Impact of Parental Involvement with Homework on Pupils' Mathematics Performance in Public Basic Schools in Ghana

Francis Avevor

Advanced School of System and Data Studies (ASSDAS), Accra Institute of Technology, Accra, Ghana

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ABSTRACT

This descriptive survey, underpinned by self-determination theory, sought to determine the relationship between parental involvement with homework and their children's academic performance in mathematics. It also examined the differences in the impact of involvement of single parents, double parents and non-parent caregivers on children's performance in mathematics. Data was collected using semi-structured questionnaire from a sample of 440 pupils of five clusters of public basic schools in Accra, Ghana. Data analysis was done using descriptive statistics (frequencies, percentages, mean and standard deviation), Pearson's product moment correlation and ANOVA. The results revealed that children's performance in mathematics has a significantly positive relationship with parental goals, values and expectations (PGE), parental support (PSU) and children's mathematics self-efficacy (MSE); and a significantly negative relationship with parental control (PCO) and homework task persistence (HTP). This study also showed that parental goals, values and expectations (PGE) has a significantly moderate relationship with both parental support (PSU) and children's mathematics self-efficacy (MSE); while children's homework task persistence (HTP) has a significantly moderate relationship with both parental support (PSU), and children's mathematics self-efficacy (MSE). Furthermore, this study revealed that children of double parents outperformed those of single parents and non-parent caregivers in mathematics; and the significant difference in the mean scores of the children in mathematics is traceable to the high absolute mean score differences between the children of double parents and single parents; and between the children of double parents and non-parent caregivers.

Keywords— Parental involvement, mathematics performance, self-efficacy, parental prudence, homework.

INTRODUCTION

Parents' involvement in children's educational activities is important [1], [2], [3] because it can facilitate children's acquisition of enhanced behavior and their attainment of higher academic performance [4]-[9]. Monitoring children's educational activities, motivating them, managing their behaviour, and supporting them (through homework assistance and providing their educational needs) are examples of parental involvement. Many studies have demonstrated that parental involvement has a positive impact on children's academic performance [7], [8], [10]-[13]. However, some other studies produced mixed results [14], [15], [16].

RESEARCH PROBLEM, GAPS AND OBJECTIVES

Pupils' terminal examination scores in Ghanaian pre-tertiary schools (comprising basic schools and senior secondary schools), as well as their results for the Basic Education Certificate Examination (BECE) and the

Senior Secondary School Certificate Examination (SSSCE), frequently reveal low academic achievement in several subjects, including mathematics [17], [18]. A continuous pattern of poor performance in mathematics among pupils is a result of

heterogenous factors involving pupils, teachers, and schools [19], [20]. Specifically, many educational stakeholders blame this phenomenon on teachers' poor lesson delivery, pupils' negative attitudes toward some subjects, poor parental controls, lack of parental motivation and assistance with homework, and parents' lack of interest in their children's educational activities [21]-[24]. Pupils' performance in other courses that need mathematical knowledge and abilities might be impaired by a lack of mastery and poor performance in mathematics [25].

Reference [26] assert that there is a significantly negative relationship between parental assistance with homework and children's academic achievement. They ascribe this phenomenon to children's inability to, on their own, develop self-regulatory strategies. In contrast, schools, teachers and parents believe that parental homework involvement is essential for pupils' academic performance; and they expect some level of parental involvement in pupils' homework completion [27], [28] [29]. However, many parents appear very busy with their daily activities (including work and leisure) and do not have time to effectively and efficiently monitor their children's educational activities. As such, their children are left to do their homework without parental assistance. Many children, therefore, struggle to do their homework; and often do it abysmally either because they do not understand the concepts on which the assignments are based or because they have not allocated themselves with ample time to do the homework.

Since the early 1990s, Ghanaian basic schools (comprising primary and junior high schools) and senior high schools have adopted Continuous Assessment (CA) of 30% for classwork (comprising in-class assignments and homework) and 70% for end-of-term examinations. It is, therefore, imperative that pupils do their homework assiduously with maximum parental assistance. A pupil's poor cumulative performance in homework, therefore, implies that his/her total scores and grades will be adversely affected. Poor grades, and for that matter, poor academic performance of pupils may impair their educational aspirations and future professional success [27], [30]; and turn some of them into truants, school-dropouts, and social deviants (such as gamblers, alcoholics, drug addicts, prostitutes, armed-robbers, burglars, et cetera). This study, therefore, seeks to assess the impact of parental assistance with homework on pupils' performance in mathematics in Ghanaian public basic schools.

