

Relationship between Sensory Responsivity, Loneliness, and Anxiety among Indian Adults with Developmental Coordination Disorder (DCD)

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<http://dx.doi.org/10.13005/bpj/1956>

(Received: 25 November 2019; accepted: 25 March 2020)

Awareness of Developmental coordination disorder has greatly increased and even when it is late in life, diagnosis of DCD in adults will help in majority of ways. To solve the debate and mystery in the literature, the current study examines the association between sensory hyper-responsiveness, anxiety and loneliness in adults with DCD. Current study involved adults with DCD (n = 15, 10 men and 5 women; age group: 20–40 years). All participants had a documented diagnosis of DCD by a registered psychiatrist. Sensory processing, loneliness, and anxiety were assessed with the Adult Sensory Profile, short-form UCLA loneliness scale, and Beck Anxiety Inventory, respectively. There exist a perfect correlation between Sensory hyper-responsiveness with anxiety and loneliness. This study concludes and insisted the need for Interventions for sensory processing difficulties to improve the psychological well-being of adults with DCD.

Keywords: Anxiety; DCD; Sensory Integration Therapy; Sensory Responsiveness.

Developmental coordination disorder (DCD) is a developmental Motor disorder with marked characteristics of difficulty in coordinating body movements and well established difficulty in communication. Difficulty in sensory processing is a predominant difficulty in adults with DCD¹. Every individual has their own pattern of sensory responsiveness. Each one is present with an individualized pattern. Environment will provide a good amount sensory input in all the activities of daily life. How the environmental demands were placed on the adults with DCD and how the sensory information is processed and how they respond to the environmental demands was paid attention when analyzing an adult with DCD².

When the sensory responsiveness is depicted with a bell-shaped distribution, majority of the adults have mild response to sensory stimulus from the environment and few individuals respond more immensively. As every individual has a unique sensory pattern, not all the sensory stimulus or input will produce a response equally for the entire individual, there will be individual differences. The stimulus which is desired to bring a response in an individual should have to exceed the neurological threshold to stimulate the nervous system³. The individual differences in perceiving and responding to a neurological input are based on the neurological thresholds. Either the individual will be having high or low neurological thresholds.



When examined The Dunn's Sensory Processing model it has been clear that sensory responsiveness will emerge based on the interaction that pins between high or low threshold and self-regulation. Neurological threshold is needed to respond to events in everyday life. Individuals with low threshold will respond to environmental stimulus more easily as their neurological system activates easier to sensory inputs. But contrarily individuals with high threshold will not respond to the input because strong input will favor activation of neurological system.

Hypersensitivity will also correlate positively with social skills in adults with DCD. Anxiety is the baseline factor which interlinks sensory hyper-responsiveness and loneliness. When these three factors interlink it affects the physical and emotional imbalances which is manifested in and as gastrointestinal problems. In adults with DCD there is a high prevalence rate of Sensory hyper-responsiveness and it affects visual perception, auditory stimulus reception, tactile response to input from the environment, smell, taste, and proprioception. Loneliness affects the psychological well being of the adult with DCD⁶. It directly interferes with the mental and physical health of adults. DCD adults were affected by social isolation, the reason underlies social isolation is difficulties in interacting with peer group with social skills, leading to deeper consequences of loneliness. However, research on the relationship between loneliness and mental health in adults with DCD is still in debate.

SUBJECTS AND METHODS

Subjects

Sample size

The sample size for this current study was calculated to assess of the effects of evaluation of sensory responsiveness, loneliness, and anxiety in Indian adults with developmental coordination disorder (DCD). The sample size was analyzed based on a confidence interval of 95%.

Procedure

The principal investigator Dr.Ganapathy sankar has obtained approval for the research (A-NO-25) from research meet at SRM College of occupational therapy, SRM institute of science and technology and included adults with DCD from the

developmental therapy centers and organizations. The principal investigator gained the confidence of the participants by explaining the study in detail and by submitting the information sheet of the study to the parents and caregivers of the adults with DCD.

