ORIGINAL ARTICLE

Motivation, Social Support, Alienation from the School and their Impact on Students' Achievement in Mathematics: The Case of Tenth Grade Students

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Abstract

The study examined tenth grade students' motivation, social support, alienation from school and their impact on mathematics achievement of Addis Ababa secondary schools. The participants were 864 students. The instruments were questionnaires and test. From the Independent t-test, Mann-Whitney and Kruskal-Wallis tests, ANOVA, regression and path analysis, the results obtained were: the extrinsic motivation of students was greater than the intrinsic motivation; the intrinsic motivation, extrinsic motivation, motivation in general and social support of the females were significantly less than that of the males, but for alienation from school, females were greater than males. For all the variables except alienation from school, the higher achievers had significantly the highest value and lower achievers had the least value, but for alienation from the school, the higher achievers had significantly the least value and lower achievers had the highest value. The contribution of all the independent variables collectively and individually significantly affected mathematics achievement. All the path coefficients from the independent variables to mathematics achievement were significant and achiever levels had the highest direct effect. In conclusion, all independent variables were around the average value and affected significantly mathematics achievement. There were also significant positive direct effects of sex, achiever levels, and social support and negative direct effect of alienation from the school on mathematics achievement. The recommendations were improvement should be made on method of teaching, applying different motivational techniques, educational support, peer support, involvement of parents, interventions by the school officials on conducting award programs, study skills and time management training, etc.

Key words: *Sex, achiever levels, motivation, social support, alienation from the school, mathematics achievement*

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INTRODUCTION

Motivation is a student's willingness, need, desire and compulsion to participate in, and be successful in the learning process (Bomia et al., 1997). Middleton and Spanias (1999) define motivation as reasons individuals have for behaving in a given situation. A more comprehensive definition is given by Ames (1992) who states that motivation exists as part of one's goal structures, one's beliefs about what is important and it determines whether or not one will engage in a given pursuit. Motivation exists in two forms: intrinsic and extrinsic.

Intrinsic motivation is a force inside the individual and works from within the individual. In other words, it does not depend upon the stimulus from outside. A natural interest in something acts as intrinsic motivation, because no outside force is required to get the individual engaged in the activity of his interest. The realization of one's own duty and the achievement motivation are the examples of intrinsic motivation (Laxman, 2010). There are occasions when learning proceeds in the absence of intrinsic motivation. **Extrinsic motivation** is so called because it is external to the learning activity itself. It is usually provided by incentives outside the activity or the task. It is not artificial; it must be built upon the foundation of some existing natural response or tendency. Appreciation, praise and reward are some of the examples of extrinsic motivation (Laxman, 2010).

Studies regarding differences in gender are also found in the motivation literature; however, they are few in number. In an experiment by Boggiano, Main, and Katz (1991), the main focus was to address the question of potential gender differences in motivational orientation. It was then found that females possess more extrinsic orientation compared to males. Other literature emphasizes that, "boys show a greater degree of academic extrinsic motivational orientation" (Anderman & Anderman, 1999), while girls show a greater academic intrinsic motivation (Mecca & Holt, 1993). Whereas Gottfried (1990) found that there is no gender difference in intrinsic motivation for mathematics.

It should also be noted that some studies have found little or no significant relationship between motivation and academic achievement. Niebuhr's (1995) findings indicate that student motivation showed no significant effect on academic achievement. Goldberg and Cornell (1998) found that correlations between variables measured revealed a series of statistically significant correlations between intrinsic motivation and academic achievement, although the correlations were generally low in magnitude. Instead, it was indicated that intrinsic motivation influenced perceived competence and that perceived competence influenced subsequent academic achievement (Goldberg & Cornell, 1998).

Social Support is present in classes where the teacher encourages students by conveying high expectations from them. These high expectations may reinforce risk taking in completing challenging academic work. Mutual respect among all the members of a group expresses the existence of social support in the classroom. Mutual respect means that students with less skill or proficiency in a subject are treated in ways that continue to encourage them and make their presence valued. If disagreement or conflict develops in the classroom, the teacher helps students resolve it in a constructive way for all concerned. A lack of social support is

evident when the behaviour, comments and actions of the teacher or students discourage effort, participation, and risks taking to learn or express one's views (Laxman, 2001).

Student perceptions of teacher support have been associated with greater feelings of school belonging (e.g., Ma, 2003), and greater school/academic engagement and motivation, as well as better academic performance (e.g., Birch & Ladd, 1998). With young children, Birch and Ladd (1998) demonstrated that positive teacher-student relations were associated with better school performance, greater school liking and greater self-direction.

Besides families and peers, teachers are also an important source of support for students. Teachers support children in growing as independent individuals and help them for the improvement of their personality (Sayar, 2006). Demaray and Malecki (2002a) indicate that the adaptation of students to school and their attitudes towards teachers and towards school is closely related to teacher support.

Regarding the social support and gender relation, research results differ as they do in math anxiety. Although some researches confirm that women have wider social network, recent researches point out that the size of social networks of women and men are more or less the same (Umberson, Meichu, House, Hopkins and Slaten, 1996).

Alienation is a term used to describe student estrangement in the learning process (Brown, Higgins, & Paulsen, 2003). Mann (2001) define alienation as "the state or experience of being isolated from a group or an activity to which one should belong or in which one should be involved" (p. 7). The causes of student alienation are multifaceted including curricular, institutional, and socio-cultural factors (Brown et al., 2003).

Several studies have pointed to student alienation as a factor contributing to low achievement by many middle school students. Lack of interest, negative attitudes toward school, social alienation, and disengagement are not only associated with poor grades but may also predict the ultimate school failure and dropout. Although dropping out typically takes place in the later years of high school, the process of disengagement and alienation that ultimately leads students to leave school often starts or is exacerbated during the middle school years (Junoven et.al. 2004: 48). Boys and low achievers are more affected by school alienation. Tina and Gerda, (2011) and Wiepert (1965) found that there was a negative relationship between grade point averages of college students and alienation.

