low accuracy in recognizing emotion and also in answering the AQ-50 questionnaire. Future research could schedule face-to-face meetings with participants and break the task into shorter segments to provide breaks, reducing the effect of fatigue.

The stimuli in this study consisted of four white male faces. To enhance the validity of future studies, it would be beneficial to include a variety of faces from different ethnicities and genders. This would provide a more comprehensive representation of facial expressions and improve the generalisability of the findings.

The use of self-report measures for assessing the autistic traits in the neurotypical population are a further limitation of this study. Self-report measures can be very useful to assess the subjective experiences of participants; however, the reliability of the score may also be influenced by limited self-awareness causing difficulty in accurately reporting their autistic traits. Therefore, behavioural observations, physiological responses and medical history of participants can supplement self-report measures to provide a more comprehensive understanding of participants' responses.

There is also the possibility of central tendency bias, the systematic preference to choose responses around the midpoint of a scale rather than the extreme response option. This also could cause underrepresentation of variability in responses. Additionally, some psychology students are familiar with the format, structure and typical response pattern of the questionnaire due to previous exposure. This could result in a distorted or inaccurate representation of the participants' actual behaviour or attitudes, as their responses may not reflect their true beliefs or experiences. This may not be a true representation of the actual behaviour in the sample recruited. To mitigate this issue, researchers can use measures to ensure that participants are not biassed by their awareness of the questionnaire type. This could include providing clear instructions at the beginning of the study, using randomised response formats, or using questionnaires that are less likely to be influenced by central tendency bias.

CONCLUSION

In conclusion, facial expression has a significant effect on the recognition of the emotional content of body postures. People with ASD traits have reduced ability to integrate multiple inputs which causes them to face difficulty in communicating in social settings. This study is beneficial in developing social awareness among society to help build understanding around the manner in which individuals with ASD communicate, ultimately promoting a more inclusive and supportive environment to people with disabilities. Moreover, this study also is useful for the neurotypical population to understand the reduced or diminished ability of people with ASD to perceive social cues and emotional signals such as facial expressions, body language, and tone of voice in social settings.

SUPPLEMENTARY MATERIALS

Appendix

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