

THE EFFECT OF FEMALE GENDER SEGREGATION IN SCHOOLS ON ACADEMIC PERFORMANCE, SELF-CONFIDENCE, AND PEER RELATIONS: A CASE OF COLLEGES AND UNIVERSITIES IN KUWAIT

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Abstract

The gender segregation in schools and its influence on the academic performance, self-esteem, and students' confidence is still an interesting topic of research worldwide. However, there is very limited research works addressing this topic in Kuwait. In this article we conducted a comparative study to explore the effect of female gender segregation in high schools on educational quality in Kuwaiti colleges and universities. Therefore, the study aims to find the effect of single sex education for Kuwaiti females in high schools on the quality of their post-secondary education. Factors such as academic performance, social skills, self-esteem, and personal development have been investigated and statistically analyzed. A survey questionnaire of ten questions has been designed and distributed randomly to college and university female students across Kuwait. The correlations and dependencies of the measured parameters have been evaluated using statistical analysis tools.

Keywords – *gender segregation, self-esteem and students, Multiple Linear regression, Binary logic regression. Educational needs.*

1. Introduction

Hundreds of studies over the past years researched the topic of gender segregation in schools. However, studies to tackle the effect of gender segregation in schools on academic and non-academic performance in Kuwaiti Universities still in their beginnings. According to a research conducted in Kuwait by Lujain Almatrouk (Al-Matrouk, 2016), statistical results showed that participants who had attended a mixed gender school scored significantly higher on the peer relations with the opposite gender as opposed to those attending a segregated school in Kuwait. This means that according to the study, they believed that they had good relationships with peers of the opposite gender more than individuals who had attended a non segregated school in Kuwait. The works of Almatrouk's explored an aspect that we did not include in our research which is the effect of parental relations on the self esteem of their kids and there was a strong correlation between self esteem and parental relations. The study concluded that parental relations in Kuwait are highly associated with self esteem, which is strongly related to peer relations. A study that was conducted in three middle schools in Philadelphia (O'Neill, 2010) on the topic of gender separate education concluded that "self esteem formation does not appear to be taking place any differently in single sex versus coeducational settings whereas students in single sex schools witness greater improvements in standardized test scores. On the other hand, it was argued in another study that single sex schooling lacks scientific support and may exaggerate sexism and gender stereotyping (Halpern, 2011).

A natural experiment that was performed at an upper secondary school in Switzerland estimated the impact of single sex education on the academic performances of female students. The results suggested that students in all girls' classes obtained better grades in mathematics than their female fellow students in coeducational classes. A positive effect of single sex education on the proficiency in mathematics in particular was found. (Eisenkopf, 2011). Different results were obtained in a study done in South Korea; Male students in single sex schools scored more than one quarter of a standard deviation higher than their counterparts in single sex classrooms within coed schools, whereas none of the specifications in their study yielded significant estimates of the impact of peer gender on female students' achievement (Lee, 2014).

A research study performed in the United States used Meta analysis to analyze the studies that have tested the effects on students of single sex compared with co-educational schooling. They meta analyzed data from 184 studies from 21 nations for multiple outcomes, academic performance and non academic performance such as self concept and gender stereotyping. According to the study, there was a little evidence of an advantage of single sex schooling for girls or boys for any of the outcomes (Pahlke, 2014).

Whether gender segregated education yields better results on student academic achievement or not varies a lot in previous research depending on the different research methods and different analytical techniques used. (Smyth, 2010)

In the research works described in this article we studied the relation that may exist among eight dependent variables (parameters) and other two independent variables using association and regression tests. Two hundred and sixty eight female students in their 2nd, 3rd, or 4th year of their diploma/degree studying at several universities and colleges that have participated in completing the distributed questionnaire. All statistical analysis, association tests, and regressions tests have been implemented using SPSS platform. The remaining of this article is organized as following: in section 2 we introduce and describe the set of variables that we considered in our study as well as the data set that we have collected. In section 3 we present the statistical analysis steps and their results. In section 4 we present a discussion and conclusion as well as some future perspectives for this work.

2. Variables and Collected data: a descriptive study

In the first phase of our works we collected the data records using a questionnaire that we have designed and implemented. The questionnaire consists of 10 Questions about academic and non academic factors during high school and university. In our study, we have collected 268 completed questionnaires filled by students that are registered in several universities and high institutes in Kuwait including: Kuwait University (KU), American University of Kuwait (AUK), Gulf university for Science and Technology (GUST), and Australian College of Kuwait (ACK). The collected parameters are summarized in Table 1 with the type of each parameter whether if it is a dependent or an independent parameter. In this section, we present a descriptive study for each of the parameters using frequency tables and charts.

Table 1. The dependent and independent parameters

	Parameter	Type
Q1	Where did you complete your secondary school?	Independent
Q2	What is your current GPA?	Dependent
Q3	What type of school did you attend?	Independent
Q4	My educational needs as a female were better met at a single sex high school	Dependent
Q5	I usually come well prepared to college/university (bring my textbooks and do my homework)	Dependent
Q6	I usually participate during the lecture	Dependent
Q7	I consider myself to fully concentrate during the explanation of the lecture	Dependent
Q8	I feel confident about asking questions (if I don't understand) during lecture.	Dependent
Q9	I am more comfortable being taught by a female instructor.	Dependent
Q10	I feel comfortable working in a mixed – sex environment (carrying out team projects with male students)	Dependent

In the following we present a descriptive study for each of the parameters using frequency summary tables, graphical representations and charts.