National assessments (e.g., National Assessment of Educational Progress, 1975) consistently indicate that men score higher than women on tests of mathematics achievement and as such, it has been an accepted belief that males achieve better in mathematics than females (Maccoby & Jacklin, 1974).

Some researches (Pajares's, 1995) indicate that mathematical ability had a significant positive influence on subsequent mathematics achievement. Students' prior achievement had the strongest direct effect on mathematics achievement (Bandura, 1997). Prior achievement has a significant indirect effect on mathematics achievement, influencing not only students' participation in mathematics learning, but also their confidence in understanding mathematical concepts and time spent on mathematics homework (Ibe, 1994). However, the mathematics ability may not,

by itself, serve as a sufficient predictor of mathematics achievement (Rhodes, 1992).

Mathematics achievement might be affected by a large number of factors and due to the difficulty of considering all the factors that affect the mathematics achievement and motivation (Gottfried, 1990 and Goldberg & Cornell, 1998), social support (Wentzel, 1998) and alienation from the school (Wiepert, 1965) were influential factors for students' mathematics achievement. In this study, these three variables were considered to examine and to see their impact on mathematics achievement.

Objective of the Study

General Objective

The major purpose of this study was to assess tenth grade students' motivation, social support and alienation from the school, and their contributions on mathematics achievement.

Specific Objectives

To attain the major objective, the following specific objectives were identified. Therefore, the study tried to achieve the following specific objectives:

- to examine differences by sex and achiever levels in tenth grade students' motivation, students' social support and students' alienation from the school in learning mathematics;
- to examine differences by sex and achiever levels in tenth grade students' achievement in mathematics,
- to investigate the relationships between students' motivation, students' social support and students' alienation from the school of tenth grade students towards mathematics with their achievement in mathematics; to investigate the impact of sex, achiever levels, motivation, social support and alienation from school on the achievements of students in mathematics.

Hypothesis of the Study

In this study the following hypotheses were used:

$H_{0[1]}$: There is no significant difference in the motivation, components of motivation, social support and alienation from school of tenth grade students in mathematics with respect to sex and achiever levels.

$H_{0[2]}$: There is no significant difference in the achievement of tenth grade students in mathematics with respect to sex and achiever levels.

$H_{0[3]}$: There is no significant impact of sex, achiever levels, components of motivation, motivation, social support and alienation from school on the achievements of students in mathematics.

Significance of the Study

The study can it help to know whether the tenth grade students' motivation, components of motivation, social support, alienation from the school and achievement of students deviate from average or not in mathematics. It is hoped to raise awareness among higher officials about which factors could negatively affect the students' mathematics achievement. It helps for the concerned authorities to design strategies for reducing the problems of the students and improve their mathematics achievements.

MATERIAL AND METHODS

Population and Sampling Method

The population for this study consisted of all tenth grade students in government schools in Addis Ababa City Administration. The population considered only from the government schools since

almost above 90% of the population of students were from these schools. There were a total of twenty two secondary schools divided among ten sub cities of Addis Ababa Administrative Region. Since the numbers of secondary schools in Addis Ababa was large and the schools were divided among ten sub-cities, the researcher selected one secondary school from each sub-city by cluster sampling and two sections were selected from grade ten sections of each selected schools. Due to administrative problem, and manageable size, the researcher considered all students in the selected sections. The participants of the study were 864 students. The present study used survey method of data collection and it adopted quantitative research method.

Instruments

Scales of mathematics motivation, social support and alienation from the school, mathematics achievement test and document were used for this study. Mathematics motivation scale was adapted from O'Neil and Schacter's (1997), social support scale adapted from Malecki and Demaray (2002), and alienation from school scale was adapted from Yildirim (1997). The mathematics motivation scale was used to assess the tenth grade students' motivation towards mathematics. The scale contains 50 items; that is, the questions were contained in the main title of intrinsic and extrinsic motivation. The social support and alienation from school scales were used to assess the tenth grade students' feeling on social support and alienation from school in mathematics. The scale contains 20 items; 10 were related to social support and the other 10 were to alienation from the school. All the scales of motivation, social support and alienation were scored on a 1-5 Likert-type scale such as strongly agree, agree, undecided, disagree and strongly disagree.

Mathematics achievement test (MAT) were selected by the researcher (and modified) from the latest five years of tenth grade Ethiopian national examination. The test items were classified at three cognitive levels (knowledge, comprehension and application). The types of the questions were all multiple choice (closed-ended). The purpose of the mathematics achievement test was to determine the students' mathematics achievement. Mathematics motivation, social support and alienation from school scales were translated into a local language (Amharic) by a staff member of Addis Ababa University where his area of specialization was Amharic major and English minor, and reviewed by other professionals by translating backward and checking for consistency.

The instruments were reviewed based on the comments of professionals and the result of the pilot study for the face and content validity. A pilot study was conducted to determine the validity and reliability of the mathematics motivation, social support and alienation from school scales and mathematics achievement test. One hundred and ten tenth grade students were chosen randomly using simple random sampling from two schools for the pilot study. From the pilot study, construct validity were established by calculating correlations between the independent variables with mathematics achievement. Therefore, all the independent variables were correlated with the mathematics achievement and the correlations were significant at 0.05 level of significance. The alpha coefficient of Cronbach yielded 0.76 for the intrinsic motivation scale, 0.784 for extrinsic motivation scale, 0.85 for the motivation scale, 0.78 for social support scale, 0.84 for alienation from the school scale, and 0.82 for the internal consistency coefficient for the mathematics

achievement test. Cronbach Alpha Coefficients of reliability for the of variables of mathematics motivation including intrinsic and extrinsic, social support, alienation from the school and mathematics achievement test indicate that they have high internal-consistency reliability.

Method of Analysis

The data analysis techniques for this study were Independent t-test, Mann-Whitney test, One and Two way ANOVA, Kruskal-Wallis test, regression analysis and path analysis.

Ethical Issues

The consent of all school officials, teachers and students involved was obtained and an official letter war secured from Department of Science and Mathematics Education, AAU.

