Research article

Statistical analysis of childhood and early adolescent externalizing behaviors in a middle low income country

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ABSTRACT

The article show the pattern of externalizing behavior across age, gender, school type, and school level, with reference to aggression, delinquency, and hyperactivity. The study samples were primary school pupils and secondary school students from three selected Local Government Areas (LGA) in Ogun State, Nigeria [Ado-Odo/Ota, Ifo, and Yewa South]. Their ages ranged from 10 to 20 years. The student/pupil sample was 1770 in all. The instrument used was an adapted version of Achenbach's child behavior checklist and youth self-report. Basic descriptive statistics like frequency, percentage, mean, standard deviation, as well as non-parametric statistics like Phi-coefficient, Chi-square, Goodman and Kruskal's gamma, Mann Whitney U test and Kruskal Wallis H test were utilized. Inferential parametric statistics like Pearson r, analysis of variance and simple regression were also utilized. Four major findings were reported. Firstly, the private schools irrespective of age, gender and level, scored higher than the public school in aggression, delinquency, and hyperactivity. Secondly, aggression is higher in secondary schools, while delinquency and hyperactivity are more prevalent in primary schools. Thirdly, school level and school type are the strongest predictors of externalizing behavior. Lastly, correspondence analysis showed a similar behavioral pattern for the three behaviors and three distinct behavioral patterns. i). Respondents aged 10 and below and those in primary schools (ii). Male, public and between 16 and 20. iii). Private, secondary, female and between 11 and 15. Implications of the study are discussed.

1. Introduction

The present study analyzes the data published earlier on the externalizing behavior of primary (elementary) school pupils and secondary (high school) students of three local government areas of Ota in Ogun State, Nigeria [1]. The study is motivated by the quest to obtain the pattern of externalizing behavior (aggression, delinquency, and hyperactivity) using four (4) demographic variables (age, gender, school type, and school level). The study has not been thoroughly considered in a middle-income setting and the demographic variables are yet to be investigated in a single context. Besides, the instrument of data collection is unique, designed to suit the socio-demographics and will be shown later, to be capable of detecting externalizing behavior. Moreover, the results presented in [1] is accentuated to reflect hidden behavioral patterns and deepen our understanding of externalizing behavior.

Behavior is largely a product of thinking. There exist two major classes of behavioral disorders in children and adolescents. Externalizing behaviors are negative behaviors that are channeled towards the external environment while internalizing behavior is directed towards self and may not be disruptive as externalizing behavior [2, 3]. The two major behavioral disorders are inmate in children in active or dormant form. Internalizing behavior can manifest as withdrawal, depression, nervousness, and solitude. Externalizing behavior can manifest as rebellion to constituted authority or failure to comply with stated rules, aggressive tendencies, anti-social behavior, attention deficiencies and disruptive attitudes triggered by impulsivity and under control of emotions. Both behavior disorders differs by their regulatory tactics [4], although they are both influenced by teacher-child conflict [5, 6] and can be as a result of biological processes such as hereditary and genetic [7], ailments [8], prenatal cocaine exposure [9], prenatal maternal stress [10], pregnancy-related complications [11] and shared environment [12]. The combination of genetic and environmental factors have been described to be the major predictors of externalizing behavior [13]. Children's exposure to heavy metal contamination [14] and noise

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pollution exhibit high levels of deviant and disruptive behaviors. Natural disasters like earthquakes and hurricanes can trigger externalizing tendencies in children and young adults. Economic problems, poverty, unemployment, family conflicts or adversity, parental mental health and tobacco use are also positively associated with or predictors of both internalizing and externalizing behaviors. Weak social structure and social exclusion are also breeding grounds for behavioral deviations. Exposure to violent media predisposes both children and adults to both internalizing and externalizing behavioral problems. Children of depressed mothers or adolescents that have experienced parental differential treatments, children and adults from persistent or concordant drinking parents, children that have low receptive language skills and children and adults from polygamous family backgrounds are at a high risk of exhibiting externalizing behavior. Adolescence deviant peer group affiliations, adolescents with tattooing and body piercing, those having history or profile of jailed parents and those that had remained impervious to behavioral corrections are at a high risk. Adults that engage in absenteeism and truancy in high schools and cyberbullying are most likely to exhibit externalizing behavior. Childhood and adolescent externalizing behavior is a serious public health issue and a predictor of later life disruptive behavior, violence, substance use and crime. Peer abusers are example of people who have history of childhood externalizing problems. Early researchers classified externalizing behavioral problems as disruptive, aggressive and hyperactive. Although deviant, antisocial, conduct problem and under controlled are some of the terms used in this context. Socioemotional behaviors have been used to describe externalizing and internalizing behaviors. This paper adopted the widely used three externalizing behavior classification or constructs recommended by, which are aggression, delinquency, and hyperactivity. The three terms are interrelated and they are scarcely studied together. Nevertheless, they are all known as antisocial and deviant behaviors. Externalizing behaviors seem to be attributed more to boys while internalizing behaviors are oriented towards girls. Racial and gender differences are often combined in terms of moderation or mediation with other variables and used to establish a relationship with externalizing behavior. Surprisingly, intervention programs targeted at addressing externalizing behavioral disorders are independent of gender and helps to improve school adjustment and overall academic performance of the students or pupils. Disruptive behavior reduces the time for learning and consequently affects the grades. Positive parenting behaviors and an increased number of adult supervision time could be combined with an intervention program to halt the aggravation of externalizing behavior, thereby unblocking the minds of young people and preventing them from rebelling against the acceptable behavior. Regrettably, the use of sports activities as an intervention program is yet to be found suitable in addressing externalizing behavior whereas active engagement of sports activities have shown to be useful in tackling internalizing behavioral problems. In the same vein, low socioeconomic status and declining life satisfaction can attenuate the effect of the intervention program.