2.1. Q01: *Where did you complete your secondary school?*

Table 2. Frequency summary for Q01

Q01	Frequency	Percent	Cumulative Percent
Single Sex School	208	77.6	77.6
Mixed School	60	22.4	100.0

The majority of female students (77.6%) attended Single Sex secondary school

2.2.Q02: *What is your CGPA? (Cumulative Grade Point Average)*

Table 3. Frequency summary for Q02

Q02	Frequency	Percent	Cumulative Percent
<1	2	0.7	0.7
1-1.99	13	4.9	5.6
2-2.99	124	46.3	51.9
3-3.49	82	30.6	82.5
3.5-4.0	47	17.5	100.0

Most of Female students have a CGPA more than two, of which 46.3% have CGPA between 2 and 2.99, and 48.1% have a CGPA more than 3.

2.3. Q03: *What type of school did you attend?*

Table 4. Frequency summary for Q03

Q03	Frequency	Percent	Cumulative Percent
Public	155	57.8	57.8
Arabic Private	42	15.7	73.5
International Private	71	26.5	100.0

57.8% of Female students attended Public school, and 42.2% attended private school where the majority is for those attended International Private School.

2.4. Q04: *My educational needs as a female were better met at a single sex high school*

Table 5. Frequency summary for Q04

Q04	Frequency	Percent	Cumulative Percent
False	151	56.3	56.3
True	117	43.7	100.0

56.3 % of Female students do not agree with the statement "My educational needs as a female were better met at a single sex high school".

2.5. Q05: *I usually come prepared to college/university (do my homework)*

Table 6. Frequency summary for Q05

Q05	Frequency	Percent	Cumulative Percent
False	23	8.6	8.6
True	245	91.4	100.0

91.4% of Female students stated that they usually come prepared to college/university

2.6. Q06: *I usually participate during the lecture*

Table 7. Frequency summary for Q06

Q06	Frequency	Percent	Cumulative Percent
False	79	29.5	29.5
True	189	70.5	100.0

70.5% of Female students stated that they usually participate during the lecture.

2.7. Q07: *I consider myself to fully concentrate during the explanation of the lecture*

Table 8. Frequency summary for Q07

Q07	Frequency	Percent	Cumulative Percent
False	57	21.3	21.3
True	211	78.7	100.0

78.7% of Female students consider their self fully concentrate during the lecture.

2.8. Q08: *I feel confident about asking questions during the lecture*

Table 9. Frequency summary for Q08

Q08	Frequency	Percent	Cumulative Percent
False	83	31.0	31.0
True	185	69.0	100.0

31.1% of Female students do not feel confident about asking questions during the lecture

2.9. Q09: *I am more comfortable being taught by a female instructor*

Table 10. Frequency summary for Q09

Q09	Frequency	Percent	Cumulative Percent
False	204	76.1	76.1
True	64	23.9	100.0

76.1% of Female students do not agree with the statement "I am more comfortable being taught by a female instructor".

2.10. Q10: *I feel comfortable working in a mixed – sex environment*

Table 11. Frequency summary for Q10

Q10	Frequency	Percent	Cumulative Percent
False	71	26.5	26.5
True	197	73.5	100.0

73.5% of Female students stated that they can work in a mixed-sex environment

3. Empirical findings and results

In this section, we study the effect of each of the independent variables Q01 and Q03 on each of the dependent ones (Q02, Q04, Q05, till Q10). In our experiments, that effect has been investigated in two steps:

Step 1: We applied the **chi-square test for association** between each of the independent variables and the dependent variable

Step 2: We applied either a **Multiple Linear regression Model** or a **Binary Logistic Regression Model** to design the equation that shows the effect of the independent variables on the

dependent variables. Actually, the type of the regression has been chosen based on the type of the dependent variable being studied.

As for the independent variables: Q01 and Q03, we note the following points:

- **Q01** is a Logic variable with 0 noted for Single sex school and 1 for Mixed school
- **Q03** is a categorical variable with three categories, and to be entered to a Multiple Linear Regression or to a Binary Logistic Regression it should be turned to logic variable(s), so we split it into two logic variables Q11 and Q12 making the reference to be the “Public school” as following:
 - **Q11**: APS (Arabic Private School) 0 for No, 1 for Yes
 - **Q12**: IPS (International Private School) 0 for No, 1 for Yes

3.1. Effect of (Q01 and Q03) on Q02

3.1.1. Step 1: Chi-Square test for Association

The association between Q02 (CGPA) and each of the independent variables (Q01 and Q03) has been studied using the following hypothesis:

H₀: There is No Association between the two variables

H₁: There is Association between the two variables

Table 12 and Table 13 show the scores given by Chi-Square test for association between Q01 and Q02. On the other hand, Table 14 and Table 15 show the scores given by Chi-Square test for association between Q03 and Q02.

Table 12. Chi-Square test for association between Q01 and Q02

Cross Tabulation		Q02 - What is your CGPA (Cumulative grade point average)?					Total
		<1	1-1.99	2-2.99	3-3.49	3.5-4.0	
Q01 - Where did you complete your secondary school?	Single Sex School	2	11	111	58	26	208
	Mixed School	0	2	13	24	21	60
Total		2	13	124	82	47	268

Table 13. Chi-Square Tests. 3 cells (30.0%) expected count less than 5. The min expected is 45

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26.733 ^a	4	.000
Likelihood Ratio	26.877	4	.000
Linear-by-Linear Association	23.519	1	.000
N of Valid Cases	268		

The obtained scores in

Table 12 and Table 13 indicate that the obtained significance value is less than 0.05, which means that there is enough evidence to reject H₀ and so, there is a significant association between "School Gender segregation" and their "CGPA".

