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Hanna Ayalon

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Hanna Ayalon
Tel Aviv University

Using multilevel analysis on a sample of academic-track 12th graders in 1989, this article compares gender inequality in course taking of mathematics and sciences in Arab and Jewish high schools. The findings show that gender inequality is almost nonexistent in Arab schools, whereas it is very prominent in Jewish, particularly secular, schools. The differences in gender inequality are explained by the differences in the curriculum. In contrast with Jewish high schools that offer a rich curriculum, Arab schools offer few advanced courses in humanities and social sciences. Consequently, male and female students who wish to take advanced courses have to choose mathematics and sciences. The findings point to a sociological paradox; the poor curriculum of Arab high schools enhances the chances of Arab female students to be exposed to highly valued knowledge. These findings shed an additional light on the beneficial effect that a restricted curriculum can have for members of disadvantaged groups.

Keywords: *Arab schools, course taking, inequality, Israel, Jewish schools, math, multilevel analysis, religious schools, sciences, secondary education*

The study reported in this article was initiated by an unexpected finding. In a seminar that I conducted on inequality in education, one of the female students, an Israeli-Arab feminist who was very critical of women's discrimination in Arab society, chose to analyze gender inequality in mathematics and science courses taking among high school Arab students in Israel.

It is well known that female students take advanced mathematics and sciences less often than their male counterparts. It is true for various education systems (e.g., Oakes, 1990), including the Jewish education system in Israel (Ayalon & Yogev, 1997). Gender differences in course taking of mathematics and sciences are particularly significant among social groups that are more traditional in terms of gender roles, such as Latinos in the US (Catsambis, 1994), and students of Middle-Eastern or North-African origin in Israel (Tamir, 1990).

The Arab population in Israel, which is a subordinate ethnic group, is more conservative than the Jewish one regarding gender roles (Khattab, 1998). Arab women are not expected to be active outside their homes and labor market participation is still low.[1] Based on this knowledge and on her personal insight, the student hypothesized that in Arab schools females would be deprived of access to mathematics and sciences even more than in Jewish schools. However, a summary of official statistics of the Israeli Central Bureau of Statistics (ICBS, 1989) yielded different results; as demonstrated in Figure 1, gender inequality among Arab students is relatively moderate, and the proportion of Arab girls who take advanced courses in mathematics, chemistry and biology, is higher than the respective proportion of Jewish girls.[2] These unexpected findings pose the question that guides the present study: under what circumstances do female students not follow the conventional pattern of choosing school subjects according to their gender-typing?

Gender Inequality in Course taking

Gender inequality in course taking of mathematics and sciences among high school students

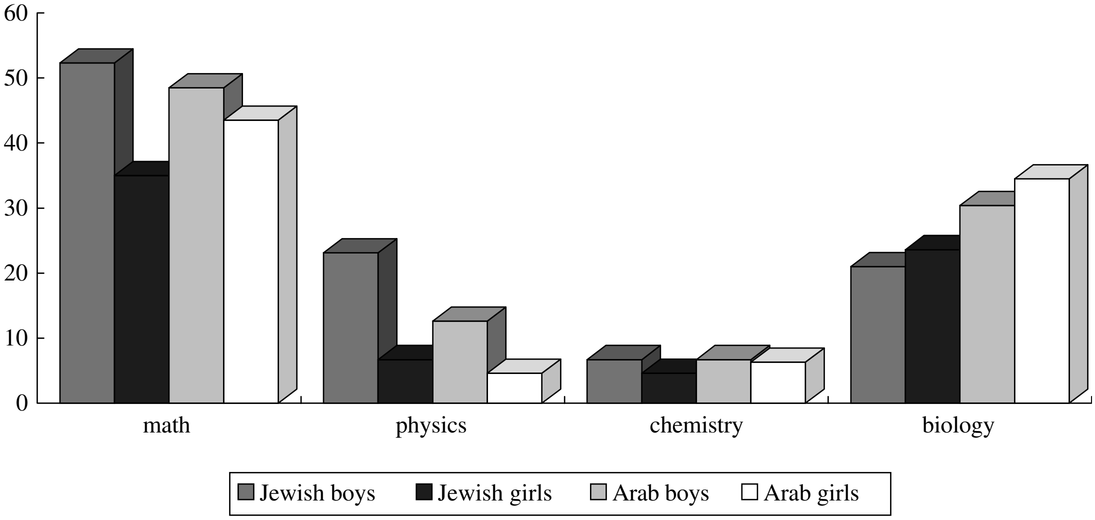

FIGURE 1. *Percent taking higher-level courses according to gender and sector.*

is true for various education systems, such as the United States (Oakes, 1990; Burkam, Lee, & Smerdon, 1997), Scotland (Croxford, 1994), Australia (Lamb, 1996), the Netherlands (Ten Dam & Volman, 1991), Germany (Heller & Ziegler, 1996), Sweden (Engstrom & Nooman, 1990), England (Tabar, 1992), and Israel (Ayalon & Yogev, 1997). The findings in these different education systems are very similar and show that girls take advanced mathematics and sciences less often than boys. They also show that different cognitive abilities and lower achievements are at most a partial explanation of this phenomenon. In their first years in school, the achievements of girls are equal to those of boys. In high school, female students who take advanced courses in mathematics and sciences do as well as their male classmates do (Oakes, 1990; Catsambis, 1994; Haller & Ziegler, 1996).

The lower participation of females in advanced mathematics and sciences is perceived as one of the reasons for their disadvantage in the labor market (Oakes, 1990; Tabar, 1992). Technology is a central feature of modern economy. Women, who refrain from taking advanced mathematics and sciences in high school, decrease or even lose their chances of specializing in related areas in college. The inability to pursue science-related careers contributes to the chances of women being situated in marginal and less economically rewarding positions in the labor market (Oakes, 1990; Ma & Willms, 1999). Therefore, the consequences of inequality in course taking of mathematics and sciences are not limited to the education system, and they constitute a major problem regarding gender equality in general.

Two sets of explanations have been offered for the lower representation of females in advanced mathematics and sciences: the first, and most common, concentrates on females' attitudes. The negative attitudes of females stem from the stereotyping of mathematics and sciences as more appropriate and more rewarding for males (Tobin & Fox, 1980; Tabar, 1992), from lack of confidence in their ability to cope with these subjects (Oakes, 1990; Adenkina-Morrow, 1996), and from lack of interest in the curriculum (Tamir, 1988; Alting & Pelgrum, 1990; Volman, Van Eck, & Ten Dam, 1995). The second explanation refers to the different biases within the school. Schools lessen the opportunities for females to learn mathematics and sciences through various mechanisms: discouragement by teachers and counselors (Maple & Stage, 1991); absence of female teachers of mathematics and sciences who can serve as role models (Oakes, 1990; Heller & Ziegler, 1996); use of different policies in assigning male and female students to advanced mathematics and sciences courses (Hallinan & Sorensen, 1987; Burkam, Lee, & Smerdon, 1997).