2. Aggression

Aggression consists of physical, emotional and verbal behaviors that are intended to cause harm or injury, hurt or threaten others. Aggression can be directed to children, adults, and animals. Cruelty to pets is an example. The understanding of the concept of aggression takes different forms; it can be viewed as a personality trait, a symptom or a behavioral pattern. The aim may be to protect oneself but in an enormous way or to harm self or others (bullying). In the case of bullying, the victims are often weaker and younger while the aggressors are often stronger, male and older. Researches are yet to determine whether under control of emotions accentuate aggressive behavior in a subconscious or premeditated manner, hence making the classification of aggression difficult. Aggression is resident in the recess of the mind waiting for an external stimulus to trigger it. Research on aggression has revealed that childhood and adolescent aggression can transmit to adulthood and cause serious antisocial behavioral disorders such as violence, murder, and crime, although this has been recently disputed. The authors noted that aggression in children is quite different from an adult as environmental and biological factors can accentuate or attenuate aggressive tendencies over time. This is expected to have far-reaching implications, especially in counseling, learning, intervention, and parenting. Hitherto, childhood aggression continues to predict antisocial behavior in adulthood such as sexual aggression and violence. In terms of gender, boys are generally found to engage in physical and verbal aggression while girls engage in verbal and emotional aggression. Emotional aggression is relative and can take the form of slander, exclusion, neglect and malicious genres. Some researchers noted that boys are oriented towards direct aggression while the girls are known for indirect aggression. Whichever classification that applies, the issue of aggression is due to biological and psychosocial factors. Alcohol use and substance abuse are some of the risk behaviors that can predict adolescent and adult aggression. Children and young adults who experienced a low level of adequate parenting, insensitive and harsh parenting and child to parent violence are most likely to be aggressive. In addition, those that engage in excessive risk-taking tend to be aggressive in adulthood. Regression of academic performance, deteriorating intellectual capabilities, injury and deaths (case of school shootings), loss of property and health issues are some of the consequences of aggressive behavior. The rising global incidence of the manifestations of aggressive behavior among young people warrants urgent intervention programs to stem the ugly tide.

3. Delinquency

Delinquency can manifest as the following antisocial behaviors; robbery, vandalism, puffybery, burglary, theft, mugging, drug or substance use, arson, and violence. Juvenile delinquency is a technical terminology used in this context, to describe a situation where an adolescent below the statutory years of age commits acts that can be imputed as a crime if the person is an adult. At times, the severity of the committed acts can warrant an amendment to crime and as such, the offender or the accused can be treated as an adult. The differences in jurisdiction, culture, race, and political environments forced researchers to adopt the widely used delinquent behaviors listed in, which serves as a unified instrument of measuring behavioral disorders, which is independent of jurisdiction and environment. Although modification exists. Some of the antisocial behaviors in these aspects are lying, truancy, peer pressure, and bad company, stealing and cheating. Hence, the concept of delinquency described in this paper is the aspects of antisocial behavior that do not involve violent acts, loosely known as nonviolent delinquency. No matter the definition, delinquency is loosely viewed as behaving outside the parameters of set values. However, delinquent behavior has been proven a predictor of criminal behavior and victimization, drunkenness and drug use in adults. Risk factors of delinquency are parenting style, family alcoholism, the influence of siblings, peer affiliation or pressure, peer rejection, genetic, poverty, and environmental factors. The effect of parenting style on delinquent behavior is the same for males and females, surprisingly, parental monitoring does not affect the delinquency behavior in boys. Moreover, no gender difference was observed for delinquent behavior, which is contrary to the findings that attributed high susceptibility to boys. Exposure to violence and personal identity formation have been implicated in predicting
delinquent behaviors in young people. For young females, intimate violence can trigger delinquent episodes [93]. Students with disabilities have been identified to have more propensity to be suspended in school due to their delinquent behaviors [94].

Researchers have categorized violent antisocial behaviors like aggression and non-violent ones as delinquency, although, an interlapping exists between them making distinct classification a herculean task. For example, handgun carrying is both a delinquent and aggressive behavior, the intention and mode of use, notwithstanding [95]. The presence of aggressive behavior is likely to trigger delinquent behavior and vice versa [96], for instance, peer delinquency is associated with perceived relational aggression in early adolescence [97].

4. Hyperactivity

Generally, hyperactivity refers to two major types of behavioral disorders, namely, restlessness (impulsivity) and inattention (attention deficits). Attention-deficit/hyperactivity disorder (ADHD) is the term commonly used in the literature [98]. Children and early adolescents can manifest any of the two behaviors; hence, it is cumbersome to isolate inattentiveness from hyperactivity-impulsivity. Inattentiveness includes behaviors such as limited attention span, easily distracted, disorientation, and inability to maintain, manage and organize given tasks, difficulty to listen and carry out given instructions, forgetfulness and making excessive mistakes in a given task. Hyperactivity-impulsivity includes behaviors such as inability to sit still, having little or no sense of danger, risk-taking, interrupting discussions in class or conversations, unthoughtful acts, excessive talking and physical movement, difficulty in queuing and difficulty keeping quiet. Besides, abnormally excitable is typical for hyperactive children and young adults. This article adopts hyperactivity to describe the two behaviors.

The diagnosis of hyperactivity is key to proper treatment and counseling. Diagnosis accuracy reduces with decreasing age; because any child can exhibit hyperactivity [99]. Clinical psychologists treat hyperactivity as a neurodevelopmental disorder [100], which can be identified by the use of electroencephalography (EEG), combined with convolutional neural networks [101]. Maternal health during pregnancy [102] and prenatal exposure to insecticides [103] are associated with hyperactivity. Children diagnosed with hyperactivity have been found to some extent, to experience written expression difficulties [104].

Hyperactivity is more prevalent in children [105] and more evident in boys than girls [106], but the manifestation is different as personality is independent of gender. The high rate of prevalence of hyperactive behavior in children of tender age was reechoed in a study conducted in a low middle-income country [107]. Nonetheless, hyperactivity is implicated in crime [108], road accidents [109] and violence [110] in adults.