Table 14. Chi-Square test for association between Q03 and Q02

Cross Tabulation		Q02 - What is your CGPA (Cumulative grade point average)?					Total
		<1	1-1.99	2-2.99	3-3.49	3.5-4.0	
Q03 - What type of school did you attend?	Public	1	9	95	34	16	155
	Arabic Private	1	2	16	15	8	42
	International Private	0	2	13	33	23	71
	Total	2	13	124	82	47	268

Table 15. Chi-Square Tests. 3 cells (33.3%) have expected count less than 5. The min expected is 31

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	46.718 ^a	8	.000
Likelihood Ratio	48.309	8	.000
Linear-by-Linear Association	35.087	1	.000
N of Valid Cases	268		

The obtained scores in Table 14 and Table 15 indicate that the obtained significance value is less than 0.05, which means that there is enough evidence to reject H0 and so, there is a significant association between "type of school the student attend" and their "CGPA"

3.1.2. Step 2: Multiple Linear Regression

In the second phase we applied the Multiple Linear Regression technique to investigate the effect of each of the independent variables on the dependent variable Q02 (CGPA). In order to use the CGPA as a scale variable, we had to recode Q02 with a new code "Q13" and replaced each category by the average of the interval as following:

- <1 is recoded as 0.5
- [1-1.99] recoded as 1.5
- [2-2.99] recoded as 2.5
- [3-3.49] recoded as 3.25
- [3.5-4.0] recoded as 3.75

As we mentioned above, we split the independent variable Q03 into two logic variables Q11 and Q12 making the reference to be the "Public school". Therefore, the model consists of the following final variables: Dependent variable: Q13 (CGPA), and Independent Variables: Q01, Q11 and Q12. The Table 16 indicates that the R Square value obtained for this model is 0.124, which means that 12.4% of the CGPA variability is explained by the independent variables.

Table 16. Model Summary - Predictors: (Constant), IPS, APS, "Where did you complete your secondary school?"

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.352 ^a	.124	.114	.57844

In order to examine if the independent variables affect the value of the dependent variables, we applied the ANOVA analysis with two hypothesis:

H_0 : All regression coefficients are equal to zero

H_1 : At least one of the regression coefficient is different from zero

The table 17 indicates that the obtained significance value Sig. is less than 0.05, which means that there is enough evidence to reject H_0 and so, at least one of the regression coefficient of the model is different from zero

Table 17. ANOVA* : Dependent Variable: CGPA, Predictors: Predictors: (Constant), IPS, APS, Where did you complete your secondary school?

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	12.453	3	4.151	12.406	.000 ^b
	Residual	88.331	265	.335		
	Total	100.784	268			

Since we found that, the Model is significant, we have used the method "ENTER" (entering all the independent variables in the regression) to design the regression model. So regardless of the significance of the coefficient, we included it in the study as the entire coefficient that will have an effect on the constant in the regression line. The second column in Table 18 shows the coefficient of each of the independent variables in the model.

Table 18. Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	
	B	Std. Error	Beta			
(Constant)	2.721	.047		58.483	.000	
1	Q01 - Where did you complete your secondary school?	.075	.129	.051	.578	.564
	Q11 - Arabic Private School (APS)	.182	.101	.108	1.805	.072
	Q12 - International Private School (IPS)	.448	.125	.323	3.577	.000

Therefore, the regression equation can be written as:

$$CGPA = 2.721 + 0.075 * Q01 + 0.182 * APS + 0.448 * IPS$$

This means that:

- Students who came from Mixed school will have 0.075 more CGPA than those who came from Single sex school
- Students who came from APS will have 0.182 more CGPA than those who came from Public school
- Students who came from IPS will have 0.448 more CGPA than those who came from Public school

3.2. Effect of (Q01 and Q03) on Q04

The effect of Q01 and Q03 on the dependent variable Q04 has been investigated in two steps: first, we applied the **chi-square test for association** between each of the independent variables and the dependent variable, then we applied the **Binary Logistic regression** to show the effect of the independent variables on the dependent variable.

3.2.1. Chi-Square test for Association

We studied the association between **Q04** and each of the independent variables (Q01 and Q03). In our works we have used the following hypothesis:

H₀: There is No Association between the two variables

H₁: There is Association between the two variables

The results obtained in Table 19 and Table 20 indicate that there is a significance association between "School Gender segregation" and "Q04".

Table 19. Chi-Square test for association between Q01 and Q04

Cross Tabulation		Q04 - My educational needs as a female were better met at a single sex high school		Total
		False	True	
Q01 - Where did you complete your secondary school?	Single Sex School	99	109	208
	Mixed School	52	8	60
Total		151	117	268

Table 20. Chi-Square test. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 26.19. Computed only for a 2x2 table

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	28.899 ^a	1	.000		
Continuity Correction ^b	27.333	1	.000		
Likelihood Ratio	32.213	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	28.791	1	.000		
N of Valid Cases	268				

The results obtained in Table 21 and Table 22 indicate that there is a significance association between "type of school the student attend" and "Q04".

Table 21. Chi-Square test for association between Q03 and Q04

Cross Tabulation		Q04 - My educational needs as a female were better met at a single sex high school		Total
		False	True	
Q03 - What type of school did you attend?	Public	68	87	155
	Arabic Private	24	18	42
	International Private	59	12	71
Total		151	117	268

Table 22. Chi-Square test. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 18.34

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	30.476 ^a	2	.000
Likelihood Ratio	32.783	2	.000
Linear-by-Linear Association	29.799	1	.000
N of Valid Cases	268		

3.2.2. Binary Logistic Regression

In the second phase we applied the Binary Logistic regression to investigate the effect of each of the independent variables on the dependent variable Q04. Since this question is a logical variable, so the binary logistic regression is suitable in this case.

Model Hypothesis:

Dependent variable: Q04 (Females believe that their educational needs were better met at a single sex high school.

