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Abstract

This study looks at the long-term effect of academic tracking and sorting mechanisms on students who attended high school during the 1990s and the resulting inequality. A series of reforms initiated by the Ministry of Education from the early 1970s to the mid-1990s brought about far-reaching changes in the structure of secondary education in Israel. At the focus of these reforms was the attempt to deal with the inequality created during the initial decades following the establishment of the State. As a result of these reforms, secondary education in Israel shifted from a model of early and relatively inflexible tracking to a model with greater emphasis on diversity in the schools, the students' (and parents') right to choose, and the academization of vocational tracks. In this study, we focus on the first cohorts that were fully exposed to the reforms and examine their educational and occupational achievements, using a dataset based on a census carried out by the Central Bureau of Statistics (CBS) combined with data from the Ministry of Education, the institutions of higher education, and the Tax Authority. Since the 1990s, there essentially have been five tracks in secondary education; an advanced science and technology

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track, which was considered the most prestigious; a regular academic track; a basic academic track; a regular technology track; and a vocational track. We show that there is a clear connection between a student's socioeconomic background and their study track and that it has far-reaching implications for future chances of acquiring an academic degree and even earnings as an adult. Although the basic academic track, which is preferred by many schools as a track for "weak" students, makes it possible to attain a Bagrut certificate (matriculation certificate), the chances of acquiring an academic education and reaching high earnings by one's early 30s are similar to the chances for students who were in the vocational track (which was previously the preferred track for these students) with no Bagrut.

Introduction

The Israeli secondary education system has transformed during the years of its existence — from a dual system that made a clear separation between academic and vocational studies (as in the education system in Germany and other European countries) to a diverse system of study programs with an emphasis on personal choice between them (as in the US and England). This process consisted of four main steps: (a) cancellation of the screening test administered in Grade 8 (then the last grade in an elementary school), which would determine which type of secondary school the student would attend, i.e., academic or vocational; (b) creation of middle schools; (c) extension of the Compulsory Education Law from Grade 8 to Grade 10; (d) a transition from high schools with an academic or vocational character to comprehensive high schools that include a diversity of curricula. The reform in the structure of the Bagrut certificate, which was implemented starting from 1977, gradually canceled the structured tracks (such as vocational, liberal arts, and sciences) in comprehensive high schools and replaced them with the option of studying a broad variety of advanced subjects which students (and parents) could choose from. This reform sought to adapt the system to the changes taking place in Israeli society, which had become more liberal in nature and placed greater emphasis on personal choice. The advocates of the reform even presented it as a response to growing criticism of the previous approach to tracking, which was perceived as one of the main causes of inequality in education (Ayalon, 2000).

Alongside this reform, there was also a gradual modification of the vocational tracks during the 1980s and 1990s and in particular the academization of their content and the possibility of attaining a Bagrut certificate in all the subjects. As part of this process, the terminology was changed from "vocational" education to "technology" education. The changes in vocational-technological education were meant to address a variety of challenges, including developments in the labor market and the transition to a technology-based economy, and to allow graduates of non-academic frameworks to also obtain a matriculation certificate and continue on to higher education (Ayalon & Shavit, 2004).[1] Nonetheless, these changes did not halt the downward trend in enrollment in vocational-technological education nor did they prevent its reaching a low point in the Jewish sector in the 1990s (for a review of vocational-technological education, including more recent developments, see Fuchs et al., 2018). The decline of vocational-technological education was accompanied by an expansion of a new academic track which focused on meeting the needs of low-achieving students, the majority of whom came from underprivileged socioeconomic backgrounds. The main response developed for this student population by the Ministry of Education's Shahar Branch (Hebrew acronym for Education and Welfare Services) involved separate classes in programs such as MBR (or Mabar, the Hebrew acronym for Regular Bagrut Track) and Etgar (the Hebrew word for challenge). Classes in these programs are relatively small and the students benefit from additional hours of instruction, the studies focus on a relatively limited number of subjects, and math and English are taught at a relatively low level. This is accompanied by academic and emotional support for students. Recent studies examining the MBR program have presented mixed findings. Thus, the program led to some reduction in the drop-out rate and increased the likelihood of attaining a Bagrut certificate, although there was also criticism from students with respect to the limited choice they were given and the low expectations of the teaching staff (Bahar, 2020; RAMA, 2019).