Many studies have been conducted relating to parental involvement with homework and their effects on children's academic performance. However, these studies largely concentrated on examining the perceptions of teachers and parents, thus, leaving out the perceptions of children. Very few studies have analyzed parental involvement with pupils' homework that focused on a specific subject [31], [32]. To the best of the researcher's knowledge, available literature does not do any comparative analysis of parental involvement with homework concerning the following categories of parents: single parents, double parents and non-parent caregivers. This study, therefore, made a comparative assessment of the involvement of the three categories of parents (single parents, double parents and non-parent caregivers), and investigated the impact of parental involvement with homework on children's performance in mathematics.

The objectives of this study are outlined as follows:

1. To assess the relationship between parental involvement with homework and children's performance in mathematics.
2. To determine the inter-relationships among parental involvement variables and student-related variables.
3. To determine the differences in the involvement of single parents, double parents and non-parent caregivers on children's performance in mathematics.

The research questions for this study are outlined as follows:

1. What is the relationship between parental involvement with homework and pupils' performance in mathematics (using the perceptions of pupils)?
2. Are there any inter-relationships among parental involvement variables and student-related variables?
3. Is there any difference in the involvement of single parents, double parents and non-parent caregivers with homework on children's performance in mathematics?

LITERATURE REVIEW

A. Conceptual Framework

Parental involvement has many dimensions [33]. This includes parental values, beliefs, expectations and attitudes regarding their children's educational aspirations and attainments [34], parental support with homework, parental control and demandingness, communication with teachers, and attending school functions and parent-teacher association meetings [35], [36]. Research has found that parental values and expectations can predict children's values and academic achievements [37], [38], [39].

Existing literature on parental involvement with pupils' homework has examined various parental styles and/or parental dimensions. Reference [40] has differentiated between authoritative, authoritarian and permissive parenting styles; while [41] differentiated between parenting dimensions of emotional support, and behavioural and psychological control. Furthermore, some studies have emphasized the importance of parents communicating their values, aspirations and goals to their children [42].

Popular theoretical frameworks for analyzing parental involvement with homework include [43]'s self-determination theory and [44]'s decay theory. The self-determination theory postulates that feelings of relatedness, competence, and autonomy are crucial for children's motivation and skills development [43]. This implies that parental support and control are forms of parental involvement that satisfy the need for a child's relatedness, competence, and autonomy. Parental support refers to children's valuation of their parents' homework assistance; whereas parental control connotes pressure and/or control which parents exert on children to complete assignments steadfastly and in a timely fashion.

The decay theory postulates that learning leaves a mark on the brain, which should be actively used else it might fade away over time. This implies that in parenting and academic accomplishment, if parents and teachers do not stress the positive qualities that they want their children/pupils to acquire on a regular basis, the learners may forget about them and eventually adopt the negative habits. Also, if pupils do not revise things they have learnt or been taught on a regular basis, they are likely to forget them.

Furthermore, [45] formulated a model with five levels for analyzing the impact of parental involvement on their children's educational activities, as shown in Fig. 1. The levels are outlined as follows:

1. Parents' perception of invitations for involvement from others (namely: Child, School, Teachers)
2. Parents' involvement behaviour (such as encouragement, modeling, reinforcement and instruction)
3. Children's perceptions of parent's involvement (through modeling, encouragement, instruction and reinforcement)
4. Children's attributes for academic achievement (such as their academic and social self-efficacies, their use of self-regulatory strategy, and their learning impetus)
5. Student achievement.

Fig. 1 Model of Parental Involvement Process [45], p.74

B. Empirical Literature

Research has revealed that children's senses of competence and autonomy as well as their learning efforts increase when parents give them autonomy thus allowing them to do the homework themselves and providing them with assistance, if needed [46]. Specifically, [47] found a positive relationship between perceived parental homework support and children's academic achievement. Research also showed that parental control reduces children's persistence in learning as well as their senses of competence and autonomy [48]. Also, [30] and [47] found that there is a negative relationship between perceived parental homework control and children's academic achievement. Thus, parental support can boost children's homework performance while parental control can impede it.