Independent variables: Q01, Q11 and Q12

Method: Enter

Table 23 shows the results of the model's coefficients test. The results indicate that the model is significant, which means that at least one of the independent variables explains the variation of the dependent variable. The results in Table 24 indicates that the independent variables explain 13.2% to 17.7% of the variability of the dependent variable

Table 23. Omnibus Tests of Model Coefficients

		Chi-square	Df	Sig.
Step 1	Step	38.034	3	.000
	Block	38.034	3	.000
	Model	38.034	3	.000

Table 24. Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	329.168 ^a	.132	.177

Table 25 shows the coefficients of the variables in the binary model's equation.

Table 25. Variables in the Equation

		B	S.E.	Wald	Df	Sig.	Exp(B)
Step 1 ^a	Q01	-1.207-	.536	5.071	1	.024	.299
	Q11 (APS)	-.458-	.356	1.660	1	.198	.632
	Q12 (IPS)	-1.054-	.476	4.895	1	.027	.349
	Constant	.269	.163	2.734	1	.098	1.308

The obtained results in Table 25. EXP(B) indicate that:

- For Q01, Students from Mixed Secondary School are 70.1%, $(1-0.299)*100\%$, less likely to agree with the statement that educational needs were better met at a single sex school, than those who came from Single Sex School.
- For Q11, Students from Arabic Private School are 36.8%, $(1-0.632) *100\%$, less likely, to agree with the statement that educational needs were better met at a single sex school, than those who came from Public School.
- For Q12, Students from International Private School are 65.1%, $(1-0.349) *100\%$, less likely, to agree with the statement that educational needs were better met at a single sex school, than those who came from Public School

Noting that the variables, with significant coefficient in the binary logistic regression, are Q01 and IPS.

3.3. Effect of (Q01 and Q03) on Q05

The effect of Q01 and Q03 on the dependent variable Q05 has been studied in two steps: first, we applied the **chi-square test for association** between each of the two independent variables and the

dependent one, then we applied the **Binary Logistic Regression** to show the effect of the independent variables on the dependent one.

3.3.1. Chi-Square test for Association

We studied the association between **Q05** and each of the independent variables (Q01 and Q03). In our works we have used the following hypothesis:

H₀: There is No Association between the two variables

H₁: There is Association between the two variables

The results obtained in Table 26 and Table 27 indicate that there is NO significance association between "School Gender segregation" and "Q05" (students come prepared or not to their college)

Table 26. Chi-Square test for association between Q01 and Q05

Cross Tabulation		Q05 - I usually come prepared to college/university (bring my textbooks and do my homework)		Total
		False	True	
Q01 - Where did you complete your secondary school?	Single Sex School	21	187	208
	Mixed School	2	58	60
Total		23	245	268

Table 27. Chi-Square Tests. 0 cells (0.0%) have expected count less than 5%.

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.715 ^a	1	.099		
Continuity Correction ^b	1.921	1	.166		
Likelihood Ratio	3.271	1	.071		
Fisher's Exact Test				.120	.075
Linear-by-Linear Association	2.705	1	.100		
N of Valid Cases	268				

On the other hand, the results of Table 28 and Table 29 indicates that there is a significant association between "type of school the student attend" and "Q05".

Table 28. Chi-Square test for association between Q03 and Q05

Cross Tabulation		Q05 - I usually come prepared to college/university (bring my textbooks and do my homework)		Total
		False	True	
Q03 - What type of school did you attend?	Public	13	142	155
	Arabic Private	8	34	42
	International Private	2	69	71
Total		23	245	268

Table 29. Chi-Square Tests: 16.7% have expected count less than 5%. The min. expected count is 3.60

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.879 ^a	2	.012
Likelihood Ratio	8.480	2	.014
Linear-by-Linear Association	.914	1	.339
N of Valid Cases	268		

3.3.2. Binary Logistic Regression

In the second phase we applied the Binary Logistic Regression to investigate the effect of the independent variables Q01 and Q03 on the dependent variable Q05 since this question is a dummy variable (True or False) and the binary logistic regression is suitable in this case.

Model Hypothesis:

Dependent variable: Q05 (I usually come prepared to college/university (bring my textbooks and do my homework))

Independent variables: Q01, Q11 and Q12

Method: Enter

The results obtained in table 30 indicate that the model is significant, this means that at least one of the independent variables explains the variation of the dependent variable. Plus, the results in Table 31 indicate that the independent variables explain 3.2% to 7.2% of the variability of the dependent variable.

Table 30: Omnibus Tests of Model Coefficients

		Chi-square	Df	Sig.
Step 1	Step	8.711	3	.033
	Block	8.711	3	.033
	Model	8.711	3	.033

Table 31. Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	148.209 ^a	.032	.072

The overall percentage of the accuracy of classifying the cases in our study is 91.4% as indicated in Table 32.

Table 32. Classification Table

Observed			Predicted		Percentage Correct
			Q05 - I usually come prepared to college/university (bring my textbooks and do my homework)		
			False	True	
Step 1	Q05 - I usually come prepared to college/university (bring my textbooks and do my homework)	False	0	23	.0
		True	0	245	100.0
Overall Percentage					91.4

Table 33 shows the coefficients of the variables in the binary model's equation for the variable Q05.

Table 33. Variables in the Equation

	B	S.E.	Wald	Df	Sig.	Exp(B)
Q01	.467	.990	.222	1	.637	1.595
Step 1 ^a						
Q11 (APS)	-.975	.492	3.929	1	.047	.377
Q12 (IPS)	.830	1.002	.686	1	.407	2.293
Constant	2.383	.290	67.506	1	.000	10.842

The obtained results in Table 33. EXP(B) Indicate that:

- **For Q01**, Students from Mixed Secondary School are 59.5% $(1.595-1)*100\%$ more likely come prepared to their College/University than those who came from Single Sex School

- **For Q11**, Students from Arabic Private School are 62.3% $(1-0.377)*100\%$ less likely come prepared to their College/University than those who came from Public School
- **For Q12**, Students from International Private School are 129.3% $(2.293-1)*100\%$ more likely come prepared to their College/University than those who came from Public School

Noting that the only variable, with significant coefficient in the binary logistic regression, is the APS.