Parenting is one key variable that predicts hyperactivity [111]. Negative parenting such as excessive punishment, parenting isolation, violent and abusive parents, gambling parents, alcoholism and attention dispersion can alter the character of young children and push them into antisocial behavior [112]. The negative familial variables that predict hyperactivity in young people could be exacerbated by excruciating poverty, homelessness, and destitution [113]. The onset of puberty can trigger hyperactivity in particular and externalizing behavior in general [114]. Mind-wandering is associated with hyperactivity and impairment [115]. This is expected since impairment in inhibitory control is one of the defining characteristics of hyperactivity [116]. Dietary habits which include excessive eating [117, 118] and unhealthy eating patterns [119] and high levels of sedentary behavior [120] are significantly associated with hyperactive behavior.

5. Study population

The study population was primary school pupils and secondary school students of different schools in three (3) selected Local Government Areas (LGA) of Ogun State, Nigeria. The local government areas are Ado-Odo/Ota, Ifo, and Yewa South. They were chosen because of proximity and similar demographics. The total population of the school was not obtained because in some schools, the school management refused to divulge the information while in some schools, the management gave the condition that their teachers are the only one that are authorized to administer the questionnaires. Parental consent were proxy as the parents consented that only the teachers can administer the questionnaires for health and security reasons.

The demographic variables are a). school type (public, private), b). age group (10 and below, 11–15, 16–20), c). gender (female, male), and d). school level (primary, secondary). School type implies privately owned or publicly funded.

6. Instrument of data collection

A Likert scale Questionnaire was obtained from the modifications of Achenbach’s manual for child behavior checklist and manual for the youth self-report. The idea is to design a questionnaire that is suited for the studied demographics. The questionnaire consists of 100 questions (variables). Only three responses were available and coded 0, 1 and 2. The highest obtainable score is two hundred (200) and the least is zero (0). High scores imply high externalizing behavior. The details can be seen in [1].

7. Survey methodology

Cluster sampling was used to select the schools in the respective LGAs. Thereafter, simple random sampling was used to draw the samples. Parental consent was sought through the respective school administrators. All the schools are duly registered and licensed to admit students and or pupils. The questionnaire was written in simple English words for easy comprehension. The school teachers were briefly trained and assisted in the administration of the questionnaires.

8. Demographics analysis

The survey was carried out between November and December 2016. Two thousand (2000) questionnaires were distributed and 1770 were finally analyzed. A detailed analysis can be found in [1].

9. Analysis of total externalizing behavior scores

The total scores obtained from the analysis of the questionnaires are the measure of the externalizing behavior presented in [1]. The present study dissects the total scores into three behavioral components and the results are discussed. P-value < 0.05 is considered significant.

10. Contingency analysis

Contingency analysis is often applied in psychological studies especially in the analysis of responses from structured or scaled questionnaires. Cross tabulation was used to classify the data and the Chi-square Pearson test was applied subsequently to obtain the association or independence of the demographic factors and the externalizing behavior variables which can be interpreted with the aid of p-values. Significance implies association. Correlation among the categorical variables was shown using Phi-coefficient (mean square contingency coefficient) and Goodman and Kruskal’s gamma simply known as gamma. The contingency analysis is presented for examining the association between externalizing behavior scores (the measure of externalizing behavior) and school type (Table 1), age group (Table 2), gender (Table 3) and school level (Table 4).

The results of the contingency analysis presented in Tables 1, 2, 3, and 4 showed that externalizing behavior is associated with school type, gender, and school level. However, no association exists between externalizing behavior and age.
Table 1. Summary of the contingency analysis between the respondents’ school type and total externalizing behavior score.

| Test                              | Value |
|-----------------------------------|-------|
| Pearson’s Chi-square              | 205.764743*** |
| Phi                               | 0.340956*** |
| Goodman and Kruskal’s gamma       | 0.177257*** |
| Pearson’s R                       | 0.139328*** |

***p < 0.001.

Also, contingency analysis was performed to determine the association between the 100 externalizing behavior variables and the demographic variables and the outcomes are presented for school type (Table 5), age group (Table 6), gender (Table 7) and school level (Table 8). The summary of all the significant associations between the demographic and 100 externalizing behavior variables is presented in Table 9.

The results of the contingency analysis presented in Tables 5, 6, 7, 8, and 9, shows the following: Sixty-two (62), sixty-three (63), thirty-seven (37) and eighty-seven (87) externalizing variables are associated with school type, age, gender, and school level respectively.

11. Mean rank of the externalizing behavior variables

The mean rank was done to quantify and rank the variables. The mean rank revealed the pattern of the scores as responded by the pupils and students. The variables with high mean are the most common externalizing behavior exhibited by the respondents. This is presented in Table 10.

One of the key objective of this paper is to investigate whether the behavioral differences can be explained by the school level (primary or secondary). The total mean score can computed separately for the school levels and the result is shown in Table 11 where it can be clearly seen that the response from the pupils differs quantitatively from the students. A clear deviation is observed in Tables 10 and 11. This is an indication that the behavioral patterns at school levels differs from the general behavioral which to some extent has proved that behavioral segments differs from the total behavioral pattern.

The summary of the mean score differences are presented in Table 12 where it can be seen that the primary school pupils have more score than the secondary school students in 58 variables (questions), ties in only 3 variables and the students scored more than the pupils in 39 variables. This is a strong evidence of the externalizing behavior differed by the school level. This will present a useful guide for behavioral intervention and counseling where areas of high mean scores can be investigated and addressed.

12. Classification of the externalizing variables

The analysis of the externalizing variable was made more meaningful by splitting the 100 variables into aggression, delinquency and hyperactivity showed in Table 13. Independent psychologist carried out the classification and grouped 19 variables under aggression, 57 under delinquency, 18 under hyperactivity and 6 variables were excluded because they cannot be explicitly classified into any of the three behaviors. Overlapping was cited as the reason. Thereafter, the three broad externalizing variables were analyzed.

