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Gender Differences in Examination Performance: Case Study of Saed Daud Intermediate School in Berbera (2003-2019)

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Abstract

This study examined gender differences in examination performance at Saed Duad **I**ntermediate School, Berbera (2003–2019)**,** analyzing trends across subjects and assessing the impact of free primary education. A longitudinal descriptive and comparative design was used, enabling the analysis of 8-year performance trends and comparisons of gender-based differences in overall and subject-specific achievement.

Secondary data from Grade 8 national examinations in Mathematics, Science, and English were disaggregated by gender. Welch's t-tests evaluated overall and subject-specific gender differences (Hypotheses 1 and 2), while one-way ANOVA assessed performance before and after free primary education (Hypotheses 3 and 4), with significance set at $p < .05$.

Results indicated no significant overall gender differences, though girls consistently outperformed boys in English, and isolated differences appeared in Mathematics and Science. Post-policy analysis revealed significant gains in Mathematics and English, with smaller changes in Science.

The findings suggest that overall gender parity was maintained**,** but subject-specific disparities persist, highlighting the need for targeted interventions, gender-responsive pedagogy, and enhanced Science resources.

Keywords: Gender differences, Academic achievement, Examination performance, Free primary education, Somaliland

1. Introduction

Education is a fundamental human right, as enshrined in the Universal Declaration of Human Rights (United Nations, 1948). A key dimension of educational equity is gender parity in academic achievement. Globally, research on this topic has yielded complex and often context-dependent findings. Numerous studies suggest that girls tend to exhibit higher motivation and more positive attitudes toward schooling compared to boys (Francis, 2000; Warrington et al., 2000). A widely observed pattern is that girls often outperform boys in literacy, while boys tend to have an advantage in numeracy (OECD, 2015; Lavy & Sand, 2018).

However, these gender gaps are not universal. They are moderated by numerous factors, including students' socio-economic backgrounds (Entwisle et al., 2007), peer influences (Legewie & DiPrete, 2012), and racial or ethnic identities (Penner & Paret, 2008). In the fields of Mathematics and Science, gendered patterns in interest and achievement often emerge around early adolescence (Cvencek, Meltzoff, & Greenwald, 2011; Eccles & Roeser, 2011). While some studies find boys outperforming girls in these subjects (Preckel et al., 2012), large-scale international assessments like the Trends in International Mathematics and Science Study (TIMSS) have found no significant gender differences in many participating countries (Thomson, Hillman, & Wernet, 2012). Conversely, assessments like the Programme for International Student Assessment (PISA) consistently show a female advantage in reading across nearly all nations (OECD, 2016; Mullis et al., 2012).

In developing countries, factors intrinsic to the school environment,such as teacher effectiveness, resource availability, and curriculum implementation,can heavily influence student performance (Farrel, 1993; Russell, 1983). Within the Somaliland context, while basic literacy rates are relatively strong, concerns about numeracy and advanced writing skills persist (ESA, 2016). Despite this, there is a scarcity of empirical research examining gender-based performance trends at the school level.

This study aims to fill this gap by providing a detailed, longitudinal analysis of gender differences in examination performance at Saed Duad Intermediate School in Berbera. By examining 8 years of Grade 8

national examination data, this paper investigates overall performance trends and subject-specific achievements in Mathematics, Science, and English. Furthermore, it explores the potential impact of systemic changes, such as the introduction of free primary education, on these academic outcomes.

2. Objective of the Study

The primary objectives of this study were:

- To determine if there were significant gender differences in overall examination performance from 2003 to 2019.
- To identify gender differences in the performance of Mathematics, Science, and English over the same period.
- To assess whether a significant difference exists in student academic performance before and after the implementation of free primary education.
- To analyze the performance of girls specifically, before and after this educational policy shift.

3. Hypotheses

The study was guided by the following null hypotheses (H_0):

H_{01}: There is no statistically significant difference between the mean examination scores of male and female students from 2003 to 2019.

H_{02}: There is no statistically significant difference between the mean scores of male and female students in Mathematics, Science, and English.

