



Teacher Attrition: Human Capital and Terms of Employment - Do They Matter?

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Citation: Arviv Elyashiv, R. & Navon, Y. (2021). Teacher attrition: Human capital and terms of employment – Do they matter? *Education Policy Analysis Archives*, 29(76).

<https://doi.org/10.14507/epaa.29.5965>

Abstract: Addressing Sorensen and Tuma's resource–reward theory, we explored teacher attrition from an economic perspective. The study aimed to explore the extent to which teachers' resources and terms of employment correlate with attrition behavior. In a sample of 10,340 Israeli K-12 teachers it was found that many beginning teachers who left the profession were relatively highly educated. Although the literature stresses teachers' intrinsic motivation for choosing their career, the findings, in line with earlier empirical studies, suggest that job rewards do play an important role in teachers' career decisions. Moreover, the current findings suggest that at lower salary levels, the rewards-attrition association differs by teacher higher-education level. That is, the attrition rates of highly-educated teachers drop more sharply as salary increases, as expected by the theory. Some explanations and policy recommendations are made.

Keywords: teacher attrition; human capital; job conditions; resource-reward model

Deserción de docentes: Capital humano y condiciones de empleo - ¿Son importantes?

Resumen: Abordando la teoría de recompensa de recursos de Sorensen y Tuma, exploramos la deserción docente desde una perspectiva económica. El estudio tuvo como objetivo explorar hasta qué punto los recursos de los maestros y las condiciones de empleo se correlacionan con el comportamiento de deserción. En una muestra de 10,340 maestros israelíes K-12 se encontró que muchos maestros principiantes que dejaron la profesión tenían una educación relativamente alta. Aunque la literatura destaca la motivación intrínseca de los docentes para elegir su carrera, los hallazgos, en consonancia con estudios empíricos anteriores, sugieren que las recompensas laborales desempeñan un papel importante en las decisiones profesionales de los docentes. Además, los hallazgos actuales sugieren que a niveles salariales más bajos, la asociación entre recompensas y deserción difiere según el nivel de educación superior del maestro. Es decir, las tasas de deserción de los docentes con un alto nivel de educación caen más drásticamente a medida que aumenta el salario, como espera la teoría. Se hacen algunas explicaciones y recomendaciones de políticas.

Palabras clave: deserción docente; capital humano; condiciones laborales; modelo de recompensa de recursos

Abandono de professores: Capital humano e condições de emprego - São importantes?

Resumo: Abordando a teoria de recompensa de recursos de Sorensen e Tuma, exploramos o abandono de professores de uma perspectiva econômica. O estudo teve como objetivo explorar em que medida os recursos dos professores e as condições de emprego se correlacionam com o comportamento de abandono. Em uma amostra de 10.340 professores israelenses de ensino fundamental e médio, descobriu-se que muitos professores iniciantes que deixaram a profissão tinham educação relativamente alta. Embora a literatura destaque a motivação intrínseca dos professores para escolher sua carreira, os resultados, consistentes com estudos empíricos anteriores, sugerem que as recompensas de trabalho desempenham um papel importante nas decisões de carreira dos professores. Além disso, os resultados atuais sugerem que em níveis salariais mais baixos, a associação entre recompensas e evasão difere de acordo com o nível de escolaridade superior do professor. Ou seja, as taxas de abandono de professores com alto nível de escolaridade caem de forma mais dramática à medida que o salário aumenta, conforme prevê a teoria. Algumas explicações e recomendações de políticas são feitas.

Palavras-chave: Abandono do professor; capital humano; condições trabalhistas; modelo de recompensa de recursos

Teacher Attrition: Human Capital and Terms of Employment - Do They Matter?

Teacher attrition rates have increased in recent decades (Darling-Hammond, 2003). Many teachers, particularly those at the beginning of their careers, leave teaching permanently. International surveys indicate high rates of teacher attrition: between 20% and 50% leave the profession within the first five years of teaching (Ingersoll, 2003; Sass et al., 2012). This phenomenon seems to be universal, although the specific rates vary between countries (den Brok et al., 2017; European Union, 2013; Papay et al., 2017; Weldon, 2018). In the professional literature, teacher attrition is referred to as “a silent crisis” (Rinke, 2008, p. 2), that is, a serious crisis that has not received proper public acknowledgement. Ingersoll (2001, p. 501) referred to it as a “revolving door,” given that a steady proportion of teachers is constantly in the process of moving: some move between schools and some leave the profession (not due to retirement). Skilbeck and Connell (2003) declare: “Teaching is becoming to some extent a career of ‘movement in and out’ – and ‘out’ may be permanent” (p. 32).

Teacher attrition makes school management more difficult, particularly since it means a loss of human capital (Dupriez et al., 2016) and a shortage of teachers (Ingersoll & May, 2012; Sutch et al., 2019). Many school principals have difficulty replacing teachers who have dropped out; consequently, they often respond by increasing the number of students per class or employing unqualified teachers (Sutch et al., 2019). All this negatively affects student learning (Kini & Podolsky, 2016). Thus, teacher attrition has negative consequences for student achievement as well (Ronfeldt et al., 2013). It may also negatively affect the interaction between students and teachers (Liu & Meyer, 2005). Similarly, teacher attrition may impede solidarity and collaboration between teachers (Guin, 2004).

Why do teachers choose to leave the teaching profession? Policymakers, educators and researchers attempt to identify teacher characteristics and workplace mechanisms that are associated with the risk of an early exit from the teaching profession. Many studies have investigated this issue through an organizational perspective. These studies mention various features of teachers' work environment that increase the likelihood of leaving teaching, such as: heavy workload; lack of autonomy; lack of opportunities to participate in decision making; difficulties in managing relationships with colleagues, students, and their parents; lack of collegial or principal support; and, lack of opportunities for professional development (e.g.: Borman & Dawling, 2008; Boyd et al., 2011; Carlsson et al., 2019; Geiger & Pivovaro, 2018; Newberry & Allsop 2017).