As a result of these processes, students who attended high school in the late 1990s were exposed to a different sorting structure in school than high school students in previous decades. Blank et al. (2015) suggest

1 Nonetheless, there remain vocational schools that are designated primarily for youth-at-risk. These schools primarily teach the traditional subjects and non-technology subjects and are under the auspices of the Ministry of Welfare and Social Affairs rather the Ministry of Education.

that a distinction be made between four main types of tracks within this decentralized structure: (a) an academic track that is designed to prepare its graduates for academic studies; (b) an "engineering" track that is part of the technology education system but is also oriented toward preparation for higher education; (c) a technology track that is more oriented toward the labor market and the technical occupations; and (d) a vocational track that is meant to provide a vocational education alongside academic studies. These researchers demonstrated a clear correlation between the type of track and the background characteristics of the students, and in particular with respect to their parents' level of education. While the average education of parents of students in the academic and engineering tracks is similar and relatively high, it is lower in the case of parents of students in the technology track and even lower in the vocational track. In this study, we seek to advance the existing knowledge on sorting in the high schools from two main perspectives. First, we suggest a somewhat different classification of the tracks with the goal of analyzing the low-status academic track that was added to the system in the 1990s. Second, we seek to shed light on the long-term implications of this form of tracking on the possibility of acquiring an academic degree and on the earning power in the labor market of those who were in high school in the late 1990s and are now in their early 30s.

A new categorization for study tracks

In this study, we propose a distinction between six main tracks in secondary education in Israel. This division is along two axes: the traditional distinction between academic and vocational-technological education and the hierarchical differentiation between selective and more demanding curricula and selective and less demanding curricula. According to this differentiation, we identified six tracks:

1. *The advanced science and technology track* which includes advanced subjects such as physics, chemistry, computers, and bio-technology together with the highest level of math (5-unit level) and at least intermediate English level (4-unit level). This track includes selective subjects both on the academic track and on the track that Blank et al. (2015) refer to as the "engineering" track.

2. *The regular academic track* which includes the advanced academic subjects from the natural sciences, the social sciences, and the humanities together with at least intermediate English level. A student on this track has the potential of being accepted to any institution of higher education in Israel.
3. *The basic academic track* which includes subjects from the social sciences and the humanities (and often geography) together with basic level English (3-unit level). A student on this track will not be accepted to the research universities, but can enroll in some Israeli colleges. Essentially, this is an academic track developed as a solution for low-achieving students. Based on the data at our disposal, it is not possible to determine with certainty whether the students in this track were part of a MBR, Etgar, or similar program; nonetheless, this track has similar curricula to these programs.
4. *The regular technology track* which includes a variety of advanced technology subjects and at least 4 units of English. A student in this track has the possibility of attending any of the institutions of higher education. This track is parallel to the technology track discussed by Blank et al. (2015) and includes, for example, electronics.
5. *The vocational track* which includes vocational and technology training in various areas and basic level English. This track is parallel to the vocational track discussed by Blank et al. (2015). The students in this track study subjects such as auto mechanics, office management, and hairdressing.
6. *Non-Bagrut* which includes students who were not eligible for a Bagrut certificate after their high school studies. This category includes students from various tracks who did not manage to qualify for a Bagrut certificate.

Research questions, data, and methods

In this study, we focus on individuals who attended high school during the second half of the 1990s and examine the long-term implications of studying in the various tracks. The main contribution of the analysis is to shed light on the basic academic track which was established during that period and which took in many students with characteristics that were common in the vocational track in previous decades.

In order to investigate the educational and occupational achievements of the graduates of the various tracks, we used a unique dataset prepared by the CBS by merging data from the 1995 census with data from the Bagrut

exams, higher education, and income tax reporting. The dataset includes background data on individuals born between 1978 and 1983 and tracks their educational progress (high school attendance, Bagrut, and academic studies where relevant) and their earnings up to 2016. This dataset allows an examination of the likelihood of entering each of the tracks based on the student's socioeconomic background (we focus on parents' education level where we differentiate between students with two parents who both lack a higher education and those with at least one parent who has higher education) and their chances of acquiring a bachelor's degree. It also allows us to observe their earnings at the age of 33 (we focus on employees only). The analysis relates to Jews only, primarily since, in those years, many Arab students dropped out of high school before the Bagrut exams and thus our classification of high school tracks is not relevant for many of them, or we did not have sufficient information for this classification (since it is based on data on students who sat for the Bagrut exams). Furthermore, the decline in vocational-technological education and its replacement by the basic academic track occurred primarily in the Jewish education system. (During that period, there was in fact an increase in the scope of vocational-technological education in the Arab schools.) Similarly, we omitted new immigrants from the analysis in order to focus on individuals who had only attended school in Israel and to avoid external effects related to immigration.