The participation of girls who belong to groups that are gender-wise conservative in advanced mathematics and sciences is particularly low. This is true for African-American girls in the United States (Adenika-Morrow, 1996), and for Latinos in the United States (Catsambis, 1994), and for girls of Middle-Eastern and North-African origin in Israel (Tamir, 1990). The particularly lower rates of participation in mathematics and sciences of these groups are explained by their eschewing of joining "masculine" areas of study both at school (Catsambis, 1994), and in the labor market (Adenika-Morrow, 1996), and by their disbelief in their power to succeed in sciences (Adenika-Morrow, 1996; Tamir, 1990).

According to this literature, female students in general, and members of social groups that are gender-wise conservative in particular, are expected to make traditional choices of school subjects. What causes Arab female students to deviate from the expected pattern? What makes them different from their Jewish counterparts who make the traditional gender-type choices more often, in spite of their less traditional social milieu?

Arab and Jewish Education in Israel

In contrast with their low rate of participation in the labor market, the participation of young Arab females in the education system is impressive. Between 1948 and 1980 Arab females have achieved equality with Arab males in enrollment at all levels of secondary education, and they have even overtaken them in participation in post-secondary education (Friedlander et al., 1998).[3]

The Arab and the Jewish education systems in Israel are completely segregated. Each group studies in its major language, Jews in Hebrew and Arabs in Arabic. Only negligible minorities of Arab students attend Jewish schools, and Jewish students do not attend Arab schools at all. Both systems have internal differentiations. The Arab system consists of private and public schools. The private schools are mostly religious (Catholic), whereas the public schools are secular. The Arab public schools are further differentiated between subgroups: Arabs, Druze, and Bedouins (Mazawi, 1996). Jewish education is mostly public and it consists of secular and religious schools.

The basic structure of Arab and Jewish academic high school systems is similar. In both, the curriculum is composed of a core of compulsory subjects—civics, Hebrew, Arabic for Arabs, lower-level mathematics, English, and history in addition to advanced optional subjects (e.g., mathematics, physics, chemistry, biology, literature, history, geography). Students are expected to choose one-to-two, and sometimes more, advanced courses from the optional subjects that the school offers.

When students choose optional subjects they usually cluster either around mathematics and sciences, or around humanities and social sciences. It is rare to find a combination of advanced mathematics or sciences with advanced humanities or social sciences (Ayalon & Yogev, 1997). The enrollment in optional courses depends, to a certain degree, on students' preferences; however, the school staff according to the student's scholastic ability and school policy makes the final decision. Most schools do not allow students to take advanced mathematics and sciences if their teachers do not think they are capable of coping with these subjects. Schools are more flexible in assigning students to advanced humanities and social sciences. Consequently, students who specialize in mathematics and sciences are characterized by high academic ability, and are considered the school elite (Ayalon & Yogev, 1997).

On completion of their high school studies, students take the matriculation examination. This is a standardized national test composed of the compulsory subjects and the optional subjects studied by the student. To qualify for the matriculation diploma, which is a prerequisite for higher education, a student has to pass examinations in a total of 20 units of study.[4] The universities in Israel demand at least one 4-unit optional subject from their candidates and offer bonuses for each subject taken at the 4- or 5-unit level.[5]

The Arab and Jewish systems differ considerably in their curriculum. Jewish students can choose from a very large number of optional subjects: mathematics, sciences, social sciences, foreign languages, literature, history, geography, philosophy, arts, and others. The curriculum of the Arab schools is very limited and most schools only offer advanced courses in mathematics, sciences, and history (ICBS, 1989). The difference between the two systems stems from differential resources, and not from different curricular policy. The Arab educational system as a whole suffers from discrimination in the allocation of resources, which is expressed in both physical and educational facilities. The curriculum is a part of this general problem (Al-Haj, 1995).[6]

The high regard for mathematics and sciences is common to both the Arab and the Jewish secular systems. Students, and occasionally even teachers, believe that taking advanced mathematics and sciences enhances the chances of being accepted to university even to fields of study which are not mathematics related (Ayalon & Yogev, 1997). Consequently, there is a strong demand to participate in these courses, and schools develop various strategies of selection. In the Jewish secular sector, girls are disadvantaged in the process of selection.[7]

The status of mathematics and sciences is different in the Jewish religious sector. The religious education system maintains an ideologically bound curriculum with particular emphasis on religious subjects such as the Bible, oral law, and Jewish philosophy. All other school subjects are secondary to the religious studies in their centrality and prestige. It is particularly important in this system to expose male students to the religious cultural capital since males are expected to be the major carriers of the religious heritage. Female students are encouraged to take more practical school subjects (Ayalon & Yogev, 1996). The two Jewish systems also differ in their attitudes towards gender roles, with the religious sector exhibiting more conservative inclinations. Due to the centrality of religious studies, and perhaps to some threat that sciences pose to the religious viewpoint, mathematics and sciences are less central in the religious system. Subsequently, religious schools are less selective in assigning students to advanced mathematics and sciences (Ayalon & Yogev, 1996), and gender inequality in course taking of these subjects is more moderate (Ayalon, 1995).

Curricular Options and Inequality in Education

As noted, one major difference between the Arab and Jewish systems can be found in the curriculum. Mathematics and sciences are two of many options for Jewish students who choose or are assigned to advanced courses, whereas these subjects are almost the only option for Arab students. This study tested the hypothesis that the restricted curriculum in Arab schools is the reason for the relative gender equality in this sector. When students or teachers have the option of choosing among subjects, as happens in Jewish schools, they make traditional decisions, and female students are found less often in advanced mathematics and sciences classes. When the "masculine" areas of study are almost the only option for advanced courses, as is the case in Arab schools, the gender typing of the areas of study turns into a minor factor in the student's choice of advanced courses or of their assignment to them by their teachers. In other words, the probability that female students who do fairly well in mathematics and sciences will join advanced courses in these subjects is lower when "feminine" areas of study are available. If we accept the common notion that the taking of advanced mathematics and sciences is attached to better opportunities in post-secondary education and in the labor market, the hypothesis implies that the restricted curriculum in Arab schools benefits females, whereas the rich curriculum in Jewish schools deprives them of exposure to the knowledge that is more rewarding in the long run.

There is a growing body of research indicating that a differentiated curriculum, which provides the students with more options, has negative effects for disadvantaged students. This finding seems to contradict common sense, the differentiated curriculum is supposed to benefit all students who are able to enroll into courses that match their interests and abilities. The negative effect of a richer curriculum with a variety of subject offerings on the enhancement of educational equality stems from the channeling of disadvantaged students to less attractive and less prestigious courses (Lee, 1993). This pattern is a part of the general tendency of education systems to match between the social hierarchy of students and the prestige hierarchy of school subjects. More valued courses are perceived as appropriate for higher status students who usually do better in school (Apple, 1990).

