Affect recognition across social versus non-social visual stimuli: Evidence for a social bias in Williams Syndrome

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Abstract

Individuals with Williams syndrome (WS) are well known for their hypersocial nature, including an increased attraction to faces. Interestingly, despite severe deficits in visual spatial processing, these individuals demonstrated relatively strong facial recognition skills. Although many studies have highlighted an impaired ability for judging facial expressions, little is known about emotion processing across social and non-social domains in this population. Of interest, as individuals with WS demonstrate the opposing pattern of attention to/interest in social versus non-social stimuli to those with autism, which has important implications for neurodevelopment. We report the results from two complementary experiments. Experiment 1 examined affective visual recognition across the social and non-social domains by utilizing standardized facial expressions as social stimuli, and stereotyped images of landscapes, animals, and objects, as non-social stimuli, which were matched for emotional content. Experiment 2 assessed affect identification of social versus non-social stimuli by utilizing black and white upright and inverted faces. The participants included individuals with WS, cognitive-levelmatched controls (CD) and typically developing age-matched (TD) controls.

Methods

Experiment 1: Facial (Social) vs. Scenic (Non-Social) Images

Participants:
- WS groups: all Williams syndrome diagnoses were confirmed by fluorescent in situ hybridization (FISH) tests for the deletion of elastin.
- CD groups: cognitive-level-matched controls consisted of individuals with mild mental retardation (IQ 50-75) unrelated to any specific etiology.
- TD group: typical controls consisted of individuals with an IQ between 90 and 120, with no history of psychiatric, neurological or developmental disorders.

Stimuli:
- Total of 92 images were presented in pseudo-random order.
  - Stimulus type: Social stimuli: 24 affective images of male and female faces; Non-social stimuli: 24 International Affective Picture System (IAPS) images [2].
  - Positive faces: happiness, smiling, laughing, laughing to tears, lauging with tears, smiling with eyes closed, smiling with teeth, positive emotions; happy, smiling, happy tears, laughing, laughing to tears, laughing with tears, smiling with eyes closed, smiling with teeth, happy expression with mouth open, happy expression with closed eyes.
  - Negative faces: sadness, fear, anger, disgust, surprise, confusion, fear, small eyes, high brow, angry eyes, angry mouth, surprised eyes, surprised mouth, sneer.

Results

Experiment 1: Facial (Social) vs. Scenic (Non-Social) Images

Results from both Experiments 1 and 2 showed: (1) relative to TD controls, individuals with WS and DD recognized emotions with a lower accuracy; and (2) individuals with WS uniquely exhibited superior aftereffects in the identification of social stimuli compared to non-social stimuli. Interestingly, results from Experiment 2 further showed that the performance of participants with WS was more similar to the TD than to the DD group in the identification of social and non-social stimuli. Taken together, the performance of the WS group in both Experiments suggests that these individuals possessed a unique pattern of emotion processing in social over non-social images, suggesting a bias towards socially relevant information. This is likely to be linked to the unique phenotype characterizing WS, including a strong attentional bias towards people, and social stimuli.

Conclusions

We recently carried out a study utilizing audio-visual affective stimuli [4]. Consistent with the data from the current Experiments, the results indicated that individuals with WS demonstrated a superior affect identification accuracy for social stimuli as compared to non-social stimuli. In that study, individuals with WS performed similarly to the TD controls in identifying emotions in social stimuli, while the DD group performed at a significantly lower level. However, the affect identification performance of the WS group with the non-social group was at the level of the DD controls, and this was significantly lower than that of TD controls. Thus, the WS group exhibited a unique pattern of performance, with surprisingly good performance within the social domain. Taken together with the current study, these findings suggest a presence of a ‘social bias’ in information processing in WS.

Two explanations may account for the tendency of WS individuals towards a superior emotion recognition ability in social relative to non-social contexts, as well as for the higher performance level for the identification of positive relative to negative emotions. First, a possible explanation for the disparity in the affect identification performance of social versus non-social images in WS could stem from a significantly increased fixation and attention towards faces [5]. Previous studies have shown that WS individuals have a tendency to fixate to faces for a longer period than TD controls and individuals with autism, and they also show blindness in disreguing from such stimuli [7]. Therefore, the increased attention towards faces in WS may account for the greater accuracy in emotion recognition of social images relative to cognitive matched controls, due to increased experience with processing such stimuli relative to non-social information.

Second, the greater affect-identification accuracy of WS individuals for positive compared to negative emotions may be linked to documented neural abnormalities in the processing of both positive and negative emotions in WS relative to TD controls [9]. Specifically, individuals with WS exhibit reduced neural activity to negative, and increased neural activity to positive, visual face stimuli, relative to TD controls [9, 10]. Thus, the imbalance in the neural processing of positive versus negative emotions in individuals with WS may underlie the disruptive behavioral performance of participants with WS in the current study.

In sum, results from the current study suggest that individuals with WS demonstrate greater emotion processing ability in social as compared to non-social contexts, as well as with positive as compared to negatively valenced visual images. This profile fits well with their hypersocial behavior, and is likely to be linked to a greater attraction towards socially relevant stimuli.

References


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