The current study explored teacher attrition through an economic perspective. This perspective views teachers as consumers in the employment market. As such, they consider costs versus benefits by calculating the ratio between their personal resources and their terms of employment. The outcome of these considerations may be retention or attrition. This approach receives limited attention in the professional literature relating to teachers' career decisions. Although some scholars have found that choosing teaching as a profession is primarily related to altruistic and intrinsic motivations (Fray & Gore, 2018), other studies have shown that decent economic rewards for teachers are still needed (Arviv Elyashiv & Gal, 2017; Ladd, 2007). This study aimed to explore the extent to which teachers' resources and teachers' terms of employment correlate with teacher attrition. Specifically, we asked:

- Do personal resources, such as a higher level of education, a degree from a prestigious institution, or a prestigious field of study, and a privileged sociodemographic background correlate with a higher probability of attrition?

- Do poor terms of employment, as expressed by relatively lower salaries or part-time positions, correlate with a higher probability of attrition?
- Are teachers with a higher level of education more affected by terms of employment (salary and part-time jobs) when making stay/dropout decisions?

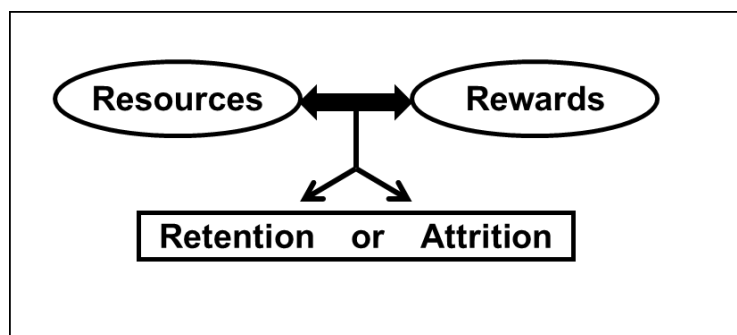
The next section elaborates the theoretical background for the economic perspective applied in the current research and reviews the relevant empirical literature.

Theoretical Explanations for Teacher Attrition: The Economic Perspective

Sorensen and Tuma's (1981) resource–reward theory (Figure 1) is based on economic assumptions and refers to employees as rational actors who make independent practical decisions about their occupational career. It is assumed that employees systematically assess the balance between their personal resources (such as human capital) and job rewards (such as salary, prestige, autonomy, promotion), expecting to maximize these rewards as compensation for the investments they have made during their professional life. Thus, they constantly evaluate the occupation's attractiveness, whether it is worthwhile to remain in the current position or to seek an alternative. This theory implies that among employees with similar resources, those who receive the highest rewards will tend to remain in their position. However, in a workplace where employees' rewards are similar, such as in the Israeli education system, those with higher-quality resources will tend to leave.

Figure 1

The Resource–Reward Model



Resources

Human capital and sociodemographic characteristics are among the resources that have been generally found to correlate with employees' attrition. These resources were also found to be relevant to teachers' career decisions.

Human capital is an important indicator proposed as a measure of an employee's acquired resources. Although human capital is a broad term that may include formal and non-formal education as well as work experience, in the current study we address only characteristics of higher education. Work experience as a form of human capital was not examined since the focus of the research was attrition among beginning teachers solely. The relationship between broad characteristics of higher education and teacher attrition has received limited attention in the professional literature. The existing findings on this matter emphasize that teachers who have

completed advanced academic studies are at the highest risk of leaving the profession (Borman & Dowling, 2008; den Brok et al., 2017; Guarino et al., 2006). Drawing on data from Belgium, Dupriez, Delvaux and Lothaire (2016) claimed that advanced credentials provide teachers with wider qualifications, expertise, competencies, and recognition in other job markets. As a result, more highly-educated teachers tend to leave the profession in the early stages.

In the current study we address not only an advanced academic degree as a valued resource, but also consider other characteristics of higher education, namely: the specific field studied in higher education and the institution granting the degree. Some studies have examined teacher attrition with regard to the subject taught (Carver-Thomas & Darling-Hammond, 2019; Ingersoll & May, 2012; Sutch et al., 2016; van Rooij et al., 2019). However, the relationship between the teachers' field of study in higher education and the probability of attrition has not received attention in the professional literature. Neither has the relationship between the prestige associated with teachers' institution of higher education and the probability of attrition.

Sociodemographic characteristics were also found to serve as resources for teachers in their career-decision processes. These characteristics may also affect the types of opportunities available in other job markets. Empirical studies have found that exit rates among teachers from privileged sociodemographic backgrounds were higher than those among teachers from less privileged backgrounds. Gender, in particular, has been extensively investigated in relation to teacher attrition. The results indicate that men are more likely than women to leave teaching and move to other occupations (e.g., Dupriez et al., 2016; Struyven & Vanthournout, 2014). In Israel, men, especially those with a high level of educational resources, tend to leave teaching to seek better occupational alternatives (Addi-Raccah, 2005). In addition, studies in the US show that teachers from ethnic minority groups are less likely to leave teaching (Borman & Dowling, 2008; Carver-Thomas & Darling-Hammond, 2019; Liu & Meyer, 2005), mostly because their prospective occupational opportunities are narrow. The concern over experiencing difficulty in finding occupational alternatives is one of the reasons for the low level of mobility among ethnic minority teachers (Borman & Dowling, 2008).