The literature provides several examples of the disadvantages of the availability of a variety of curricular options. Bryk, Lee, & Holland (1993) and Lee (1993) reported that in Catholic schools in the United States, which are characterized by a restricted curriculum, all students followed the same academic programs, whereas in public schools, which offered many options, course taking was related to socioeconomic background. Kilgore and Pendelton (1993) reported that when students had control over their track in mathematics, they preferred to enroll in the less academic courses of this subject. Stevenson and Baker (1991) found that in centralized educational systems, where the curriculum is controlled at the national level, the quantity of mathematics teachers taught was not related to the characteristics of the students, whereas in less centralized systems with local or provincial control it is found to be related. Gamoran and Hannigan (2000) showed that in American schools that restricted the mathematics curriculum to college preparatory courses, all students benefited from taking algebra, regardless of their prior achievements.

Shavit (1990) studied the hypothesis that the limited curriculum of the Arab education system has a positive impact on Arab students. In analyzing a different aspect of the phenomenon, Shavit demonstrated that the participation rate of Arab males in post-secondary education was higher than that of Jews of Middle-Eastern and North-African origin, the disadvantaged Jewish ethnic groups. Shavit interpreted this pattern as an outcome of the scarcity of vocational secondary education, which is usually a dead end, in the Arab educational system. Vocational education is highly developed in the Jewish system, and it absorbs mainly students from the disadvantaged Jewish ethnic groups. Graduates of most vocational programs have neither the certificates nor the motivation for postsecondary education. Shavit concluded that the scarcity of vocational education in the Arab sector, which probably stems from discrimination, actually benefits Arab students.

Previous research referred to the positive effect of a restricted curriculum on the enhancement of socioeconomic and ethnic equality in education. It did not refer to gender equality. Moreover, Bryk et al. (1993) reported that in spite of the moderating effect of the curriculum of Catholic schools on various aspects of inequality, girls in these schools took fewer courses in mathematics and sciences, just as they did in public schools. This pattern stems probably from the nature of the restricted curriculum in Catholic schools, which is described as academic (as opposed to general and vocational). When female students in Catholic schools have academic female-type alternatives to the academic male-type areas of study, they probably use them. We can expect that a curriculum that offers only a few alternatives to mathematics and sciences, as is the case in Arab schools in Israel, will enhance gender equality.

One should not get the impression that all Jewish schools offer a rich curriculum, and all Arab schools a restricted one. On average the curriculum of Jewish schools is richer compared with Arab schools, but there are inner variations in each system. This variability is particularly prominent in Jewish schools, which vary significantly in the scope and content of course offerings (Ayalon, 1994). The differentiation within each sector enables empirical testing of the hypothesis that the curriculum can explain the difference between Arab and Jewish schools in gender inequality in course taking. We shall test that hypothesis by comparing gender inequality in the two sectors with and without control for subject offerings. The hypothesis leads to the prediction that control for subject offerings will moderate or even eliminate the differences between the Jewish and the Arab systems in gender inequality in course taking. In other words, we can expect female students in Arab schools with more subject offerings to join traditional "feminine" areas of study more often, and female students in Jewish schools with a curriculum that is restricted to advanced courses in mathematics and sciences to have higher rates of enrollment in these "masculine" courses.

Multilevel Analysis of Course Taking of Mathematics and Sciences

Method

The comparison of gender inequality in course taking of mathematics and sciences in Arab and Jewish schools is based on a multilevel analysis. A Multilevel analysis is particularly appropriate for the present study since it provides an estimate of the effect of gender on course taking (student level), the effect of school characteristics on course taking (school level), and the effect of school characteristics on gender inequality (interaction between the student level and the school level). To address the two levels the analysis is based on Hierarchical Linear Modeling (HLM) (Bryk & Raudenbush, 1992).

Data and Sample

The data are based on a survey of all 12th graders in academic programs, which was conducted by the Israel Central Bureau of Statistics (ICBS) for the Israel Ministry of Education and Culture in 1989. I am aware that changes may have occurred in the Israeli education system since 1989. However, my purpose is to analyze the link between subject offerings and gender inequality in course taking and not to describe the current state of the Israeli system. In spite of the time lag since the collection, the data suits this purpose. In that survey, questionnaires were sent to the school principals, who were asked to provide information on the subjects studied by each student during all of his or her years in high school and on each student's gender. The analysis is based on 22,766 students and 263 schools: 14,998 students are distributed among 114 schools in the Jewish secular system; 3,794 students and 87 schools in the Jewish religious system, and 3,974 students and 62 schools in the Arab system. Arab private schools, which usually cater to students with better socioeconomic backgrounds (Ichilov & Mazawi, 1996) are not included in the data. Subsequently, lower status Arab students are over represented in the sample.[8]

Variables

Each level includes a different set of variables, as follows:

Student-Level Variables

Gender: A dummy variable coded 1 for males, 0 for females. Two variables represent course taking:

1. *Sunits:* Number of units taken in sciences (a sum of the student's units in physics, chemistry, biology, and computer sciences).
2. *Mathunits:* Number of units taken in mathematics.

Unfortunately, the data does not provide information on the socioeconomic background of the students. However, since the purpose of the study is to analyze the effect of school-level variables, and especially subject offerings on gender inequality in course taking, and not to analyze any other aspects of inequality, the absence of such information causes severe, but not critical limitations. I shall refer to implications of the absence of this variable in the analysis of the findings.

School-Level Variables

The two major school-level variables are sector and subject offerings.

The three sectors (Arab, Jewish secular, and Jewish religious) are represented by two dummy variables:

1. *Arab:* Coded 1 for Arab schools, 0 otherwise. Due to the small number of Arab schools (62), they are not internally differentiated among the subgroups.
2. *Religious:* Coded 1 for Jewish religious schools, 0 otherwise. The secular Jewish schools serve as the reference category. Subject offerings are represented by two variables:

3. *Nscience:* Number of advanced science subjects offered in school.
4. *Nalt:* Number of alternative advanced subjects offered in school. This category includes all advanced academic subjects that the school offers, except mathematics, physics, chemistry, biology, and computer sciences.

The additional school-level variables serve mainly as controls.

5. *Size:* Number of 12th graders in school.
6. *Mathmean*: Mean mathematics units taken in school. The average level of mathematics in a school depends on the average ability of the students and on school policy. I refer to this combination as school math orientation.
7. *%Male:* Percent of male students among the 12th graders in school. There are two sources of variance in the gender composition of schools: (a) availability of vocational education in the community. Vocational education absorbs students of both genders, but it caters more to male students. Subsequently, females are over represented in academic education. (b) Some of the religious schools in the sample are single-gendered.

Models

The analysis consists of four models, two for mathematics (*mathunits*), and two for sciences (*Sunits*). The general model is described in equations 1, 2, and 3. Equation 1 is a within-school equation. It presents the outcome (*mathunits* or *Sunits*) of student in school *j* as a function of the mean number of units in school (the intercept), the student's gender, and an error term.

$$(1) \qquad (\text{outcome})_j = \beta_{0j} + \beta_{1f}(\text{gender})_{ij} + r_{ij}.$$

Gender is centered around the school mean (the percent of male students in school).

