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Parental Engagement, Parents' Attitude to Science, and Basic Science Students' Mental Well-Being in the Ibadan Metropolis, Nigeria

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Good mental well-being is necessary for achievement in science at any level. There are extrinsic factors that have the potential to determine a learner's mental well-being, and the role of the parent(s) cannot be undermined. Therefore, this study examined the relationships between parental engagement (PE), parents' attitude to science (PAS), and mental well-being (MWb) among junior science students. This descriptive survey involved a population of Junior Secondary Three (3) students studying Basic Science in public co-educational schools. A sample of three hundred (300) respondents was randomly drawn from 10 schools within the metropolis. Quantitative data were sourced using three validated questionnaires and analyzed using descriptive and inferential statistics. The research showed that PE (2.19) and PAS (2.13) are relatively high, while MWb (2.51) is moderately normal. The influence of PE and PAS on MWb is significant. Both PE and PAS have a significant positive relationship with MWb. Also, PE and PAS were found to jointly contribute to students' MWb. In conclusion, PE and PAS have implications for the child's mental well-being and ultimate success in science. We, therefore, recommend that more parental engagement be encouraged by improving sensitization, and orientation programs could be organized for parents of science students. This may provide an avenue for parents to be better equipped to support their young scientists.

Keywords: parental engagement, parents' attitude to science, mental well-being, basic science, junior science students

Introduction

Science education, an integral aspect of the Nigerian educational system, provides the platform and opportunities for socioeconomic and technological advancement for the nation. Therefore, the strategic procedure for distributing science knowledge across all levels is expedient. Hence, its teaching and learning is implemented at the lower secondary level as Basic Science. The intention of creating the subject was to equip learners with basic scientific knowledge and skills as well as develop a sustained interest in the sciences. Doing science at a young age can be challenging. This may be brought on due to the abstraction, bulky nature, poor teaching method, learning environment, cost of doing science, etc. These could impact the young scientists, especially in the area of their mental well-being. The fact is that science learners need to be in a good mental state to do well.

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Mental well-being is a critical component of individual well-being. It plays a pivotal role in addressing some of the SDGs' goals, particularly those related to health, education, poverty reduction, and social inclusion. Mental health is explicitly included in SDG 3, which aims to "ensure healthy lives and promote well-being for all at all ages". Target 3.4 specifically emphasized the reduction of premature mortality by promoting mental health and well-being (WHO, 2022). Mental well-being is essential for learning and academic achievement. Students with good mental health are more likely to perform well in school, complete their education, and develop skills for future employment (UNESCO, 2021).

The mental well-being of students has gained significant attention globally due to rising concerns about mental health issues such as anxiety, depression, and stress. According to the World Health Organization (WHO, 2021), anxiety and depression are among the leading mental health issues affecting students, with many reporting feelings of loneliness, stress, and burnout due to this pressure. Nigerian students face immense pressure to excel academically, especially in examinations, often leading to stress and anxiety (Odofin, 2023).

There are suggestions that students' mental well-being may be influenced by parental factors. For instance, recent studies, such as Li et al. (2023), emphasize the importance of parental involvement in enhancing students' engagement and reducing stress. Similarly, X. Liu, J. Liu, Demmans Epp, and Cui (2024) highlighted the impact of parental attitudes on students' academic performance and psychological health. The role of parents in shaping students' academic and psychological outcomes has been widely documented in educational research. Parental engagement goes beyond the involvement of parents in their children's education.

Parental engagement refers to the active involvement of parents in their children's educational activities, both at home and in school. It encompasses practices such as assisting with homework, attending parent-teacher meetings, and fostering a supportive learning environment. According to Goodall and Montgomery (2014) and Collins (2023), parental engagement is distinct from parental involvement, as it emphasizes the quality of interaction and emotional support rather than mere participation in school activities. Parental engagement has been identified as a critical factor in students' academic success and psychological well-being. Parents who are actively involved in their children's education provide emotional and academic support, which enhances students' confidence and reduces stress. Musengamana (2023) highlighted that those dimensions of parental involvement, such as homework assistance and school-family communication, positively impact students' academic outcomes. However, strict parenting and high expectations were found to negatively influence students' mental health.