3.4.Effect of (Q01 and Q03) on Q06

The effect of Q01 and Q03 on the dependent variable Q06 has been studied in two steps: by applying the **chi-square test for association** between each of the two independent variables and the dependent one, then by applying the **Binary Logistic regression** to show the effect of the independent variables on the dependent one.

3.4.1. Chi-Square test for Association

We studied the association between **Q06** and each of the independent variables (Q01 and Q03) using the following hypothesis:

H₀: There is No Association between the two variables

H₁: There is Association between the two variables

The results in Table 34 and Table 35 indicate that there is NO significant association between "School Gender Segregation" and "Q06" (whether students usually participate during the lecture).

Table 34. Chi-Square test for association between Q01 and Q06

Cross Tabulation		Q06 - I usually participate during the lecture		Total
		False	True	
Q01 - Where did you complete your secondary school?	Single Sex School	66	142	208
	Mixed School	13	47	60
Total		79	189	268

Table 35. Chi-Square Tests. 0 cells (0.0%) have expected count less than 5. The min. expected is 17.69

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.269 ^a	1	.132		
Continuity Correction ^b	1.811	1	.178		
Likelihood Ratio	2.371	1	.124		
Fisher's Exact Test				.150	.087
Linear-by-Linear Association	2.260	1	.133		
N of Valid Cases	268				

On the other hand, Table 36 and Table 37 indicate that there is No significance association between "type of school the student attend" and "Q06" (whether students usually participate during the lecture).

Table 36. Chi-Square test for association between Q03 and Q06

Cross Tabulation		Q06 - I usually participate during the lecture		Total
		False	True	
Q03 - What type of school did you attend?	Public	52	103	155
	Arabic Private	9	33	42
	International Private	18	53	71
	Total	79	189	268

Table 37. Chi-Square Tests: 0 cells (0.0%) have expected count less than 5. The min. expected is 12.38

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.126 ^a	2	.210
Likelihood Ratio	3.197	2	.202
Linear-by-Linear Association	2.049	1	.152
N of Valid Cases	268		

3.4.2. Binary Logistic Regression

The Binary Logistic regression has been applied to investigate the effect of the independent variables Q01 and Q03 on the dependent variable Q06 since this question is a dummy variable (True or False) so the binary logistic regression is also suitable in this case.

Model Hypothesis:

Dependent variable: Q06 (I usually participate during the lecture, noting that 0 for False, and 1 for True)

Independent variables: Q01, Q11 and Q12

Method: Enter

Table 38 indicates that the model is not significant (sig. = 0.205 > 5%), which means that none of the independent variables has significant effect on the dependent variable. Table 39 indicates that the independent variables explain 1.7% to 2.4% of the variability of the dependent variable.

Table 38. Omnibus Tests of Model Coefficients

	Chi-square	Df	Sig.
Step	4.585	3	.205
Step 1 Block	4.585	3	.205
Model	4.585	3	.205

Table 39. Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	320.431 ^a	.017	.024

Table 40 shows the coefficients of the variables in the binary model's equation for the variable Q05.

Table 40. Variables in the Equation

	B	S.E.	Wald	Df	Sig.	Exp(B)
Q01	.605	.516	1.374	1	.241	1.831
Step 1 ^a Q11 (APS)	.577	.414	1.943	1	.163	1.781
Q12 (IPS)	-.028	.476	.004	1	.953	.972
Constant	.673	.170	15.605	1	.000	1.960

The Model is not significant and so, none of the independent variables affect the dependent variable, that is, Whether the student came from Mixed or Single sex school, and whether from Public, Arabic or International Private school, it is not related to whether the student participate or not during the lecture.

3.5. Effect of (Q01 and Q03) on Q07

In this section we describe the results of our study on the effect of Q01 and Q03 on the dependent variable Q07. As for the above mentioned dependent variables, the study has been made of steps: First, we applied the **chi-square test for association** between each of the two independent variables and the dependent one, then we applied the **Binary Logistic regression** to show the effect of the independent variables on the dependent one.

3.5.1. Chi-Square test for Association

We studied the association between **Q07** and each of the independent variables (Q01 and Q03) using the following hypothesis:

H₀: There is No Association between the two variables

H₁: There is Association between the two variables

The results in Table 41 and Table 42 indicate that is NO significance association between "School Gender Segregation" and "Q07" (students fully concentrate during the explanation of the lecture)

Table 41. Chi-Square test for association between Q01 and Q07

Cross tabulation		Q07 - I consider myself to fully concentrate during the explanation of the lecture		Total
		False	True	
Q01 - Where did you complete your secondary school?	Single Sex School	48	160	208
	Mixed School	9	51	60
Total		57	211	268

Table 42. Chi-Square Tests: 0 cells (0.0%) have expected count less than 5.

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.814 ^a	1	.178		
Continuity Correction ^b	1.364	1	.243		
Likelihood Ratio	1.927	1	.165		
Fisher's Exact Test				.212	.120
Linear-by-Linear Association	1.807	1	.179		
N of Valid Cases	268				

On the other hand, the results in Table 43 and Table 44 indicate that there is No significant association between "type of school that the student attended" and "Q07" (whether students fully concentrate during the explanation of the lecture).