13. Statistical analysis of the three behavioral constructs

Externalizing behavior was classified into three behavioral constructs, namely; aggression, delinquency, and hyperactivity.

13.1. Gender and the trio of aggression, delinquency and hyperactivity

The descriptive statistics presented in Table 14, shows that the male scored higher than the female in the three behaviors. The Mann-Whitney test shows that the mean scores of males and females are the same for aggression and hyperactivity. However, the mean score is different for delinquent behavior.

Two-way analysis of variance presented in Table 15, showed that the mean scores of the three behaviors across the gender are different. Similarly, the mean score between the genders across the three behaviors is different. The interaction between the gender and the trio of aggression, delinquency, and hyperactivity is significant.

13.2. Age and the trio of aggression, delinquency and hyperactivity

The descriptive statistics presented in Table 16, showed the respondents aged between 11 and 15 scored highest in aggression. Respondents aged 10 and below scored highest in delinquency and hyperactivity. The Kruskal Wallis H test showed that the mean scores of all the age groups are the same in aggression and delinquency but different in hyperactivity.

Two-way analysis of variance presented in Table 17, showed that the mean scores of the three behaviors across the age groups are different. However, the mean score among the age groups across the three behaviors is the same. The interaction between the age and the trio of aggression, delinquency, and hyperactivity is not significant.

13.3. School type and the trio of aggression, delinquency and hyperactivity

The descriptive statistics presented in Table 18, showed the respondents in private schools scored higher than those in public schools in

| Test                              | Value |
|-----------------------------------|-------|
| Pearson’s Chi-square              | 216.363803*** |
| Phi                               | 0.349628*** |
| Goodman and Kruskal’s gamma       | -0.060586 |
| Pearson’s R                       | -0.040193 |

***p < 0.001.
The three behaviors. The Mann-Whitney test showed that the mean scores of private and public schools are different in all three behaviors.

Two-way analysis of variance presented in Table 19, showed that the mean scores of the three behaviors across the school type are different. Similarly, the mean score between the school types across the three behaviors is different. The interaction between the school types and the trio of aggression, delinquency, and hyperactivity is significant.

### 13.4. School level and the trio of aggression, delinquency and hyperactivity

Two-way analysis of variance presented in Table 20, showed that the mean scores of the three behaviors across the school level are different. Similarly, the mean score between the school level across the three behaviors is different. The Mann-Whitney test between the school levels and the trio of aggression, delinquency, and hyperactivity is significant.
Two-way analysis of variance presented in Table 21, showed that the mean scores of the three behaviors across the school levels are different. Similarly, the mean score between the school levels across the three behaviors is different. The interaction between the school types and the trio of aggression, delinquency, and hyperactivity is significant.

### 14. Regression analysis

Regression analysis was done using aggression, delinquency and hyperactivity as the respective dependent variables and the demographic variables as the independent variables.
The regression models as shown in Table 22 are significant despite the low values of both the R square and adjusted R square. Controlling for age and gender, yielded the final regression model that establishes the relationship between aggression and the duo of school type and school level.

14.1. Aggression

The regression coefficient model indicates that school type and school level contributed significantly to the model while gender and age did not.

14.2. Delinquency

The regression coefficient model indicates that all four demographics factors contributed significantly to the model.
14.3. Hyperactivity

The regression coefficient model indicates that school type and school level contributed significantly to the model while gender and age did not.

Controlling for age and gender, yielded the final regression model that establishes the relationship between hyperactivity and the duo of school type and school level.

15. Correspondence analysis

Correspondence analysis is a vital tool used to classify variables regardless of the nature of the variables (dependent and independent). The associations are depicted graphically without establishing inferences. The data of the three behaviors were first broken into nine (9) demographic variables namely, public, private, 10 and below, 11-15, 16-20, female, male, primary and secondary respectively. Correspondence analysis was applied and the two-dimensional graphs were obtained for
aggression (Figure 1), delinquency (Figure 2) and hyperactivity (Figure 3). In all the instances, the model was able to explain 65% of the variability of the data. Three distinct behavioral patterns were obtained.

i). below 10 and primary

ii). Male, public and between 16 and 20

iii). Private, secondary, female and between 11 and 15.

| Variable | School Type | Age Group | Gender | School Level | Variable | School Type | Age Group | Gender | School Level |
|----------|-------------|-----------|--------|--------------|----------|-------------|-----------|--------|--------------|
| 1        |             |           |        |              | 2        |             |           |        |              |
| 2        | *           |           |        |              | 3        |             |           |        |              |
| 3        |             |           |        |              | 4        |             |           |        |              |
| 4        | *           |           |        |              | 5        | *           |           |        |              |
| 5        |             |           |        |              | 6        | *           |           |        |              |
| 6        |             |           |        |              | 7        |             |           |        |              |
| 7        |             |           |        |              | 8        |             |           |        |              |
| 8        | *           |           |        |              | 9        |             |           |        |              |
| 9        | *           |           |        |              | 10       | *           |           |        |              |
| 10       |             |           |        |              | 11       |             |           |        |              |
| 11       |             |           |        |              | 12       |             |           |        |              |
| 12       |             |           |        |              | 13       |             |           |        |              |
| 13       |             |           |        |              | 14       |             |           |        |              |
| 14       |             |           |        |              | 15       |             |           |        |              |
| 15       |             |           |        |              | 16       | *           |           |        |              |
| 16       | *           |           |        |              | 17       |             |           |        |              |
| 17       |             |           |        |              | 18       | *           |           |        |              |
| 18       | *           |           |        |              | 19       |             |           |        |              |
| 19       |             |           |        |              | 20       | *           |           |        |              |
| 20       |             |           |        |              | 21       |             |           |        |              |
| 21       |             |           |        |              | 22       |             |           |        |              |
| 22       |             |           |        |              | 23       |             |           |        |              |
| 23       | *           |           |        |              | 24       | *           |           |        |              |
| 24       |             |           |        |              | 25       |             |           |        |              |
| 25       |             |           |        |              | 26       | *           |           |        |              |
| 26       | *           |           |        |              | 27       |             |           |        |              |
| 27       |             |           |        |              | 28       | *           |           |        |              |
| 28       | *           |           |        |              | 29       |             |           |        |              |
| 29       |             |           |        |              | 30       | *           |           |        |              |
| 30       |             |           |        |              | 31       |             |           |        |              |
| 31       | *           |           |        |              | 32       |             |           |        |              |
| 32       |             |           |        |              | 33       | *           |           |        |              |
| 33       | *           |           |        |              | 34       |             |           |        |              |
| 34       |             |           |        |              | 35       |             |           |        |              |
| 35       |             |           |        |              | 36       |             |           |        |              |
| 36       |             |           |        |              | 37       |             |           |        |              |
| 37       |             |           |        |              | 38       |             |           |        |              |
| 38       | *           |           |        |              | 39       |             |           |        |              |
| 39       |             |           |        |              | 40       |             |           |        |              |
| 40       |             |           |        |              | 41       |             |           |        |              |
| 41       |             |           |        |              | 42       | *           |           |        |              |
| 42       |             |           |        |              | 43       |             |           |        |              |
| 43       |             |           |        |              | 44       |             |           |        |              |
| 44       |             |           |        |              | 45       |             |           |        |              |
| 45       |             |           |        |              | 46       |             |           |        |              |
| 46       |             |           |        |              | 47       |             |           |        |              |
| 47       |             |           |        |              | 48       |             |           |        |              |
| 48       |             |           |        |              | 49       |             |           |        |              |
| 49       |             |           |        |              | 50       |             |           |        |              |