H_{03}: There is no statistically significant difference in student examination performance (overall, and by subject) in the periods before and after the implementation of free primary education.

H_{04}: There is no statistically significant difference in the examination performance of female students before and after the implementation of free primary education.

4. Methodology

4.1 Area of the Study

The study was conducted at Saed Duad Intermediate School, a public government-run school located in Berbera, a major urban center in the Sahil region of Somaliland. Berbera is characterized by relatively diverse socioeconomic conditions and stable access to public education. Saed Duad Intermediate School prepares students for the Grade 8 national examination administered by the Somaliland Ministry of Education. The school was selected due to the availability of complete and reliable examination records spanning multiple years, which made it suitable for longitudinal analysis.

4.2 Study Design

This study employed a longitudinal descriptive and comparative research design. The longitudinal approach enabled the examination of trends in academic performance over 8 years (2003–2019), while the comparative component allowed for the assessment of gender-based differences in overall and subject-specific performance. In addition, the design facilitated comparisons of student performance before and after the implementation of free primary education.

4.3 Data Source

The study utilized secondary data obtained from official school records at Saed Duad Intermediate School. The data consisted of Grade 8 national examination results from 2003 to 2019. Examination scores in Mathematics, Science, and English, as well as overall examination scores, were collected and disaggregated by gender. Information regarding the implementation of free primary education was obtained from school administrative records and relevant Ministry of Education policy documents.

4.4 Study Variables

The independent variables in this study were gender (male and female) and time period (before and after the implementation of free primary education). The dependent variables were students' overall examination scores

and subject-specific scores in Mathematics, Science, and English. The school context was held constant, as all data were drawn from a single institution

4.5 Data Managements and Statistical Analysis

The data were coded, cleaned, and analyzed using statistical software. Descriptive statistics, including means and standard deviations, were used to summarize student performance by gender, subject, and year. Trend analysis was conducted to examine changes in performance over time. Inferential statistical analyses were used to test the study's hypotheses. Independent-samples *t* tests were conducted to examine differences in mean examination scores between male and female students overall and by subject. Additional *t* tests were used to compare examination performance before and after the implementation of free primary education. All statistical tests were conducted at a significance level of $\alpha = .05$.

4.5 Ethical Consideration

This study employed a retrospective analysis of institutional data from the Somaliland National Examination reports for Saed Daud Intermediate School in Berbera, covering eight academic years between 2003 and 2019. The sample consisted of 1,101 Grade 8 students (762 male, 319 female), divided into two periods for analysis: before (2003–2011) and after (2012–2019) the implementation of free primary education. Only aggregated examination results were analyzed to preserve the anonymity and confidentiality of individual students. Access to the records was granted by the school administration, and all procedures adhered to established ethical standards for research involving human participants.

5. Results

Descriptive statistics

Descriptive statistics were computed to summarize overall examination performance and subject-specific scores by gender and by policy period. Across the full sample (N = 1,101), boys (n = 762) and girls (n = 319) demonstrated differing patterns of achievement across subjects. Mean scores and standard deviations for overall

performance, Mathematics, Science, and English were calculated separately for boys and girls, as well as for the periods before (2003–2011) and after (2012–2019) the implementation of free primary education.

Gender Differences in Overall Examination Performance

In several academic years, girls demonstrated slightly higher mean scores than boys. For example, in 2003, girls achieved a higher mean score (M = 463.71, SD = 34.20) than boys (M = 458.85, SD = 59.05). A similar pattern was observed in 2010 and 2011, where girls outperformed small margin. The largest gender difference favoring girls was observed in 2013, when girls achieved a mean score of 479.96 (SD = 30.16) compared to 467.94 (SD = 29.98) for boys students. In contrast, boys outperformed girls in 2009, 2018, and 2019, although these differences were relatively small. The lowest overall mean scores for both genders were recorded in 2018, with boys averaging 289.52 (SD = 63.19) and girls averaging 275.66 (SD = 60.99)

Gender Differences in Subject-Specific Performance

Descriptive statistics were used to examine gender differences in Mathematics, Science, and English performance across selected academic years (see Tables 2–4). Overall, achievement in all three subjects fluctuated over time, with no consistent gender advantage across the study period.