Existing literature suggests that parents' involvement in their children's academic achievement can differ at school-grade levels. In a meta-analysis regarding parental involvement programs for urban students, [39] found that parental involvement predicts children's academic achievement better at elementary school level than at secondary school level. He ascribed three main reasons for this phenomenon; namely: parents' higher motivation for involvement with their children's educational activities (including homework) at their tender ages; higher influence of parents' educational values on their children at their tender ages; and children's self-belief of their academic competences as they get higher in their education and become more autonomous (and, thus, get less parental involvement) in their academic activities.

Prior literature on parental involvement with educational attainment of elementary and secondary school students shows that parental expectations and aspirations as well as parental support and encouragement are positively related to children's academic achievement [49]-[53].

Children's performance in mathematics is influenced by their cognitive abilities, self-perceived beliefs, self-concept, and the impact of teachers, parents and their peers [54], [55]. Some studies have used children's self-perceived beliefs about their abilities and competencies in mathematics, their mathematics self-concept and their attitudes towards mathematics to assess children's academic achievement [54], [56]. Research has found a positive relationship between children's mathematics self-concept and their achievement in mathematics [57], [58]; and children's cognitive ability enhances their achievement in mathematics [55]. In contrast, [32] found that parental control tends to inhibit children's mathematics self-concept.

In their recent study of the effect of parents' involvement on Chinese students' performance in mathematics, [9] analyzed data from 2866 students and their parents on the following three parental involvement dimensions: personal involvement, behavioral involvement and cognitive involvement. They made three findings: (1). Children from families with only one child outperformed those from families with two or more children in all the three parental involvement dimensions, as well as in "mental health, mathematics self-efficacy, and mathematics performance" (p.6); (2). The three parental involvement dimensions have different effects on students' performance in mathematics; (3). Students' mental health and mathematics self-efficacy partially mediate the influences of parental behavioral involvement and cognitive involvement on students' performance in mathematics; whilst students' mental health and mathematics self-efficacy fully mediate parental personal involvement on the students' performance in mathematics.

In their analysis of how Korean middle school students' academic self-efficacy and test anxiety relate to their parents' involvement towards their learning strategy and performance in mathematics, [59] found that the most significant influence on students' learning strategy and academic achievement was their academic self-efficacy. Similarly, in a longitudinal study to examine the relationship between parents' involvement in homework and pupils' performance in mathematics across third and sixth grades in 28 Estonia schools, [60] found a positive relationship between parental support and pupils' homework task persistence; and that pupils' low mathematics self-concept predicted an increased parental control.

Combining findings from nine meta-analyses, [1] found a positive relationship between parents' involvement and students' academic performance, regardless of how parental involvement is defined or how students' performance is measured. He also found that the relationship is strongest if parents' expectations for their children's academic performance is used to define parental involvement. Furthermore, he found the weakest impact when homework assistance is used to define parental involvement. Similarly, [2] concluded from their meta-analysis that there is a negative relationship between parents' involvement with homework and children's performance in mathematics. Also, in their study of private university students in Malaysia, [61] found a negative relationship between parents' involvement and students' academic performance in mathematics.

METHODOLOGY

This study is underpinned by [43]'s self-determination theory and the parental involvement process model of [45]. The researcher, therefore, conceptualized parental homework involvement using the following five variables: (a). parental goals, values and expectations; (b). parental support, (c). parental control, (d). children's mathematics self-efficacy, and (e). children's homework task persistence. Fig. 2 showed the conceptual framework proposed for this study to establish whether parental involvement with homework has any impact on children's performance in mathematics.