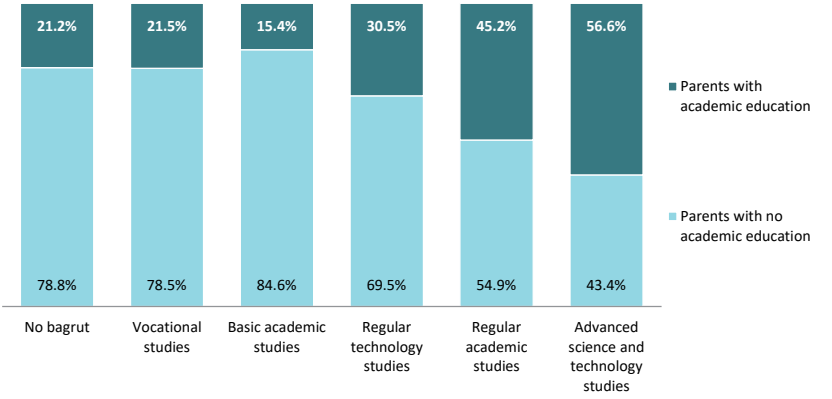
We first present descriptive statistics and then predictions based on logistic regressions (for the likelihood of acquiring a bachelor's degree) and linear regressions (for earnings). In the multivariate model, we control for the continent of origin and parents' education, gender, and score on the civics Bagrut exam, which is a proxy for overall academic ability. (The civics exam is a compulsory Bagrut exam; all students take this exam at the same level and it is unrelated to the chosen study major or to the tracking in the school.)

Findings

Figure 1 presents the association between parents' education and their children's educational tracks. The graph shows a clear hierarchy of tracks according to parental education. The percentage of students with parents with higher education is the highest in the advanced science and technology track, followed by the regular academic track, the regular technology track, the vocational track, and finally the basic academic track. These findings are in

line with those of a long series of studies which showed that the reforms and changes carried out in secondary education in Israel from the 1970s until the 1990s failed to essentially change the relationship between socioeconomic background and location in the hierarchy of curricula (see, for example, Ayalon, 2000; Ayalon and Shavit, 2004; Blank et al., 2015).

Figure 1. Distribution of students by high school study tracks and parents' education level

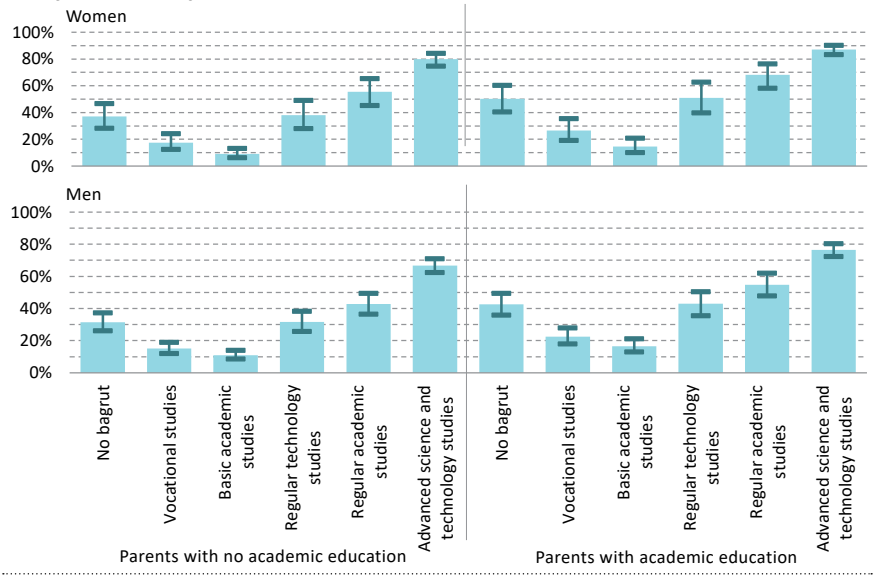


Source: Eyal Bar-Haim and Yariv Feniger, Taub Center | Data: CBS

We now turn to the implications of placement in the various tracks in high school. Figure 2 shows the predicted probability of acquiring a bachelor's degree among students from the various tracks (Appendix Table 1 presents the full regression model used to produce these predictions). This probability is calculated for students with average academic ability (in other words, an average score in civics) from a mixed Mizrahi-Ashkenazi background (the findings are for the most part similar for other ethnic backgrounds). We present the findings on these probabilities for students from homes with parents with more and less education and for boys and girls separately. Figure 2 shows that across all tracks, children of parents with an academic education have a higher likelihood of acquiring an academic education than children of parents without an academic education. Nonetheless, there are statistically significant differences between the various tracks. Unsurprisingly, graduates of the advanced science and technology track have the greatest chance of