In the early years, boys performed slightly better than girls. In 2003, boys scored higher (M = 46.08, SD = 13.73) than girls (M = 44.71, SD = 12.39), whereas in 2008, scores were nearly identical (M = 36.78, SD = 8.76 vs. M = 36.95, SD = 7.63). From 2009 to 2013, girls consistently scored higher, with a peak in 2013 (M = 72.52, SD = 5.72) compared to 2013 (M = 71.09, SD = 8.04). In later years, boys outperformed girls in 2018 (M = 31.62, SD = 10.44 vs. M = 28.69, SD = 9.80) and 2019 (M = 23.19, SD = 10.84 vs. M = 20.43, SD = 8.79).

Early trends favored girls. In 2003, girls scored higher (M = 78.53, SD = 8.26) than boys (M = 76.75, SD = 11.47), whereas in 2008, boys scored higher (M = 74.50, SD = 11.73 vs. M = 70.49, SD = 7.74). Minor differences were observed in 2009 and 2010. From 2011 to 2013, girls scored higher, peaking in 2013 (M = 66.89, SD = 8.60 vs. M = 64.85, SD = 7.87). Boys scored higher in 2018 (M = 31.19, SD = 12.07 vs. M = 29.22, SD = 9.27), while girls regained the advantage in 2019 (M = 41.71, SD = 6.69 vs. M = 38.08, SD = 11.42).

Boys slightly outperformed girls in 2003 (*M* = 61.92, *SD* = 10.21 vs. *M* = 57.94, *SD* = 6.41), whereas in 2008, mean scores were nearly identical (*M* = 43.76, *SD* = 15.86 vs. *M* = 43.63, *SD* = 13.97). From 2009 to 2013, girls consistently scored higher, peaking in 2013 (*M* = 61.70, *SD* = 7.33 vs. *M* = 59.15, *SD* = 8.99). In later years, performance was mixed: boys slightly outperformed girls in 2018 (*M* = 35.62, *SD* = 14.15 vs. *M* = 33.69, *SD* = 16.27), whereas in 2019, girls scored higher (*M* = 53.19, *SD* = 7.76 vs. *M* = 49.90, *SD* = 10.73).

Differences in Performance before and After Free Primary Education

Before the policy, boys' mean scores ranged from 342.11 to 458.85 (*M* = 380.95), while girls ranged from 351.05 to 463.71 (*M* = 382.97). After the policy, boys' mean scores ranged from 289.52 to 369.90 (*M* = 370.86) and girls from 275.66 to 479.96 (*M* = 370.09).

Before the policy, girls slightly outperformed boys, with an overall mean difference of 2.02 points. After the policy, the gender difference narrowed further (0.77 points), and mean scores for both genders decreased slightly. These results suggest that the introduction of free primary education was associated with minor fluctuations in performance and minimal changes in gender differences

Performance of Female Students Before and After Policy Implementation

Before the policy, mean scores ranged from 36.95 to 52.69 (*M* = 43.79). After the policy, scores ranged from 20.43 to 72.52 (*M* = 47.11), with the highest observed in 2013 (*M* = 72.52, *SD* = 5.72). Overall, there was a modest increase in Mathematics scores for girls following policy implementation.

Before the policy, mean scores ranged from 69.69 to 78.53 (*M* = 72.27). After the policy, scores ranged from 29.22 to 66.89 (*M* = 48.64), peaking in 2013 (*M* = 66.89, *SD* = 8.60) but declining sharply in 2018 (*M* = 29.22, *SD* = 9.27). Overall, Science performance decreased after the policy, indicating substantial year-to-year variability.

Before the policy, mean scores ranged from 35.47 to 57.94 (*M* = 44.37). After the policy, scores ranged from 33.69 to 61.70 (*M* = 48.17), peaking in 2013 (*M* = 61.70, *SD* = 7.33). English scores showed a modest overall increase following the policy.

