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Oxytocin Enhances Visual Attention in Patients with Schizophrenia: Evidence from an Eye-tracking Study

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BACKGROUND

Social cue processing, particularly face perception, plays a critical role in social cognitive functioning. Patients with schizophrenia struggle to extract information from faces and interpret facial expressions (Kohler et al., 2010). Indeed, eye-tracking studies have demonstrated that schizophrenia patients exhibit **reduced exploratory behaviour** (i.e. **reduced number of fixations** and **longer fixation duration**) in response to facial stimuli compared to healthy controls (e.g. Manor et al., 1999), suggesting restricted visual attention. The neuropeptide, **oxytocin** has been demonstrated to exert **pro-social effects** on behaviour and **modulate eye gaze** during face perception. In this study, we tested whether oxytocin has a compensatory effect on visual processing of human faces.

METHODS

Twenty right-handed male participants with schizophrenia or schizoaffective disorder were administered **intranasal oxytocin 40UI** or **placebo** in a **double-blind, placebo-controlled, cross-over** fashion during **two visits** separated by 7 days.

Participants engaged in a free-viewing eye-tracking task, looking at images of Caucasian men displaying **angry**, **happy**, & **neutral** facial expressions and control images including **animate** and **inanimate** stimuli.



Figure 1. Examples of facial and control stimuli

Primary outcomes:

- 1) Total number of fixations
- 2) Mean duration of fixations

Secondary outcomes:

- 3) Dispersion
- 4) Saccade amplitudes

Repeated-measures ANOVA were carried out to explore the within-subject effects of **treatment** (oxytocin vs. placebo), **stimuli** (angry / happy / neutral / animate / inanimate), and the **interactions** between stimuli and treatment ($p < .05$, two-tailed).

RESULTS

Total number of fixations: Main effect of treatment ($F_{1,17} = 5.604$, $p = .030$); Main effect of stimuli ($F_{4,68} = 5.008$, $p = .001$).

Duration of fixation: Main effect of treatment ($F_{1,13} = 4.791$, $p = .047$); Main effect of stimuli ($F_{4,52} = 1.382$, $p = .253$).

Figure 2. Mean Number of Fixations on Oxytocin vs Placebo

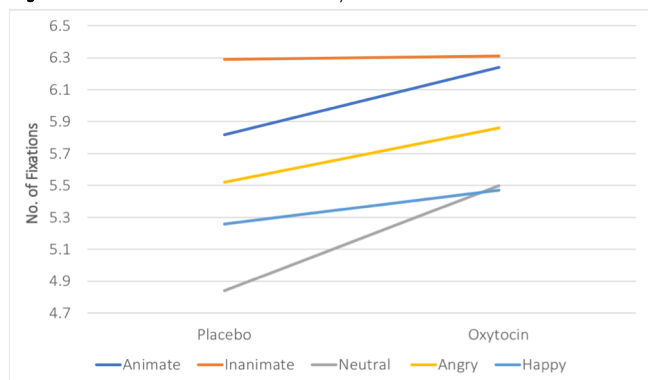
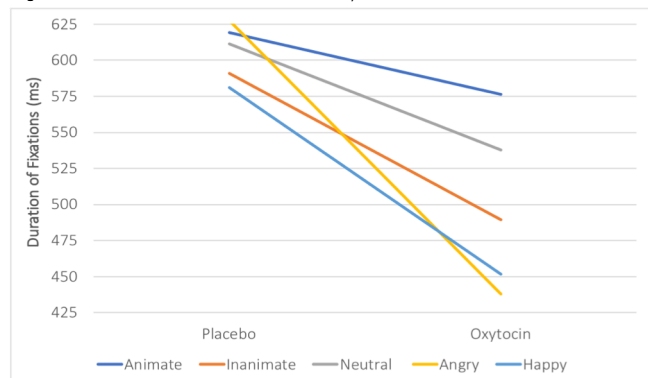


Figure 3. Mean Durations of Fixations on Oxytocin vs Placebo



Dispersion: No main effect of treatment; Main effect of stimuli ($F_{4,68} = 2.998$, $p = .024$).

Saccade amplitudes: No main effect of treatment; Main effect of stimuli ($F_{4,68} = 0.289$, $p = .008$).

None of the **interactions** reached significance.

DISCUSSION

In this study, **oxytocin enhanced exploratory viewing behaviour** by increasing the total number of fixations, whilst reducing the mean duration of fixations compared to placebo. These results indicate that acute administration of intranasal oxytocin has the potential to enhance visual attention and improve social cognitive deficits in schizophrenia (Averbeck et al., 2012). The absence of any interaction effects may warrant future studies into oxytocin-induced eye movement changes and facial emotion recognition in larger samples.

References: Kohler, C. G., Walker, J. B., Martin, E. A., Healey, K. M., & Moberg, P. J. (2010). Facial emotion perception in schizophrenia: A meta-analytic review. *Schizophrenia Bulletin*, 36(5), 1009–1019; Manor, B. R., Gordon, E., Williams, L. M., Rennie, C. J., Bahramali, H., Latimer, C. R., ... Meares, R. A. (1999). Eye movements reflect impaired face processing in patients with schizophrenia. *Biological Psychiatry*, 46(7), 963–969; Averbeck, B. B., Bobin, T., Evans, S., & Shergill, S. S. (2012). Emotion recognition and oxytocin in patients with schizophrenia. *Psychological Medicine*, 42(2), 259–266.