

Correlation between Vanderbilt ADHD Diagnostic Scale and the Draw-a-Man Test in School Children

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ABSTRACT

Introduction: The Draw-A-Man Test (DAMT) is a culture free developmental process test to assess children's nonverbal abilities. It has been widely used to measure their intellectual and psychological development. The possible correlation between the results of DAMT and the attention deficit hyperactivity disorder (ADHD) symptoms was investigated in school-age children.

Methods: Non-probability sampling method was used to select students aged 48-137 months, who are students in private educational institution from Nursery 1-2 and Primary 1-2-3-4 grades. Students were selected from private school in capital city, Abuja, Nigeria. Children were asked to draw a human figure on a piece of paper for DAMT. The Vanderbilt ADHD Diagnostic Rating Scale (VADRS) was used to assess the ADHD symptoms.

Results: There was negative correlation between DAMT and classroom behavioral performance score in VADRS. Additionally, there was positive correlation between DAMT and academic performance score in VADRS. However, there were no correlation between both DAMT-1 and DAMT-2 and other ADHD symptom scores.

Discussion: A previous study showed that decreased DAMT scores were associated with behavioral and cognitive disabilities. The results of present study suggest that DAMT is not convenient to screen the ADHD in school age children.

Conclusion: DAMT can be a good indicator for academic and classroom performances related to ADHD but it is not convenient to screen the ADHD symptoms in school age children.

Key words: Draw-a-man test, ADHD, Vanderbilt diagnostic rating scale, Children

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INTRODUCTION

The importance of child development, psychology and education increases gradually in recent years. Many studies have been conducted to have correct and scientific information related to normal and abnormal developmental processes [1]. Different developmental capabilities such as gross and fine motor skills, personal-social skills, language and communication and problem-solving (cognition) can be assessed in children [2]. A lot of questionnaires to discover

developmental or educational delays in children worldwide have been established and validated accurately and systematically [3].

The Draw-A-Man Test (DAMT), first conceived by Dr. Florence Goodenough in 1926, is a developmental process test to assess children's culture free nonverbal abilities [4]. It has been widely used by child psychiatrists to measure intellectual and psychological development in children [5,6]. Also, DAMT has rarely been used with right cerebrovascular accident patients to determine personal neglect [7]. DAMT is a skill test to measure a child's mental age through a figure drawing task. It estimates the progress of learning visual, cognitive, and motor skills by

having the candidate draw a human figure, scoring the drawing for presence and quality of figure features, and comparing the score to children's typical rate of acquisition of figure features.

The Vanderbilt ADHD Diagnostic Rating Scale (VADRS) is a psychological assessment tool for teachers/parents of children aged 6 to 12 designed to measure the severity of attention deficit hyperactivity disorder (ADHD) symptoms. In 2002, the AAP and the National Initiative for Children's Healthcare Quality (NICHQ) jointly published a toolkit to be used in the assessment and treatment of ADHD in primary care settings (available at www.nichq.org) [8]. This rating scale is open to the public [9].

In a recent study, behavioral and cognitive disabilities were associated with the results of DAMT in school-age children [10]. DAMT may be relevant to detect behavioral abnormalities such as attention deficit and hyperactivity in the classroom in school-age children. This is a hypothetical study. We hypothesized that the results of DAMT may be correlated with the data resulted from VADRS in school-age children.

METHODS

Participants

Teachers of students (n=239) who had classes at the time of the study were approached and requested to participate in the study. Non-probability sampling method (purposive sampling) was used to select students aged 48-137 months, who are students in private educational institution from Nursery 1-2 and Primary 1-2-3-4 grades. Students were selected from private school in capital city, Abuja, Nigeria. Age of the participants was not different statistically by gender.

In respect to ethical concerns, the purpose of the study was briefly explained to all the parents and teachers of the participants, and researchers promised that test results would be kept confidential and only accessible by school management. Guidance and counselor of the respective educational institutions were also involved in the study as volunteers, in order to see the progress of their students and for transparency purpose. Exclusion criteria were known or diagnosed health problems, such as psychiatric and central or autonomic nervous system diseases and physical or mental disabilities. Also, children with ADHD diagnosed clinically did not include the study.