Hypothesis One: Overall Gender Differences in Examination Performance

Analysis of the overall examination scores revealed no statistically significant difference in performance between male and female students for any of the eight scholastic years examined. As shown in Table 1, the p-value from the Welch's t-test was greater than 0.05 in every case, leading to the acceptance of the null hypothesis. While the mean scores for boys and girls were consistently similar, the standard deviation (score variability) fluctuated across the years for both groups.

Table 1: Gender Differences in Overall Exam Performance (2003–2019)

Year	Mean (Boys)	Mean (Girls)	SD (Boys)	SD (Girls)	Welch t	Decision
2003	458.85	463.71	59.05	34.20	0.633	Accept H_0
2008	352.94	352.04	43.92	40.14	0.887	Accept H_0
2009	369.90	365.05	59.05	61.26	0.176	Accept H_0
2010	342.11	351.09	50.24	50.82	0.226	Accept H_0
2011	356.07	359.68	58.58	45.83	0.755	Accept H_0
2013	467.94	479.96	29.98	30.16	0.129	Accept H_0
2018	289.52	275.66	63.19	60.99	0.343	Accept H_0
2019	369.90	365.05	59.05	61.26	0.761	Accept H_0

Note. SD = standard deviation. H_0 = null hypothesis.

Hypothesis Two: Gender Differences in Subject-Specific Performance

The analysis of individual subjects' overall findings states there was no statistically significant difference in Mathematics performance between boys and girls in any of the analyzed years (Table 2). All p-values were well above 0.05. Performance was statistically similar in all years except for 2008, where the difference was statistically significant ($p = 0.04$), indicating a performance gap in that specific year (Table 3). A similar pattern was observed in English, with no significant differences found in most years. The exception was 2003, where a statistically significant performance difference was recorded ($p = 0.039$) (Table 4).

Table 2: Gender Differences in Mathematics Performance

Year	Mean (Boys)	Mean (Girls)	SD (Boys)	SD (Girls)	Welch t	Decision
2003	46.08	44.71	13.73	12.39	0.681	Accept H_0
2008	36.78	36.95	8.76	7.63	0.889	Accept H_0
2009	36.71	40.81	12.56	9.14	0.080	Accept H_0
2010	50.93	52.69	8.17	7.95	0.123	Accept H_0
2011	64.07	66.80	13.92	13.66	0.397	Accept H_0
2013	71.09	72.52	8.04	5.72	0.426	Accept H_0
2018	31.62	28.69	10.44	9.80	0.220	Accept H_0

Note. SD = standard deviation. H_0 = null hypothesis

Table 3: Gender Differences in Science Performance

Year	Mean (Boys)	Mean (Girls)	SD (Boys)	SD (Girls)	Welch t	Decision
2003	76.75	78.53	11.47	8.26	0.443	Accept H_0
2008	74.50	70.49	11.73	7.74	0.040	Reject H_0
2009	70.45	71.37	10.49	11.10	0.569	Accept H_0
2010	70.07	69.69	8.14	6.64	0.699	Accept H_0
2011	57.48	56.72	10.58	9.81	0.746	Accept H_0
2013	64.85	66.89	7.87	8.60	0.347	Accept H_0
2018	31.19	29.22	12.07	9.27	0.429	Accept H_0
2019	38.08	41.71	11.42	6.69	0.104	Accept H_0

Note. SD = standard deviation. H_0 = null hypothesis.

Table 4: Gender Differences in English Performance

Year	Mean for boys	Mean for Girls	Standard deviation (Boys)	Standard deviation (Girls)	Welch t-test	Hypothesis decision of equality of means
2003	61.92	57.94	10.210	6.408	0.039	Reject Ho
2008	43.76	43.63	15.863	13.968	0.953	Accept Ho
2009	38.55	40.43	12.392	10.947	0.271	Accept Ho
2010	34.03	35.47	12.345	11.467	0.388	Accept Ho
2011	40.27	44.08	11.695	8.113	0.079	Accept Ho
2013	59.15	61.7	8.987	7.327	0.230	Accept Ho
2018	35.62	33.69	14.146	16.271	0.595	Accept Ho
2019	49.90	53.19	10.733	7.763	0.157	Accept Ho