The characteristics of participants included in the study are presented in (Table 1). Participants were diagnosed with DCD in accordance to DSM-IV criteria and the adults with DCD were included into the study (n = 15, age group: 20–40 years). All participants had a documented diagnosis of DCD by a registered psychiatrist. The principal investigator assessed the information sheet and the assessment done by the psychiatrist. Dr.U.Ganapathy sankar confirmed the diagnosis by the AAC-Q. Excluded the adults with IQ less than 70. During the baseline assessment reading and writing skills were tested by instructing the adults to read a paragraph and write it. All the adults were from India, English / Tamil papers were provided by considering their native language.

Measures

Sensory Profile: The Adult Sensory Profile is used to analyze the sensory processing and this is the reliable and valid test in examining the sensory profile. It contains 60 questions, which analyzes four factors of sensory processing skill. Total score lies in the range of 15–75.

Anxiety: The Beck Anxiety Inventory (BAI) was used to examine the anxiety and its severity. The BAI has 21 items that assess the severity of anxiety in adults. Participants were instructed to report the symptoms they experience using a 4 point (0 = "not at all," 3="severely"). Total scores lies between 0 to 63.

Loneliness: The short-form UCLA loneliness scale is used and scored using a 4-point

Table 1. Demographic data

Participants details	n(mean)
Gender	Male- 10 Female- 5
Age	28.8
Educational level	High school- 68 College- 20
Employed	35
Marrital status	80

Likert scale ranging from 1 (never) to 4 (always). Total score is from 8–32

AAC-Q: Adolescent and adults Coordination Questionnaire was used to identify the DCD Adults.

Demographic Information: Participants were assessed in the baseline and questioned for demographic profile that lists the information including age, gender, associated psychiatric disorders, educational status, employment, marital status, personal habits (TABLE 1). Data Analysis. SPSS 20.0 for Windows

RESULTS

Sensory responsivity in adults with DCD mean scores were 40.1, 42.2, 42.6 and 40.6 respectively. The mean score for anxiety was 20.0 and reported severe level of anxiety. The mean score resulted for loneliness was 25.2 on the ULS-8. The correlation matrix was used to assess the relationship between sensory hyper-responsiveness, anxiety and loneliness. There is a perfect correlations existed among the above mentioned variables. A significant positive correlation was obtained between sensory avoiding and anxiety, it highlights that adults with DCD resulted with greater level of anxiety when sensory avoiding is present, they can't execute the ADL by overcoming the environmental demands placed on them. DCD and sensory avoiding were correlated positively with loneliness and anxiety ($p < 0.001$).

DISCUSSION

The current study was to summarize the association between sensory avoiding, anxiety, and loneliness in adults with DCD. The results suggest that in adults with DCD, more sensory avoiding was correlated with higher level of anxiety and loneliness. Loneliness is expressed as a moderator between sensory avoiding and anxiety. Thus sensory processing difficulties not only present in children with DCD, however it also invigilates into adults and adolescents.

This result is consistent with that of a study by Dr. Ganapathy Sankar, which revealed that caregivers burden is greater with DCD children and that study highlighted that if not diagnosed at the earlier stage, children will not outgrow of DCD,

but they suffer with coordination disorder in Adult life too. The sensory feature will be subjected to variation in each age band and the consideration must be given to gender difference too. But these types of hypothesis need further examination and this is considered to be the limitation in the initial pilot trail. Adults with Developmental coordination disorder reported sensory avoiding and they experience more feeling of loneliness and they found themselves isolated from the environment and the society in which they live. Furthermore, loneliness is considered to be the important factor that serves as a mediator for sensory avoiding and anxiety. Moreover, the lack of treatment strategies for treating adults with sensory processing difficulties could also affect their emotional well-being. Self-regulation is based on the behavioral strategies. Two instances can demonstrate self-regulation in detail, individual when placed at a position to receive multiple sensory stimuli from the environment, but responds without any passive self-regulation strategy will respond to all the input and ends with frustration. Few adults were mastered in adapting a self-regulation strategy to the multiple environmental stimuli placed around him. Adults with DCD may exhibit a low or high neurological threshold to environmental sensory stimulus. Sensory hyper-responsiveness correlated with sleep problems in ADULTS with DCD^{4,5}. It has been proved that auditory sensitivity affects the adults ability to process information by listening.