In another vein, parents of young science learners have a role to play in enabling their children's interest and participation in science. Parents' attitude to science entails the degree to which parents value science and the importance they attach to the subject (Perera, 2014). Positive parental attitudes encourage students to pursue science with enthusiasm, while negative attitudes may deter them from engaging with the subject. Researchers say that children adopt attitudes not only from school but also from their home environment and that scientific understanding can be supported by their parents. There is also evidence that parents' attitude to science correlates with students' success in science (Perera, 2014; Aktamış, 2017; Halim, Abd Rahman, Zamri, & Mohtar, 2018; Setioko & Ding, 2022). However, the interaction between parental engagement, parents' attitudes towards science, and students' mental well-being remains underexplored, particularly in the context of a developing country like Nigeria.

Ecological Systems Theory was proposed by Bronfenbrenner in 1979. The theory stated that an individual's development is influenced by interactions within multiple environmental systems. These include:

the microsystem which emphasizes immediate settings, such as family and school. Parental engagement (e.g., involvement in schoolwork) is a direct factor within this level. The mesosystem is the interactions between settings, such as how parents engage with teachers or schools. The exosystem and macrosystem are the external structures influencing parents' attitudes towards education and societal emphasis on science. This theory suggests that parental engagement and attitudes are important in shaping a student's well-being by functioning as key variables within the microsystem and mesosystem.

Literature Review

Mental well-being encompasses emotional, psychological, and social dimensions, reflecting an individual's ability to cope with stress, maintain relationships, and achieve personal goals. It is a crucial determinant of students' academic success and overall quality of life. Baig, Ganesan, Ibrahim, Yousuf, and Mahfoud (2021) emphasized the role of social support, including parental engagement, in enhancing students' mental well-being. Interventions such as cognitive-behavioral therapy (CBT) have been shown to improve mental health outcomes among students (Jagiello, Belcher, Neelakandan, Boyd, & Wuthrich, 2024).

Literature is somewhat lacking in studies on parental engagement. Rather, more focus is placed on parental involvement. Yang et al. (2023) conducted a systematic review of parental involvement and student engagement, revealing that active parental participation in school and home activities significantly enhances students' affective, behavioral, and cognitive engagement. Similarly, Baig et al. (2021) explored the association of parental involvement with adolescents' well-being in Oman. Their findings revealed that higher parental involvement was positively correlated with better mental health outcomes, including reduced odds of poor mental health and substance use. Epping (2018) examined the impact of parental involvement on students' academic achievement and parental well-being. The study emphasized the importance of family-school partnerships in fostering positive outcomes for students and parents. The research further reflected the negative impact of family dysfunctions on students' emotional well-being and academic interests.

Parents' dispositions, generally, affect learner's attitudes. For instance, Fasasi (2017) submitted that parent's educational background slightly affects their children's attitude to science. Oluwatelure and Oloruntegbe cited in Clemente and Ado (2024) found that parental involvement and attitudes significantly influence students' attitudes towards biology and chemistry, highlighting the importance of a supportive home environment for science education. Furthermore, the role of parental attitudes towards science has been explored in various contexts. Studies indicate that positive parental attitudes foster a supportive environment, encouraging students to pursue science-related fields with confidence (Clemente & Ado, 2024). Conversely, negative attitudes can lead to increased pressure and stress, adversely affecting students' mental well-being.

Haspolat, Ağırkan, and Eşkisu (2024) highlighted that parental attitudes emphasizing high achievement in science could lead to increased academic stress, insomnia, and reduced life satisfaction among students. Muenks, Peterson, Green, Kolvoord, and Uttal (2020) also found that parents' beliefs about their children's abilities in STEM influenced their encouragement to pursue STEM careers and that positive parental attitudes significantly boosted students' confidence and mental well-being, while negative stereotypes could hinder students' aspirations. Bodur and Aktan (2021) examined the predictive effects of parental attitudes on students' academic motivation and personal responsibility. Their findings revealed that democratic parental attitudes positively influenced students' mental health. Ayeni (2021) concluded that positive parental attitudes and involvement in education can significantly enhance students' academic performance and mental well-being in Kwara State, Nigeria.