RESULTS

Below is the descriptive statistics of the variables such as intrinsic motivation, extrinsic motivation, motivation, social support, alienation from school and achievement in mathematics.

Table 1: Descriptive statistics for different variables of students in mathematics

Variable	N	Mean	SD
Intrinsic	864	2.81	.5698
Extrinsic	864	3.25	.5034
Motivation	864	3.03	.5264
Social Support	864	2.82	.5428
Alienation from the school	864	3.32	.5564
Achievement	864	43.51	12.4662

Table 1 indicates that intrinsic motivation (2.81), extrinsic motivation (3.25), motivation (3.03), social support (2.82), alienation from school (3.32) and achievement in mathematics (43.51) were around the average value. The average of the intrinsic motivation is less than that of the extrinsic motivation.

The poor performance of students in mathematics might be due to the absence of students from the class, lack of motivation of the methodology of teaching mathematics, not using teaching aids, shortage of instructional materials, teachers' qualification, teachers' method of assessment, the nature of the subject, teachers' attitude to their profession, lower income of the family of the students, shortage of time for study, shortage of reference books in the library, etc.

First it was attempted to check the hypotheses $H_{0[1]}$ and $H_{0[2]}$, that is there were no significant differences in the motivation, components of motivation, social support, of alienation from school and achievement of tenth grade students in mathematics with respect to sex and achiever levels.

Sex

The first step was to check whether there were significant differences or not in the motivation, components of motivation, social support, alienation from the school and achievement of students in mathematics with respect to sex.

Table 2: Mann-Whitney U test for the different variables of students in mathematics in terms of sex

Groups	N	Mean Rank	U	p
Intrinsic			64112.0	.000
Male	514	482.77		
Female	350	358.68		
Extrinsic			58783.5	.000
Male	514	493.14		
Female	350	343.45		
Motivation			60003.0	.000
Male	514	490.76		
Female	350	346.94		
Social Support			80830.0	.011
Male	514	450.24		
Female	350	406.44		
Alienation from the school			67299.0	.000
Male	514	388.43		
Female	350	497.22		

Table 2 showen the mean or average ranks for males and females on each of the five dependent variables. SPSS ranked the 864 students from 864 (highest) to 1 (lowest) and concluded that males scored higher than females in intrinsic motivation, extrinsic motivation, motivation and social support; and females higher scored higher than males in alienation from the school. The table also provides the Mann-Whitney U and p value. From p value, the mean ranks of the sex differ significantly in all variables such as intrinsic motivation, extrinsic motivation, motivation, social support and alienation from school of students in mathematics.

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Table 3: Independent samples t-test for mathematics achievement with respect to sex

Groups	N	M	SD	SE	df	t	p
Mathematics Achievement					857.05*	-9.656*	.000
Male	514	46.539	13.1155	.57850			
Female	350	39.060	9.6357	.51505			

* The t and df were adjusted because variances were not equal.

Table 3 shows that males were significantly different from females on mathematics achievement, ($p = .000$). Inspection of the two group means indicates that the average mathematics achievement score for female students (39.06) is lower than the score for males (46.539). Therefore, for the mathematics achievement, the appropriate $t = -9.656$, $df = 857.05$, and $p < 0.05$. Thus, t is statistically significant and we can concluded that females (39.06) were significantly less than males (46.539) on mathematics achievement ($p < 0.05$). The difference between the means is 7.479. The effect size d is approximately 0.63, which

is, according to Cohen (1998), medium to large sized effect.

Achiever Levels

The second step was to check whether there were significant differences or not in the motivation, components of motivation, social support, alienation from school and achievement of students in mathematics with respect to achiever levels.

Table 4: Kruskal Wallis test for the different variables in mathematics in terms of achiever levels

Groups	N	Mean Rank	df	Chi-Square	p
Intrinsic			2	500.001	.000
Lower achiever	481	286.03			
Average achiever	220	496.09			
Higher achiever	163	778.90			
Extrinsic			2	521.179	.000
Lower achiever	481	280.18			
Average achiever	220	509.01			
Higher achiever	163	778.72			
Motivation			2	529.217	.000
Lower achiever	481	276.98			
Average achiever	220	514.87			
Higher achiever	163	780.24			
Social Support			2	434.330	.000
Lower achiever	481	313.87			
Average achiever	220	432.19			
Higher achiever	163	783.00			
Alienation from the school			2	475.149	.000
Lower achiever	481	569.61			
Average achiever	220	392.10			
Higher achiever	163	82.43			

From Table 4, it can be easily seen that higher achievers were the highest group and lower achievers were the least in scores of intrinsic motivation, extrinsic motivation, motivation and social support where as higher achievers were the least group and lower achievers were the highest group in alienation from school. The p value of table 4 also indicates that the mean ranks of the achiever level differ significantly in all variables of intrinsic motivation, extrinsic motivation, motivation, social support and alienation from school of students in mathematics.

Since the students had significant difference in intrinsic motivation, extrinsic motivation, motivation, social support and alienation from school in mathematics with respect to the achiever levels, then the next question was which of the achiever levels made more significant difference. To find these, paired comparisons Mann-Whitney U test was used. The Mann-Whitney U test for the paired achiever levels for each variable is given in Table 5.

Table 5: Mann-Whitney U test for the paired mathematics achiever levels in for each variables

Groups	Average achiever		Higher achiever	
	Mann-Whitney	P	Mann-Whitney	P
Intrinsic				
Lower achiever	21553.000	.000	105.000	.000
Average achiever			562.500	.000
Extrinsic				
Lower achiever	18845.500	.000	.000	.000
Average achiever			697.500	.000
Motivation				
Lower achiever	17308.000	.000	.000	.000
Average achiever			450.000	.000
Social Support				
Lower achiever	35048.500	.000	.000	.000
Average achiever			.000	.000
Alienation from the school				
Lower achiever	26162.500	.000	.000	.000
Average achiever			70.000	.000

From table 5, for all variables such as intrinsic motivation, extrinsic motivation, motivation, social support and alienation from school, all achieves levels made more significant difference with each other. That is, there is a significant difference between higher, average and lower achievers for all variables. Table 6 is F-test for the achievement of students in mathematics for the three achiever levels, i.e lower, average and higher achievers.

