INTRODUCTION

Alterations in reward processing are frequently reported in Attention Deficit Hyperactivity Disorder (ADHD). One important factor that affects reward processing is the type of reward since social and monetary rewards are processed by different neural networks. However, the effect of reward type on reward processing in ADHD has not been extensively studied.

In the present study, we aimed to explore the effect of reward type (i.e., social or monetary) on different phases of reward processing, and also examine the hypothesis that ADHD symptoms are associated with a problem in the processing of social rewards. For this, we used a spatial attention paradigm with cues heading availability and type of the reward and feedbacks informing about the reward earned that has been previously used in an functional magnetic resonance imaging (fMRI) (Krebs et al., 2012) and electroencephalography (EEG) study (Schevernels et al., 2014). According to the social exchange theory, we expected to find larger amplitude of the ERPs in social reward condition comparing with monetary reward and social or monetary non-reward conditions.

**Keywords**: attention-deficit/hyperactivity disorder; event-related potentials; FRN; reward processing

METHODS

The event-related potentials (ERPs) were recorded from thirty-nine (19 males and 20 females) healthy individuals (mean age: 22.06±1.94 years, age range: 19-27). All participants filled out self-report questionnaires, including Turkish versions of Adult ADHD self-report scale (ASRS) (Adler et al., 2003; Doğan et al., 2009; Kessler et al., 2005), UPSs Impulsive Behavior Scale (UPPS) (Whiteides & Lyam, 2001; Yargıcı et al., 2011), Barratt Impulsiveness Scale (BIS) (Barratt, 1995; Güleç et al., 2008; Patton & Stanford, 1995) and Wender Utah Rating Scale (WURS) (Öncü et al., 2005; Ward, 1993).

EEG activity was recorded at a sampling rate of 1000 Hz. Trials with eye blink artifacts and other overt movement artifacts were excluded. Epochs were created within the time window -200 and +1400 ms relative to the onset of the relevant stimulus (cue or feedback), including a 200 ms pre-stimulus period for baseline correction. Then, EEG epochs were averaged for each participant across trials according to the different conditions. Averaged data were digitally filtered with a 40/0.034 Hz low-pass and high-pass filter. Mean amplitudes were selected for cue-related P100, N100, P200, CNV following cue stimuli and for feedback-related N100, P200, FRN, P300 following feedback stimuli across electrodes.

The data were examined using a repeated-measures analysis of variance (ANOVA) with factors availability of reward (reward, no-reward) and reward type (social, monetary). The correlations between the mean amplitude of the ERPs and ADHD scales (ASRS, UPPS, BIS and WURS) were calculated.

**RESULTS**

The FRN component was significantly larger (more negative amplitude) for monetary reward feedbacks compared to social reward (F (1, 37) = 89.767, p<0.001; fig 2). The feedback-related P3 and P2 component had significantly larger amplitude for social reward feedbacks compared to monetary rewards (F (1, 37) = 56.141, p<0.001; F (1, 37) = 13.636, p=0.001; fig 3). The feedback-related P2 had a larger amplitude for reward feedbacks than non-reward feedbacks (F (1, 37) = 5.317, p=0.027).

The cue-related N1 amplitude was larger for reward cues compared to non-reward cues (F (1, 37) = 4.423, p=0.042). The cue-related P2 had a larger amplitude for non-reward cues than reward cues (F (1, 37) = 6.091, p=0.018).

**DISCUSSION**

Our findings suggest a link between hyperactivity and processing of social rewards. Future studies should explore the effect of reward type on reward processing in clinical populations with known reward processing deficits.

**REFERENCES**