Table 43. Chi-Square test for association between Q03 and Q07

		Q07 - I consider myself to fully concentrate during the explanation of the lecture		Total
		False	True	
Q03 - What type of school did you attend?	Public	35	120	155
	Arabic Private	9	33	42
	International Private	13	58	71
Total		57	211	268

Table 44. Chi-Square Tests: 0 cells (0.0%) have expected count less than 5. The min expected is 8.93

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.531 ^a	2	.767
Likelihood Ratio	.542	2	.762
Linear-by-Linear Association	.509	1	.475
N of Valid Cases	268		

3.5.2. Binary Logistic Regression

The Binary Logistic regression has been applied to investigate the effect of the independent variables Q01 and Q03 on the dependent variable Q07. Since this question is a dummy variable (True or False), the binary logistic regression is also suitable in this case.

Model Hypothesis:

Dependent variable: Q07 (I consider myself to fully concentrate during the explanation of the lecture, noting that 0 for False, and 1 for True)

Independent variables: Q01, Q11 and Q12

Method: Enter

The results of Table 45 indicate that the model is Non-Significant, this means that none of the independent variables has significant effect on the dependent variable Q07; However, the results in Table 46 indicate that the independent variables explain 0.8% to 1.2% of the variability of the dependent variable.

Table 45. Tests of Model Coefficients

	Chi-square	Df	Sig.
Step	2.143	3	.543
Step 1 Block	2.143	3	.543
Model	2.143	3	.543

Table 46. Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	275.234 ^a	.008	.012

Table 47 shows the coefficients of the independent variables in the binary model's equation for the dependent variable Q07.

Table 47. Variables in the Equation

	B	S.E.	Wald	Df	Sig.	Exp(B)
Q01	.717	.570	1.581	1	.209	2.048
Q11 (APS)	.022	.424	.003	1	.958	1.023
Q12 (IPS)	-.229	.519	.196	1	.658	.795
Constant	1.221	.192	40.292	1	.000	3.390

The results in Table 47. EXP(B) show that the Model is not significant and so, none of the independent variables affect the dependent variable Q07, that is, Whether the student came from Mixed or Single sex school, and whether from Public, Arabic or International Private school is not related to whether the student concentrate or not during the explanation of the lecture.

3.6. Effect of (Q01 and Q03) on Q08

In this section we study the effect of Q01 and Q03 on the dependent variable Q08. The study has been also made of two steps: first, we applied the **chi-square test for association** between each of the two independent variables and the dependent one, then we applied the **Binary Logistic regression** to show the effect of the independent variables on the dependent one.

3.6.1. Chi-Square test for Association

We used the following two hypotheses to study the association between Q08 and each of the independent variables Q01 and Q03.

H₀: There is No Association between the two variables

H₁: There is Association between the two variables

The results in the Table 48 and Table 49 indicate that there is a significance association between "School Gender segregation" and "Q08" (whether students feel confident about asking questions during their lecture).

Table 48. Chi-Square test for association between Q01 and Q08

Cross Tabulation		Q08 - I feel confident about asking questions (if I do not understand) during the lecture		Total
		False	True	
Q01 - Where did you complete your secondary school?	Single Sex School	71	137	208
	Mixed School	12	48	60
Total		83	185	268

Table 49. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.352 ^a	1	.037	.040	.025
Continuity Correction ^b	3.716	1	.054		
Likelihood Ratio	4.621	1	.032		
Fisher's Exact Test					
Linear-by-Linear Association	4.336	1	.037		
N of Valid Cases	268				

The results in Table50 and Table 51 indicate that there is a significance association between "type of school the student attend" and "Q08" (whether students feel confident about asking questions during their lecture).

Table 50. Chi-Square test for association between Q03 and Q08

Cross Tabulation		Q08 - I feel confident about asking questions (if I do not understand) during the lecture		Total
		False	True	
Q03 - What type of school did you attend?	Public	58	97	155
	Arabic Private	9	33	42
	International Private	16	55	71
	Total	83	185	268

Table 51. Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.167 ^a	2	.028
Likelihood Ratio	7.338	2	.026
Linear-by-Linear Association	5.964	1	.015
N of Valid Cases	268		

3.6.2. Binary Logistic Regression

The Binary Logistic regression has been applied to investigate the effect of the independent variables Q01 and Q03 on the dependent variable Q08. Since this question is a logic variable (0 for False and 1 for True), the binary logistic regression is also suitable in this case.

Model Hypothesis:

Dependent variable: Q08 (I feel confident about asking questions during the lecture, noting that 0 for False, and 1 for True)

Independent variables: Q01, Q11 and Q12

Method: Enter

The results in Table 52 indicate that the model for this dependent variable is a significant model. This means that at least one of the independent variables explains the variation of the dependent variable.

Table 52. Omnibus Tests of Model Coefficients

		Chi-square	Df	Sig.
Step 1	Step	8.349	3	.039
	Block	8.349	3	.039
	Model	8.349	3	.039

Table 53 indicates that based on the collected data there is 69% accuracy of classifying the cases in our study. Table 54 shows the coefficients of the independent variables in the binary model's equation for the dependent variable Q08.

Table 53. Classification table

Observed		Predicted			
		Q08 - I feel confident about asking questions (if I do not understand) during the lecture		Percentage Correct	
		False	True		
Step 1	Q08 - I feel confident about asking questions (if I do not understand) during the lecture	False	0	83	.0
		True	0	185	100.0
Overall Percentage					69.0

Table 54. Coefficients of variables in the model equation

	B	S.E.	Wald	Df	Sig.	Exp(B)
Q01	.526	.524	1.006	1	.316	1.692
Step 1 ^a						
Q11 (APS)	.751	.413	3.313	1	.069	2.119
Q12 (IPS)	.352	.485	.526	1	.468	1.421
Constant	.505	.166	9.220	1	.002	1.657

The obtained results in Table 54. EXP(B) Indicate that:

- **For Q01:** Students from Mixed Secondary School are 69.2% $(1.692-1) * 100\%$ more likely to feel confident about asking questions during the lecture than those who came from Single Sex School
- **For Q11:** Students from Arabic Private School are 111.9% $(2.119-1) * 100\%$ more likely to feel confident about asking questions during the lecture than those who came from Public School
- **For Q12:** Students from International Private School are 42.1% more likely to feel confident during the lecture than those who came from Public School

3.7. Effect of (Q01 and Q03) on Q09

Similarly to the previous dependent variables, we studied the effect of Q01 and Q03 on Q09 in two steps: the **chi-square test for association** and then the **Binary Logistic regression** to show the effect of the independent variables on the dependent variable Q09.