Table 6: F-test for students' mathematics achievement with respect to achiever levels

Groups	N	M	SD	SE	F	p
Mathematics Achievement					2999.756	.000
Lower achiever	481	34.9127	3.37526	.15390		
Average achiever	220	46.0182	5.37877	.36264		
Higher achiever	163	65.4908	5.44259	.42630		

Inspection of the three group means indicates that the average mathematics achievement score for lower achiever students (34.9127) is lower than the score for average achiever students (46.0182), and the one for average achiever students (46.0182) is lower than the higher achiever students (65.4908). From table 6 of F-ratio, the F value is 2999.756 with $p < 0.05$, there was a high significant difference in the achievement of students in mathematics with respect to the achiever levels of students. This means there were high significant differences between the different groups in their achiever levels such as low, average and high achievers

about the achievement of students in mathematics.

Since the achiever levels had significant differences in the achievement of students in mathematics; then the next question was which of the achiever levels made more significant differences. To find these multiple comparisons among means Games-Howell test was used. The difference between the averages of achievement of students in mathematics for each achiever levels in mathematics is compared in table 7.

Table 7: Games-Howell test for comparison of the achiever levels for mathematics achievement

Variable	Average achiever		Higher achiever	
	Games-Howell	**P**	**Games-Howell**	**P**
Mathematics achievement				
Lower achiever	-11.10550	.000	-30.57812	.000
Average achiever			-19.47262	.000

The Games-Howell test for mathematics achievement indicate, that higher achiever and lower achiever differed significantly in their mathematics achievement ($p < .05$, $d = 7.64$), higher achiever and average achiever differed significantly in their mathematics achievement ($p < .05$, $d = 3.6$) and average achiever and lower achiever differed significantly in their achievement ($p < .05$, $d = 2.7$). The effect of size d for all comparison according to Cohen (1998), much larger sized effect. Next to show whether sex and achiever levels each seem to have an effect on mathematics achievement, achiever levels and sex interact.

Table 8: Analysis of variance for mathematics achievement as a function of sex and achiever levels

Achiever Level	Sex	N	M	SD	df	F	p	η^2
Lower achiever	M	265	35.7623	1.94627				
	F	216	33.8704	4.33610				
Average achiever	M	131	49.4962	2.73263				
	F	89	40.8989	4.05655				
Higher achiever	M	118	67.4576	4.81743				
	F	45	60.3333	3.12614				
Achiever Level					2	3607.345	.000	.894
Sex					1	5351.692	.000	.335
Sex * Achiever levels					2	961.611	.011	.153

*R Squared = .920 (Adjusted R Squared = .919)

Fig. 1: Estimated Marginal Means of Achievement

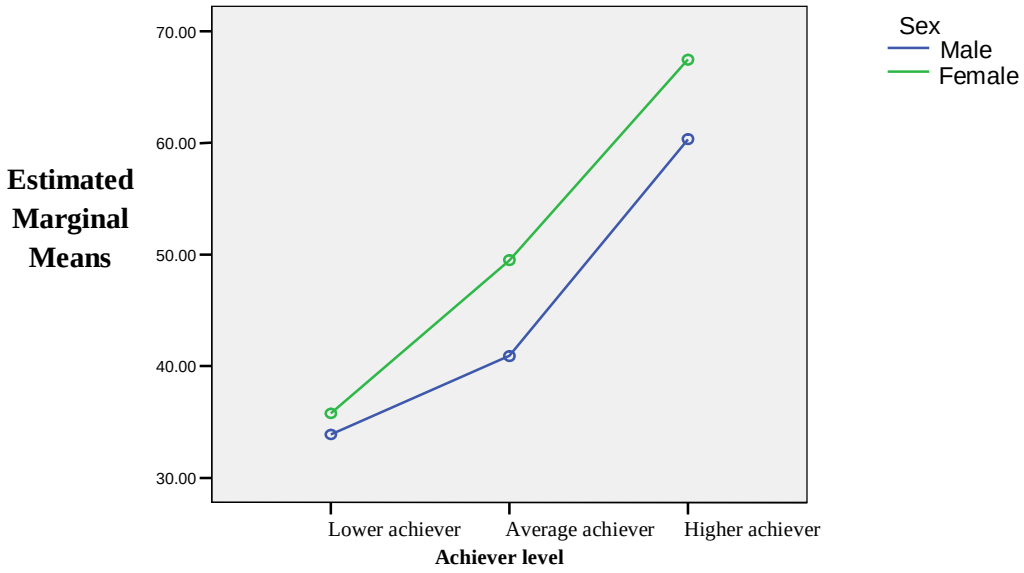

Table 8 shows that there was a significant main effect of sex on mathematics achievement, $F(1, 858) = 432.918$, $p < 0.05$. Eta for sex was about .58, which, according to Cohen (1988), is a much larger effect.

Furthermore, there was a significant main effect of achiever level on mathematics achievement, $F(2, 858) = 3607.345$, $p < 0.05$. Eta for achiever levels was about .95, a much larger effect. There was also a significant interaction between sex and achiever levels on mathematics achievement ($p = .011$). This means the interaction (sex*achiever levels) was significant, the effect of achiever levels on mathematics achievement was not the same for both sexes. Also, from the profile plots and differences between the cell means, males were larger than females for average achiever (difference cell means = 8.60) and higher achiever (difference cell means = 7.12), but the difference between males and females was small for lower achiever level (difference cell means = 1.89).

Below is the hypothesis to check whether there were significant impacts or not of sex, achiever levels, motivation, social support and alienation from school on the achievements of students in mathematics.

$H_{0[6]}$: There is no significant impact of sex, achiever levels, motivation, social support and alienation from the school on the achievements of students in mathematics.

Table 9 shows the relationships between each of the variables motivation, social support and alienation from the school with each other and with the achievement in mathematics and the significance of their correlation.