When considering the general population, loneliness has a negative effect over physical & psychological well being¹⁰. Adults with DCD may be more prone to anxiety if they experience more sensory hyper-responsiveness and perceive greater loneliness. Thus, our results conclude that feelings of loneliness have high impacts on the psychosocial wellbeing of adults with DCD. The findings of the current study have important implications in designing the subsequent therapeutic interventions in adults with DCD.

Data Availability

The data used in this study are available from the corresponding author upon request.

ACKNOWLEDGMENTS

We thank the individuals who participated in this research.

REFERENCES

1. American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders, American Psychiatric Association, Washington, DC, USA, 5th edition, (2013).
2. Hill, E. L., Brown, D., & Sorgardt, K. S. A preliminary investigation of quality of life satisfaction reports in emerging adults with and without developmental coordination disorder. *Journal of Adult Development*, **18**(3), 130–134 (2011).
3. Hill, E. L., & Brown, D. Mood impairments in adults previously diagnosed with Developmental Coordination Disorder. *Journal of Mental Health*, (2013); doi:10.3109/09638237.2012.745187.
4. Kirby, A., Edwards, L., Sugden, D. A., & Rosenblum, S. The development and standardization of the adult developmental coordination disorders/dyspraxia checklist (ADC). *Research in Developmental Disabilities*, **31**(1), 131–139 (2010).
5. U.Ganapathy Sankar, Monisha.R. (2019). prevalence rate of childhood obesity in Kattankulathur. *International Journal Of Advanced Research In Medical & Pharmaceutical Sciences* (IJARMPS-ISSN-2455-6998), **4**(2).
6. U.Ganapathy sankar, Monisha.R: Evaluation of Cardio-Vascular Risk in Children with Developmental Coordination Disorder in Indian Context- Pilot Study: *Research J. Pharm. and Tech.* **11**(12): (2018)
7. U.Ganapathy sankar, Monisha.R: Life Impact of Developmental Coordination Disorder:Qualitative Analysis of Patient and Therapist Experiences; *Biomedical & Pharmacology Journal*, **12**(1): p. 491-494 (2019).
8. Nichols, S. A., McLeod, J. S., Holder, R. L., & McLeod, H. S. T. Screening for dyslexia, dyspraxia and Meares-Irlen syndrome in higher education. *Dyslexia*, **15**(1); 42–60 (2008).
9. Piek, J. P., Rigoli, D., Pearsall-Jones, J. G., Martin, N. C., Hay, D. A., Bennett, K. S., *et al.* Depressive symptomatology in child and adolescent twins with attention-deficit hyperactivity disorder and/or developmental coordination disorder. *Twin Research and Human Genetics*, **10**(4): 587–596 (2007).
10. Skinner, R. A., & Piek, J. P. Psychosocial implications of poor motor coordination in children and adolescents. *Human Movement Science*, **20**: 73–94 (2001).
11. Tal-Saban, M., Zarka, S., Grotto, I., Ornoy, A., & Parush, S. The functional profile of young adults with suspected Developmental Coordination Disorder (DCD). *Research in Developmental Disabilities*, **33**: 2193–2202 (2012).
12. Rasmussen, P., & Gillberg, C. Natural outcome of ADHD with developmental coordination disorder at age 22: A controlled, longitudinal, community based study. *Journal of the American Academy of Child and Adolescent Psychiatry*, **39**: 1424–1431 (2000).