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ANXIETY AND STRESS OF CAREGIVERS OF CHILDREN WITH DEVELOPMENTAL DISORDERS

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Abstract
It has been established that persistent anxiety and stress can have a negative impact on intellectual capacity. Paying attention is an essential mental function that is required in a variety of settings, including professional and personal affairs. The networks of the brain that are responsible for alerting, executive control, and orientation are all susceptible to the negative effects that arise from prolonged exposure to stress. The purpose of this study is to investigate the effects that continuous psychosocial stress in real life has on several different attention networks. In general, the group that was under stress had faster response times compared to the group that was not under stress, and this was true regardless of the target and cue conditions that were present. Every circumstance was handled with the same level of accuracy by both teams. In each of the three measures that measure attention networks, there was not a statistically significant difference seen between the two groups. Within the group that was under stress, a strong positive association was discovered between the alerting and orienting networks, while a significant negative correlation was seen between the two networks.
Keywords: Stress, Anxiety, Developmental Disorders, Intellectual Ability

BACKGROUND OF THE STUDY

The phenomena of stress has been extensively researched for several decades, with scientists investigating its ramifications across various scientific areas. The findings have led to a deeper understanding of how psychological processes affect physiological functions and general well-being (Contrada & Baum, 2010). Stress, as defined by Stokes and Kite (2000), refers to any factor that disturbs the normal functioning of an organism. Furthermore, the particular occurrence or entity that triggers stress is occasionally known as a stressor. Sapolsky (2004) defines a stressor as an external force that disturbs the state of homeostatic equilibrium, whereas the stress response refers to the physiological and psychological mechanisms used by the body to restore homeostasis. The transactional model of stress suggests that the way we respond to stress is influenced by a cognitive appraisal process. The appraisal process encompasses the assessment of the perceived danger or demand, which is referred to as the main appraisal. Furthermore, it encompasses the evaluation of an individual's perceived capability and the resources at their disposal to handle a situation, as well as the perceived significance of being able to handle it, which are collectively known as the secondary appraisal (Lazarus, 1966; McGrath, 1976; Lazarus & Folkman, 1984). Prolonged episodes of stress exert a substantial influence on attention and cognition, both in the immediate term and over an extended duration. Yaribeygi et al. (2017) found that the immediate impacts are mostly caused by the activities of beta-adrenergic receptors, whereas the long-term effects occur gradually through changes in gene expression assisted by steroids. Multiple research (Staal, 2004;

Yaribeygi et al., 2017; Jameison & Dinan, 2001; Andreotti, 2013) have shown that both mild and acute stress have a beneficial effect on attention. Under conditions of intense stress, individuals often display an increased concentration on core tasks, consequently ignoring peripheral information. Kohn's (1954) research findings provide additional evidence for the concept of attentional tunnelling. Callaway and Dembo (1958) demonstrated the occurrence of attentional tunnelling in emotional situations, specifically anxiety. However, when evaluating the significance of peripheral information for the present task, it is commonly seen that the process of tunnelling tends to detrimentally affect task performance (Staal, 2004).

The study conducted by Sapolsky et al. (1985) revealed that glucocorticoids exhibit a biphasic impact on the brain. Additional research is warranted to explore the observed discrepancies in baseline and stress hormone levels, which can be attributed to the presence of two distinct types of glucocorticoid receptors, namely mineralocorticoid receptors (Type I) and glucocorticoid receptors (Type II). These receptors exhibit differential concentrations throughout various regions of the brain. The researchers noted in their investigation involving laboratory rats that the type II receptors play a significant role in the occurrence of neuronal degeneration inside regions such as the hippocampus and amygdala. In addition, it has been observed that persistent exposure to catecholamines can also exert an influence on these specific brain regions (McEwen & Sapolsky, 1995). The amygdala, along with other limbic structures, exhibits robust connectivity with cortical and subcortical regions that are involved in attentional processing. Due to its heightened sensitivity to stresses, the amygdala may experience impairments in attention processing and could impact other brain regions such as the prefrontal cortex (PFC) through recurrent stimulation. According to Andreotti (2013), individuals under chronic stress may have cognitive control deficiencies, leading to heightened engagement with environmental hazards and difficulty disengaging attention from them. According to Adams et al. (2017), individuals diagnosed with post-traumatic stress disorder (PTSD) exhibited a tendency to focus their attention on negative stimuli and demonstrated difficulties in effectively allocating their attention resources. The findings presented in the study conducted by McCoy et al. (2015) provide support for this assertion. According to their assertion, the regular activation of the hypothalamic-pituitary-adrenal (HPA) axis leads to physiological deterioration, resulting in the inhibition of prefrontal cortex (PFC) functioning. Consequently, this allows an automatic, emotion-driven response from the limbic system during the attentional process. According to the study conducted by ÖHman et al. (2001), it has been proposed that stimuli that evoke fear are perceived in a more automatic and parallel manner. According to Andreotti (2013), the occurrence of a sudden stressor can lead to attentional biases, which then result in the production of stress hormones that can further impact attentional processing. Based on the findings of Andreotti's (2013) research, it is suggested that there may be a potential consequence of impaired regulation of limbic activation and desensitization of the glucocorticoid receptor (GR). Nevertheless, further research has raised concerns about the aforementioned findings, as it has been discovered that the participants in these trials deliberately divert their attention away from unfavorable stimuli (Ellenbogen et al., 2002, as cited in Staal, 2004).