The intercept (β_{0j}) and the slope of *gender* (β_{1j}) are allowed to vary among schools and serve as outcomes in equations 2 and 3, the between-school equations, as follows:

$$(2) \qquad \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Arab}) + \gamma_{02}(\text{religious}) + \gamma_{03}(\%\text{male}) + \gamma_{04}(\text{size}_j) + v_{0j}.$$

$$(3) \qquad \beta_{1j} = \gamma_{10} + \gamma_{11}(\text{Arab}) + \gamma_{12}(\text{religious})_j + \gamma_{13}(\%\text{male}) + v_{1j}.$$

Equations 2 and 3 present the school variables that are included in the model of *mathunits* on the first step of the analysis. The parallel equations for *Sunits* also include *mathmean,* which, as an aggregate of *mathunits,* cannot be included in the equations of that outcome.[9]

%Male is included in equations 2 and 3 as an indirect indicator of the selectivity of male students in academic programs in school. Fewer males in academic programs indicate higher selectivity since it means that higher proportions of less able males enrolled in vocational programs. I shall refer later to possible implications of the degree of selectivity of male students in academic programs in the results section. The inclusion of *%male* in the between-school equations, combined with the centering of *gender,* has an additional advantage: it decomposes *gender* into within-school and between-school components. Thus, the within-school equation includes only within school variation of *gender,* and the between-school equations include only variations in gender composition. Subsequently, at the student level the analysis ignores between-school variance in gender composition, and the *gender* coefficient is net of this contextual effect (Bryk and Raudenbush 1992).

The inclusion of *mathmean* in the equations of the gender slope and the intercept of *Sunits* is based on previous findings showing that a school's math orientation was linked to course taking of sciences, and to gender differentiation in course taking of various science subjects (Ayalon 1995).

The equations of the intercepts of the two outcomes include, on the first step, all school variables included in the respective *gender* slope equations,[10] and an additional variable; *size. Size* is included in the intercept equation following previous research indicating a link between school size and course taking (Lee et al., 2000).[11]

On the second step *Nalt* is added to the equation of the *gender* slope of each outcome, and the two-course offering variables, *Nalt and Nscience* are added to the equations of the intercepts of the two outcomes.[12] By comparing the effects of *Arab* and *religious* in the gender-slope equations that do not include *Nalt,* with their effects in the respective equations that include it, we will estimate the impact of alternative subject offerings on the link between sector and gender inequality in course taking of mathematics and sciences.

The school-level interval variables (*Nscience, Nalt, mathmean, size, %male*) are centered around the grand means and the sector variables retain their original form. Thus, the intercept represents the number of mathematics or science units taken by a female student in a Jewish secular school with average characteristics. The *gender* slope represents gender inequality in course taking in an average Jewish secular school.

Results

The descriptive statistics and the correlations are presented in Table 1. At the student level, the means show moderate differences among the three sectors in *mathunits.* Students in Jewish secular schools have the highest mean (3.67), followed by students in Jewish religious (3.63) and Arab schools (3.61). Yet, t-test (not presented in the table) produced statistically significant results ($p < .05$) only for the comparison between Jewish secular and Arab schools. The differences among the sectors in mean *Sunits* are greater and statistically significant. Students in Jewish secular schools have the highest mean (6.10) followed by students in Arab schools (5.74), and students in Jewish religious schools (5.23). The separate means for the two genders show that boys take more mathematics than girls in the three sectors. T-test showed that gender difference is statistically significant ($p < .05$) in all three sectors. The picture is different for Sunits. Boys take more science units than girls in Jewish secular and Arab schools, and the differences are statistically significant, however, in Jewish religious schools gender difference (in favor of girls), is very small and it lacks statistical significance. The substantive correlations between *mathunits* and *Sunits* point to the link in Israeli high schools between taking advanced mathematics and sciences. Although the correlations for the three sectors are positive and statistically significant, they show that the link between *mathunits* and *Sunits* is relatively low in the Jewish religious sector.

The interesting statistics in the school-level part of the table are the means of the Jewish and the Arab systems. The number of alternative subject offerings demonstrates the remarkable difference between the two systems; the means for the Jewish schools are 3.71 for secular schools, and 2.75 for religious schools, compared with .98 for Arab schools. As expected, the difference between the sectors in the number of sciences offered is moderate, and Arab schools offer more sciences than Jewish religious schools. The three sectors are similar in *mathmean,* with the mean being a little higher in Arab schools. The difference between

TABLE 1
Descriptive Statistics and Correlations of Student and School Variables

Student Variables
N of Units in Math and in Sciences according to Gender for the Three Sectors

	Math				Sciences			
	Total	Jewish secular	Jewish religious	Arab	Total	Jewish secular	Jewish religious	Arab
Total								
M	3.64	3.67	3.63	3.61	5.87	6.10	5.23	5.74
SD	.88	.91	.91	.77	3.16	3.36	2.41	3.01
Girls								
M	3.55	3.54	3.52	3.57	5.59	5.67	5.25	5.60
SD	.84	.87	.82	.75	3.05	3.25	2.31	2.91
Boys								
M	3.79	3.87	3.76	3.65	6.28	6.79	5.21	5.87
SD	.92	.93	1.05	.79	3.27	3.43	2.56	3.10

Correlations between Math Units and Sciences Units

Jewish secular	Jewish religious	Arab
.57*	.32*	.59*

School Variables
Descriptive Statistics and Correlations for the Three Sectors

Variable	*Mathmean*	*%male*	*Nscience*	*Nalt*	*M*	*SD*
Size						
Jewish secular	.21*	.01	.51*	.69*	131.56	99.43
Jewish religious	.29*	.05	.61*	.48*	45.68	34.89
Arab	.08	.09	.44*	.37*	92.38	53.87
Mathmean						
Jewish secular	–	.05	.23*	.08	3.59	.50
Jewish religious	–	.06	.39*	.12	3.51	.55
Arab	–	–.13	–.04	–.03	.63	.45
%male						
Jewish secular	–	–	–.02	–.14	.38	.12
Jewish religious	–	–	–.03	–.34*	.40	.44
Arab	–	–	.03	.03	.51	.16
*N*sciences offered						
Jewish secular	–	–	–	.60*	2.39	1.18
Jewish religious	–	–	–	.48*	1.51	1.19
Arab	–	–	–	.41*	1.81	.92
*N*alternative subjects offered						
Jewish secular	–	–	–	–	3.71	1.76
Jewish religious	–	–	–	–	2.75	1.32
Arab	–	–	–	–	.98	.59

Note: Statistics shown are for 14,998 (38% male) students in 114 Jewish secular schools; 3,794 students (41% male) in 87 Jewish religious schools; and 3,974 students (52% male) in 62 Arab schools.
$^*p < .05$.

the Jewish and the Arab sectors in *%male* is impressive: .51 in Arab and about .39 in Jewish schools. This is a consequence of the status of vocational education in the two systems. Vocational education, which is highly developed in the Jewish systems, attracts students of both genders, but it caters more to males than to females. Consequently, females are over represented in the academic high schools in the Jewish sector. Due to the marginality of vocational education in the Arab system, the two genders are equally represented in academic education.