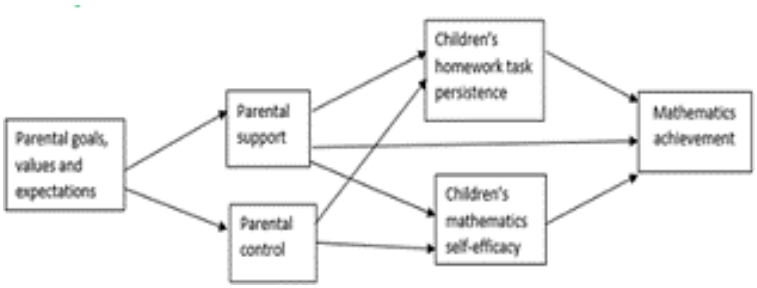

Fig. 2 Conceptual framework for parental involvement and children's mathematics achievement

This study is a descriptive survey. The researcher used a mixed research design so as to have a comprehensive data analysis [62]. Specifically, a semi-structured questionnaire was used to collect quantitative data on students' mathematics performance, as well as their biographical data and 5-scale likert-

style data on the five perception constructs in Table 2. Also, before the data analysis stage, the researcher held a 53-minute focus group discussion with 3 headteachers and 8 teachers (from the selected clusters of schools), as well as 10 parents/caregivers. These two sets of data were triangulated for two reasons: i. to enhance the credibility and validity of the findings of this study; and ii. explain the results in more detail.

The instruments for measuring the following four (4) variables were adapted from literature as shown in Table 1:

1. perceptions of parental support,
2. perceptions of parental control,
3. children's mathematics self-efficacy, and
4. children's homework task persistence.

However, an 11-item instrument for gathering both biographical data (comprising age, gender, class, number of siblings, and parental type) and for measuring the perception of parental goals, values and aspirations was developed by the researcher; and this was validated by two university professors with expertise in questionnaire design.

Table 1. Instruments for Measuring Parental Support, Parental Control, Mathematics Self-Efficacy and Task Persistence

Measurement Variable	Source Adapted From	Number of data items
Perceptions of parental support	[63]	7
Perceptions of parental control	[60]	4
Children's mathematics self-efficacy	[64]	7
Children's homework task persistence	[60]	5

Five data collectors were trained on ethical issues and quality data collection approaches. All the 6,487,133 pupils in public basic schools in Ghana during the 2020/2021 academic year [65] constituted the general population for this study. The target population comprised all eligible and potential public basic school pupils with the ability to read and understand texts in English language. According to [66], the national average for children aged 7-14 years who have foundational reading skills "based on contents for Grades 2 and 3" (p. 12) is 21%. Thus, the target population for this study was 1,362,298. This study's accessible population comprised members of the target population who were willing and available to participate in this study.

The researcher used stratified random sampling technique to break the general population into regions and then randomly selected Greater Accra Region to focus on for this study. This selection was made considering financial constraints as well as the large size and the geographically dispersed nature of the target population. Also, the public basic schools in Greater Accra Region were stratified into metropolis/ municipalities/districts; and stratified further into locality types (namely: urban and rural areas); and random sampling technique was used to select one metropolis and one municipality in Accra for this study. Furthermore, the researcher used convenience sampling technique to select 4 urban clusters of schools and 1 rural cluster of schools (from the chosen metropolis and municipality in Accra). These 5 clusters of schools had a combined students' population of 9,172. In compliance with [67]'s sample size determination table, a minimum sample size of 385 was targeted for this study. The researcher sought clearance from the headteachers of these schools; and with the help of one teacher from each of the 5 clusters of schools, a sample size of four hundred and forty (440) primary and junior high school pupils was randomly selected for this study. Furthermore, with the help of the headteachers, the parents/caregivers of the pupils selected

for this study were contacted to seek their permissions for their children's participation.

A total of 440 questionnaires were administered to the primary and junior high school pupils who were between the ages of 8 and 19 years; and could read and understand texts in English language [66]. 420 of the administered questionnaires were usable; thus, the response rate was 97.3%. The 420 completed questionnaires used for this study, therefore, exceeded the minimum number (of 385) required for this study.

Data analysis was done using descriptive statistics (frequencies, percentages, mean and standard deviation), Pearson's product moment correlation and ANOVA on IBM SPSS Statistics version 28.0.1.1. Specifically, the statistical tools used for analyzing data in respect of each of the research questions are outlined as follows:

RQ1. What is the relationship between parental involvement with homework and pupils' performance in mathematics (using the perceptions of pupils)?

Pearson's correlation coefficients were used to clearly determine the relationships/correlations among the variables.

RQ2. Are there any inter-relationships among parental involvement variables and student-related variables?

Pearson's correlation coefficients were used to clearly determine the relationships/correlations among the variables.