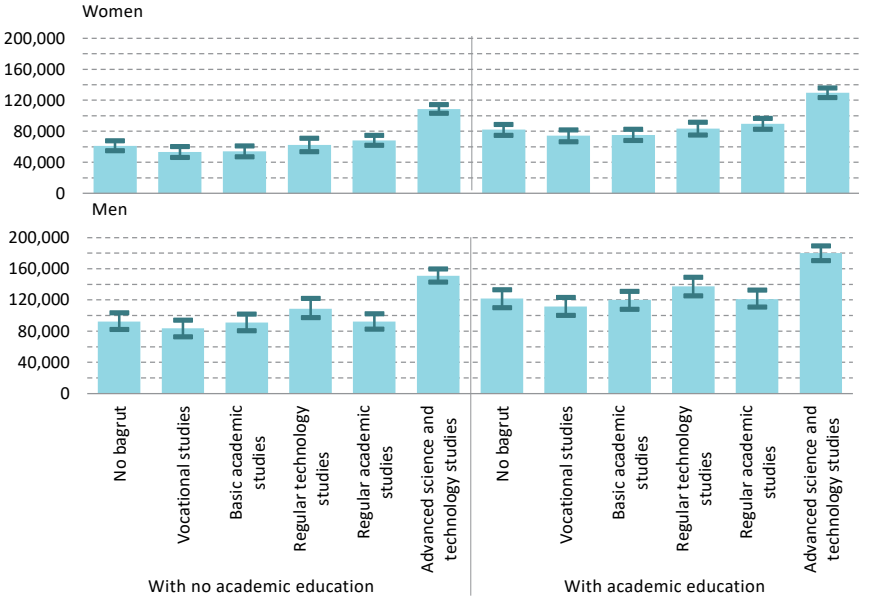
acquiring at least a bachelor's degree. Following them are those on the regular academic track, those on the regular technology track and well behind them, graduates of the vocational track. The individuals with the lowest chance of acquiring an academic degree are those placed in the basic academic track (although the difference between them and those in the vocational track is small and border on being statistically significant). It is interesting that an individual who did not qualify for a Bagrut certificate during high school studies has, on average, a higher chance of acquiring an academic degree than graduates of the lower status tracks. It may be that this advantage is related to the "second chance" programs which were designed for those who did not qualify for a Bagrut in high school (high school completion tracks, pre-academic preparation programs, etc.). These are important findings, particularly with respect to the basic academic track. This track was, as noted, designed to expand the population eligible for a Bagrut certificate based on the understanding that it is the key to entering higher education. However, as shown in Figure 2, the chance of students on this track acquiring an academic degree is particularly low.

Figure 2. The likelihood of acquiring an academic degree, by high school study track and parents' education level



Note: Predictions are for Jewish students whose parents have no academic education, who are of mixed Mizrahi-Ashkenazi origin, and who have average academic achievement The I-bars represent 95% confidence intervals.
Source: Eyal Bar-Haim and Yariv Feniger, Taub Center | Data: CBS

Figure 3. Predicted annual earnings at age 33, by high school study track and educational attainment, NIS



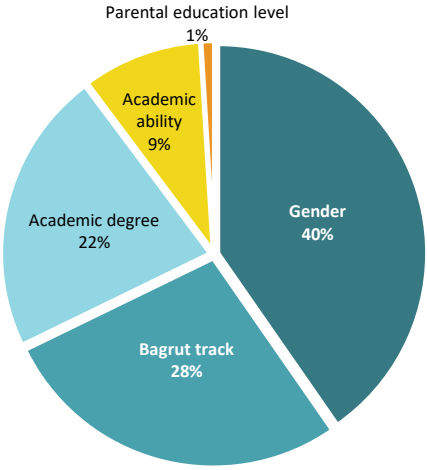
Note: Predictions are for Jewish students whose parents have no academic education, who are of mixed Mizrahi-Ashkenazi origin, and who have average academic achievement The I-bars represent 95% confidence intervals.
Source: Eyal Bar-Haim and Yariv Feniger, Taub Center | Data: CBS