16. Discussion

16.1. Externalizing behavior is associated with school type

This work has shown that the externalizing behavior of children and young adolescents is associated with school variety (private and public schools). Furthermore, the association confers different behavioral patterns
in privately owned and publicly funded primary and secondary schools. Although, it has been shown by [121] that students in secondary schools have twice more odds to exhibit externalizing behavior than their colleagues in private schools, this present study considered both primary and secondary schools. The outcome is highly expected because of the income disparity in Nigeria. Children from high-income families attend private schools while those from low-income attend public schools [122]. Privately funded schools have a low student to teacher ratio compared with public

| Variable | Rank | Variable | Rank | Variable | Rank | Variable | Rank | Variable | Rank |
|----------|------|----------|------|----------|------|----------|------|----------|------|
| Q19      | 74.51| Q28      | 59.45| Q82      | 53.70| Q5       | 46.49| Q32      | 40.79|
| Q50      | 73.65| Q2      | 59.20| Q77      | 53.30| Q71      | 45.69| Q10      | 40.68|
| Q33      | 73.14| Q7      | 58.81| Q100     | 53.24| Q23      | 45.45| Q44      | 39.92|
| Q41      | 71.49| Q59     | 58.81| Q34      | 53.13| Q37      | 45.30| Q79      | 39.87|
| Q35      | 70.10| Q91     | 58.12| Q51      | 53.13| Q24      | 45.27| Q67      | 38.10|
| Q1      | 69.30| Q30     | 57.91| Q81      | 52.41| Q96      | 45.06| Q13      | 38.01|
| Q58      | 69.01| Q40     | 57.90| Q27      | 52.33| Q97      | 44.98| Q63      | 37.93|
| Q70      | 66.59| Q88     | 57.25| Q39      | 51.32| Q61      | 44.75| Q42      | 37.50|
| Q9      | 66.14| Q49     | 56.74| Q66      | 51.16| Q22      | 44.50| Q84      | 37.43|
| Q89     | 65.95| Q87     | 56.53| Q48      | 50.8 | Q31      | 44.41| Q98      | 37.36|
| Q65      | 64.79| Q95     | 56.40| Q21      | 50.74| Q26      | 44.04| Q72      | 36.28|
| Q52      | 63.26| Q62     | 56.04| Q17      | 49.77| Q18      | 43.91| Q55      | 36.05|
| Q94      | 63.24| Q78     | 55.23| Q25      | 49.73| Q86      | 43.55| Q56      | 34.93|
| Q90      | 62.82| Q8      | 54.58| Q38      | 49.24| Q6       | 43.42| Q99      | 34.75|
| Q57      | 61.25| Q69     | 54.47| Q73      | 48.85| Q93      | 42.83| Q80      | 32.12|
| Q54      | 60.11| Q75     | 54.21| Q64      | 48.11| Q14      | 42.59| Q4       | 32.06|
| Q20      | 60.00| Q47     | 54.16| Q16      | 47.81| Q3       | 42.23| Q46      | 31.93|
| Q60      | 59.81| Q53     | 53.93| Q74      | 47.76| Q43      | 41.68| Q11      | 31.34|
| Q36      | 59.55| Q85     | 53.93| Q92      | 46.95| Q45      | 41.62| Q76      | 31.12|
| Q15      | 59.49| Q29     | 53.76| Q83      | 46.94| Q68      | 41.36| Q12      | 30.64|

Table 10. Mean rank of the externalizing variables arranged in descending order.

| Variable | Primary | Secondary |
|----------|---------|-----------|
| Q19      | 65      | 68        |
| Q50      | 48      | 53        |
| Q33      | 46      | 22        |
| Q41      | 18      | 10        |
| Q35      | 41      | 30        |
| Q1      | 39      | 25        |
| Q58      | 48      | 51        |
| Q70      | 48      | 44        |
| Q9      | 62      | 64        |
| Q89     | 18      | 25        |
| Q65      | 12      | 9         |
| Q52      | 16      | 7         |
| Q94     | 23      | 19        |
| Q90     | 38      | 24        |
| Q57      | 46      | 54        |
| Q54      | 36      | 34        |
| Q20      | 45      | 35        |
| Q60      | 34      | 27        |
| Q15      | 46      | 55        |
| Q28     | 33      | 39        |
| Q2      | 23      | 32        |
| Q7      | 34      | 30        |
| Q59     | 32      | 30        |
| Q91     | 39      | 36        |

Table 11. The mean score based on the school level.