Table 9: ANOVA Table that shows collective impact of motivation, social support and alienation from the school on mathematics achievement

ANOVA Table	Sum of Squares	df	Mean Square	F	p
Regression	106742.278	3	35580.759	1197.553	.000
Residual	25551.648	860	29.711		
Total	132293.926	863			
Multiple R = .898					
R^2 = .807					

In the ANOVA table 9, F value indicates that the multiple correlations R were significant for mathematics achievement that is the contribution of all variables i.e, motivation, social support and alienation from school (M, S and A respectively) collectively significantly affected the achievement of students in mathematics.

Table 10: t-table that shows individual impact of motivation, social support and alienation from the school on mathematics achievement

Variable	r	B	Std. Error	Beta	t	p
Motivation	.858*	8.768	.732	.373	11.982*	.000
Social Support	.836*	7.636	.633	.337	12.055*	.000
Alienation from the School	-.793*	-5.775	.545	-.259	-10.601*	.000

In table 10, t values indicate that the contribution of motivation, social support and alienation from school in mathematics were significantly affected the mathematics achievement. From regression table 10, since $R^2 = 0.807$, then the three variables (motivation, social support and alienation from school in mathematics) had 80.7% effect or contribution on mathematics achievement.

The percent of effect or contribution of each component of motivation, social support and alienation from the school (M, S and A respectively) on achievement of students in mathematics can be found by $(R^2 = \beta_M r_{XM} + \beta_S r_{XS} + \beta_A r_{XA}) \times 100\%$. That is, $80.7\% \approx 32.0\% + 28.17\% + 20.53\%$. Therefore, the contribution of motivation in learning mathematics enhanced the achievement of mathematics by 32.0%, the contribution of social support in mathematics enhanced the achievement of mathematics by 28.17% and the contribution of alienation from school in mathematics enhanced the achievement of mathematics by 20.53%.

A Structural Model for Mathematics Achievement

The present study also investigated the role of the variables such as sex, achiever levels, motivation, students' social support and alienation from school in mathematics on students' mathematics achievement using a causal path analytic model. Table 11 provides the direct effects of variables from the path analysis.

From Table 11, all the path coefficients from the sex, achiever levels, students' social support and alienation from school in mathematics variables to mathematics achievement were significant. Achiever levels had the highest direct effect on mathematics achievement. The path coefficient of alienation from school in mathematics to mathematics achievement was negative and significant. The final regression model for estimating the direct effects of independent variables on mathematics achievement showed that the model accounted for 95 percent of the variability in mathematics achievement. In addition, the effects of sex, achiever levels and students' social support on mathematics achievement were more direct than indirect, and motivation and students' alienation from school on mathematics achievement were more indirect than direct. Achiever levels had a stronger direct and indirect effect on mathematics achievement than did any of the variables in the study.

Table 11: Direct, indirect and total effects of variables on achievement, alienation from the school, social support and motivation in mathematics

Effect	r	Direct Effect	Indirect Effect	Total Effect	t	R^2
On mathematics achievement						0.95
of sex	.297*	.172*	.0007	.1727	14.584*	
of achiever levels	.924*	.693*	.2259	.9189	27.878*	
of motivation	.858*	-.023	.0037	-.0193	-.864	
of social support	.836*	.207*	.0233	.2303	9.818*	
of alienation from school	-.793*	-.072*	-	-.072	-3.847*	
On mathematics alienation from the school						.823
of sex	-.183*	-.018	-.0097	-.0277	-.823	
of achiever levels	-.804*	-.498*	-.2910	-.789	-11.873*	
of social support	-.781*	-.304*	-.0193	-.3233	-6.515*	
of motivation	-.718*	-.051*	-	-.051	-1.328	
On mathematics motivation						.91
of sex	.312*	.190*	-	.190	13.290*	
of achiever levels	.861*	.525*	.3088	.5338	21.118*	
of social support	.838*	.378*	-	.372	15.169*	
On mathematics social support						.824
of sex	.145*	.041	-	.041	2.106*	
of achiever levels	.823*	.817*	-	.817	41.954*	