Rewards

The most salient reward found to correlate with career decisions is salary. Evidence shows that in many countries the average teacher's salary is significantly lower than that of other professionals (Dupriez et al., 2016; Newberry & Allsop, 2017). Allegretto and Mishel's (2016) data revealed that the gap between teachers' salaries and those of similarly educated professionals in California (US) had considerably widened in the preceding two decades. In 2015, public school teachers' weekly salary was 17% lower than the average weekly salary at the time, as compared to a 1.8% gap in 1994. Likewise, according to Johnson and Kardos (2008), many teachers reported that their salary was not commensurate with the number of hours worked per week. Similar results were found through personal interviews conducted with teachers in the US state of Virginia (Certo & Fox, 2002). In addition to the direct effect of low salary on attrition, low remuneration contributes to the low prestige of the teaching profession and thus, also indirectly affects teacher attrition (Borman & Dowling, 2008; European Union, 2013; Geiger & Pivovarova, 2018; Hanushek et al., 2004; Ingersoll & May, 2012). Kelly (2004) argued that salary level has a stronger effect among novice teachers who are more likely to examine other (more rewarding) employment options. Similar trends are also valid in the Israeli context (Adi-Raccah, 2005; Arviv Elyashiv & Zimmerman, 2015).

Although previous studies examined the extent to which resources and rewards separately correlate with teacher attrition, very few studies have examined the interaction between resources

DIFFERENCIA
SALARIAL ENTRE
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and rewards and its relationship to teacher attrition. Based on the resource–reward approach, this interaction is crucial to career decisions. According to this theoretical model, as mentioned above, the hypothesis is that more highly-educated teachers will be more sensitive to salary level than their less highly-educated counterparts. The former will demonstrate a greater tendency to exchange their current job for a more attractive position accompanied by higher rewards that better fit the resources they have to offer. The current study examines this theoretical assumption within the context of the Israeli education system.

Teacher Attrition among Israeli Teachers: The Research Setting

Teaching in Israel is a female-dominated occupation (Adi-Raccah, 2005) in which women constitute approximately 75% of the teaching force (Israel Central Bureau of Statistics, 2013). Compared to their Jewish counterparts, among Arab men teaching is a more common profession. This is mostly due to limited alternatives in the Israeli job market. Yet, in the Arab sector as well, the majority of teachers are women (Israel Central Bureau of Statistics, 2013). It should be noted that in Israel, Jewish and Arab education belong to separate systems. Most Arab teachers teach in Arab schools while a minority (1% of Arab teachers) are employed in the Jewish sector (Blass, 2014).

In general, teaching is perceived as a comfortable form of employment that enables women to combine work with family life. It is also considered a profession with a high level of job security. Most teachers are employed by the state and usually receive tenure after three years; they are then protected and cannot be easily dismissed. Due to teacher shortages and representation by strong organized unions, teacher dismissals are very rare.¹

Nevertheless, the tangible rewards of teaching are considered to be rather low. Teachers' salaries are determined by collective agreements between the Ministry of Education, Ministry of Finance and the teachers' unions. Wages are determined by a combination of formal classification levels which include seniority, educational credentials, and courses taken for professional development. Between 2003 and 2014, teachers' salaries increased by 9.61% (Israel Central Bureau of Statistics, 2018); however, they are still lower than the average teacher's salary in many OECD countries (2017) and lower than other professionals in the Israeli labor market (Israel Central Bureau of Statistics, 2018).

A full-time teaching position in primary education is defined as 36 hours per week, and 40 hours per week in secondary education. The proportion of part-time teachers is relatively high (Adi-Raccah, 2005), especially among beginning teachers; approximately 50% of teachers are employed in part-time positions (Arviv Elyashiv et al., 2019). In many cases, this is not the teacher's choice but rather, due to school needs. The limited opportunity to obtain a full-time position creates sub-optimal employment conditions for many teachers. As a profession, teaching offers only a moderate level of autonomy and participation in decision-making (Arviv Elyashiv & Zimmerman, 2015), and the available paths to promotion are limited (Avidov-Ungar & Arviv Elyashiv, 2018).

Since the mid-1990s, in addition to teaching certification, teaching candidates have been required to obtain an academic degree, from universities, academic colleges, or teacher-training colleges. The latter are considered less selective, their curriculum is characterized by a more practical orientation, while providing graduates with a Bachelor of Education degree (B.Ed.; Kfir et al., 1997). On the other hand, the academic programs in the universities and academic colleges are characterized by theoretical orientation, and they provide graduates with a B.A. degree (Ayalon & Yogevev, 2006). It was also suggested that the academic abilities of students enrolled in teacher-

¹ There are no formal statistics, but the economic press cites informed estimates of only several dozen dismissals a year (out of more than 100K teachers in the system)

training colleges are weaker than those of students in other higher-education institutions (Ayalon & Yogeve, 2006).

At the end of their academic study, new teachers must take part in a two-year internship program to support their first steps in the education system (Nasser-Abu Alhija et al., 2011). In comparison to veteran teachers, the starting salary for beginning teachers is rather low and many of them work in part-time positions. Participation in professional development courses increases teachers' salary, but the compensation at the beginning stages, in absolute terms, is rather limited.

Every year, approximately 6,000 novice teachers complete a teacher-training program in Israel and 75% of them enter the education system (Israel Central Bureau of Statistics, 2018). After a period of five years, a third of them will have left the profession (Arviv Elyashiv & Zimmerman, 2015), the vast majority by their own choice. Still, no extensive research has been conducted on this issue in Israel.