Gender Inequality in the Various Sectors

The results of the multilevel analysis are presented in Table 2 and Table 3. Table 2, which summarizes the statistics of the models, shows substantial between-school variance in *mathunits* and in *Sunits* (28% of the total variance for *mathunits,* and 33% for *Sunits*). This variance validates the use of hierarchical modeling.

The table shows that school variables explain a small portion of between-school variance in *mathunits*—2% before the inclusion of course offerings, and about 6% after it. This implies that school variables are hardly linked to variations in math taking. School variables explain a greater portion of between-school variance in *Sunits*—15% before the inclusion of course offerings, 26% after it, indicating that science taking is more sensitive to school characteristics than math taking. School variables explain a significant portion of between school variance in the *gender* slope: 28% before the inclusion of *Nalt* and 31% after it, for *mathunits;* 23% and 28%, respectively, for *Sunits.*

The comparison between models 1 and 2 shows that *Nalt* adds 3% to the explanation of between-school variance of the *gender* slope of *mathunits.* The comparison between models 3 and 4 shows that the parallel increment for *Sunits* is 5%. The difference between χ^2 of the models with and without *Nalt* is statistically significance for the two outcomes (for *mathunits* −12.22 with 1 *df*; for *Sunits* −20.62 with 1 *df*).

In spite of its statistical significance, the net contribution of *Nalt* to the explanation of between-school variance of the two *gender* slopes is small. This is not surprising. The high correlation (−.69) between *Nalt* and *Arab* does not leave much room for a substantial residual effect of either variable beyond the other. We should recall however that the hypothesis stated that subject offerings mediated the effect of *Arab* on gender inequality, and not that *Nalt* has a substantial net contribution to the explained variance, beyond that of *Arab.* Yet, to compare the contribution of *Nalt* to the *gender* slope equations with that of *Arab,* I computed the approximate "t-to-enter" statistics, suggested by Bryk and Raudenbush as a test of whether a Level-2 predictor should be included in a model. The results showed that *Nalt* has a statistically significant contribution beyond that of *Arab,* whereas *Arab* has no significant contribution beyond that of *Nalt.*[13]

The coefficients produced by the HLM analyses are presented in Table 3. Columns 1 and 2 refer to mathematics, and columns 3 and 4 to sciences. The upper part of column 1 presents the effects of school characteristics on the mean number of mathematics units taken at school (the intercept). We can see that *Arab* and *religious* have no effect on the intercept. This means that, *ceteris paribus,* there is no difference between Jewish secular, Jewish religious, and Arab schools in course taking of mathematics. This is not surprising in view of the small differences among the three sectors in mean *mathunits* (see Table 1).

The *gender* slope in the first column, 0.27, expresses the average advantage of boys in Jewish secular schools in mathematics units. *Arab* reduces the slope by −.18, implying that the average gender difference in *mathunits* in Arab schools is particularly low (27 − .18 = .09). Gender inequality in *mathunits* is similar in the two Jewish sectors.

The models presented in columns 1 and 2 are identical with one exception; in the second model, *Nscience* and *Nalt* are added to the equation of the intercept, and *Nalt* is added to the equation of the gender slope. Thus, the comparison of the effect of *Arab* and *religious* on the gender slope before and after the inclusion of *Nalt,* points to the effect of alternative subject offerings on the difference among the sectors in gender inequality in *mathunits.* We can see that after the inclusion of *Nalt* to the analysis (column 2) the coefficient of *Arab* is reduced to −.03, and it loses its statistical significance. This suggests that Jewish and Arab schools with similar alternative subject offerings do not differ in gender inequality in mathematics taking. The coefficient of *Nalt* indicates that, other things being equal, each additional offering of advanced humanities, social sciences, or foreign languages enhances the advantage of male students by .03. Thus, the offering of advanced courses in the

TABLE 2
Summary statistics of the models

Random Effects:

Dependent Variable	Variance component	χ^2	*df*	P value	Proportion variance Reduction[b]
Mathunits					
Intercept					
Model 0 (No Level-2 predictors)	.236	6347.10	1,96	.00	
Model 1 (*Arab*, *religious*, *size*, *%male*)	.231	6101.16	1,92	.00	.021
Model 2 (Model 1 + *Nscience*, *Nalt*)	.223	5899.38	1,90	.00	.055
Gender slope					
Model 0 (No Level-2 predictors)	0.32	460.61	1,96	.00	
Model 1 (*Arab*, *religious*, *%male*)	0.23	395.98	1,93	.00	.283
Model 2 (Model 1 + *Nalt*)	0.22	383.54	1,92	.00	.313
Sciences					
Intercept					
Model 0 (No Level-2 predictors)	3.210	7795.31	1,96	.00	
Model 3 (*Arab*, *religious*, *size*, *%male*, *mathmean*)	2.716	5774.42	1,91	.00	.154
Model 4 (Model 3 + *Nscience*, *Nalt*)	2.377	5228.71	1,89	.00	.260
Gender slope					
Model 0 (No Level-2 predictors)	.608	577.88	1,96	.00	
Model 3 (*Arab*, *religious*, *%male*)	.466	471.88	1,92	.00	.234
Model 4 (Model 3 + *Nalt*)	.440	451.26	1,91	.00	.277

Intraclass Correlation coefficients: Math: .28 Sciences: .33

[a] Proportion of the variance of the outcome that is between schools.

[b] Computed as $(V_0 - Vi)/V_0$, where V_0 presents "total" variance (of the intercept or the slope), and *Vi* the variance components of the *i* (= 1, 2, 3, 4) models presented in the table.

"feminine" school subjects increases the gender gap in mathematics taking. To illustrate; in a Jewish secular school whose offerings exceed the mean by one standard deviation (1.76), males' advantage in *mathunits* increases by about 25% (.21 + .03 * 1.76 = .26).