RQ3. Is there any difference in the involvement of single parents, double parents and non-parent caregivers with homework on children's performance mathematics?

Frequency, Mean, Standard deviation, and ANOVA were used to determine the significance of differences in the mean scores of the children of these 3 parent types in mathematics; and trace such differences, if any.

RESULTS

Table 2 presented the demographic data of the respondents. It showed that the 420 pupils are between the ages of 8 and 19 years; and 108 (25.7%) of them are in Primary 1-3,. while 145 (34.5%) of them are in Primary 4-6, and the remaining 167 (39.8%) of them are in Junior high school 1-3. Also, 172 (40.95%) of the pupils have double parents while 149 (35.48%) of them have single parents and the remaining 99 (23.57%) have non-parent caregivers looking after them.

Table 2: Frequencies and Percentages of Respondents' Demographic Data

Data Item	*N*	*Percentage*	*Data Item*	*N*	*Percentage*
Age			*Siblings*		
8 – 10 years	59	14.0%	1 – 2	156	37.1%
11 – 13 years	102	24.3%	3 – 4	133	31.7%
14 – 16 years	125	29.8%	5 – 6	98	23.3%
17 – 19 years	134	31.9%	> 6	33	7.9%
Total	420	100.0%	Total	420	100.0%
Class			*Parent type*		
Primary school 1–3	108	25.7%	Double parents	172	40.95%
Primary school 4–6	145	34.5%	Single parents	149	35.48%
Junior High school 1–3	167	39.8%	Non-parent caregivers	99	23.57%
Total	420	100.0%	Total	420	100.00%

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Table 3 shows that average variance extracted (AVE) values higher than the 0.50 threshold [68] was attained, indicating convergent and discriminant validity. Also, Cronbach alpha reliability values higher than the 0.70 threshold [69] was attained indicating internal consistency of the data items. Furthermore, composite reliability (CR) values of at least 0.80 [70] was attained signifying convergent validity. Thus, the instrument passed the validity and variability tests.

TABLE 3: Mean, SD, Beta and Reliability Measures of the Study Variables

Variables	Mean	SD	AVE	Beta	Cronbach α	CR
Mathematics achievement (MA)	63.25	14.71	0.61	0.039	0.83	0.91
Parental goals, expectations (PGE)	3.37	0.79	0.62	0.059	0.77	0.89
Parental support (PSU)	3.12	1.70	0.58	0.045	0.83	0.87
Parental control (PCO)	2.93	1.99	0.54	0.049	0.87	0.85
Mathematics self-efficacy (MSE)	2.67	2.04	0.59	0.053	0.81	0.88
Homework task persistence (HTP)	3.23	0.81	0.67	0.038	0.78	0.90

n=420, Mathematics scores range from 0 – 100; all other variables use likert-scale 1-5.

Among the five variables in Table 3, parental goals, values and expectations has the largest mean score of 3.37, while Mathematics self-efficacy has the smallest mean score of 2.67) Also, Mathematics self-efficacy has the largest standard deviation of 2.04, while parental goals, values and expectations has smallest standard deviation of 0.79.

RQ1. What is the relationship between parental involvement with homework and pupils' performance in mathematics (using the perceptions of pupils)?

Table 4 revealed that there is a significantly positive correlation between children's performance in mathematics and their perception of their parents' goals, values and expectations ($r=0.571$, $p<0.00001$ and effect size $r^2=0.326$). The effect size interpretation table of [71] showed that this relationship is moderate (See Table 5). Thus, an increase in children's perception of their parents' goals, values and expectations will moderately increase their performance in mathematics. Similarly, there is a significantly moderate positive correlation between children's performance in mathematics and their perceptions of their parents' support ($r=0.527$, $p<0.00001$ and effect size $r^2=0.278$).

Table 4: Mean, Standard Deviation, Pearson's Correlation Coefficients and Corresponding P Values

Variables	1 MA	2 PGE	3 PSU	4 PCO	5 MSE	6 HTP
1. Mathematics achievement (MA)	1	.571 *p<.00001*	.527 *p<.00001*	-.415 *p<.00004*	.158 *p<.00116*	-.337 *p<.00001*
2. Parental goals, values & expectations (PGE)		1	.511 *p<.00001*	.365 *p<00001*	.491 *p<.00001*	.043 *p<.3794*
3. Parental support (PSU)			1	.384 p<.00001	.272 p<.00001	.416 p<.00001

4. Parental control (PCO)				1	-.19 *p<.00009*	*-.051* *p<.29706*
5. Mathematics self-efficacy (MSE)					1	.526 *p<.00001*
6. Homework task persistence (HTP)						1

**p < .05*

Table 5: Effect Size Interpretation Table.