Objectives of the Study

The study examined:

(1) The relationship between parental engagement and basic science students' mental well-being.

(2) The relationship between parents' attitudes towards science and basic science students' mental well-being.

(3) The joint relationships between parental engagement, parents' attitudes towards science, and basic science students' mental well-being.

Research Questions

(1) What is the level of parental engagement of parents of basic science students in the Ibadan metropolis?

(2) What is the level of basic science students' parents' attitudes towards science?

(3) What are basic science students' mental well-being levels in the Ibadan metropolis?

(4) Does parental engagement influence basic science students' mental well-being?

(5) Does parents' attitudes to science influence basic science students' mental well-being?

Research Hypotheses

(1) There is no significant relationship between parental engagement and basic science students' mental well-being.

(2) There is no significant relationship between parents' attitudes towards science and basic science students' mental well-being.

(3) There is no significant joint contribution of parental engagement and parents' attitude to science to basic science students' mental well-being.

Methodology

The study employed a survey design of a correlational type. The study involved 300 basic science students (aged 10-14) from 10 junior secondary schools in the Ibadan metropolis who were selected using stratified random sampling. Using stratified random sampling with equalization, participants were selected to ensure representation across different schools, i.e. 30 students per school. The instruments were developed and validated for parental engagement, attitudes towards science, and students' mental well-being. These instruments include: the Parental Engagement Questionnaire (PEQ), the Parents' Attitudes towards Science Questionnaire (PASQ), and the Students' Mental Well-Being Questionnaire (SMWBQ). These instruments were initially trial tested on 30 Junior Secondary School students who were not part of the study. The reliability of these instruments was done using Cronbach's Alpha, and the reliability coefficients were 0.80, 0.85, and 0.81, respectively. Informed consent was secured before the self-administered questionnaires were distributed to students who were properly guided. Data were analyzed using Mean, Standard Deviation, Percentages, Regression, and Pearson Product-Moment Correlation to examine relationships among the variables.

Results

Research Question 1: What is the level of parental engagement of parents of basic science students in the Ibadan metropolis?

Table 1
Parents of Junior Secondary School Basic Science Students Level of Parental Engagement

S/N	Items	Mean	Standard deviation
1	My parent cares about my education	2.54	0.79
2	My parent joins me in educational activities at home	2.45	0.81
3	My parent often helps me manage my time	2.33	0.86
4	My parent usually attends parent-teacher association meetings	2.41	0.84
5	My parent always participates in our school events	2.03	0.91
6	My parent communicates frequently with teachers and the school about my academic progress	2.17	0.91
7	My parent helps me develop a positive attitude towards learning	2.21	0.91
8	My parent often assists me with my school projects and assignments	2.08	0.92
9	My parent makes me get extra lessons	2.10	0.90
10	My parent discusses school-related issues with me regularly	2.14	0.92
11	My parent checks on available school resources to help my learning	2.21	0.90
12	My parent always follows up on my school activities	2.20	0.89
13	My parent regularly attends enlightenment workshops and programs at my school	2.08	0.89
14	My parent often communicates with my school counselor	2.12	0.90
15	My parent is aware of my homework routine	2.16	0.89
16	My parent often studies with me at home	2.12	0.91
17	My parent helps me in setting my academic goals	2.12	0.90
18	My parent often supports me in extra-curricular activities	2.04	0.90
19	My parent guides me to make the right decisions	2.21	0.90
20	My parent often helps me prepare for examinations	2.04	0.91
Weighted mean = 2.19			
Criterion mean = 2.00			

Table 1 showed that the weighted mean obtained is 2.19, which is above the criterion mean of 2.00. The result showed that the cluster mean is 43.76, which is higher than the normative mean of 40. This implies that the level of parental engagement of parents of junior secondary science students is relatively high.

Research Question 2: What is the level of basic science students' parents' attitude towards science?