Table 12. The frequency of the difference between the mean scores of the variables based on the school level.
schools [123], hence, teachers are in a better position to monitor and correct behavior lapses exhibited by the students or pupils. On the other hand, public-funded schools are overcrowded because the population is skewed towards low-income families, and the teachers have enormous workloads and cannot effectively monitor the behaviors of the children. In this case, the emphasis of the teachers is exclusively teaching and not behavioral corrections. The inability of teachers in public schools to adequately monitor the students results to absenteeism [124] and truancy [125], which are some of the manifestations of externalizing behaviors. The low motivation of public school teachers is also a contributory factor.

Table 13. Summary of the Classification of the 100 externalizing variables.

| Behavior      | Variables | Total |
|---------------|-----------|-------|
| Aggression    | 2 9 12 14 15 21 24 28 48 49 50 53 54 57 62 65 70 71 77 | 19    |
| Delinquency   | 1 3 4 10 11 13 16 17 19 22 23 25 26 29 31 32 33 34 35 | 57    |
| Hyperactivity | 5 6 7 8 18 20 27 30 47 75 78 79 83 87 90 91 97 98 | 18    |
| Neither       | 52 58 81 86 89 95 | 6     |

Table 14. Descriptive statistics and t test of gender and the three behaviors.

| Behavior   | Statistic | Male | Female | W     | P-value |
|------------|-----------|------|--------|-------|---------|
| Aggression | Mean      | 17.91| 17.63  | 694240.5 | 0.406   |
|            | Median    | 18   | 18     |        |         |
|            | St. Dev   | 7.226| 6.719  |        |         |
|            | Sum       | 13862| 17563  |        |         |
|            | Total     | 774  | 996    |        |         |
| Delinquency| Mean      | 40.69| 38.5   | 857698.5| 0.0229  |
|            | Median    | 39   | 37     |        |         |
|            | St. Dev   | 17.538| 15.752|        |         |
|            | Total     | 31496| 38344  |        |         |
| Hyperactivity| Mean   | 14.49| 14.33  | 876348.5| 0.599   |
|            | Median    | 14   | 14     |        |         |
|            | St. Dev   | 5.963| 5.779  |        |         |
|            | Total     | 11214| 14276  |        |         |

Table 15. ANOVA assessing interaction between gender and the three behaviors.

| Source    | SS         | Df | MS         | F       |
|-----------|------------|----|------------|---------|
| Rows (R)  | 654964.02  | 2  | 327482.01  | 2754.29*** |
| Column (C)| 1000.82    | 1  | 1000.82    | 8.42***  |
| R x C     | 1140.34    | 2  | 570.17     | 4.8***   |
| Error     | 630639.45  | 5304 | 118.9   |         |
| Total     | 1287744.63 | 5309|            |         |

***p < 0.001.

Table 16. Descriptive statistics and one-way ANOVA of age and the three behaviors.

| Behavior  | Statistic | ≤ 10 | 11 ≤ 15 | 16 ≤ 20 | H-value | P-value |
|-----------|-----------|------|---------|---------|---------|---------|
| Aggression| Mean      | 17.29| 17.92   | 17.44   | 2.353   | 0.3084  |
|           | Median    | 17   | 18      | 18      |         |         |
|           | St. Dev   | 7.952| 6.752   | 7.089   |         |         |
|           | Sum       | 2698 | 21541   | 7186    |         |         |
|           | Total     | 156  | 1202    | 412     |         |         |
| Delinquency| Mean     | 40.82| 39.41   | 39.09   | 1.184   | 0.5531  |
|           | Median    | 39   | 38      | 37      |         |         |
|           | St. Dev   | 17.372| 16.616| 16.131  |         |         |
|           | Sum       | 6368 | 47368   | 16104   |         |         |
| Hyperactivity| Mean    | 15.35| 14.56   | 13.57   | 13.703  | 0.0011  |
|           | Median    | 16   | 14      | 13      |         |         |
|           | St. Dev   | 6.134| 5.827   | 5.766   |         |         |
|           | Sum       | 2394 | 17505   | 5591    |         |         |
16.2. Externalizing behavior is not associated with age

The present study has shown that externalizing behavior is not associated with age, an indication that externalizing behavioral pattern is the same for ages considered in this work. The implication is that an intervention program must target all the age groups, although some specific age groups may be tagged the riskiest. Early findings indicated that antisocial behavior attenuates as children migrate to adulthood [43]. This is increasingly been disputed since externalizing behavior is a predictor of crimes, violence and substance abuse in adults [38]. This is been reechoed in the present study that externalizing behavioral patterns is the same in children and early adolescents. Moreover, recent studies employ

| Table 17. ANOVA assessing interaction between age and the three behaviors. |
|-----------------------------|---------------|---------------|---------------|---------------|
| Source                     | SS            | df            | MS            | F             |
| Rows (R)                   | 654964.02     | 2             | 327482.01     | 2747.37***    |
| Column (C)                 | 523.42        | 2             | 261.71        | 2.2           |
| R x C                      | 387.62        | 4             | 96.91         | 0.81          |
| Error                      | 631869.57     | 5301          | 119.2         |               |
| Total                      | 1287744.63    |               |               |               |