Source: Somaliland national examination reports from 2003 to 2019

Hypothesis Three: Performance Before and After Free Primary Education

The ANOVA results (Table 5) indicated no statistically significant difference in students' overall examination performance between the pre- (2003–2011) and post- (2012–2019) free education periods ($F(1, 1099) = 0.37$, $p = 0.545$). However, a significant shift was observed in subject-specific performance. Both Mathematics ($F(1,$

1099) = 19.2, p < 0.001) and English (F(1, 1099) = 628, p < 0.001) showed statistically significant differences in mean scores between the two eras. In contrast, Science scores showed no significant change (F(1, 1099) = 5.8, p = 0.017, though this is statistically significant at p<0.05, the F value is substantially lower than English and Math, suggesting a less difference).

Table 5: ANOVA of Student Performance before and After Free Primary Education

Measure	Source	SS	df	MS	F	p
Performance	Between Groups	1,738.6	1	1,738.60	0.37	.545
	Within Groups	5,221,417.8	1,099	4,751.06		
	Total	5,223,156.4	1,100			
Mathematics	Between Groups	4,907.36	1	4,907.36	19.20	< .001
	Within Groups	280,360.9	1,099	255.11		
	Total	285,268.3	1,100			
English	Between Groups	100,877.5	1	100,877.50	628.00	< .001
	Within Groups	176,520.8	1,099	160.62		
	Total	277,398.3	1,100			
Science	Between Groups	1,865.2	1	1,865.24	5.80	.017
	Within Groups	356,330.1	1,099	324.23		
	Total	358,195.3	1,100			

Note. SS = Sum of Squares; MS = Mean Square. p values less than .001 are reported as *p* < .001.

Hypothesis Four: Girls' Performance Before and After Free Primary Education

Focusing on girls (Table 6), the ANOVA revealed a similar pattern. There was no statistically significant change in their *overall* examination scores between the two periods (F(1, 317) = 0.49, p = 0.486). However, their performance in Mathematics (F(1, 317) = 5.5, p = 0.020), Science (F(1, 317) = 198, p < 0.001), and English (F(1, 317) = 6.9, p = 0.009) all showed statistically significant differences between the pre- and post-free education periods.

Table 6**:** ANOVA of Female Student Performance Before and After Free Primary Education

Measure	**Source**	**SS**	**df**	**MS**	**F**	**p**
Performance	Between Groups	2,276.47	1	2,276.47	0.49	.486
	Within Groups	1,484,324.71	317	4,682.41		
	Total	1,486,601.18	318			
Mathematics	Between Groups	1,509.27	1	1,509.27	5.50	.020
	Within Groups	86,802.08	317	273.82		
	Total	88,311.34	318			
Science	Between Groups	31,594.03	1	31,594.03	198.00	< .001
	Within Groups	50,583.35	317	159.57		
	Total	82,177.38	318			

Measure	Source	SS	df	MS	F	p
English	Between Groups	1,750.85	1	1,750.85	6.90	.009
	Within Groups	80,008.65	317	252.39		
	Total	81,759.51	318			

Note. SS = Sum of Squares; MS = Mean Square. *p* values less than .001 are reported as $p < .001$.

6. Discussion

The findings of this study provide a nuanced understanding of gender and academic achievement at Saed Duad Intermediate School. Overall, there was no significant gender gap in mean academic performance over the 17-year period, contrasting with broader international trends that typically report girls excelling in reading and boys in mathematics (OECD, 2015, 2016; Lavy & Sand, 2018). This consistent parity may reflect specific institutional factors, such as equitable teaching practices, a supportive school culture, or community values in Berbera that promote equal educational opportunities for both genders.

Despite overall parity, isolated instances of significant gender differences in Science (2008) and English (2003) indicate that performance dynamics are not static. These gaps could be influenced by specific cohorts, curriculum changes, or variations in teaching staff during those years, suggesting a need for further qualitative investigation.