Figure 3 presents the annual earnings predicted at age 33 for graduates of the various tracks, while differentiating between those who acquired at least a bachelor's degree and those who did not acquire an academic education by gender (Appendix Table 2 presents the full regression model used to produce these predictions). The prediction presented here is calculated for those whose parents have no academic education, who are of mixed Mizrahi-Ashkenazi origin, and who have average academic ability (based on their score on the civics Bagrut exam). As expected, there is a large gap in all the tracks in favor of those who acquired an academic education. As in previous studies (such as Ben-David & Kimhi, 2020; Kimhi & Horowitz, 2015), we also found that graduates of the advanced science and technology track earn more than graduates of other tracks, between which there are relatively narrow gaps.

Among men, graduates of the regular technology track earn somewhat more than the graduates of other tracks. Nonetheless, it is important to remember that earnings were measured at a relatively young age and it may be that this difference is the result of an earlier entry into the labor market. Studies in Israel and other countries show that in older age groups studying in an academic track is usually linked to a higher earnings in the labor market relative to the technological-vocational track (Gabay-Egozi & Yaish, 2021; Hanushek et al., 2017).

In order to examine the effect of tracking on earnings as a part of the factors that are controlled for in our estimations, we decomposed the explained variance in the earnings prediction model on the basis of socioeconomic background (as measured by parents' education), gender, academic ability (measured by the score on the civics Bagrut exam), high school study track, and academic education (for an explanation of the methodology for decomposing explained variance, see Israeli, 2007). The results of the decomposition of variance are presented in Figure 4, which shows that the track contributes almost 30% of explained variance in earnings. The low contribution of parents' education to the prediction of earnings can be explained by the fact that a significant portion of it is captured by the differential placement into tracks (as can be seen in Figure 1) and in the likelihood of continuing on to higher education (Figure 2). It is interesting that the contribution of tracks to the explained variance of earnings remains highly significant even in the model that includes the component of higher education. This implies that the effect of tracking on earnings may be manifested in other areas rather than just the actual acquisition of an academic education. Beyond the effect on the likelihood of continuing on to higher education, placement in a track is related to enrollment in different fields of study in higher education and to the acquisition of skills that are relevant in the labor market and to the development of occupational aspirations. According to our analysis, academic ability contributes almost 10% to the explained variance in earnings and this may be an indication of the importance of academic skills in the labor market, beyond the increased likelihood of acquiring an academic degree. Unsurprisingly, and as seen in many other studies, gender is the most important component contributing to explained variance, accounting for about 40%. Previous studies indicate that the majority of the gender gap is explained by factors such as work hours, the sector of employment and occupation (see, for example, Fuchs, 2016).

Figure 4. Decomposition of the explained variance (R^2) in the linear model for predicting earnings at age 33



Note: The percentage of explained variance in this analysis is 11.04%. The model includes parents' education, gender, score on the civics Bagrut exam, study track, and academic degree. Jewish students only.
Source: Eyal Bar-Haim and Yariv Feniger, Taub Center | Data: CBS

Summary and conclusion

This research joins a long line of studies carried out in Israel on the role of tracking in secondary education as a mechanism for preserving social and economic gaps between various populations. We have focused on it from the perspective of socioeconomic status, as measured by parents' education. By following individuals who were high school students in the 1990s, we show that socioeconomic background is closely related to sorting into various tracks. We also show how the track is connected to both the likelihood of acquiring an academic degree and earnings in one's early 30s. Students whose parents have no academic education have a relatively low likelihood of entering the selective tracks in high school and, as a result, their chances of acquiring an academic education and reaching a high level of earnings are relatively low. In contrast, children of parents with higher education are much more likely to be in one of the selective tracks, acquire an academic education, and enjoy a job with relatively high earnings. Part of the relationship between parents' education and the educational and occupational success of their children can be attributed to inherited traits, which we were unable to control for statistically in this study. Nonetheless, it is important to remember that current studies show that the role played by genetics in intergenerational transfer of educational advantages is relatively limited and only about 15–25% of the explained variance can be attributed to it (for a recent review, see Mills & Tropf, 2020). The data analyzed in this study show, therefore, that even after several decades of educational reforms that attempted in a variety of ways to deal with educational inequality in Israel, inequality in educational opportunity is still very significant and requires serious consideration on the part of decision makers. Moreover, the study shows that, after gender, tracking in high school is the most important factor in explaining wage gaps.