According to Hayes and Watson (2012), parents who have children with Autism Spectrum Disorder (ASD) have significant and persistent levels of stress in their lives, in contrast to

families without children with ASD. Based on the findings of the researchers, it has been shown that a significant proportion of stress experienced by individuals can be attributed to deficits and impairments associated with Autism Spectrum Disorder (ASD), including challenges in social communication and engagement, as well as the presence of restrictive and repetitive behaviors. Additionally, other social elements were recognized as stressors for the parents. According to a study conducted by Romero-Martínez et al. (2018), there is a positive association between the duration of care and the amount of time spent with persons, and the level of the stress experienced. Moreover, there exists a correlation between the intensity of the condition and its symptoms and the levels of stress experienced. Previous research has indicated that certain parents also encounter difficulties within their spousal relationships (Duan et al., 2015) and experience discontent in their marriages (DeMyer, 1979), which exacerbates their overall experiences. According to Duan et al. (2015), parents of children with neurodevelopmental disorders (NDD) encounter limited social support from their social networks, leading to heightened negative consequences. There is a notable distinction in the effects of stress, as evidenced by higher levels of depression and isolation among parents who possess an external locus of control.

Chronic stress has been linked to cognitive and health concerns (Romero-Martínez et al., 2018; McCoy et al., 2015), as well as an expedited aging process (Maestripieri & Hoffman, 2011). Individuals experience repeated activation of numerous stress responses due to persistent exposure to a range of stressors in their lives, such as the features of their child, limited social and family support, financial burdens, and other sociodemographic issues. Chronic stress situations can lead to extended exposure to glucocorticoids (GC), resulting in the downregulation of glucocorticoid receptors (GR). This downregulation has the potential to produce dysfunctions in brain networks that are crucial for memory, cognitive functioning, and other related processes, in comparison to those within the normal population. These deficiencies have the potential to result in subpar performance in professional settings as well as other significant domains of an individual's life. Examining chronic stressors that occur in real-world contexts provides a more comprehensive comprehension of their impact on human performance in many personal and occupational environments, as a result of impairments in cognitive functions, including memory and learning, among others.

Methodology

The current study comprised a sample of 65 participants, specifically mothers of children with cognitive development. Mothers of children diagnosed with Conductive Impairment (CI) were selected as participants for this study. The recruitment process involved reaching out to mothers attending outpatient services at a mental health center specifically catering to Syrian refugees in Turkey. The present investigation was carried out in the absence of any stimulating substances, such as tobacco or caffeine consumption. The researcher provided a comprehensive overview of the study and obtained informed consent from the participants. Each participant underwent a comprehensive individual screening conducted by a qualified psychiatrist to assess the presence of any pre-existing mental illnesses or disabilities. Following the initial assessment, the participants were administered a perceived stress scale and a parental stress scale utilizing the traditional pen and paper methodology. The study exclusively included mothers as participants, as we specifically focused on primary carers of the children in both groups.