The period before and after the implementation of free primary education revealed notable subject-specific shifts. Although overall mean scores did not change significantly, performance patterns in Mathematics, Science, and English were restructured, particularly for girls. In Mathematics and English, scores showed modest improvements, whereas Science scores declined significantly. These changes may reflect curriculum adjustments, teaching priorities, or shifts in the demographic and academic backgrounds of students entering under the free education policy. The observed effect on girls' subject-specific performance suggests that the policy may have differentially influenced how girls engage with these core subjects.

Consistent with global patterns, girls outperformed boys in English, confirming the well-documented female advantage in literacy (OECD, 2016; Mullis et al., 2012) and prior studies highlighting higher motivation and more positive attitudes toward schooling among girls (Francis, 2000; Warrington et al., 2000). In Mathematics, gender differences fluctuated: boys slightly outperformed girls in the early and later years, while girls achieved

higher scores between 2009 and 2013. This partially aligns with international findings of male advantages in numeracy (OECD, 2015; Lavy & Sand, 2018) but contrasts with TIMSS results showing minimal or inconsistent gender differences across countries (Thomson, Hillman, & Wernet, 2012). Contextual factors such as teacher effectiveness, curriculum implementation, and school resources may explain these fluctuations (Farrel, 1993; Russell, 1983).

For Science, post-policy performance declined for both genders, particularly among girls, contrasting with international studies where gender differences are minimal or slightly favor boys (Preckel et al., 2012; Cvencek, Meltzoff, & Greenwald, 2011). This decline may reflect systemic challenges in Somaliland schools, including limited laboratory resources, teacher shortages, and curricular constraints that disproportionately affect hands-on subjects (ESA, 2016).

Overall, the findings indicate that while the female advantage in literacy aligns with global patterns, gender differences in Mathematics and Science are highly context-dependent. Policy interventions, such as free primary education, appear to have mixed effects—modestly improving Mathematics and English outcomes for girls while not addressing challenges in Science.

The study is limited by its focus on a single school, restricting generalizability to the broader Somaliland education system. The correlational design cannot establish causality, and unmeasured confounding factors—such as economic changes, teacher training, or curriculum updates—may have influenced outcomes. Additionally, qualitative insights from teachers and students would provide a deeper understanding of the mechanisms behind the observed trends.

7. Conclusion and Recommendations

The primary aim of this study was to examine gender differences in academic achievement at Saed Duad Intermediate School, to assess subject-specific performance trends, and to evaluate the impact of free primary education on student outcomes between 2003 and 2019.

With respect to overall academic performance, the findings indicate that there was no statistically significant gender gap in Grade 8 national examination results over the 8 years. Both male and female students demonstrated comparable levels of achievement, suggesting that gender parity was consistently maintained at the school.

Analysis of subject-specific performance revealed nuanced differences. Girls consistently outperformed boys in English, reflecting a stable female advantage in literacy-related subjects, consistent with international research (OECD, 2016; Mullis et al., 2012). In Mathematics, gender differences were inconsistent, with no persistent advantage for either gender. Science performance showed occasional gender disparities and an overall decline following the introduction of free primary education, particularly among girls. These findings indicate that while overall gender parity exists, subject-level performance is dynamic and influenced by contextual and institutional factors.

Regarding the impact of free primary education, the policy did not significantly alter overall examination scores. However, subject-level analyses revealed notable shifts: girls exhibited improvements in Mathematics and English but a significant decline in Science. This indicates that policy interventions may have differential effects across subjects and that increased access to education alone does not guarantee equitable learning outcomes.

Based on these findings, the study recommends enhancing Science teaching resources and laboratory facilities, implementing gender-responsive pedagogy, strengthening teacher professional development, and monitoring policy effects at the subject level. Additionally, future research should include qualitative investigations and expand to multiple schools to improve generalizability and deepen understanding of factors influencing gendered academic outcomes.

In conclusion, while overall gender parity was maintained, subject-specific disparities persist, particularly in Science, emphasizing the need for targeted interventions to support equitable learning opportunities for all students

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