* $p < 0.05$

Fig 2: Path Model for Mathematics Achievement

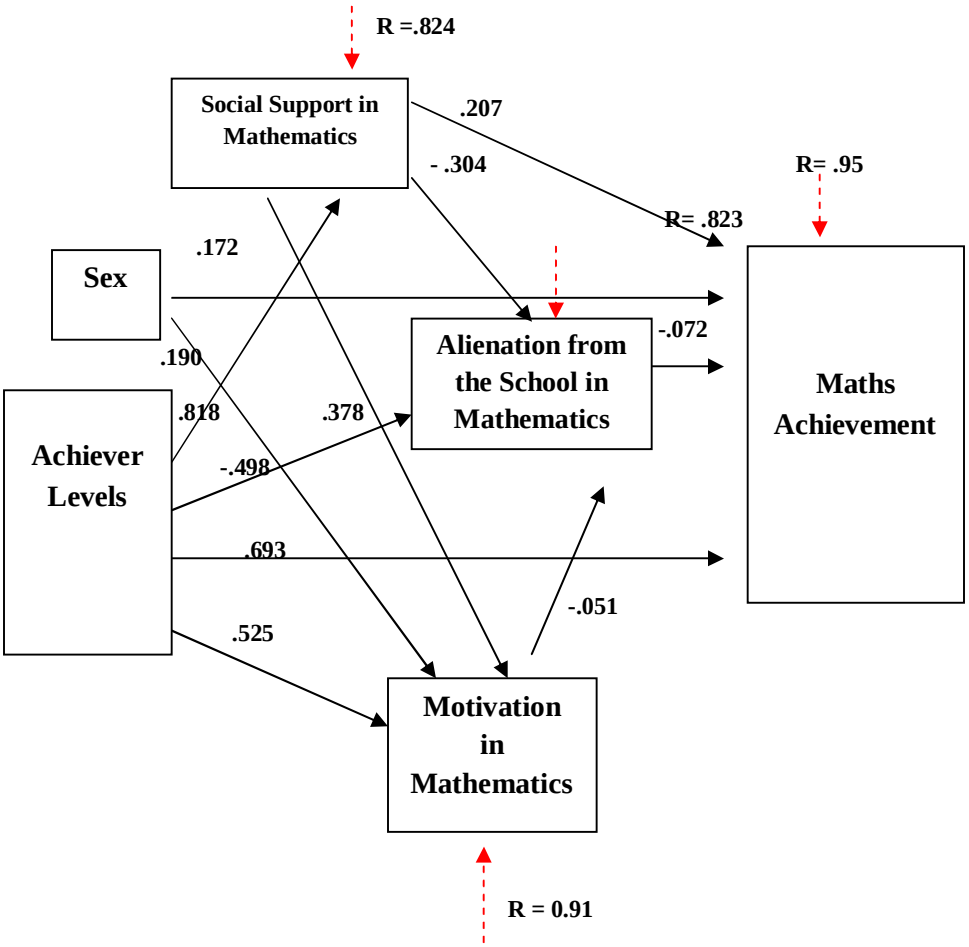

Figure 2 illustrates the path analysis model with non significant paths removed. Mathematics achievement of Addis Ababa secondary school students was considered to be a function of sex, achiever levels, motivation, students' social support and alienation from school in mathematics. The sex and achiever levels variables were considered exogenous variables. Motivation, students' social support and alienation from school in mathematics and students' mathematics achievement form endogenous variables, each considered dependent on the exogenous sex and achiever levels.

DISCUSSION

Motivation and Achievement in Mathematics

The intrinsic and extrinsic motivations were found to be average and the average of the intrinsic motivation was less than that of the extrinsic motivation. The intrinsic motivation and extrinsic motivations in mathematics of the females were significantly less than that of the males. The result indicated that females had less internal and external motivation in doing mathematics than males and they require more external support to engage in mathematical activities. The finding regarding intrinsic motivation was in disagreement which found out with the findings of Mecca & Holt (1993) that girls show a greater academic intrinsic motivation than boys and with Gottfried (1990) that there is no gender difference in intrinsic motivation for mathematics. Similarly, the finding regarding extrinsic motivation agreed with the finding of Anderman & Anderman (1999) that boys show a greater degree of academic extrinsic motivational orientation than girls, but disagreed with the finding of Boggiano, Main, and Katz (1991) that showed females possess a more extrinsic orientation than males.

The mean ranks of the achiever level differ significantly in all variables i.e, intrinsic motivation, extrinsic motivation and motivation of students in mathematics. There were significant differences between higher, average and lower achievers for intrinsic motivation, extrinsic motivation and motivation, that is, for these variables, the higher achievers had significantly the highest value and the lower achievers had significantly the lowest value.

The contribution of motivation significantly affected the mathematics achievement and the highest contributions for the mathematics achievement were the result of motivation (32.0%), that is the contribution of students motivation in mathematics enhanced the achievement of mathematics by 32.0%. The finding regarding motivation was supported by Gottfried (1990) and Goldberg and Cornell (1998) that is a significant positive correlation between motivation and achievement was obtained, and Middleton and Spanias' (1999) also identified that success in mathematics is a powerful influence on the motivation to achieve.

To facilitate the development of students' intrinsic motivation, teachers must teach knowledge and skills that are worth learning. In other words, students must understand that the mathematics instruction they receive is useful, both in immediate terms and in preparing them to learn more in the fields of mathematics and in areas in which mathematics can be applied (e.g., physics, business, etc.). Use of ill-structured, real-life problem situations in which the use of mathematics facilitates uncovering important and interesting knowledge promotes this understanding. However, utility and importance are not

sufficient to develop students' intrinsic motivation.

Social Support and Achievement in Mathematics

The response on students' social support was found to be average and students' social support in mathematics of the females was significantly less than that of the males. The female students fell that they get less support was in from the teachers. The finding for social support disagreement with the finding of Umberson, Meichu, House, Hopkins and Slaten (1996) that showed there is no difference in social support between women and men.

The mean ranks of the achiever levels differ significantly in social support of students in mathematics. There were significant differences between higher, average and lower achievers for students' social support; the higher achievers had significantly the highest value and the lower achievers had significantly the lowest value in social support.

The contribution of students' social support in mathematics significantly affected the mathematics achievement; that is the contribution of social support in mathematics enhanced the achievement of mathematics by 28.17%. The finding is supported by Birch & Ladd (1998) and Demaray and Malecki (2006) that is student perception of teacher support has been associated with greater school/academic engagement and motivation, as well as better academic performance.

Social support creates motivation for students to achieve (Weiner, 1985). It builds confidence and a sense of self that make academic success seem attainable (Bandura, 1995). Of course, the support students receive may not always be conducive to academic achievement. For example, student peer groups may create a social stigma around academic achievement.

Alienation from School and Achievement in Mathematics

The response of students' alienation from school was found to be average and the alienation from school of females was greater than that of males. This result indicates that females were more isolated from group activities or class activities than males. The finding disagreed with the findings of Tina and Gerda (2011) that is boys are more affected by school alienation. The variation in the present result of this study and that of Tina and Gerda (2011) may be connected with the issue of environment. While the present study was conducted in Ethiopia, Africa, where there is negative social impact on girls, the other was conducted in Austria, Europe.

The mean ranks of the achiever levels differ significantly in alienation from school of students in mathematics. There were significant differences between higher, average and lower achievers for students' alienation from school; the higher achievers had significantly the least value and the lower achievers were significantly the highest value in alienation from the school. The finding agrees with the finding of Tina and Gerda (2011) that is low achievers are more affected by school alienation.

The contribution of alienation from school in mathematics significantly affected the mathematics achievement, that is, the contribution of alienation from the school in mathematics enhanced the achievement in mathematics by 20.53%. The finding is

supported by Johnson, G. M. (2005) that is student alienation was related to academic achievement.