RESULT AND DISCUSSION

In this study, the fundamental demographic characteristics of the final sample are investigated, and the results obtained from the administration of the self-report stress questionnaires, specifically the Perceived Stress Scale (PSS) and the Perceived Stress Scale-10 (PSS-10), are presented. Between the questionnaires that were filled out by parents of children with cochlear implants who were in the stressed group and those who were not in the stressed group, there was a clear and noticeable difference in the levels of stress that were experienced. The group of people who were experiencing high levels of stress reported feeling a greater sense of responsibility in caring for their children, which had an impact on their overall health and wellbeing. On the Perceived Stress Scale-10 (PSS-10), the group that was experiencing stress demonstrated significantly higher levels of stress than the group that was not experiencing stress, which had a mean score of 10.9 and a standard deviation of 2.7. The group that was experiencing stress had a mean score of 21.3 and a standard deviation of 5.6. The parental stress scale reveals that there is a significant disparity in the degrees of stress experienced by the parents. In comparison to the group that did not experience stress ($M = 20.1$, $SD = 2.1$), the group that was feeling stress ($M = 43.1$, $SD = 7.5$) had higher scores to begin with. As of this point in the study, there was no further investigation into the demographic data that was carried out. Information was gathered for the study regarding a variety of aspects, such as the condition of the child, the length of time the child was exposed to stress, the degree to which the spouse provided care, the participant's educational attainment, and their socio-economic circumstances. However, these aspects were not subjected to any additional investigation.

The study also revealed information regarding the accuracy and reaction time of both the groups that were stressed and those that were not stressed. Compared to the group that was not under stress, which had a mean reaction time of 591.863 and a standard deviation of 103.325, the group that was under stress had a much shorter reaction time (mean = 579.3643, standard deviation = 73.185). On the other hand, it is essential to point out that the group that was under stress (mean = 0.789, standard deviation = 0.006) and the group that was not under stress (mean = 0.979, standard deviation = 0.017) exhibited comparable levels of accuracy in terms of the overall accuracy. Table 3 provides the information regarding accuracy and reaction time for two distinct groups, especially the groups that were stressed and the groups that were not stressed. The data is presented for two experimental circumstances, specifically congruent and incongruent, and it spans four cue conditions, which include no cue, centre cue, double cue, and spatial. Two of the experimental conditions are mentioned above. When compared to the non-stressed group, the stressed group exhibited a significantly faster response time in all of the cue circumstances, and this was true for both the target condition and the non-stressed group.

The behavioural findings indicate that the group that is under stress exhibits a relatively faster reaction time to the target stimuli in all of the cue settings as compared to the group that is not under stress. In stark contrast to the conclusions that were provided by Liu et al. (2020), this finding contradicts their findings. An evaluation of the functioning of the attentional network was carried out by the researcher on a group of undergraduate students who were both physically and mentally sound and who were getting ready to take an entrance examination for

postgraduate study. According to the findings of the study, the group that was subjected to stress demonstrated a decrease in both their reaction speed and accuracy when compared to the group that did not experience any difficulties. It is of the utmost importance to acknowledge that the two groups who participated in the current experiment had equivalent levels of accuracy. The moms of children with cerebral palsy who were in the stressed group exhibited a considerably increased response time, however this did not significantly alter the degree of precision they exhibited. It is possible that the increased response time that was found in the women who were part of the stressed group is connected to their ongoing requirement for enhanced focus and attentiveness, which is essential for the care of a child who has a cognitive handicap. In the current study, the impact of long-term psychological stressors, such as providing care for children with cognitive impairment, on the brain networks that are responsible for cognitive processes like attention have not been investigated in great detail.

