

Video Game Play May Attenuate Cortisol Response to Psychosocial Stress in Individuals with Autism Spectrum Disorders

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Editorial

The common characteristics and patterns of individuals with Autism Spectrum Disorders (ASD) include the need for consistency, rituals, predictability and problem solving [1]. The constant changing nature of unfamiliar social interactions that require spontaneous intuitive adjustment may exacerbate socially related anxiety for these individuals with ASD [1]. Accumulating evidence indicates that individuals with ASD were easily suffered from anxiety symptoms in stressful situations [2-4]. For example, salivary cortisol levels were significantly increased in response to an unfamiliar peer compared to a familiar peer in thirty-three children aged 6-13 years [1]. The peer interaction paradigm resulted in significantly higher levels of salivary cortisol in 21 children with ASD aged 8 to 12 years compared to normal controls, suggesting that the ASD children easily activate hypothalamic-pituitary-adrenal (HPA) responses in social situations [3]. Twenty-seven male children with ASD aged 8 to 12 years maintained an elevated cortisol level in response to standardized social-evaluative performance task compared to children with age-matched 32 typical developments [4].

Children with ASD spent approximately 62% more time watching television and playing video games than in all non-screen activities combined. Compared with TD siblings, children with ASD spent more hours per day playing video games (2.4 vs. 1.6 for boys, and 1.8 vs. 0.8 for girls) [5]. Among 860 students with ASD aged 13-16 years, the majority of youths with ASD (64.2%) spent most of their free time using non-social media (television, video games) [6]. Videogame effects are complex and would be better understood as multiple dimensions rather than a simplistic "good-bad" dichotomy [7]. Actually, video game play did not increase up-regulation of salivary serum [8] or salivary [9] cortisol levels. Moreover, casual video game decreased physiological stress responses [10]. Thus, video game play can decrease physiological stress responses.

It is therefore possible that video game play may distract stress response in individuals with ASD. The author examined the relation of between video game play and plasma cortisol response to three types of stress situation such as interruption of video game play and interpersonal communication with unfamiliar adults, and asked questions on the most unpleasant in 10 individuals with ASD compared to 7 healthy normal controls.

Full details of study procedures were described in our previous report [11]. During video game for 40 minutes, a structured interview consisting of the declarative memory recall was carried out. Before the start of the interviews, each participant played a TV-based videogame as the default context. Two serial contexts followed in which participants were exposed to different social and emotional stimuli for 7 minutes each (a total of 14 minutes) during which time all

individuals were ceased video game play. Two types of the stimulators such as an unfamiliar female and an unfamiliar male made a structured interview on most unpleasant daily events in their personal relationship to their peers or teachers in their school, respectively. Blood specimens for plasma cortisol determination were conducted at the time of 28 days before and again 5 minutes after the interviews.

Noteworthy is the fact that there were no significant differences in plasma cortisol levels between the 10 children with ASD and the 7 normal controls both at 28 days before the interviews, and at 5 minutes after the interviews.

In respect to the effects of memory retrieval on cortisol response, an inverted U-shaped dose-response relationship between salivary cortisol levels and recall performance was observed with moderate elevation of salivary cortisol resulting in the best recall performance [12]. Moreover, memory retrieval testing after the learning session was strongly associated with urine cortisol secretion [13] or salivary cortisol response [14]. Therefore, memory retrieval of the unpleasant daily events may have been induced increased plasma cortisol response.

In this study, there were different types of stressful situations. These were as follows: 1) interaction with two unfamiliar adults during video game play; 2) memory retrieval on most unpleasant daily events; 3) disruption of videogame play by asked question. However, plasma cortisol levels in the 10 children with ASD were not significantly increased in the above described test setting. As described above, video game did not induce in change serum [8] or salivary [9] cortisol levels. Interestingly, video game play changed autonomic nervous system relaxation or decreased physiological stress responses as indicated by electroencephalographic changes and heart rate variability [10]. Moreover, the video game successfully distracted stress of patients during the dental procedure [15]. Drawing these strands together, the video game play may distract plasma cortisol response to stressful setting.

Although detailed neurobiological mechanisms associated with flat responses of cortisol profile in the 10 children with ASD are not clearly understand, there were two factors may be considered as follows: stressful situation used in thus study was not so strong to induce any changes in plasma cortisol levels; 2) considering previously reported findings that younger children who showed willing to approach to others did not increase cortisol response [16], the 10 individuals with ASD in this study may be willing to approach unfamiliar adults, and thus showed no changes of plasma cortisol response.

Collectively, it is plausible that video game play may be able to distract cortisol response to psychosocial stress.

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