Students alienated from school structure, while not being handicapped in terms of scholastic achievement, may be hindered in the development of other important personal characteristics. The principle which underlies much of the educational policy calls for student involvement in their curricular experiences, yet those that are alienated can see no purpose in involvement. They see themselves as having no real power, as being isolated from the community, and their work as generally having no meaning and being unreal.

Mathematics Achievement and Impacts of other variables

The achievement of students in mathematics was found to be average and females were significantly less than males in their achievement. Some researches (National Assessment of Educational Progress, 1975) also supported the above result; that is their findings consistently indicate that men score higher than women on mathematics achievement tests.

The average mathematics achievement score for lower achiever students was lower than the score for average achiever students and the average achiever students were also lower than the higher achiever students in their achievement. The Games-Howell test indicate that there were high significant differences between the different groups of students in their achiever levels such as low, average and high achiever in their mathematics achievement. Some researches (Pajares, 1995) also supported the above result; that is mathematical ability had a significant positive influence on subsequent mathematics achievement.

There was also a significant interaction between sex and achiever levels on mathematics achievement. This means the interaction (sex*achiever levels) was significant, the effect of achiever levels on mathematics achievement was not the same for both sexes. Also from the profile plots and differences between the cell means, males had larger mean than females for average and higher achievers, but the difference between males and females was small for lower achievers.

From the path analysis, achiever levels had the highest direct effect on mathematics achievement. The path coefficient of alienation from school in mathematics to mathematics achievement was negative and significant. In addition, the effects of sex, achiever levels and students' social support on mathematics achievement were more direct than indirect, and motivation and students' alienation from school on mathematics achievement were more indirect than direct. Achiever levels had a stronger direct and indirect effect on mathematics achievement than did any of the variables in the study. The finding regarding achiever levels is supported by Bandura (1997) that is students' prior achievement had the strongest direct effect on mathematics achievement, and is supported by (Ibe, 1994) that is prior achievement has a significant indirect effect on mathematics achievement, influencing not only students' participation in mathematics learning, but also their confidence in understanding mathematical concepts and time spent on mathematics homework. However, mathematics ability may not, by itself, serve as sufficient predictors of mathematics achievement (Rhodes, 1992).

CONCLUSION

Iintrinsic motivation, extrinsic motivation, motivation, social support, alienation from school and achievement in mathematics were around the average value. The extrinsic motivation of students was greater than their intrinsic motivation. The intrinsic motivation, extrinsic motivation, motivation and social support of students in mathematics of the females were significantly less than that of the males, but for alienation from school variable of females, were significantly greater than that of males.

The intrinsic motivation, extrinsic motivation, motivation and social support of students in mathematics for the higher achievers had significantly the highest value and lower achievers had the least value, but for alienation from school of students in mathematics; the higher achievers had significantly the least value and lower achievers had the highest value. There was a significant main effect of sex and achiever level on mathematics achievement.

The contribution of all variables (motivation, social support and alienation from school) collectively significantly affected the achievement of students in mathematics. Similarly, the contribution of

each of the variables such as motivation, social support and alienation from school in mathematics significantly affected the mathematics achievement.

The path coefficient of alienation from the school in mathematics to mathematics achievement was negative and significant. Achiever levels had the highest direct effect on mathematics achievement. In addition, the effects of sex, achiever levels and students' social support on mathematics achievement were more direct than indirect and motivation and students' alienation from the school in mathematics on mathematics achievement were more indirect than direct.

RECOMMENDATION

Since intrinsic motivation, extrinsic motivation, motivation, social support, alienation from the school and achievement in mathematics were around average. In order to improve the positive impact and reduce the negative impact of each independent variable on students' mathematics achievement the following suggestions were recommended:

1. The mathematics teachers should give more interesting lessons taking into account the students' developmental and learning needs by using active learning methods, such as project work, experimental work, different visual and authentic learning tasks. These pedagogical approaches are important to increase the level of intrinsic motivation for learning mathematics.
2. The mathematics teachers should try as much as they can motivate their students during the course of instructions and emphasis also given to female students. S/he can use different motivational techniques such as giving motivation, tell students exactly what

   you want to accomplish, have students set short term goals, use spoken and written praise, use tests and grades judiciously, capitalize on the arousal of suspense, discovery, curiosity, exploration, control and fantasy, occasionally do the unexpected, use familiar materials for examples, use unique and unexpected contexts when applying concepts and principles, make students use what they have previously learned, use simulation and

games, minimizing the attractiveness of competing motivational system and minimizing any unpleasant consequences of student involvement.

3. Peer supports really work; they're a great, efficient way to help all students learn, make the most of teacher/ paraprofessional time, and increase the achievement level of students in challenging students. This is the concise, practical guide every middle and high school needs to implement peer support strategies-including cooperative learning and peer tutoring to benefit students with moderate to severe disabilities and their peers.

4. Mathematics teachers should know students names, recognize their efforts, and provide academic support and encourage educational and student development. Those who do not care, fail to listen, and refuse to recognize individual differences in achievement potential, contribute to the alienation of students.

5. School officials should improve the climate of their schools by advocating for policies that promote rather than detract from the personal and educational development of students. They should do this by conducting in-service training for teachers and administrators on basic communication skills, and methods of affirming students' importance and providing encouragement to them.

6. School officials should also help develop a positive school climate by sponsoring and conducting award programs.

7. Other direct interventions that are frequently employed by school officials include study skills groups, time management training, classroom guidance units aimed at improving test taking skills, and achievement motivation groups.

8. School officials should involve parents through parent consultation, parent education classes that teach parents how to support their children in schools as well as parenting skills.

REFERENCES

Ames, C. (1992). Classrooms: Goals, Structures, and Student motivation, *Journal of Educational Psychology*, 84(3), 261-271.

Anderman, L. H. (1999). Classroom Goal Orientation, School Belonging and Social Goals as Predictors of Students' Positive and Negative Affect Following the Transition to Middle School. *Journal of Research and Development in Education*, 32, 89-103.

Bandura, A. (1977). Self-efficacy: Toward a Unifying Theory of Behavioral Change, *Psychological Review*, 84(2), 191 – 215.