The effect of *Nalt* on the gender gap is statistically significant and in the expected direction, but since the gender gap is small relative to the mean, the effect of *Nalt* on *mathunits* is less impressive. This is not surprising. Mathematics is compulsory at the lower level and most students take at least the 3-unit level. Sciences are optional, and the variation in science taking is substantial. The coefficients of variation demonstrate the difference between the two outcomes: for *mathunits*

TABLE 3
HLM Model for Number of Units Taken in Mathematics and the Sciences

	Outcome Variable			
Effect	Math Model 1	Math Model 2	Sciences Model 3	Sciences Model 4
On mean *N* of units				
Average intercept	3.55* (.05)	3.57* (.06)	5.57* (.18)	5.48* (.18)
Sector:				
Arab	.07 (.08)	−.05 (.12)	.12 (.28)	.24 (.38)
Religious	.03 (.08)	.05 (.08)	−.41 (.28)	−.21 (.26)
Size × 100[a]	.11* (.03)	.08* (.04)	.32* (.12)	.02 (.14)
%Male	.08 (.13)	.04 (.12)	.03 (.42)	.04 (.41)
Mathmean	–	–	1.08* (.30)	.84* (.25)
Nscience subjects offered	–	.11* (.04)	–	.59* (.12)
Nalternative subjects offered	–	−.05 (.02)	–	−.03 (.08)
On gender inequality				
Average intercept	.27* (.02)	.21* (.04)	.97* (.09)	.76* (.14)
Sector:				
Arab	−.17* (.04)	−.03 (.06)	−.64* (.17)	−.13 (.29)
Religious	.02 (.10)	.06 (.10)	−.59* (.28)	−.43 (.29)
%Male	−.11 (.18)	−.06 (.17)	−.91 (.69)	−.76 (.68)
Mathmean	–	–	.05 (.13)	.03 (.12)
*N*alternative subjects offered	–	.03* (.01)	–	.13* (.05)

[a]The coefficient is multiplied by 100 to produce more comprehensible numbers.
*$p < .05$.

the coefficients are .25 for the Jewish sector, and .21 for the Arab sector. The parallel coefficients for *Sunits* are .55 for Jewish secular schools; .46 for Jewish religious schools, and .52 for Arab schools. Evidently, the restricted variation of *mathunits* does not leave much room for a large *gender* slope.

The average advantage of male students in the Jewish secular sector in *Sunits* equals one unit of study (column 3). Gender inequality is more moderate in the Jewish religious sector: the advantage of male students is reduced to .44 (1.00 – .56) units. Gender equality reaches its highest level in the Arab sector. Here the advantage of male students equals only .23 units (1.00 – .76). The upper part of the column, which refers to the intercept, shows that *Arab* has no effect on the mean number of science units taken in school. Students in Arab schools take as much sciences as their counterparts in Jewish secular schools, and gender equality is achieved in a relatively high level of science taking. The case of the Jewish religious sector is different. The effect of *religious* on the intercept is negative and although it is not significant at the p < .05 level, the coefficient exceeds its standard error by 1.46 (p < .15). In Jewish religious schools the relative gender equality occurs in a lower level of science taking between both groups.

When curriculum is added to the equation (column 4), the effect of *Arab* on the *gender* slope loses about 75% of its magnitude and its statistical significance, indicating that the relative gender equality in this sector is strongly attached to the different curricula. This suggests that Arab and Jewish secular schools that offer similar numbers of alternative advanced subjects resemble one another in the degree of gender inequality in science taking. The picture is similar but not identical, in the religious sector. When *Nalt* is added to the equation, *religious* loses its statistical significance, but only 32% of its magnitude. Clearly, the control for the curriculum is more effective in explaining the differential gender inequality in the Arab and the Jewish secular sectors, than the difference between the two Jewish sectors. The effect of *Nalt* implies that each alternative course increases the advantage of males by .13. To illustrate, when the alternative offerings in a Jewish secular school exceed the mean by one standard deviation, the gender gap in *Sunits* increases from .76 to 1 study unit (.76 + .13 * 1.76). Just as in mathematics, when a school offers more courses in the humanities, social sciences, and foreign languages, female students use this alternative and take fewer courses in sciences.[14]

In all four models the effect of *%male* on the *gender* slope does not reach statistical significance. As noted, *%male* is included in the *gender* slope equations as an indirect indicator of the selectivity of male students in academic programs. Based on the popularity of vocational education among Jewish male students, we could argue that the gender gap in course taking of mathematics and sciences in the Jewish sector stems from the concentration of highly able male students in academic programs, since their less able counterparts enroll, in high proportions, in vocational programs. These highly able male students take advanced mathematics and sciences, which can explain the more prominent gender gap in the Jewish sector. The inclusion of *%male* serves as an informal test of this explanation. If this explanation were true, we would have expected the control for *%male* to substantially decrease or even eliminate the effect of *Arab* on the *gender* slope. In other words, if the negative effect of *Arab* on the *gender* slope resulted from the selectivity of the Jewish sector in assigning male students to academic programs, we would have expected *%male,* which is an outcome of this selectivity, to affect the link between *Arab* and the *gender* slope. We can see in the table (columns 1 and 3) that *Arab* affects significantly the *gender* slopes for both math and sciences, in spite of the control for *%male.* It is only after the inclusion of the curriculum that *Arab* loses its statistical significance (columns 2 and 4). I also tested the effect of the exclusion of *%male* from the equations on the effect of Arab on the *gender* slope, and found that it did not produce significant changes in the results. It should be noted, however, that for sciences the negative coefficient of *%male* exceeds its standard error by 1.33 ($p < .19$). Since *%male* is only a proxy to male selectivity, we cannot omit the idea that the school's male selectivity has some effect on the gender slope of *Sunits* (but not of *mathunits*). However, this effect does not explain the effect of *Arab* on the slope.

Alternative Explanations

The blurring effect of subject offerings on the differences among the various sectors supports the hypothesis that the curriculum is strongly linked to the gender gap in course taking of mathematics and sciences. To substantiate this conclusion, let us consider two additional alternative interpretations of the findings. First, we should refer to the possible implications of our lack of data on students' socioeconomic background. One could argue that the differences in gender inequality between Arab and Jewish secular schools stem from SES differences between the two populations. Israel's Arab population is characterized by lower SES (Mazawi, 1996). Arab females who attend academic high schools are a selective group, due to the relatively high dropout rates in this sector,[15] but they are still characterized by lower SES compared with their Jewish counterparts, who are also a selective group since lower status Jewish students are over represented in vocational education (Shavit, 1989). However, since previous research reported that higher status female students take more courses in mathematics and sciences (Oakes, 1990), this alternative explanation to the findings might apply if we had found more severe, and not more moderate, gender inequality in Arab schools.[16]

Another rival explanation refers to the attitude of the students towards mathematics and sciences. Mittelberg and Lev-Ari (1999), who studied the attitudes of Israeli high school students towards mathematics, reported that Arab female students express more positive attitudes than their Jewish counterparts. We could suggest that these attitudes, and not the restricted curriculum, are the reason of the moderate gender gap in the Arab sector. Even so, the causal order between attitudes and course taking is not straightforward. Positive attitudes towards mathematics may indeed cause more participation in advanced courses, but the opposite direction is also probable, and exposure to mathematics may produce a positive attitude towards this field of study. The present data do not provide information on attitudes, and we cannot test empirically the causal order between attitudes and course taking. Nonetheless, the positive attitudes of Arab female students cannot explain why control for the curriculum eliminates inter-sector differences in the gender gap, while the exposure to advanced mathematics, (which stems from the restricted curriculum, according to the logic of the present study), can explain the positive attitudes of Arab female students. Obviously, this issue needs further research.