The experimental protocol was in accordance with international ethical standards. The study was carried out in accordance with the Helsinki Declaration (1975, revised in 1996-2013). The study was descriptive cross-sectional. All parents and teachers of students voluntarily gave a written informed consent to participate in the study. The study was anonymous. A paper-and-pencil based method of drawing figure was utilized. The study was conducted between March 2018 and January 2019.

Assessment of DAMT-1 and DAMT-2

Children were asked to draw a human figure on a piece of paper (Figure 1). The rating scale contains 51 items. Each item was identified and scored carefully. Presence and ratio of the item were dominant features during scoring. Some pictures contained uncertain shapes, and those ones were evaluated by other expertise and vote of majority was used to mark that item or not.

There are two important questions researchers being asking about conducting the Draw-a-Man

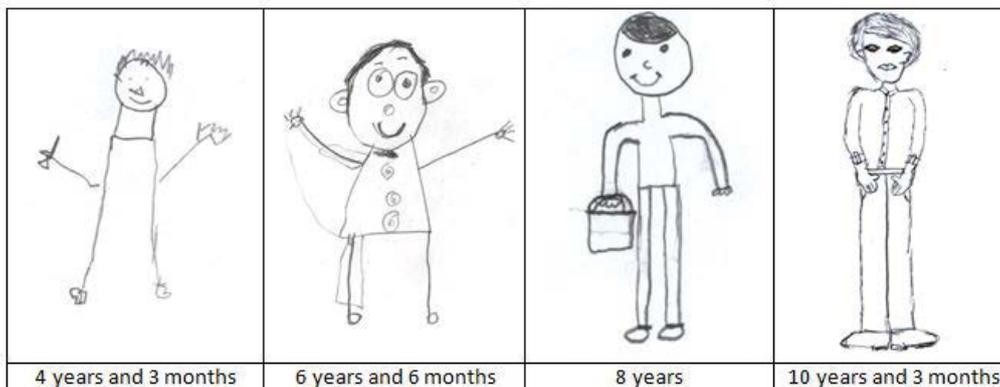


Figure 1: Some examples of drawing of participants by their chronological ages.

test: validity and reliability of the test. As per Anastasi et al. [11], reliability of the test means “consistency of the scores obtained by the same person, when re-examined by the same test on different occasions”. Dunn et al. [12] was one of first to question reliability of Draw-a-Man test in his study, where he conducted the test twice and checked correlation between two them, reaching correlation coefficient of 0.93. We, therefore, decided to conduct the test twice, with 1 week gap between them, to get more reliable data and to check if tests will differ in correlation with other features.

Assessment of VADRS

Attention, hyperactivity, oppositional defiant and conduct disorders and anxiety or depression symptoms and academic and classroom behavioral performances were measured using Vanderbilt ADHD Diagnostic Teacher Rating Scale.

Statistical analyses

Measured values are given as a mean \pm standard deviation (SD). Statistical analysis was performed using SPSS for Windows version 18. The Student's t and one way ANOVA tests were used to compare the depression scores in the participants. A p value less than 0.05 was considered statistically significant.

RESULTS

In total sample, there were significant negative Pearson correlations between age and classroom behavioral performance score in Vanderbilt Diagnostic Teacher Rating Scale ($r=0.29, p=0.00$) and also between age and Grade Point Average (GPA) ($r=0.26, p=0.001$). Also, there were the similar negative correlations for male (VADRS: $r=0.31, p=0.00$; GPA: $r=0.26, p=0.01$) and female (VADRS: $r=0.3, p=0.001$; GPA: $0.26, p=0.02$) participants.

In total sample, there were significant negative Pearson correlations between DAMT-1 and classroom behavioral performance score in Vanderbilt Diagnostic Teacher Rating Scale ($r=0.22, p=0.002$). Also, there were the similar negative correlations for male ($r=0.25, p=0.01$) and female ($r=0.26, p=0.02$) participants.