Hypotheses

According to the **resource–reward model**, this study investigates the following hypotheses:

1: Resources hypothesis

- (a) Advantageous human capital, in terms of academic degree, field of study (professional qualification) and institutional prestige, increases the likelihood of leaving the teaching profession.
- (b) A privileged sociodemographic background increases the likelihood of leaving the profession.

2: **Reward hypothesis** - Poor terms of employment, low salary and/or few working hours, increases the likelihood of leaving the teaching profession

3: **The resource–reward interaction hypothesis** - Poor terms of employment (low salary and/or few working hours) correlate more strongly with the likelihood of leaving the teaching profession among highly-educated teachers, as compared to less highly-educated teachers.

Materials and Methods

Database

The database used in the current study is a dataset generated by the Israeli Central Bureau of Statistics from administrative files of teachers. It includes the records of all 20,585 Israeli teachers in the Jewish and Arab sectors in levels K-12 who began teaching in 2000, 2003 and 2005. However, for approximately 50% of the teachers in the original database, data regarding higher education records were missing. Since information on this important resource is a main concern of this paper, here only the 50% of cases in the dataset for which complete information existed were used. Thus, the analysis sample (henceforth, “the sample”) consisted of 10,340 teachers. The dataset records their careers until 2010. It also includes sociodemographic information, employment characteristics and school features.

The sample used may be selective since it is uncertain whether the information on higher education was randomly missing. However, comparing available characteristics of the study's sample (i.e., the 50% that includes the relevant information) with the entire (100%) database indicated that

there were almost no significant differences. Still, there was some underrepresentation of teachers in the Jewish religious sector in the study sample. This can be partially explained by the fact that a greater share of the Jewish religious sector teachers, as compared to teachers in other sectors, complete education programs grounded in religious studies rather than official academic education. Nevertheless, the trends found in the smaller sample regarding teacher retention/attrition were similar to those found in the complete database (Arviv Elyashiv & Zimmerman, 2015). Therefore, confidence is high that the data used for the present study are, to a great degree, representative of the Israeli population of teachers working in official state schools in the secular Jewish and Arab sectors.

Similar to the original database, the majority of the teachers included in the sample were women (81.7%, 8,444 teachers); 83.9% of the sample were married. Arab teachers constituted one third of the sample (34.5%, 3,567 teachers). Only 3.9% (404 teachers) had immigrated to Israel at some point in time. Regarding the grade levels, 9.6% (909) were kindergarten teachers, 50.8% (5,261) were primary school teachers, and 39.4% (4,079) were secondary school teachers (for 1% of the sample this information was missing).

Variables

Predicted Variable

The predicted variable distinguishes between dropping out and staying among teachers. This variable is based on a follow-up of teacher retention during the first five years of their professional career. Teachers who dropped out of teaching during the first five years of their work and did not return to the profession (at least not in official schools) during this period (referred to as *dropouts*) were coded using the value 1. Teachers who stayed in the system after the first five years (referred to as *stayers*) were coded with the value 0. According to the data, 2,363 teachers dropped out of the system during this period, constituting 22.9% of the sample. To clarify, mobility within the school system was not considered attrition. As there was no way to differentiate dropout from layoff, the dropout indicator may include cases of teachers who were laid off. This, however, is not a major concern since teacher lay-offs in Israel, as mentioned above, are so rare and unlikely to impact the data.

Predictors. Below all the variables used as predictors in this study and the criteria used to define them are presented.

Human Capital.

(a) *Academic degree:* the teacher's highest academic degree, as follows: 1. Non-advanced degree (an undergraduate degree or teaching certificate²); 2. Advanced degree (M.A./ M.Ed. or Ph.D.).

(b) *Field of study in higher education:* 1. Education; 2. Professional (occupation-oriented fields of study, e.g., engineering, law, medicine, computer science); 3. Semi-professional (e.g., humanities, paramedical discipline); 4. Sciences (math, physics, biology).

(c) *Higher-education institution:* 1. Teacher-training college; 2. Academic college; 3. University.

² As mentioned, since the mid-1990s teachers in Israel are required to have an academic degree. Thus, only 0.02% of the teachers in the sample (204 teachers) have a teaching certificate, without an academic degree.

Sociodemographic Characteristics.

- (a) *Gender*: male vs. female
- (b) *Ethnicity*: Jews vs. Arabs
- (c) *Immigration*: immigrants vs. Israeli-born citizens

Terms of Employment.

- (a) *Monthly salary*: measured as a natural log of the teachers' average monthly salary in their last known year of teaching.
- (b) *No. of work hours per week* (0.1% of the participants had missing values): Average number of weekly hours in the last known year of teaching. As mentioned, many teachers in Israel work in part-time positions, not by choice. Thus, working hours are viewed as part of the terms of employment.

Control Variables.

- (a) *Family status*: married vs. unmarried
- (b) *Age of entry into the teaching profession*
- (c) *Educational level*: kindergarten, primary education or secondary education.
- (d) *Year of entry into the teaching profession*

Data Analysis

The data were first analyzed using descriptive statistical procedures, including χ^2 tests. A logistic regression was then estimated to examine the likelihood of leaving the teaching profession within the first five years, as compared to the likelihood of remaining in teaching after the first five years. The final model for estimation was:

$$\log_b \frac{p(\text{dropout})}{p(\text{retention})} = \beta_0 + \beta_1 * X_{i1} + \beta_2 * X_{i2} + \beta_3 * X_{i1} * X_{i2} + \varepsilon_i$$

Where X_{i1} stands for the resources variables (higher education and sociodemographic characteristics), and X_{i2} stands for the rewards variables (salary and working hours). Thus, $X_{i1} * X_{i2}$ represent interaction terms between resources and rewards. In the analysis, this is the interaction of advanced academic degree (representing human capital) with salary and with working hours (both forms of employment terms).