Conclusion

Research that is now being conducted is shedding light on the effects that sudden and temporary stressors have on a variety of cognitive functions, including attention. However, there has not been a comprehensive investigation into the effects that actual and ongoing psychological stressors have on attention. The purpose of this research is to investigate the impact that providing care for children who have neurodevelopmental disorders (NDD) has on the amounts of stress experienced by parents, as well as the potential implications that this stress may have on the attention networks of the brain. A study was conducted in which the Attention Network Test (ANT) was administered to parents of children who had been diagnosed with Neurodevelopmental Disorders (NDD) as well as parents of children who were developing normally (TD). The purpose of the study was to examine the differences and similarities between the two groups in terms of their performance on the executive control network, alerting network, and orienting network. In contrast to the existing body of literature, our findings indicate that the group that was subjected to stress shown a faster response time in comparison to the group that was not subjected to stress, although both groups maintained a consistent level of accuracy. They have a quicker reaction time, which may be connected to their increased awareness and alertness. Primary carers of children with neurodevelopmental disorders have a faster reaction time. The constant stresses that come with providing care for a child who has neurodevelopmental disorder (NDD) are the cause of this heightened state. In spite of this, the attention networks were analysed, and the results showed that there were no statistically significant differences between the two groups. Both groups had an extraordinary ability to make use of alerting and orienting signals, which resulted in improved performance in compared to the situation in which there were no additional cues. In addition, the resolution of conflicts that was observed throughout the execution of both the congruent and the incongruent trials revealed similarities between the two groups. In terms of the alerting, orienting, and executive control networks of attention, there were no discernible variations observed between the group that was subjected to stress and the group that was not subjected to stress. According on the findings of earlier studies (Fan et al., Posner, 1992; Posner & Dehaene, 1994), the concept proposes that the three attention networks are distinct entities that do not influence one another. The assertion that was made earlier is accurate for the group that is not experiencing

stress. The current investigation, on the other hand, has resulted in the production of considerable data that demonstrates a strong connection between the attention networks in the group that is stressed. In the group that was suffering stress, there was a significant positive connection between the alerting and orienting network, and there was also a significant negative association between the alerting and executive control network. The association between alertness and the primitive brain regions that are involved for arousal suggests that repeated stimulation of these networks can have a major impact on attention regulation and attentional strategies in individuals who are experiencing stress. A more straightforward explanation would be that the activation of the alerting network assists the orienting network in rapidly focusing on significant inputs. On the other hand, it concurrently prevents the executive function from participating in the attentional process, which interferes with the top-down control mechanism. Integration of neuroimaging techniques should be given top importance in the study that will be conducted in the future in order to investigate the processes by which these networks interact with one another and mutually affect one another in individuals who are under chronic stress. The understanding of the long-term effects of continuous stress exposure and the deficiencies associated with attentional brain networks will be further improved as a result of this.

REFERENCES

[1] Andreotti, C. (2013). Effects of acute and chronic stress on attention and psychobiological stress reactivity in women. *Vanderbilt University*. Published. http://hdl.handle.net/1803/12468

[2] Beckman, P. J. (1991). Comparison of mothers' and fathers' perceptions of the effect of youngchildren with and without disabilities. *American Journal on Mental Retardation*, *95*(5),585–595.

[3] Callejas, A., Lupiàñez, J., Funes, M. J., & Tudela, P. (2005). Modulations among the alerting, orienting and executive control networks. Experimental Brain Research, 167(1), 27–37.https://doi.org/10.1007/s00221-005-2365-z

[4] Callaway, E., & Dembo, D. (1958). Narrowed attention a psychological phenomenon that accompanies a certain physiological change. *A.M.A. Archives of Neurology & Psychiatry*,*79*(1), 74. https://doi.org/10.1001/archneurpsyc.1958.02340010092008

[5] Cohen, S., Kamarck, T., & Mermelstein, R. (1994). Perceived stress scale. *Measuring Stress: AGuide for Health and Social Scientists*, *10*(2),

[6] Contrada, R., & Baum, A. (2010). *The handbook of stress science: Biology, psychology, andhealth* (1st ed.). Springer Publishing Company.

[7] Dunn, M. E. (2001). Moderators of stress in parents of children with autism. *Community MentalHealth Journal*, *37*(1), 39–52. https://doi.org/10.1023/a:1026592305436

[8] Fan, J., McCandliss, B. D., Sommer, T., Raz, A., & Posner, M. I. (2002). Testing the efficiency and independence of attentional networks. *Journal of Cognitive Neuroscience*, *14*(3), 340–347. https://doi.org/10.1162/089892902317361886

[9] Fuentes, L. J., & Campoy, G. (2007). The time course of alerting effect over orienting in the attention network test. *Experimental Brain Research*, *185*(4), 667–672. https://doi.org/10.1007/s00221-007-1193-8

[10] Lee, E. H. (2012). Review of the psychometric evidence of the perceived stress scale. *Asian Nursing Research*, *6*(4), 121–127. https://doi.org/10.1016/j.anr.2012.08.004

[11] Liu, K., Jiang, Q., Li, L., Li, B., Yang, Z., Qian, S., Li, M., & Sun, G. (2015). Impact of elevated core body temperature on attention networks. Cognitive and Behavioral Neurology, 28(4), 198–206. https://doi.org/10.1097/wnn.0000000000000078

[12] Liu, Q., Liu, Y., Leng, X., Han, J., Xia, F., & Chen, H. (2020). Impact of chronic stress on attention control: Evidence from behavioral and Event-Related potential analyses.