***p < 0.001.

| Table 18. Descriptive statistics and one-way ANOVA of school type and the three behaviors. |
|---------------------------------|-----------------|-----------------|-----------------|
| Behavior                         | Value           | Private         | Public          | W         | P-value   |
| Aggression                      | Mean            | 18.51           | 17.33           | 597681    | 0.0004    |
|                                | Median           | 19              | 17              |           |           |
|                                | St. Dev          | 6.973           | 6.895           |           |           |
|                                | Sum              | 11738           | 19687           |           |           |
|                                | Total            | 634             | 1136            |           |           |
| Delinquency                     | Mean            | 42.3            | 37.87           | 621419    | <0.0001   |
|                                | Median           | 41              | 36              |           |           |
|                                | St. Dev          | 16.48           | 16.443          |           |           |
|                                | Sum              | 26816           | 43024           |           |           |
| Hyperactivity                   | Mean            | 15.54           | 13.76           | 624024    | <0.0001   |
|                                | Median           | 16              | 13              |           |           |
|                                | St. Dev          | 5.879           | 5.753           |           |           |
|                                | Sum              | 9855            | 15635           |           |           |

| Table 19. ANOVA assessing interaction between school type and the three behaviors. |
|---------------------------------|---------------|---------------|---------------|---------------|
| Source                          | SS            | df            | MS            | F             |
| Rows (R)                        | 654964.02     | 2             | 327482.01     | 2788.25***    |
| Column (C)                      | 7404.01       | 1             | 7404.01       | 63.04***      |
| R x C                           | 2418.45       | 2             | 1209.22       | 10.3***       |
| Error                           | 622958.15     | 5304          | 117.45        |               |
| Total                           | 1287744.63    | 5309          |               |               |

***p < 0.001.

| Table 20. Descriptive statistics and one-way ANOVA of school level and the three behaviors. |
|---------------------------------|---------------|---------------|---------------|---------------|
| Behavior                        | Value         | Primary       | Secondary     | W         | P-value   |
| Aggression                      | Mean          | 16.99         | 17.96         | 307899    | 0.0395    |
|                                | Median        | 17            | 18            |           |           |
|                                | St. Dev       | 7.651         | 6.375         |           |           |
|                                | Sum           | 6251          | 25174         |           |           |
|                                | Total         | 368           | 1402          |           |           |
| Delinquency                     | Mean          | 42.66         | 38.62         | 358044.5  | 0.0002    |
|                                | Median        | 41            | 37            |           |           |
|                                | St. Dev       | 18.671        | 15.897        |           |           |
|                                | Sum           | 15700         | 54140         |           |           |
| Hyperactivity                   | Mean          | 15.17         | 14.2          | 352943.5  | 0.0019    |
|                                | Median        | 15            | 14            |           |           |
|                                | St. Dev       | 6.281         | 5.739         |           |           |
|                                | Sum           | 5581          | 19909         |           |           |
age as a moderating or mediating variable between their studied variables and externalizing behavior. Intimate sexual violence [126] and exposure to greenspaces [127] are examples of the studied variables.

16.3. Externalizing behavior is associated with gender

Most studies link externalizing behavior to gender [128]. Hitherto, boys lead girls in any given methodology such as self, teacher scores and parental scores [121]. The present study has extended gender differentials in externalizing behavior disorders to different age groups, school type, and school level.

16.4. Externalizing behavior is associated with school level

Externalizing behavior in this study is associated with the school level (primary, secondary) [129]. The findings are opposite to [130] where the study population was restricted to girls only. Surprisingly, this is in variance with age because age is what often determines primary (elementary) and secondary (high school) educational level. The present study has shown that there are hidden variables that confer different externalizing behaviors between primary and secondary schools. Two of the reasons are gender and school types. The respondents externalizing behavior is associated with gender and school type, which spreads across the primary and secondary schools. Primary school pupils that attend private schools are most likely to have different externalizing behavior with those that attend public primary schools. The same applies to secondary schools. Similarly, boys display more externalizing behavior than girls at both primary and secondary schools.

16.5. Externalizing behavior differences and the demographics

Contingency analysis showed that the externalizing behavioral patterns differ mostly in school level (87/100), age (63/100), school type (62/100) and gender (37/100) in the given 100 externalizing variables in the questionnaire. This study has shown that the externalizing behavioral pattern is completely different in secondary and primary schools. To fully comprehend the contingency and mean results, the 100 questions in the questionnaires were split into the aggression, delinquency, and hyperactivity. Analysis of the behaviors in bits will reveal some patterns, inadvertently concealed in the whole analysis.

Table 21. ANOVA assessing interaction between school level and the three behaviors.

| Source       | SS          | df | MS        | F       |
|--------------|-------------|----|-----------|---------|
| Rows (R)     | 654964.02   | 2  | 327482.01 | 2768.24 *** |
| Column (C)   | 1588.02     | 1  | 1588.02   | 13.42 *** |
| R x C        | 3731.06     | 2  | 1865.53   | 15.77 *** |
| Error        | 627461.53   | 5304 | 118.3     |
| Total        | 1287744.63  | 5309 |           |

***p < 0.001.

Table 22. Regression of the three behaviors against the demographic variable.

| Behavior    | Constant  | School type | Age     | Gender | School level | Adjusted R Square | F       |
|-------------|-----------|-------------|---------|--------|--------------|-------------------|---------|
| Aggression  | 16.890*** | 1.126***    | -0.213  | -0.340 | 1.131*       | 0.008             | 4.785*** |
| Aggression II | 16.553*** | 1.189***    | 5.165*** | -1.994* | -5.309***    | 0.032             | 15.586*** |
| Delinquency | 14.773*** | 1.702***    | 2.352*** | -0.135 | -0.797*      | 0.024             | 11.816*** |
| Hyperactivity | 14.519*** | 1.776***    | -0.239  | -0.952*** | 0.024       | 11.816***         |

*p < 0.05; ***p < 0.001, Aggression II = controlling for age and gender, Hyperactivity II = controlling for age and gender.

Figure 1. Correspondence plot for aggression and the demographic variables.

Figure 2. Correspondence plot for delinquency and the demographic variables.
16.6. Gender and the trio of aggression, delinquency and hyperactivity

Expectedly, males scored higher than females in aggression, delinquency, and hyperactivity. The present study corroborates the findings of [65] and [67]. Genetic and environmental factors are the prime contributory factors [63]. The present study has shown that delinquent behavior is inclined to boys than girls, which is a submission of [90] and contrary to [88, 89]. The same was observed for hyperactivity [106].

Similar aggressive and hyperactive behavioral patterns were observed for both males and females which is contrary to the findings of [131]. The difference is because of the cumulative effects of demographics used in [131] while the present study is from single demography.