We would also mention that this study is the first to examine the long-term implications of studying in the basic academic track, in the context of graduates' educational and occupational outcomes. This track was created in the 1990s in order to provide for the educational needs of students from weaker socioeconomic backgrounds who were also low achievers. In previous decades, they were commonly placed in vocational education with low chances of attaining a Bagrut. The persistent criticism of this type of tracking, primarily in the Jewish education system, was one of the main reasons behind the creation of this track. Our research shows that the success of this effort was limited. Although this track raised the percentage of students eligible

for a Bagrut certificate, the chances of its graduates acquiring an academic education remained particularly low and in view of the strong relationship between academic education and earnings, their average earnings are also low as a result.

The question then arises as to how these findings can be explained, particularly in view of the substantial investment made in this track in the form of small classes and tutorial hours. This question requires further research although we are able to offer an explanation on the basis of the large bodies of knowledge in the sociology and psychology of education. Students who are placed in a low-status track are being sent a clear message by the school with respect to their abilities and learning potential. That message is only amplified by the low expectations of their teachers and by a learning environment that is characterized by low demands and relatively little learning. These students are therefore likely to develop a negative attitude to school and to the idea of education in general. Moreover, they also learn less relative to their peers in the more selective tracks. In other words, the negative effects of the segregation into "special" classes per se, which are intended for "weak" and "struggling" students, is likely to have much more of a negative effect than the positive effect of extra resources and hours of instruction in a small class (see, for example, Mizrahi et al., 2013; Francis et al., 2017). The findings presented here, alongside these theoretical claims, point to the need for a renewed discussion of the solution offered by the Israeli education system to low-achieving high school students, many of whom also come from weaker socioeconomic backgrounds.

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Appendix

Appendix Table 1. Regression and logistic regression to predict academic education, men and women

	Men	Women
Study track (reference group: advanced science and technology)		
Regular academic studies	-0.987***	-1.156***
	(0.091)	(0.145)
Regular technology studies	-1.468***	-1.869***
	(0.115)	(0.179)
Basic academic studies	-2.792***	-3.679***
	(0.104)	(0.154)
Vocational studies	-2.415***	-2.933***
	(0.098)	(0.147)
No bagrut	-1.479***	-1.903***
	(0.090)	(0.144)
Parents' with academic education	0.483***	0.068
	(0.050)	(0.040)
Civics Bagrut score	0.344***	0.021
	(0.014)	(0.048)
Ethnicity (reference group: mixed Mizrahi-Ashkenazi)		
Mizrahi Jews	0.204***	0.535***
	(0.043)	(0.051)
Ashkenazi Jews	0.005	0.354***
	(0.044)	(0.013)
Intercept	0.697***	1.376***
	(0.099)	(0.149)
No. of cases	13,735	15,879
Pseudo R2	0.23	0.07

Significance level: ***p < 0.01.
Source: Eyal Bar-Haim and Yariv Feniger, Taub Center | Data: CBS (calculations and analyses by the authors)

Appendix Table 2. Linear model for predicted earnings, men and women ages 33

	Men	Women
Study track (reference group: advanced science and technology)		
Regular academic studies	-58892.320***	40255.190***
	(2794.479)	(1856.139)
Regular technology studies	-42340.140***	-46362.470***
	(4322.096)	(3378.710)
Basic academic studies	-59948.590***	-54445.590***
	(3710.636)	(2466.772)
Vocational studies	-67959.810***	-55245.530***
	(3517.339)	(2251.745)
No bagrut	-58693.730***	-47505.510***
	(2917.783)	(1966.352)
Academic education	28733.600***	20869.280***
	(1970.487)	(1160.657)
Parents' with academic education	-3569.730	-2562.875**
	(2013.352)	(1145.732)
Civics Bagrut score	5245.138***	2192.973***
	(592.439)	(322.882)
Ethnicity (reference group: mixed Mizrahi-Ashkenazi)		
Mizrahi Jews	4738.797	0.040
	(2650.228)	(0.026)
Ashkenazi Jews	2817.470	-0.007
	(3304.399)	(0.034)
Intercept	154801.100***	11.127***
	(3948.614)	(0.044)
No. of cases	13,735	15,879
Pseudo R2	0.16	0.14

Significance level: **p < 0.05; ***p < 0.01.
Source: Eyal Bar-Haim and Yariv Feniger, Taub Center | Data: CBS (calculations and analyses by the authors)