Results

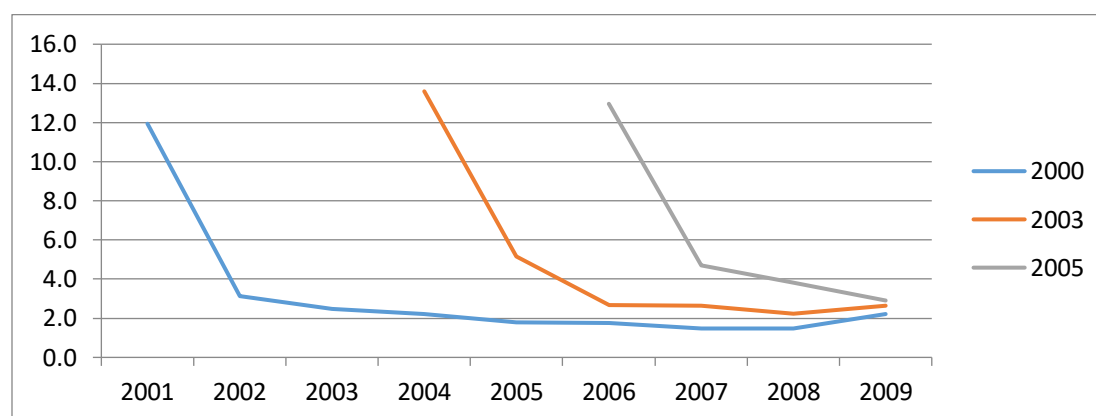
Attrition among Israeli Teachers

Figure 2 presents teacher attrition trends in the current sample. It is noteworthy that many novice teachers, roughly 13%, decide to leave teaching within the first year of their career. In the second year, the rate of teacher attrition declines sharply (4% on average), and after the third year, it stabilizes at a yearly average of approximately 2.5%. Altogether, during the period we explored, teacher attrition during the first five years in the Israeli education system is high; it comprises approximately one quarter of all of the teachers who enter the system. As of 2010, these teachers

had not returned to teaching in the formal school system.³ Similar trends were found in the complete database (Arviv Elyashiv & Zimmerman, 2015) and appear in the Israeli Central Bureau of Statistics' figures (2018). These similar trends support the study's assumption that overall, the sample is representative.

Figure 2

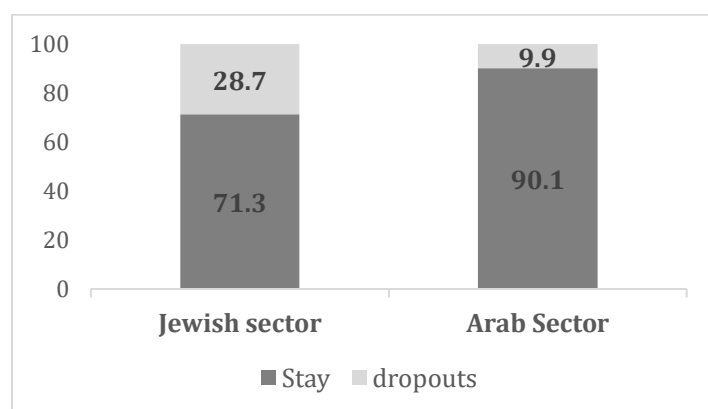
Attrition Rates in the First Five Years



Descriptive statistics by school sector (3.2% of the sample had missing values in this respect) are presented in Figure 3. As shown, in the first five years, attrition rates among teachers in the Jewish sector are high. Only in the Arab sector was the rate of attrition rather low (9.9%).

Figure 3

Stayers and Dropouts by Educational Sector



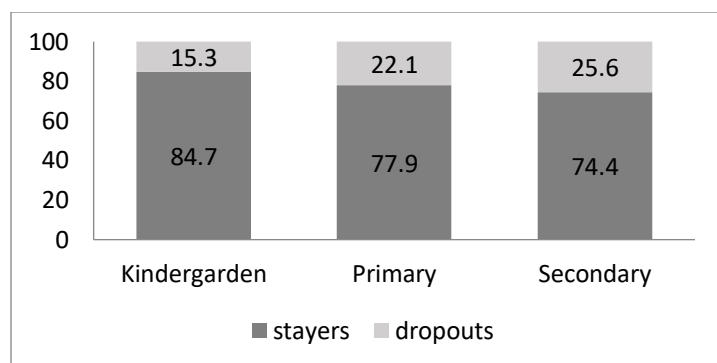
In Figure 4, attrition rates in the first five years of teaching are shown by grade level taught (1% of the sample had missing values in this respect). Attrition rates among primary school teachers

³ No further information regarding their teaching careers was available after this point. However, cases in which the teacher was recorded in the system up to 2009 but not recorded for 2010 were not coded as "attrition," as these may have been temporary leaves, such as maternity leave or a sabbatical.

and secondary school teachers are similar – about 24% on average. The proportion of kindergarten teachers dropping out is lower (15.3%).

Figure 4

Stayers and Dropouts by Educational Stage



Resources and Attrition: Human Capital and Sociodemographic Characteristics

Table 1 presents the differences between stayers and dropouts by two major types of resources: acquired resources, such as education (degree, field of academic studies, type of academic institution) and non-acquired resources, such as sociodemographic characteristics (gender, ethnicity and immigrants).