Table 2
Level of Junior Secondary School Basic Science Students' Parent Attitude to Science

S/N	Items	Mean	Standard deviation
1	My parent believes that science is useful in helping solve everyday life problems	2.37	0.85
2	My parent enjoys learning about science and its applications in life	2.20	0.87
3	My parent loves science	2.21	0.89
4	My parent thinks that science is easy to understand	2.16	0.84
5	My parent believes that science helps us understand the challenges of today's world	2.20	0.87
6	My parent tells me about science	2.10	0.85
7	My parent believes that knowing science can help one secure a good job in the future	2.21	0.86
8	My parent understands my science assignments	1.91	0.86
9	My parent discusses science-related issues with me regularly	2.04	0.89
10	My parent always encourages me to take science learning seriously	2.10	0.88
11	My parent tells me that understanding science is important	2.24	0.86
12	My parent loves to take me to places where I can learn about science	1.96	0.90
13	My parent often watches science-related programs on TV	2.04	0.89
Weighted mean = 2.13			
Criterion mean = 2.00			

Table 2 showed that the weighted mean obtained is 2.13, which is above the criterion mean of 2.00. The result showed that the cluster mean of 27.74 is higher than the normative mean of 26. This implies that the level of junior secondary science students' parents' attitudes towards science is also relatively high.

Research Question 3: What are basic science students' mental well-being levels in the Ibadan metropolis?

Table 3

Levels of Mental Well-Being of Junior Secondary School Basic Science Students

S/N	Items	Mean	Standard deviation
1	I have been feeling optimistic about the future	2.76	1.35
2	I have been feeling useful to the people around me	2.67	1.22
3	I have been feeling relaxed	2.45	1.27
4	I have been feeling interested in other people	2.50	1.25
5	I have been dealing with my problems well	2.57	1.27
6	I have been thinking clearly	2.69	1.22
7	I have been feeling good about myself	2.59	1.28
8	I have not been feeling anxious	2.41	1.24
9	I have been feeling confident about myself	2.51	1.26
10	I have been able to make up my mind about things	2.37	1.28
11	I have been feeling loved	2.31	1.25
12	I have been interested in new things	2.44	1.31
13	I have been feeling cheerful	2.42	1.34
Weighted mean = 2.51			
Criterion mean = 2.50			

Table 3 showed that the weighted mean is 2.51, which is above the criterion mean of 2.50. The result also indicated that the cluster mean of 32.69 is higher than the normative mean of 26. This implies that the level of junior secondary science students' mental well-being is moderately normal.

Research Question 4: Does parental engagement influence junior secondary basic science students' mental well-being?

Table 4

Linear Regression Analysis Showing the Influence of Parental Engagement on Junior Secondary School Basic Science Students Mental Well-Being

Model	Unstandardized coefficients		Significant coefficients beta (β)	T	Significant
	B	Std. Error			
(Constant)	12.482	1.132		11.025	0.000
Parental engagement	0.467	0.033	0.638	14.273	0.000

Table 4 showed that parental engagement influenced junior secondary school students' mental well-being ($\beta = 0.64$; $p < 0.05$). This implies that parental engagement predicts junior secondary school students' mental well-being.

Research Question 5: Does parents' attitude to science influence junior secondary basic science students' mental well-being?

Table 5
Linear Regression Analysis Showing the Influence of Parents' Attitude to Science on Junior Secondary Basic Science Students' Mental Well-Being

Model	Unstandardized coefficients		Significant coefficients beta (β)	T	Significant
	B	Std. Error			
(Constant)	2.891	0.924		3.12	0.002
Parents' attitude to science	0.568	0.020	0.851	27.953	0.000

Table 5 showed that the parents' attitude to science influenced junior secondary school students' mental well-being ($\beta = 0.85$, $p < 0.05$). This implies that parents' attitude to science predicts junior secondary school basic science students' mental well-being.

Testing Null Hypotheses

Ho1: There is no significant relationship between parental engagement and junior secondary science students' mental well-being.