However, delinquent behavioral pattern is different for both genders, although gender differences in delinquent behavior are often moderated by other variables such as incarceration [132] and parenting methods [133]. This research is one of the few that reported similar aggressive and hyperactive behavioral patterns for male and female children and young adolescents.

The interaction between the gender and the trio of aggression, delinquency, and hyperactivity (ADH) is significant. This is an indication that the effects on gender on the three behaviors are different. The finding is parallel to [134], although the authors included resilience, somatic symptoms to aggression, delinquency, and hyperactivity.

16.7. Age and the trio of aggression, delinquency and hyperactivity

The respondents aged between 11 and 15 scored highest in aggression. This is expected because that age bracket marks the onset of puberty where hormonal changes can trigger aggressive behaviors [135] such as bullying [136]. The aggression slowed down between ages 16 and 20 which is expected to attenuate or remain latent as the adolescents advance towards adulthood [137].

The present study showed that delinquency decreases as age increases [138]. Ironically, the Kruskal Wallis test showed that age is not related to delinquency. Numerous findings point to the contrary [139, 140]. This is traceable to the fact that most of the studies considered homogenous populations but the present finding considered a heterogeneous one.

Similarly, hyperactivity decreases as the ages of the respondents increases but a significant association was established between age and hyperactivity. Expectedly, it has been shown that hyperactivity decreases as children migrate to adulthood [141]. The study population and other variables determine whether hyperactivity is associated with age [115, 142, 143].

The interaction between the age and the trio of aggression, delinquency, and hyperactivity is not significant. This explains the reasons why different results are obtained by different researchers and a pointer that a significant interaction is possible if the median is used instead of the mean, the same number of variables for the three behaviors or environmental and biological factors that cannot be captured using questionnaires.

16.8. School type and the trio of aggression, delinquency and hyperactivity

This is one of the four areas; this work makes substantial additions to the literature. Unexpectedly, the private schools irrespective of age, gender and level scored higher than the public school in aggression, delinquency, and hyperactivity and their mean scores are different. In the aggression aspect, the present study corroborates the findings of [144], which was a study conducted in the southern Philippines. Similar results on emotional problems have been reported [145]. Caution is advocated in terms of hyperactivity because private schools are often victims of false positives [146].

Although the sample size of public schools is higher than the private schools, the effects are equaled by the average or the mean. Another explanation could be that the teachers in the public schools did not monitor the students/pupils effectively during the period of questionnaire administration or the students in the private schools understand the questionnaire better than those in the public schools [147]. As mentioned earlier, the workload of teachers in public schools could be culpable [148]. The present work has shown the presence of behavioral differences between private and public schools in Nigeria. Nevertheless, this finding has shown that intervention programs should be targeted at private schools if the reduction of the prevalence of behavioral disorders in Nigeria is anticipated. Despite the perceived advantages of private education [149, 150], parents are to be aware that sending their wards there would not shield them from externalizing behavior unless a targeted action is taken to address disruptive behavior observed in them. Even religious private schools are not exceptions [151]. Emphasis should not be limited to quality education and civil responsibilities, ethics and guidance and counseling should be incorporated into their curriculum [152]. Psychiatric evaluation units should be established to manage behavioral profiles, coordinate behavioral corrections, treatments and effectively handle cases of episodes [153]. Research activities are expected to flow towards this area to fully study the behavioral differences between private and public schools in the nursery, primary, secondary, vocational and tertiary levels of education.

The interaction between the school types and the trio of aggression, delinquency, and hyperactivity is significant, an evidence that the three behaviors differ significantly in private and public schools.

16.9. School level and the trio of aggression, delinquency and hyperactivity

The second major contribution of the present study presented that aggression is higher in secondary schools, while delinquency and hyperactivity are more prevalent in primary schools. It is an age-long view that aggressors are usually older while their victims are younger [154] and hence, younger people are expected to score lower in aggression scale, as it was the case of primary school pupils [155]. A comparison between aggressiveness in primary and secondary schools is necessary for the design and implementation of intervention programs.

The higher score obtained from primary school pupils corroborates the findings of [156] which stated that hyperactivity is most likely to be prevalent and diagnosed in young children. Hence, the effects of hyperactivity decrease towards adulthood. Similar findings have shown that hyperactive and delinquent behavior attenuates or in this aspect, decreases towards adulthood [157]. Since, hyperactive and delinquent behaviors are diagnosed early (in this case, in the primary schools), intervention methods are highly recommended to address the behavioral
disorders before they snowballed into adolescence and possibly adult-
hood [158, 159, 160, 161].

The interaction between the school level and the trio of aggression,
delinquency, and hyperactivity is significant. Since the three behaviors
are components of externalizing behavior, it implies that externalizing
behavioral pattern is different for primary and secondary schools.

16.10. Regression of the behaviors with the demographic variables

The third major contribution of this work is that Regression analysis
was used to establish an association between three behaviors and the
demographic variables. Firstly, it was discovered that aggression and
hyperactivity could be predicted by school type and level after control-
ling for the duo of age and gender, which contributed infinitesimally to
the respective model. Lastly, delinquency can be predicted by age, gender,
and school type and school level. All the demographic variables
contributed significantly to the model. The present study has shown that
school level and type are the strongest predictors of externalizing
behavior. Intervention program, especially in this demographic, should
consider this in addressing behavioral disorders in the schools, the ages,
and gender of the students/pupils notwithstanding.

16.11. Exploratory analysis

Correspondence analysis showed a similar behavioral pattern for the
three behaviors. This is the last major contribution of this work. Indi-
viduals grouped based on the three behavioral clusters can be targeted
for intervention.

Declarations

Author contribution statement

H.I. Okagbue: Conceived and designed the experiments; Performed
the experiments; Analyzed and interpreted the data; Wrote the paper.
S.A. Bishop, J.A. Odukoya: Conceived and designed the experiments; Performed
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