Bandura, A. (1975). Social Foundations of Thought and Action: A Social Cognitive Theory. *Englewood Cliffs*, NJ: Prentice Hall.

Birch, S. & Ladd, G.W. (1998). Children's Interpersonal Behaviors and the Teacher-Child Relationship. *Developmental Psychology*, 34, 934-946.

Boggiano, A. K., Main, D. S., & Katz, P. (1991). Mastery Motivation in Boys and Girls: The Role of Intrinsic Versus Extrinsic Motivation. *Sex Roles*, 25(9/10), 511-520.

Bomia, L., Beluzo, L., Demeester, D., Elander, K., Johnson, M., & Sheldon, B. (1997). The Impact of Teaching Strategies on Intrinsic Motivation. Champaign, IL: ERIC Clearinghouse on Elementary and Early Childhood Education.

Brown, M. R., Higgins, K., & Paulsen, K. (2003). Adolescent alienation: What is It and What can Educators Do about It? Intervention in School & Clinic, 39, 3-7.

Demaray, M. K., & Malecki C. K. (2002a). Critical Levels of Perceived Social Support Associated with Student Adjustment. *School Psychology Quarterly*, 17:213–41.

Demaray, M. K., & Malecki C. K. (2006). Social Support as a Buffer in the Relationship between Socioeconomic Status and Academic Performance. *School Psychology Quarterly*. 21(4): 375-95.

Goldberg, M. D. & Cornell, D. G. (1998). The Influence of Intrinsic Motivation and Self Concept on Academic Achievement in Second- and Third-grade Students. *Journal for the Education of the Gifted*, 21(2), 179-205.

Gottfried, A. E. (1990). Academic Intrinsic Motivation in Young Elementary School Children. *Journal of Educational Psychology*, 82, 525-538

Ibe, R. E. (1994). The Enduring Afflicts of Productivity Factors on Eighth-Grade Students' Mathematical outcome. *Paper presented at the annual meeting of the American Educational Research Association*, New Orleans, LA.

Johnson, G. M. (2005). Students' Alienation, Academic Achievement,

and WebCT Use. *Educational Technology & Society*, 8 (2), 179-189.

Juvonen, Jaana; Vi-Nhuan Le, Kaganoff, Tessa; Augustine, Catherine and Constant, Louay (2004). *Focus on the Wonder Years: Challenges Facing the American Middle School*, Rand Corporation, Santa Monica.

Laxman D. (2010). Impact of Academic Motivation and Perceptions of Classroom Climate on Academic Achievement of Secondary School Students in North Coastal Andhra Region. *Ph. D Dissertation (Unpublished)*, Andhra University, Pradish, India.

Ma, X. (2003). Sense of Belonging to School: Can Schools make a Difference? *The Journal of Educational Research*, 96(6), 340349.

Maccoby, E. E., & Jacklin, C. N. (1974). The Psychology of Sex Differences, Stanford, CA: Stanford University Press, In M. C. Linn, & J. S. Hyde (1989) Gender, Mathematics, and Science; *Educational Researcher*, 18(8), 17-27.

Malecki, C. K., & Demaray, M. K. (2002). Measuring perceived social support: Development of the child and adolescent social support scale (CASSS). Psychology in the Schools, 39, 1–18. doi:10.1002/pits.10004.

Mann, S. J. (2001). Alternative Perspective on the Student Experience: Alienation and Engagement. *Studies in Higher Education*, 26, 7-13.

Meece, J.L. & Holt, K. (1993). A Pattern Analysis of Students' Achievement Goals. *Journal of Educational Psychology*, 85,582-590.

Middleton, J. A. & Spanias, P. A. (1999). Motivation for Achievement in Mathematics: Findings, Generalization and Criticism of the Research. *Journal for Research in Mathematics Education*, 30(1), 65-88.

National Assessment of Educational Progress. (1975). The First National Assessment of Mathematics: *An Overview (Report 04-MA-40)*. Denver: Education Commission of the States.

Niebuhr, K. (1995). The Effect of Motivation on the Relationship of School Climate, Family Environment, and Student Characteristics to Academic Achievement (Report No.

EA 027467). East Lansing, MI: National Center for Research on Teacher Learning. (*ERIC Document Reproduction Service No. ED393202*)

O'Neil, H. F. & Schacter, J. (1997). *Test Specifications for Problem Solving Assessment, CSE Technical Report 463*. Los Angeles, CA: Center for the Study of Evaluation.

Pajares, F. (1995). Self-efficacy Beliefs and Mathematical Problem-solving of Gifted Students: *Contemporary Educational Psychology*, 21, 325-344.

Rhodes, L. (1992). Focusing Attention on the Individual in Identification of Gifted Black Students, *Roeper Review*, 14, 108-110.

Sayar, M. (2006). A Longitudinal Study of the Relationship between Perceived Social Support and Psychological well-being of Adolescent from Low Socioeconomic Status. *Yüksek Lisans Tezi*. Bogaziçi Üniversity, Institute of Social Sciences.

Tina H. & Gerda H. (2011). *Alienation from School* – a Problem occurring during early Adolescence. European Educational Research Association. Faculty of Education, University of Salzburg, Austria.

Umberson, D., Meichu D. C., House J. S., Hopkins K., & Slaten E. (1996). The Effect of Social Relationships on Psychological Well-being: Are Men and Women really so Different? *American Sociological Review*, 61:837-57.

Weiner, Bernard (1985). *Human Motivation*. New York: Springer-Verlag.

Wentzel, K. (1998). Social Relationships and Motivation in Middle School: The Role of Parents, Teachers, and Peers. *Journal of Educational Psychology*, 90(2), 202-209.

Wiepert, H. (1965). A Study of the Incidence of Alienation in a College Population and its Relationship to Certain Demographic Variables. *Unpublished Dissertation*. New York University.

Yildirim, S. (1997). Algılanan sosyal destek ölçeginin gelistirilmesi: Güvenirligi ve geçerligi. Hacettepe Egitim Fakültesi Dergisi, 13:81- 87.