3.7.1. Chi-Square test for Association

We studied the association between **Q09** and each of the independent variables (Q01 and Q03) using the following hypothesis:

H₀: There is No Association between the two variables

H₁: There is Association between the two variables

The results on Table 55 and Table 56 indicate that there is NO significance association between "School Gender Segregation" and "Q09" (whether students feel more comfortable of being taught by a female instructor). Actually 0 cells (0.0%) has expected count less than 5%.

Table 55. Chi-Square test for association between Q01 and Q09

Cross Tabulation		Q09 - I am more comfortable being taught by a female instruct		Total
		False	True	
Q01 - Where did you complete your secondary school?	Single Sex School	153	55	208
	Mixed School	51	9	60
Total		204	64	268

Table 56. Chi-Square tests: 0 cells (0.0%) have expected count less than 5. The min expected is 14.33

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.354 ^a	1	.067		
Continuity Correction ^b	2.754	1	.097		
Likelihood Ratio	3.619	1	.057		
Fisher's Exact Test				.085	.045
Linear-by-Linear Association	3.342	1	.068		
N of Valid Cases	268				

Similarly, Table 57 and Table 58 indicate that there is no significance association between "type of school the student attend" and "Q09" (students feel more comfortable of being taught by a female instructor)

Table 57. Chi-Square test for association between Q03 and Q09

Cross Tabulation		Q09 - I am more comfortable being taught by a female instruct		Total
		False	True	
Q03 - What type of school did you attend?	Public	114	41	155
	Arabic Private	30	12	42
	International Private	60	11	71
Total		204	64	268

Table 58. Chi-Square Tests. 0 cells (0.0%) have expected count less than 5.

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.820 ^a	2	.148
Likelihood Ratio	4.063	2	.131
Linear-by-Linear Association	2.712	1	.100
N of Valid Cases	268		

3.7.2. Binary Logistic Regression

The Binary Logistic regression has been applied to investigate the effect of the independent variables Q01 and Q03 on the dependent variable Q09. Since this question is also a dummy variable (True or False), the binary logistic regression is also suitable in this case

Model Hypothesis:

Dependent variable: Q09 (I am more comfortable being taught by a female instructor, True or False)

Independent variables: Q01, Q11 and Q12

Method: Enter

The results in Table 59 indicate that the model is non-significant. This means that none of the independent variables has significant effect on the dependent variable.

Table 59. Tests of Model Coefficients

	Chi-square	Df	Sig.
Step	4.492	3	.213
Step 1 Block	4.492	3	.213
Model	4.492	3	.213

The results in Table 60 designate that the independent variables explain 1.7% to 2.5% of the variability of the dependent variable, whereas the results in Table 61 indicate that based on the collected data, there is 76.1% accuracy of classifying the cases in our study.

Table 60. Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	290.147 ^a	.017	.025

Table 61. Classification Table

Observed		Predicted		Percentage Correct	
		Q09 - I am more comfortable being taught by a female instruct	True		
Step 1	Q09 - I am more comfortable being taught by a female instruct	False	204	0	100.0
		True	64	0	.0
Overall Percentage					76.1

Table 61 shows the coefficients of the independent variables in the binary model's equation for the dependent variable Q09.

Table 62. Variables in the Equation

	B	S.E.	Wald	Df	Sig.	Exp(B)
Q01	-.373-	.571	.427	1	.513	.688
Q11 (APS)	.133	.389	.116	1	.733	1.142
Q12 (IPS)	-.411-	.541	.577	1	.447	.663
Constant	-1.016-	.182	31.039	1	.000	.362

According to Table 62, the binary logistic regression model of variable Q09 is not significant and so, none of the independent variables affect the dependent variable, that is, Whether the student came from Mixed or Single sex school, and whether from Public, Arabic or International Private school is not related to whether the student is more comfortable of being taught by a female instructor.

3.8. Effect of (Q01 and Q03) on Q10

We studied the effect of Q01 and Q03 on the dependent variable Q10 also in two steps: the **chi-square test for association** and then the **Binary Logistic regression** to show the effect of the independent variables on this dependent variable Q10.

3.8.1. Chi-Square test for Association

The association between **Q10** and each of the independent variables (Q01 and Q03) has been studied using the following hypothesis:

H₀: There is No Association between the two variables

H₁: There is Association between the two variables

The results in Table 63 and Table 64 indicate that there is a significant association between "School Gender segregation" and "Q10" (whether students feel comfortable working in a mixed-sex environment)

Table 63. Chi-Square test for association between Q01 and Q10

Cross Tabulation		Q10 - I feel comfortable working in a mixed – sex environment (carrying out team projects with male students)		Total
		False	True	
Q01 - Where did you complete your secondary school?	Single Sex School	67	141	208
	Mixed School	4	56	60
Total		71	197	268

Table 64. Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	15.604 ^a	1	.000		
Continuity Correction ^b	14.320	1	.000		
Likelihood Ratio	19.058	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	15.546	1	.000		
N of Valid Cases	268				

On the other hand, and as for the independent variable Q03, the results in Table 65 and Table 66 indicate that there so a significant association between "type of school the student attend" and "Q10" (whether students feel comfortable working in a mixed-sex environment).