Human Capital

The findings show that a larger proportion of teachers with an advanced degree dropped out as compared to those with only an undergraduate degree⁴ (29.9% vs. 21.0%). Moreover, as shown in Table 1, teachers who specialized in professional fields of study were more inclined to drop out compared to those with a degree in other fields of study. Half of these teachers did not stay in teaching throughout the first five years (e.g., management and finance: 46.2%; law and medicine: 60%; engineering: 51.2%). Nevertheless, higher proportions of teachers who specialized in science (23%) and who studied semi-professional fields (21.9%) decided to dropout, as compared to teachers who majored in education in their higher education studies (17.5%). Another finding indicated that graduates of academic colleges or universities dropped out at a higher rate than did graduates of teaching colleges (40.5%, 29.9% and 15.4%, respectively). These findings correspond with Dupriez, Delvaux and Lothaire's (2016) argument that wider qualifications, expertise, competencies, and recognition in other job markets drive teachers to leave the profession in the early stages.

Sociodemographic Characteristics

The findings suggest that, in general, as hypothesized, teachers from more privileged social groups are more likely to drop out. As shown in Table 1, men dropped out at a higher rate than women (28.3% vs. 21.6%) and the Jewish teacher dropout rate was higher than that of Arab teachers (29.6% vs. 9.6%). However, contrary to expectations, more immigrants than Israeli-born teachers dropped out (41.3%, versus 22.1%). Due to the small group of immigrants, and the missing

⁴ As mentioned, this group includes 204 teachers without an academic diploma, only a teaching certificate. Since they comprise less than 0.5% of the group there is no reason to believe their inclusion alters the results.

information with regard to their country of origin and year of immigration, this finding does not necessarily contradict the overall resources hypothesis, but should be further explored.

To summarize the findings, on average, the teachers who decided to leave the teaching profession had more valued resources, in terms of both human capital and demographic background, than did their colleagues who decided to persist in the teaching profession. Since these resources, in particular human capital, are highly valued in the labor market, these teachers could have expected to find better employment opportunities outside the teaching profession.

Table 1

Human Capital and Personal Characteristics among Stayers and Dropouts

	Stayers	Dropouts	χ^2
<u>Human Capital</u>			
Academic degree:			
Non-advanced degree ($n = 8,174$)	79.0%	21.0%	76.18***
Advanced degree ($n = 2,150$)	70.1%	29.9%	
Field of study in higher education:			
Education ($n = 3,220$)	82.5%	17.5%	405.40***
Professional ($n = 769$)	48.8%	51.2%	
Science ($n = 1,069$)	77.0%	23.0%	
Semi-professional ($n = 5,282$)	78.1%	21.9%	
Higher-education institution:			
Teacher-training college ($n = 5,353$)	84.6%	15.4%	370.67***
Academic college ($n = 435$)	59.5%	40.5%	
University ($n = 4,550$)	70.1%	29.9%	
<u>Personal characteristics</u>			
Gender:			
Male ($n = 1,896$)	71.7%	28.3%	39.40***
Female ($n = 8,444$)	78.4%	21.6%	
Ethnicity:			
Jews ($n = 6,773$)	70.4%	29.6%	539.25***
Arabs ($n = 3,530$)	90.4%	9.6%	
Immigration:			
Immigrants ($n = 404$)	58.7%	41.3%	81.47***
Native-born residents ($n = 9,936$)	77.9%	22.1%	
Family status:			
Married ($n = 8,671$)	78.3%	21.7%	41.00***
Unmarried ($n = 1,669$)	71.1%	28.9%	
Mean age of entry into teaching (SD)	27.15 (4.71)	28.22 (4.94)	$t= 9.63***$
n	7,967	2,357	

* $p = .05$; ** $p = .01$; *** $p = .001$

Rewards and Attrition: Terms of Employment

The differences between dropouts and stayers, in terms of rewards, are presented in Table 2. As shown, teachers who decided to leave teaching had poorer terms of employment on average, as compared to their colleagues who stayed in the education system. The former earned less and held part-time positions. It is worth mentioning that an analysis of difference by salary quartiles (available by request) reveals that 65% of the teachers in the lowest quartile of the salary distribution drop out of the profession, compared to only 4.8% of those in the highest quartile ($\chi^2 = 3164.22, p = .000$).

Table 2

Terms of Employment among Teachers

		Stayers	Dropouts	<i>t</i>
Monthly salary (in US dollars)	Mean	2,038	1,021	56.64***
	SD	(755)	(683)	
No. of work hours per week	Mean	26.23	14.33	58.30***
	SD	(8.76)	(8.40)	
<i>N</i>		7977	2363	

* $p = .05$; ** $p = .01$; *** $p = .001$

Multivariate Analysis

In order to examine the unique contribution of each variable and of the combination between the resource and reward variables we performed a multivariate analysis. Table 3 presents the results of the logistic regression estimating the likelihood of leaving the teaching profession (versus staying). This model was estimated in two steps. The first step included the resource and reward variables, according to the resource-reward theoretical model, and in the second step, we allowed terms of employment to correlate differently with the dropout risk by academic degree level. This was done by adding two interaction terms: advanced academic degree * monthly salary and advanced academic degree * working hours.

Regarding human capital, the first step of the multivariate analysis (model 1) mostly confirmed the descriptive outcomes mentioned above, indicating that advantageous higher education, in terms of field of study and institutional prestige, increases the likelihood of leaving the teaching profession. These results support Hypothesis 1(a). However, some exceptions were found. First, teachers whose degree was in an area of science (considered a valued qualification) were less likely to leave teaching as compared to their colleagues whose degree was in education. Second, academic degree was found to significantly predict the probability of dropping out in model 2 only after the interaction terms were added to the equation (the interaction model). This pattern may imply that despite the consideration of advanced degrees in the formal calculation of teacher salaries, there is a mismatch between the salary expectations of highly educated teachers and their actual salary distribution, thus emphasizing the need to look at both resources and compensation (rewards) together, as well as at the way they interact.