Table 6
Correlation Matrix Showing the Relationship between Parental Engagement and Students' Mental Well-Being

Variables	Students' mental well-being	Parental engagement
Students' mental well-being	1	
Parental engagement	0.628* 0.000	1
Mean	32.70	43.79
STD.D	11.24	12.35

Note. * denotes significant at 0.05 level of significance.

Table 6 showed a positive moderate significant relationship between students' mental well-being ($r = 0.63$; $p < 0.05$) and parental engagement. This implies that parental engagement is related to students' mental well-being.

Ho2: There is no significant relationship between parents' attitudes towards science and junior secondary science students' mental well-being.

Table 7
Correlation Matrix Showing the Relationship between Parents' Attitude to Science and Students' Mental Well-Being

Variables	Students' mental well-being	Parental engagement
Students' mental well-being	1	
Parents' attitude to science	0.638* 0.000	1
Mean	32.70	27.77
STD.D	11.24	8.24

Note. * denotes significant at 0.05 level of significance.

Table 7 showed a positive moderate relationship between students' mental well-being ($r = 0.64$; $p < 0.05$) and parent's attitude to science. This implies that parent's attitude to science is related to students' mental well-being.

Ho3: There is no significant joint contribution of parental engagement and parents' attitude to science to junior secondary science students' mental well-being.

Table 8

Multiple Regression Analysis Showing the Joint Contribution of Parental Engagement and Parents' Attitude to Science to Junior Secondary Basic Science Students' Mental Well-Being

Sources of variance	Sum of squares	Df	Mean squares	F	Significant
Regression	16313.498	2	8156.749	113.003*	0.000
Residual	21365.806	296	72.182		
Total	37679.304	298			

R = 0.658
R square = 0.433

Adjusted R square = 0.429
Std. Error of the estimate = 8.49599

Table 8 showed that the joint contribution of parental engagement and parents' attitude to science to the prediction of junior secondary school students' mental well-being is significant [$F_{(2, 296)} = 113.00$; Adj $R^2 = 0.43$; $p < 0.05$]. This implies that parental engagement and parents' attitudes to science jointly predict junior secondary school student's mental well-being. The table also showed a multiple regression coefficient (R = 0.66), and this means that parental engagement and parents' attitudes to science have a positive, moderately significant relationship with students' mental well-being. Table 8 further revealed a multiple regression adjusted ($R^2 = 0.43$). This suggests that parental engagement and parents' attitude to science account for a 43% variation in junior secondary school students' mental well-being.

Discussion

The level of parental engagement of parents of junior secondary science students is high. Perhaps, this is a result of some level of awareness among parents about the importance of their participation in their children's academic work. Although the parents were not directly sampled in this study, the students were encouraged to provide the information as accurately as possible. In junior secondary school, most students' ages range between 10-14 years. This is a vital transitional period often marked by characteristic changes, peer pressure, and more complex class work. There is a possibility that parents increase engagement to monitor academic performance, social dynamics, and emotional well-being. Furthermore, the parents' attitude towards science is positive. This could be because parents understand that science-related fields such as medicine and engineering offer lucrative opportunities. STEM careers are often perceived as respected and constant, motivating parents to encourage their children's interest in science. This finding agrees with that of Clemente and Ado (2024).

The level of junior secondary science students' mental well-being is moderately positive. Perhaps, these young science learners have begun developing coping mechanisms but still rely heavily on family and school support. This finding concurs with Baig et al. (2021), who emphasized the role of social support, including parental engagement, in enhancing students' mental well-being. Also, parental engagement and parents' attitude to science were found to predict junior secondary school students' mental well-being. This further buttresses the idea that parents can drive the potential success of their children in more ways than have been known. It is clear that when parents participate actively and transfer positive attitudes towards science, the children are likely to feel more comfortable, less tense, and cope better with the rigors of learning science.

Conclusions and Recommendations

A child's mental well-being and ultimate success in science can to a great extent, be influenced by parental engagement and parent's attitude to science. Therefore, it was recommended that schools could do more to facilitate parental engagement through sensitization and orientation programs among parents of basic science students. This might provide an avenue for them to be better equipped to support their young scientists at home.

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