Minimum Correlation coefficient value (r)	Coefficient of determination (r^2)	Interpretation
0.2	≥ 0.04	Weak
0.5	≥ 0.25	Moderate
0.8	≥ 0.64	Strong

Ferguson (2009)

This study also revealed that there is a significantly weak negative relationship between children's performance in mathematics and their homework task persistence (r=-0.337, p<0.00001 and effect size r^2 =0.114). Furthermore, there is a significantly positive relationship between children's performance in mathematics and their mathematics self-efficacy (r=0.158, p<0.00116 and effect size r^2=0.025) but the effect is negligible; thus, one cannot make a strong claim about this relationship. In contrast, there is a significantly weak negative correlation between children's performance in mathematics and their perception of their parents' control (r=-0.415, p<0.00004 with the effect size r^2 = 0.172). Thus, an increase in children's perception of their parents' control will weakly decrease their performance in mathematics.

RQ2. Are there any inter-relationships among parental involvement variables and student-related variables?

Table 4 also revealed the strength of relationships between pairs of the five variables examined in this study. Children's perception of their parents' goals, values and expectations has a significantly moderate positive relationship with their perception of parental support (r=0.511, p<0.00001, r^2=0.261); and it has a significantly weak positive relationships with both their parents' control (r=0.365, p<0.00001, r^2=0.133) and their mathematics self-efficacy (r=0.491, p<0.00001, r^2=0.241) since the p value is less than 0.05 level of significance. However, children's perceptions of their parents' goals, values and expectations has no significant relationship with their homework task persistence (r=0.043, p<0.3794, r^2=0.002). Thus, an increase in the children's perception of their parents' goals, values and expectations will increase their perception of their parents' support; but it will not necessarily increase their perception of their parents' control; neither will it increase their mathematics self-efficacy.

Children's perception of their parents' support has a significantly weak positive relationship with their homework task persistence (r=0.416, p<0.00001, r^2=0.173), their mathematics self-efficacy (r=0.272, p<0.00001, r^2=0.074), and their perception of their parents' control (r=0.384, p<0.00001, r^2=0.147).

Also, children's perception of their parents' control has a negligible negative relationship with their mathematics self-efficacy (r=-0.19, p<0.000089, r^2=0.036); but it has no significant relationship with their

homework task persistence (r=-0.051, p<0.29706, r^2=0.003) since the p value is greater than 0.05 level of significance. Thus, an increase (or decrease) in the children's perception regarding their parents' control will not change their mathematics self-efficacy; neither will it change their homework task persistence.

Furthermore, there is a significantly moderate positive relationship between children's mathematics self-efficacy and their homework task persistence (r=0.526, p<0.00001, r^2 = 0.277). Thus, an increase in the children's self-efficacy will moderately increase their homework task persistence.

RQ3. Is there any difference in the involvement of single parents, double parents and non-parent caregivers with homework on children's performance in mathematics?

Table 6 revealed that children of double parents had the highest mean achievement score of 70.09 and the lowest standard deviation of 10.984 in mathematics; whilst children of single parents had the lowest mean achievement score of 61.33 and the highest standard deviation of 15.718 in mathematics. Thus, children of double parents are doing well in mathematics, but children of single parents are performing poorly in mathematics. Children of non-parent caregivers, on the other hand, had a mean score of 65.02 and a standard deviation of 13.061 in their mathematics achievement.