Discussion

The comparison of gender inequality in course taking of mathematics and sciences in Arab and Jewish schools reveals an additional aspect of the advantages of a restricted curriculum for members of disadvantaged social groups. Previous research revealed that a restricted curriculum enhances socioeconomic and ethnic equality in course taking and achievement. The current study shows that the same is true for gender equality. The current findings, combined with previous ones, lead to a general conclusion; when a school offers a rich curriculum with a variety of courses, students who belong to privileged social groups join the more valued, more attractive, and more rewarding courses, thus depriving members of disadvantaged groups exposure to highly valued knowledge. These findings support the view, developed in the framework of conflict theories on education, that curriculum differentiation, which is supposed to reduce inequality by helping students find the courses that suit their capacities and interests, actually helps to reproduce existing inequalities. This function of the differentiated curriculum is a consequence of two of its features: (a) the various courses are stratified and some are valued more then others, and (b) the assignment of students to courses is affected by common beliefs on the proper matching between students and courses. These beliefs take into account ascriptive characteristics of the students such as socioeconomic background, ethnic origin, and gender.

The beneficial effect of the restricted curriculum constitutes a sociological paradox when we refer to Arab female students. The poor curriculum of the Arab high schools, which probably stems from discrimination towards this sector, enhances the chances of girls, a group that usually suffers from the double disadvantage of being both female and Arab, to be exposed to highly valued knowledge that other female students in Israel are deprived of. This does not imply that the restricted curriculum does not have negative aspects for Arab students. First, the poor curriculum in Arab schools deprives the students of valuable knowledge in the humanities and social sciences. This may be of particular value to Arabs in Israel, a minority group that may be deprived of its cultural heritage (Al-Haj, 1995). Second, the restricted curriculum is considered as one of the reasons for the higher dropout rates of Arab students. However, these dropout rates are usually assigned to the scarcity of vocational education in the Arab sector (e.g. Mazawi, 1994), and not to the few alternatives to mathematics and sciences. Data on the attendance rates of Jewish and Arab students confirm this view.[17] Yet, the exposure of Arab female students to mathematics and sciences is considered an unquestionable advantage. The statement of Mittelberg and Lev-Ari (1999) that the attitude of Arab girls to mathematics provides an avenue for an inversion of the stratified relationships between genders in Israeli Arab society is a good expression of the view prevalent in Israel.

A major question concerns the actual, as opposed to perceived, outcomes of the exposure of female students in the Arab schools to mathematics and sciences. Data on undergraduate students in Israeli universities in 1995 show that Arab female students indeed enroll in the faculties of physical and life sciences more than their Jewish counterparts, whereas among males the opposite is true (ICBS, 1997).[18] Post-secondary education in physical and life sciences usually leads to science-oriented careers, which lead to social prestige and economic rewards (Oakes, 1990; Ma & Willms, 1999). This may substantiate the popular claim, represented by Mittelberg and Lev-Ari, that the exposure to mathematics and sciences would produce a significant improvement in the occupational and economic status of Arab women in Israel. However, even if it occurs, this change would probably be gradual and slow since the participation of Arab females in the labor market is still very low.

Another prediction is that the exposure of Arab females to highly valued knowledge would enhance their status in areas not attached to the labor market; for example, it might improve their value in the marriage market (Mazawi, 1996). This suggests that Arab females do not necessarily convert their advantage in course taking to occupational achievements. This pattern may perhaps explain why Arab conservative society accepts the nontraditional course taking patterns of female students. If we accept the idea that dominant social groups monopolize highly valued knowledge in order to deprive weaker groups of access to the power attached to it, we can speculate that female students in Arab schools are "permitted" to acquire highly valued knowledge because they are not expected to compete with males in the future, and hence do not pose any threat to their dominance.

The relative gender equality in the Jewish religious sector is a different story. Unlike the Arab sector, it is less linked to course offerings. As noted, mathematics and sciences are less valued in this sector, and gender equality occurs in a lower level of science taking for all students, male and female. However, gender inequality in this sector is revealed in course taking of the highly appreciated religious studies that are perceived as the monopoly of males (Ayalon & Yogev, 1996). In other words, the religious sector is not necessarily exhibiting a more egalitarian curricular policy; it only follows its own definitions of the link between gender and school subjects. One mechanism that probably facilitates this pattern of inequality is the single-gender classes. Single-gender classes may be contributing to the reduction of gender inequality by enhancing the exposure of female students to mathematics and sciences. Previous research shows that girls in single-gender classes take more mathematics and sciences and have better achievements (e.g., Lee & Lockheed, 1990; Gillibrand, Robinson, & Osborn, 1999). This may be true for Israel, although the issue has not been studied in the Israeli context. At the same time, the separate classes contribute to the enhancement of gender inequality by helping to preserve gender differences in exposure to the religious studies. The differences between the Arab and Jewish religious sectors notwithstanding, we can suggest that in both, the exposure of female students to highly valued mathematics and sciences do not necessarily convert into social advantages. Obviously, this issue needs further research.

The need for a rich curriculum with a variety of course offerings follows current trends of multiculturalism and pluralism in education. Educational systems acknowledge differences among students and accept their right to a curriculum that corresponds to their predispositions. Subsequently, educational systems are sometimes expected by the political system, parents, and educators to develop programs for specific groups, such as programs for ethnic minorities, emphasizing their unique culture, and sometimes their particular language (Olneck 1993; McDonough 1998). Similarly, there are some who advocate creating a special curriculum that would correspond to the interests of females, in contrast with the conventional curriculum, which is male oriented (e.g., Volman et al., 1995). The body of research that suggests that a diverse curriculum may increase educational inequality rather than decrease it, challenges the claim that a differentiated curriculum would be beneficial for disadvantaged students. This body of research has to be considered in the process of shaping curricular policy.

Notes

I wish to thank Yossi Shavit, Haya Stier and the anonymous reviewers for their helpful comments. Please address all correspondence to Professor Hanna Ayalon, School of Education, Tel Aviv University, Tel Aviv 69978, Israel. E-mail: *ayalon@post.tau.ac.il*

[1] For example, in 1992, 15% of Arab women participated in the labor market compared with 45% of Jewish women (Semyonov & Lewin-Epstein, 1994).

[2] The statistics are based on a survey of all 12th graders in academic programs, which was conducted by the Central Bureau of Statistics (ICBS) for the Israeli Ministry of Education and Culture in 1987. The graph is based on the information on 19,300 students in the Jewish sector, and 5,300 students in the Arab sector. The graph represents the proportion of 12th graders, according to the combination of ethnic origin (Jewish or Arab) and gender, who took advanced courses in mathematics, and in the major science subjects: physics, chemistry, and biology.

[3] When the state of Israel was established in 1948 girls constituted 18.6% of the student body of Arab schools compared with 49% in Jewish schools (Al-Haj, 1995).