Table 3*Logistic Regression of Teachers' Likelihood of Leaving the Teaching Profession*

Independent Variable	1 Recourses- Rewards	2 Interactions
Academic degree:		
Advanced degree (vs. Non-advanced degree)	.11	2.87***
Field of study in higher education: (Reference group: Education)		
Professional	1.34***	1.35***
Science	-.68***	-.69***
Non-professional	.21**	.21**
Higher-education institution: (Reference group: Teacher-training college)		
University	.45***	.44***
Academic college	.42**	.40*
Gender: Male (vs. Female)	.81***	.82***
Ethnicity: (Reference group: Arabs)		
Jews	1.20***	1.21***
Other	1.63**	1.62**
Immigration: Native citizens (vs. Immigrants)	.34*	.34*
Monthly salary (ln salary centered to the mean)	-1.07***	-1.01***
Salary - missing	-.32	-.32
No. of work hours per week	-.12***	-.12***
Salary * Advanced degree		-.32***
Working hours * Advanced degree		-.001
Family status: Unmarried (vs. Married)	.30**	.30**
Age of entry into teaching	.01	.005
Kindergarten (vs. primary school)	-.22	-.20
Secondary school (vs. primary school)	-.49***	-.48***
2000	-.35***	-.35***
2005	.20**	.20**
Intercept	8.62***	8.12***
R2(Cox & Snell)	.33	.34
-2Log-Likelihood	6792.33***	6782.28***

* $p = .05$; ** $p = .01$; *** $p = .001$

With respect to sociodemographic characteristics, the results mostly support Hypothesis 1(b) as well. A sociodemographically privileged background correlates with a greater likelihood of leaving the teaching profession. As shown in Table 3, men are 2.3 times more likely to drop out than women and Jewish teachers are three times more likely to drop out, as compared to Arab teachers. However, contrary to this hypothesis, immigrants are 1.4 times more likely than native-born Israelis to drop out.

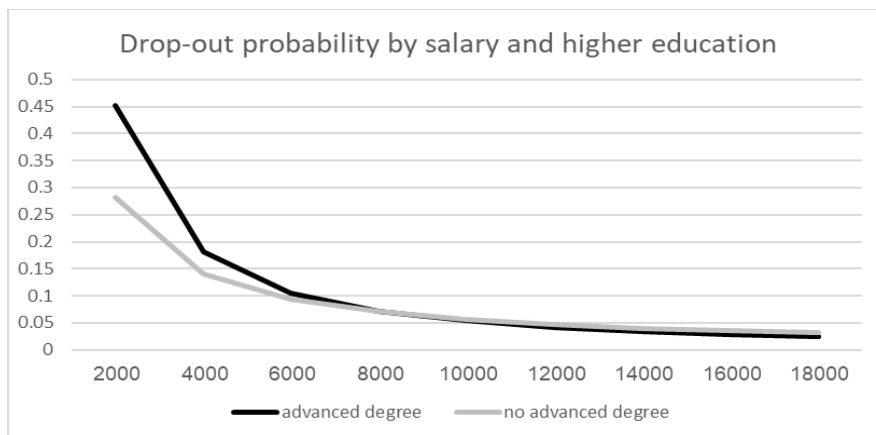
The resource-reward model also suggests a negative correlation between poorer terms of employment and teacher attrition rates. The logistic regression results in Table 3 confirm this negative correlation, described in Hypothesis 2: a lower monthly salary and a part-time position increase the likelihood of leaving the teaching profession. These variables seem to act as dominant factors in teachers' decisions to drop out.

As mentioned above, highly-educated employees expect to get higher rewards in the labor market as a result of their investment in their academic studies. Accordingly, we expected to find a similar relationship for teachers. To test this expectation, articulated in Hypothesis 3, two interaction terms were added to the model. The first term expresses the interaction between advanced academic degree and salary and the second represents the interaction between advanced academic degree and working hours.

As seen in Table 3, the interaction between academic degree and working hours was found to be non-significant, but the coefficient of the interaction between advanced academic degree and salary is significantly negative. This suggests that in line with Hypothesis 3, among highly-educated teachers, a higher salary is accompanied by a decrease in the likelihood of dropping out, even more than among less educated teachers. This pattern is shown in Figure 5 where the difference by education level in the dropout probability at the lower end of the salary distribution is evident, as is the reduction in the gap of dropout propensity. The lines converge at the medium levels of teachers' salaries.

Figure 5

Drop-out Probability by Salary and Higher Education



Note: Drop out probabilities (within the first five years) of a Jewish female secondary school teacher who entered the profession at 2003 at the average age (~27), and the average number of weekly work hours (~24)

Discussion

High rates of teacher attrition are found in many education systems and are usually even higher in the early stages of teachers' professional careers. Attrition among novice teachers has been the subject of recent studies in several countries worldwide (Borman & Dowling, 2008; den Brok et al., 2017; Dupriez et al., 2016; European Union, 2013; Guarino et al., 2006; Ingersoll, 2001, 2003; Ingersoll et al., 2012; Papay et al., 2017; Struyven & Vanthournout, 2014). Most of these studies have investigated teacher attrition from an organizational perspective. Based on the resource–reward theory (Sorensen & Tuma, 1981), the current study employed an economic approach in the aim of exploring teachers' decisions regarding whether to remain in the teaching profession or to exit early, treating teachers as consumers in the employment market who rationally calculate the balance between the resources they bring with them to the job and the rewards of the particular job. Certainly, the complexity of decision making of individuals cannot be completely captured by a simple model of rational calculation, but this model holds some important insights through which the massive dropout of teachers during their first years can be evaluated.