Table 65. Chi-Square test for association between Q03 and Q10

Cross Tabulation		Q10 - I feel comfortable working in a mixed – sex environment (carrying out team projects with male students)		Total
		False	True	
Q03 - What type of school did you attend?	Public	52	103	155
	Arabic Private	13	29	42
	International Private	6	65	71
Total		71	197	268

Table 66. Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.259 ^a	2	.000
Likelihood Ratio	19.006	2	.000

Linear-by-Linear Association	14.448	1	.000
N of Valid Cases	268		

3.8.2. Binary Logistic Regression

The Binary Logistic regression has been also applied to investigate the effect of the independent variables Q01 and Q03 on the dependent variable Q10 in the same way applied for previous logic dependent variables.

Model Hypothesis:

Dependent variable: Q10 (I feel comfortable working in a mixed-sex environment, noting that 0 for False, and 1 for True)

Independent variables: Q01, Q11 and Q12

Method: Enter

The results in table 67 designate that the model for dependent variable Q10 is a significant model. This means that at least one of the independent variables explains the variation of the dependent variable.

Table 67. Tests of Model Coefficients

	Chi-square	Df	Sig.
Step	22.092	3	.000
Block	22.092	3	.000
Model	22.092	3	.000

The results in Table 68 indicate that based on the collected data there is 73.5% accuracy of classifying the cases in our study, whereas Table 69 shows the coefficients of the independent variables in the binary model's equation for the dependent variable Q10.

Table 68. Classification Table

Observed	Predicted			Percentage Correct	
	Q10 - I feel comfortable working in a mixed – sex environment (carrying out team projects with male students)				
	False	True			
Step 1	Q10 - I feel comfortable working in a mixed – sex environment (carrying out team projects with male students)	False	0	71	.0
		True	0	197	100.0
	Overall Percentage				73.5

Table 69. Variables in the Equation

	B	S.E.	Wald	Df	Sig.	Exp(B)	
Step 1 ^a	Q01	1.163	.687	2.862	1	.091	3.198
	Q11 (APS)	.050	.378	.018	1	.894	1.052
	Q12 (IPS)	.965	.590	2.677	1	.102	2.626
	Constant	.666	.171	15.251	1	.000	1.947

The obtained results in Table 69. EXP(B) Indicate that:

- **For Q01:** Students from Mixed Secondary School are 219.8% more likely to feel comfortable working in a mixed-sex environment
- **For Q11:** Students from Arabic Private School are 5.2% more likely to feel comfortable working in a mixed-sex environment

- **For Q12:** Students from International Private School are 162.6% more likely to feel comfortable working in a mixed-sex environment

Discussion and Conclusion

In this work we conducted a study to explore the effect of female gender segregation in high schools as well as other factors on educational quality in Kuwaiti colleges and universities. The main aims of the study is to find the effect of single sex as well as the type of school for Kuwaiti females in high schools on the quality of their post-secondary education. Factors such as academic performance, social skills, self-esteem, and personal development have been investigated and statistically analyzed. Two hundred and sixty eight female students in their 2nd, 3rd, or 4th year of their diploma/degree studying at several universities and colleges that have participated in completing a distributed questionnaire. The correlations and dependencies of the measured parameters have been evaluated using statistical analysis tools.

We first have started by a descriptive study for each of the parameters using frequency summary tables. Then we realized a study about the effect of each of the independent variables (parameters) on each of the dependent ones. That effect has been investigated for each variables in two steps: in first step we applied a chi-square test for association between each pairs of dependent and independent variables. In step two we have applied either the Multiple Linear Regression technique or the Binary Logistic Regression technique to design the equation that shows the effect of the independent variables on the dependent one.

Significant results have been obtained for most of our dependent variables in the questionnaire. However, few variables had no significance in relation to the type of schooling.

For instance, there was a much larger effect on the academic performance (measured by the GPA) when comparing the GPA of students who came from international private schools and the GPA of students who studied in public schools. Students who attended International private schools had a GPA higher by around 45% than those who attended public schools.

Also, statistical results showed that students who studied in mixed secondary schools are more likely to come prepared to their college or university (do their homework, bring their textbooks , ...) than those who studied in single sex schools. As well, students coming from International private schools come more prepared to their college or university than those who came from public schools. Results also showed that female students coming from mixed secondary schools and those coming from International private schools feel more comfortable working in a mixed sex environment than those coming from Single sex schools or public schools. These findings match Almatrouk's results on peer relations in Kuwait in particular (Almatrouk, 2016).

On the other hand, few variables had no significant effect. Whether students significantly participate during the lecture, fully concentrate during the teacher's explanation, or feel more comfortable being taught by a female instructor are not related to whether the students came from mixed or single schools, or from Public, Private Arabic, or International private schools.

There are some other factors that could affect the academic and non academic performance of female students other than the ones we mentioned, but we did not include in our research which formed kind of a limitation to our study or caused some bias in the results. Such factors could be the parental educational level of the female students, the social status of the students' families, and the type of support that they could be receiving at home. It is also worth noting that unlike other countries where usually private schools are mostly the ones that are gender segregated, the large

majority of single sex schools in Kuwait are the public schools. These schools are usually non selective ones. In addition, Most of the international private schools in Kuwait are mixed (co-ed) ones.

So, not only we got significant results regarding gender segregation and female students' academic and non academic performance but also we got very significant results regarding the influence of type of schooling (public, Arabic private, and international private) on academic and non-academic performance. This opens the way for future research to discover the underlying factors and variables leading to this huge gap between public schools and private schools in Kuwait and what could be done in order to reduce that gap.

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