Table 6: Mathematics Performance Level by Parental Type

Parental Type	N	Mean	Standard Deviation	Min	Max
Double parents	172	70.09	10.984	0	100
Single parents	149	61.33	15.718	0	100
Non-parent caregivers	99	65.02	13.061	0	100
Total	420				

Table 7 showed that there is a significant difference in the mean scores of children of at least one pair of parent types in mathematics since the p value is less than the alpha (α) value [p=0.0000, α = 0.05 and $F(2, 417) = 1720.63$]. In order to identify the source of the difference in the children's mean scores, the Tukey-Kramer post ad hoc HSD test was performed, as presented in Table 8. It revealed that there is a significant difference in the mean mathematics achievement scores between children of double parents and those of single parents; and between children of single parents and those of non-parent caregivers, since q(3, 417) =3.314 (as read from Studentized q table) is less than the HSD values of 6.7402 and 3.9010 in the 1st and 2nd rows of Table 8, respectively, at α = 0.05 level of significance.

Table 7: One Way Anova for Measuring Group Differences Across Parental Type

	Mathematics Achievement Level				
Parental Type	Sum of Squares	df	Mean Square	F	p value
Between Groups	23140.231	2	11570.115	1720.631	.00000
Within Groups	2804.051	417	6.7243436		
Total	25944.282	420			

Note: N = 420 α = 0.05 level of significance

Table 8 also showed that the absolute mean difference in the achievement scores between children of double parents and those of single parents is 8.76; while the absolute mean difference in the scores in mathematics

between children of double parents and those of non-parent caregivers is 5.07. Thus, the significant difference in the mean scores of the children in mathematics is traceable to the high absolute mean score differences between the children of double parents and single parents; and between the children of double parents and non-parent caregivers.

Table 8: Tukey-Kramer HSD One Way Anova for Measuring Mathematics Across Parental Types

Parental Type (I)	Parental Type (J)	Absolute Mean Difference |I-J|	HSD (q_{calc}) Decision
Double parents	Single parents	8.76	6.7402* Significant
	Non-parent caregivers	5.07	3.9010* Significant
Single parents	Non-parent caregivers	3.69	2.8392

* α=0.05 level of significance q(3, 417) = 3.314 from Studentized q table

DISCUSSION

The discussion of the findings is done in this section on the basis of the research questions.

RO1. What is the relationship between parental involvement with homework and pupils' Mathematics performance (using the perceptions of pupils)?

This study examined the impact of the following five variables on pupils' academic performance in mathematics: Parental goals, values and expectations (PGE), Parental support (PSU), Parental control (PCO), Mathematics self-efficacy (MSE), and Homework task persistence (HTP)

This study found a significantly moderate correlation between children's performance in mathematics and their perception of their parents' goals, values and expectations. This means that an increase in the children's perception of their parents' goals, values and expectations will moderately increase their academic performance in mathematics. This implies that if parents want their children to perform well in mathematics, they should constantly and openly communicate their goals, values and expectations to their children regarding the children's education and future career prospects. This result is consistent with those of [3], [38], and [49]-[53].

Similarly, this study found that there is a significantly moderate positive correlation between children's performance in mathematics and their perceptions of their parents' support. This implies that the more support (such as homework support and provision of school and other ancillary materials) that parents provide to their children, the more their children's performance in mathematics will increase. Thus, parental support is an important stimulus for children's academic performance in mathematics; so, parents need to provide support for their children's education to increase their achievement in mathematics. This result is consistent with those of [48]-[53], [72], and [73].

Furthermore, this study found a significantly weak negative correlation between children's performance in mathematics and their perception of their parents' control. This implies that an increase in children's perception of their parents' control regarding their educational activities will decrease their performance in mathematics slightly. This result complements those of [30], [32], [47] and [60]. In contrast, [74] in their study found a positive relationship between parental control and children's performance in mathematics; while [75] found no relationship between these two variables.

Comparing the effect sizes of the three parental involvement variables discussed above, that of parental goals, values and expectations is the largest; and thus had the largest impact on children's performance in mathematics. This result corroborated that of [1] which found parental expectations as the strongest parental

involvement factor influencing children's academic performance. Thus, the importance of parental goals, values and expectations as stimulus for children's performance in mathematics cannot be overstated.

Also, this study revealed that there is a significantly positive but negligible relationship between children's performance in mathematics and their mathematics self-efficacy; so, one cannot make a strong claim about this relationship. Thus, children's belief in their mathematical ability and capability (mathematics self-efficacy) had a negligible effect on their performance in mathematics. This result is consistent with those of [57], [58], [59], and [76].