[4] The number of units refers to the time devoted to each subject. One unit equals one hour a week for three years or three hours a week for one year. To clarify the issue we shall use the curricula of the different levels of mathematics as an example. The purpose of the mathematics curriculum is to expose all students to the same topics, as much as possible. Thus, the different levels are distinguished according to the degree of difficulty of the subject matter. For example, all students study Euclidean geometry, but at the 3-unit level they study only properties of geometrical figures, at the 4-unit level the program includes some formal proofs, and at the 5-unit level the major part of the program is devoted to formal proofs.

[5] For each subject taken at the 4-unit level, there is a bonus of 10 points, for the 5-unit level 20 points, provided that the student has passed the exam. The bonuses for mathematics and English are higher: 12.5 points at the 4-unit level, and 25 points at the 5-unit level.

[6] It is important to note that Arab schools are not deprived in the quality of instruction. Due to the limited availability of occupational opportunities for educated Arabs, many graduates of the universities, male and female, pursue teaching careers. In the Jewish sector teaching has a low priority as a career, particularly among males with academic degrees (Shavit, 1990).

[7] A common strategy for selecting students for the advanced science courses is to use mathematics as a filter. In some schools students are allowed to take advanced courses in sciences only if they take 5-unit mathematics. Other schools demand only 4-unit mathematics, and a minority of schools does not restrict the advanced courses in sciences to students who take advanced mathematics. Since female students take 5-unit mathematics less often than their male classmates, they are disadvantaged in schools that link advanced science courses to 5-unit mathematics (Ayalon, 1995).

[8] The paper tries to explain the relative gender equality in the Arab sector. Since gender equality is more common among higher status groups, the underrepresentation of higher-status Arab students in the sample works against the hypotheses.

[9] Since many schools require higher level mathematics courses as a pre-requisite for many science courses; I analyzed parallel models with *mathunits* as an additional predictor of *Sunits.* The inclusion of *mathunits* did not change the findings, but complicated their presentation. I decided, therefore, not to present these analyses. The analyses are available upon request.

[10] It is common in HLM analysis to include in the equation of the intercept all school variables that are included in the equations of the slopes. This procedure is in accordance with general linear modeling, where the fitting of main effects (here, the effects of school variables on the intercept), precedes the consideration of interaction effects (the effects of school variables on the gender slope represent interaction between gender and school variables) (Bryk & Raudenbush 1992).

[11] I considered the inclusion of *size* in the gender slope equation. However, previous research showed that *size* affects inequality in course taking via its link to subject offerings (Lee et al., 2000). In an unreported analysis, I added *size* to the equation of the gender slope of both *mathunits* and *Sunits. Size* had no effect on the gender slopes of both outcomes and, more important, its inclusion did not change the effect of *Arab* on the slope. To get more parsimonious models I decided not to include *size* in the final models of the gender slope.

[12] I considered the inclusion of *Nscience* in the equations of the gender slope. To test the effect of *Nscience* on gender inequality I performed analyses with *Nscience* substituting *Nalt.* The effect of *Nscienc*e on the gender slope is similar to that of *Nalt*—each additional advanced course in sciences improves the advantage of male students in science taking. This implies that an increase in course offerings of either field of study increases the concentration of each gender on its "appropriate" subjects—boys on sciences and girls on humanities and social sciences. This may be due to students' preferences, school encouragement, or a combination of the two. Obviously, the present data cannot serve for a test of the various explanations. However, the inclusion of *Nscience* did not cause any significant change in the effect of *Arab* on the gender slope (*Arab* lost a marginal portion of its magnitude, and retained its statistical significance in the two equations). Since *Nscience* did not change the effect on *Arab,* and the major purpose of the study was to explain gender equality in the Arab sector, I decided, in order to get more parsimonious and clearer models, not to include *Nscience* in the final models of the gender slope.

[13] The *gender* slope, net of all Level-2 predictors except *Nalt,* was regressed on *Nalt* for each of the two outcomes. The results for *mathunits* were: coefficient: .006; SE: .003; t: 2.001; for Sunits–coefficient: .027; SE: .013; t: 2.034. For both outcomes t ratios were greater than 2. In the second test, the *gender* slope net of all school variables except *Arab,* was regressed on *Arab.* The results were: −.003, .012. −.275, for *mathunits;* −.012, .060, −.194, for *Sunits.* The small t-ratios show that *Arab* has no significant effect on the residual of the *gender* slope for the two outcomes.

[14] A different explanation to the findings may be that girls take more advanced alternative subjects because schools that offer more advanced alternative subjects offer fewer advanced sciences. This explanation is improbable. We have seen in Table 1 that

schools that offer more advanced sciences also offer more advanced alternatives.

[15] Between 1989 and 1990 the dropout rate among Arab students was .13. The parallel rate among Jewish students was .07 (ICBS 1997).

[16] One may argue that the selection among Arab students is so significant that the average SES of Arab 12th graders is higher than the SES of the comparable group of Jewish students. Data on a different cohort, the students that took the matriculation exams in 1992, shows otherwise. The mean parents' years of schooling of Arab female students who took the matriculation exams in 1992 were 8.15. The respective average for Jewish female students is much higher, 13.95. The averages were calculated from the records of the Ministry of Education and Culture. Yet, it is possible that the selective groups of lower status Arab female students who attend academic high schools are particularly ambitious and take more advanced mathematics and sciences than their higher status counterparts. Analysis of the cohort who graduated in 1992 shows that the correlations between fathers' years of schooling and number of units taken in mathematics and sciences for Arab girls are .16 and .28, respectively. The parallel correlations for Jewish girls are .22 and .28. This means that in the two sectors socioeconomic background is positively and similarly linked to taking advanced mathematics and sciences. Although the study is based on a different cohort, there is no reason to expect any dramatic changes of the SES composition of Arab and Jewish students and of its link to course taking between 1989 and 1992.

[17] In 1992, 691 out of 1,000 Arab girls and 672 out of 1,000 Arab boys aged 14–17 were in high school. The parallel figures for Jewish students were 792 and 706, respectively. However, most Arab students (77%) were in the academic track whereas, among Jewish students only 445 out of 1,000 girls and 318 out of 1000 boys were in the academic track (ICBS 1994). This suggests that the attendance rates of Arab students in academic education are even higher than those of Jewish students, and the differences between the total attendance rates of the two groups are due mainly to the scarcity of vocational education in the Arab sector.

[18] 12.9% of the Arab-female undergraduate students in 1995 studied exact or life sciences (mathematics, computer sciences, physics, chemistry, or biology) compared with 9.7% of their Jewish counterparts. The respective proportions for males are 18.5% for Jewish students and 15.9% for Arab students.

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Author

HANNA AYALON is Associate Professor at the School of Education and the Department of Sociology and Anthropology, and the head of the Horowitz Research Institute on Society and Economy, Tel Aviv University. P.O.B. 39040 Ramat Aviv 69978, Tel-Aviv, Israel. She specializes in the sociology of education.

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