In total sample, there were significant negative Pearson correlations between DAMT-2 and classroom behavioral performance score in

Vanderbilt Diagnostic Teacher Rating Scale ($r=0.16, p=0.002$). Also, there were the similar negative correlations for male ($r=0.19, p=0.02$) and female ($r=0.26, p=0.02$) participants.

In total sample, there were significant positive Pearson correlations between DAMT-1 and academic performance score in Vanderbilt Diagnostic Teacher Rating Scale ($r=0.15, p=0.03$). Also, there were the similar positive correlation for female ($r=0.26, p=0.02$) participants, but not for male.

In total sample, there were significant positive Pearson correlations between DAMT-2 and academic performance score in Vanderbilt Diagnostic Teacher Rating Scale ($r=0.16, p=0.03$). Also, there were the similar positive correlation for female ($r=0.29, p=0.006$) participants, but not for male.

In total sample, there were significant negative Pearson correlations between GPA and VADRS (Inattention: $r=0.35, p=0.00$; Hyperactivity/impulsivity: $r=0.28, p=0.001$; Oppositional defiant and conduct disorders: $r=0.28, p=0.00$). Also, there were the similar negative correlations for male (Inattention: $r=0.47, p=0.00$; Hyperactivity/impulsivity: $r=0.42, p=0.00$; Oppositional defiant and conduct disorders: $r=0.43, p=0.00$; Anxiety or depression symptoms: $r=0.26, p=0.02$) participants, but not for female.

There were no statistically significant correlation between DAMT (1 and 2) and other ADHD scores (Inattention, Hyperactivity/impulsivity, Oppositional defiant and conduct disorders, Anxiety or depression symptoms) in Vanderbilt Diagnostic Teacher Rating Scale.

DISCUSSION

The VADRS includes both parent and teacher versions of standardized measure of ADHD symptoms. It contains lots of the information required to make a DSM-IV-based diagnosis of ADHD and to screen for common co-morbidities [13,14]. The American Academy of Pediatrics guidelines mentioned the importance of screening for co-morbid learning disorders as part of ADHD evaluations, because about 30% of children with ADHD also meet the criteria for the learning disorders [15].

The VADRS includes achievement items that ask about children's reading, math, and writing

abilities. The utility of a teacher rating scale, the Academic Performance Rating Scale was examined, in identifying children who should be referred by physicians for a psycho-educational evaluation. Bennet et al. reported that it had adequate clinical utility and could be used by physicians to screen for the learning disabilities, that is, teacher's rating of children's reading ability and math ability [16].

In the present study, there were negative correlations between both DAMT-1 and DAMT-2 and classroom behavioral performance score in VADRS in total sample, and both male and female subjects. Additionally, there were positive correlations between both DAMT-1 and DAMT-2 and academic performance score in VADRS in total sample and in female subjects but not in male subjects. However, there were no correlation between both DAMT-1 and DAMT-2 and other ADHD symptom scores in VADRS (Inattention, Hyperactivity/ impulsivity, Oppositional defiant and conduct disorders, Anxiety or depression symptoms). Actually these results are very interesting. In a recent study, delayed DAMT scores were associated with behavioral and cognitive disabilities, but DAMT performance indicators were insufficient to use DAMT as a screening or diagnostic test [10]. It can be stated that DAMT is not convenient to screen the ADHD in school age children but it can be a good indicator for academic and classroom performances related to ADHD. Also, in the present study, there were negative correlations between GPA and ADHD symptoms including inattention, hyperactivity/ impulsivity, and oppositional defiant and conduct disorders. High levels of ADHD symptoms are related to severe negative outcomes, which underscore the importance of identifying early markers of these behavior problems [17]. There are a lot of studies in which children with ADHD show significant academic difficulties in school settings [18,19]. Also, many studies reported that ADHD symptoms is together with multiple neuropsychological deficits [20,21]. The negative correlations in the present study between GPA and ADHD symptoms and above mentioned studies that support them show the reliability of the results of the present study.

CONCLUSION

As a consequent, DAMT may be an indicator classroom behavioral performance and academic

performances in school age children but not convenient to screen the ADHD symptoms including inattention, hyperactivity/impulsivity, oppositional defiant and conduct disorders, anxiety or depression symptoms.

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