In addition, this study showed that there is a significantly weak negative relationship between children's performance in mathematics and their homework task persistence. Thus, the higher the children's homework task persistence, the lower their level of performance in mathematics. Children exert much effort in doing mathematics homework if they do not understand the concept(s) on which the assignments are based, if they consider the questions to be difficult, and if the questions are very many.

RO2. Are there any inter-relationships among parental involvement variables and children's performance variables?

This study found the following relationships among the five independent variables examined:

1. Children's perception of their parents' goals, values and expectations has a significantly moderate positive relationship with their perception of parental support; but it has significantly weak positive relationships with both their parents' control and their mathematics self-efficacy. These findings call for parents to communicate their goals, values and expectations fluidly to their children and also create a friendly, supportive environment for the children to develop and achieve their educational and future career goals. Also, children's perception of their parents' support has a significantly weak positive relationship with their homework task persistence. This finding is consistent with that of [60].
2. Children's perception of their parents' support has significantly weak positive relationships with parental control, their homework task persistence, and their mathematics self-efficacy.
3. Children's perception of their parents' control has negligible negative relationships with both their mathematics self-efficacy and their homework task persistence. Thus, an increase in the children's perception regarding their parents' control will reduce their mathematics self-efficacy and their homework task persistence slightly. This finding is consistent with that of [60] who concluded that increased parental control leads to low task persistence as well as low math self-concept.
4. Children's mathematics self-efficacy has a significantly moderate positive relationship with their homework task persistence. This means that an increase in children's self-efficacy in mathematics will moderately increase their homework task persistence. Thus, children will not struggle or exert much effort in executing their mathematics assignments if their self-efficacy is good.

RO3. Is there any difference in the involvement of single parents, double parents and non-parent caregivers with homework on children's Mathematics performance?

This study revealed that children of double parents had the highest mean score in mathematics while children of single parents had the lowest mean score. Thus, children of double parents were doing well in mathematics, but children of single parents were performing poorly in mathematics. It also showed that there is a significant difference in the mean scores of children of at least one pair of parent types in mathematics. In addition, it revealed that there is a significant difference in the mean achievement scores in mathematics between children of double parents and those of single parents; and between children of double parents and those of non-parent caregivers. Thus, the significant difference in the mean scores of the children in mathematics is traceable to the high absolute mean score differences between the children of

double parents and single parents; and between the children of double parents and non-parent caregivers. This study, therefore, adds an analysis of parenting types (viz: double parents, single parents and non-parent caregivers) to the existing literature on the impact of parents' involvement with homework on children's academic performance in mathematics.

CONCLUSION AND RECOMMENDATIONS

This study sought to determine three things: the impact of parents' involvement with homework on children's academic performance in mathematics, the inter-relationships among the five independent variables used for this study, and the differences in the impact of involvement of single parents, double parents and non-parent caregivers on children's performance in mathematics. It revealed that children's performance in mathematics has a significantly positive relationship with parental goals, values and expectations (PGE), parental support (PSU) and children's mathematics self-efficacy (MSE); and a significantly negative relationship with parental control (PCO) and homework task persistence (HTP). Also, parental goals, values and expectations (PGE) has the strongest impact on children's performance in mathematics, followed by parental support (PSU) and parental control (PCO). This result, therefore, calls for parental prudence and self-circumspection in order to create a congenial environment at home for children to have some form of autonomy regarding their studies and homework task performance; and this will, in turn, foster the children's academic performance in mathematics.

This study also showed that parental goals, values and expectations (PGE) has a significantly moderate relationship with both parental support (PSU) and children's mathematics self-efficacy (MSE). Furthermore, this study revealed that the significant difference in the mean scores of the children in mathematics is traceable to the high absolute mean score differences between the children of double parents and single parents; and between children of double parents and non-parent caregivers.

This study used five clusters of public basic schools in Accra, Ghana; and the results may not be truly representative of the population. Therefore, future research may consider using a sample that covers a wider geographical area. Also, future researchers may consider focusing on some other salient parental involvement variables as well as other student-related variables as predictors of children's academic performance in mathematics and other STEM courses (namely: science, technology, and engineering). Furthermore, parents should endeavour to provide a congenial environment at home for their children to engage in school-related activities (including homework and studying) to enhance their academic performance in mathematics.

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