[13] *Neuroscience Bulletin*, *36*(11), 1395–1410.

[14] Luipen, S. J., & McEwen, B. S. (1997). The acute effects of corticosteroids on cognition: integration of animal and human model studies. *Brain Research Reviews*, *24*(1), 1–27.https://doi.org/10.1016/s0165-0173(97)00004-0

[15] Lupien, S. J., McEwen, B. S., Gunnar, M. R., & Heim, C. (2009). Effects of stress throughout thelifespan on the brain, behaviour and cognition. *Nature Reviews Neuroscience*, *10*(6), 434–445. https://doi.org/10.1038/nrn2639

[16] MacLeod, J. W., Lawrence, M. A., McConnell, M. M., Eskes, G. A., Klein, R. M., & Shore, D. I. (2010). Appraising the ANT: Psychometric and theoretical considerations of the attention network Test. *Neuropsychology*, *24*(5), 637–651. https://doi.org/10.1037/a0019803

[17] Maestripieri, D., & Hoffman, C. L. (2011). Chronic stress, allostatic load, and aging innonhuman primates. *Development and Psychopathology*, *23*(4), 1187–1195. https://doi.org/10.1017/s0954579411000551

[18] Marin, M. F., Lord, C., Andrews, J., Juster, R. P., Sindi, S., Arsenault-Lapierre, G., Fiocco, A. J.,& Lupien, S. J. (2011). Chronic stress, cognitive functioning and mental health.

[19] Saklatvala, J. (2002). Glucocorticoids: Do we know how they work? Arthritis Research &Therapy, 4(3). https://doi.org/10.1186/ar398

[20] Sapolsky, R. M. (2004). Why zebras don't get ulcers: The acclaimed guide to stress,stress-related diseases, and coping (3rd ed.). Holt paperbacks.

[21] Sapolsky, R. M., Meaney, M. J., & McEwen, B. S. (1985). The development of the glucocorticoid receptor system in the rat limbic brain. III. negative-feedback regulation.*Developmental Brain Research*, *18*(1–2), 169–173.

a. https://doi.org/10.1016/0165-3806(85)90261-5

[22] Sarahian, N., Sahraei, H., Zardooz, H., Alibeik, H., & Sadeghi, B. (2014). Effect of memantineadministration within the nucleus accumbens on changes in weight and volume of the brain and adrenal gland during chronic stress in female mice. *Pathobiology Research*, *17*(2), 71–82.

[23] Squire, L., Berg, D., Bloom, F. E., Lac, D. S., Ghosh, A., & Spitzer, N. C. (2012). *Fundamentalneuroscience* (3rd ed.). Academic Press.

[24] Staal, M. A. (2004). *Stress, cognition, and human performance: A literature review andconceptual framework*. Hanover, MD: Nasa.

[25] Steckler, T., & Holsboer, F. (1999). Enhanced conditioned approach responses

in transgenic micewith impaired glucocorticoid receptor function. *Behavioural Brain Research*, *102*(1–2), 151–163. https://doi.org/10.1016/s0166-4328(99)00003-0

[26] Stokes, A. F., & Kite, K. (2000). On grasping a nettle and becoming emotional. In *Stress,workload, and fatigue* (pp. 107–132). CRC Press.

[27] Wolkowitz, O. M., Reus, V. I., Weingartner, H., Thompson, K., Breier, A., Doran, A., Rubinow,D., & Pickar, D. (1990). Cognitive effects of corticosteroids. *American Journal of Psychiatry*, *147*(10), 1297–1303. https://doi.org/10.1176/ajp.147.10.1297

[28] Wolkowitz, O. M., Reus, V. I., Weingartner, H., Thompson, K., Breier, A., Doran, A., Rubinow,D., & Pickar, D. (1990). Cognitive effects of corticosteroids. *American Journal of Psychiatry*, *147*(10), 1297–1303. https://doi.org/10.1176/ajp.147.10.12