As expected by the theoretical model and in accordance with the existing literature, the findings reveal that in general, teachers with high levels of resources and/or a relatively low level of formal rewards are more likely to choose an early exit. With regard to teachers' resources, the analysis shows that in the Israeli education system, as in other countries, such as the US (Borman & Dowling, 2008), Belgium (Dupriez et al., 2015), Sweden (Lindqvist et al., 2014), and Norway (den Brok et al., 2017), advanced educational attainments are positively associated with teacher attrition when salary is not controlled for. Israeli teachers who acquired a Master's or Ph.D. degree, specialized in a professional field of study, and graduated from one of the more prestigious tertiary educational institutions were more likely to leave the profession than were their counterparts whose human capital --as defined in this study-- was lower. In contrast, teachers with accredited teacher preparation, mostly graduates of teacher-training colleges, were more persistent teachers and the attrition rates among them were lower. In this context, it is important to note again that teacher preparation in the teacher-training colleges is more oriented to teaching practice, than in education programs at other institutions. This means that teacher-training colleges are not only less prestigious, but also offer their graduates fewer occupational alternatives. Yet, they offer better preparation with regard to coping with the many aspects of teaching (Ayalon & Yogev, 2006). Higher academic credentials may lead to higher rates of teacher attrition for two related reasons. First, higher education credentials, such as an advanced degree and university (vs. teacher college) graduation, are valued in the general labor market and translate into a greater range of professional alternatives. Second, and partially due to the first reason, teachers with these credentials may expect higher rewards than those generally offered to Israeli teachers.

Another type of resource explored in the current study is affiliation with advantageous sociodemographic groups. This attribute has received less empirical attention in previous studies but some findings (Borman & Dowling, 2008; Liu & Meyer, 2005) support the hypothesis that this type of resource correlates positively with dropout risk. The present findings indeed suggest, as hypothesized, that teachers from privileged sociodemographic backgrounds are more likely than their counterparts to leave the teaching profession. In Israel, men are more likely to drop out of teaching in comparison to woman, as well as Jews in comparison to Arabs. Again, these dropout groups have, in general, more alternatives in the job market and hence, might expect higher rewards.

In terms of rewards, the results support previous findings indicating that poorer terms of employment, mostly low salary, but also a limited part-time position, contribute to the likelihood of leaving teaching in the first years. It is worth mentioning that in some cases, beginning teachers are

not able to find a fulltime position and must settle for a part-time position. This is mostly due to schools' needs (Arviv Elyashiv et al, 2019). Thus, while it has been documented that many teachers are drawn to the teaching profession due to intrinsic motivations (Arviv Elyashiv & Gal, 2017; Carlsson et al., 2019; Watt, & Richardson, 2008), external rewards seem to matter too in decision making; the absence of appropriate rewards may lead to dissatisfaction and eventually to attrition (e.g. Borman & Dowling, 2008; Dupriez et al., 2016; Johnson & Kardos, 2008; Newberry & Allsop, 2017).

The research also attempted to examine the "effect" of the balance between resources and rewards – as suggested by Sorensen and Tuma's (1981) theoretical model. In order to balance the human capital resources of highly educated teachers, it was hypothesized that a higher salary and more working hours (closer to a full-time position) are required, more so than for less educated teachers. The results partially support this hypothesis. Results of the multivariate analysis suggest that, as expected, among novice teachers with a graduate-level degree, higher salary decreases the likelihood of leaving the teaching profession. Still, among novice teachers with higher resources in terms of human capital, the correlation between salary and the likelihood of retention is even stronger. This suggests that these highly educated teachers' career decisions are more sensitive to salary level. Dropout probability, however, is similar among these teachers and their less educated counterparts on the right side of the distribution (higher salary levels), suggesting, in line with the resource-reward model, that there is some salary level that balances teachers' higher-level educational resources. Thus, Sorensen and Tuma's model is at least partially supported by the results, as expectations were met with respect to the salary and education interaction.

This balance, however, is achieved at lower levels of salary than might be expected, since the average teachers' salary in Israel is not as high as in other professions (Israel Central Bureau of Statistics, 2018). One explanation might be related to motivational theories. It may be the case that there are other non-monetary forms of rewards, such as job security, comfortable working conditions, or altruistic motivations (Fray & Gore, 2018) which lead Israeli teachers to choose to stay in the teaching profession. These factors could not be examined in the current study due to data limitations, but further examination is needed.

The significant distinction between highly-educated novice teachers and their less educated counterparts at the lower levels of the salary distribution can be explained, as mentioned, within the resources-rewards theory. It seems that beginning teachers examine alternatives that may improve their position in the labor market. It thus appears that some highly-educated teachers choose to seek more lucrative jobs outside the teaching arena. In this case, the advanced credentials and professional certifications serve as a "safety net" that increase the likelihood of gaining appropriate remunerative recognition in other labor markets, in line with the notion that teacher attrition is associated with seeking better occupational rewards (Dupriez et al., 2016). Still, it could be explained alternatively. Low salary levels among highly educated teachers may signify their low commitment to teaching as a career to begin with, which leads them to part-time positions. For instance, some scholars suggest that young people sometimes adopt a pragmatic approach in choosing teaching as a career and study education as a route to obtain an academic degree (Ayalon & Yogeve, 2006) and to gain some experience in a profession which offers the opportunity to leave and come back at different points of their career development (Thomson & McIntyre, 2013). Some important insights may be gained by examining the alternative career paths of the dropout teachers. This issue will be explored in future research.

The current study has some limitations. The most pertinent is that it is based on administrative data. As such, it does not include information about conditions in the teaching environment, such as: principals' and colleagues' support, workload, as well as other subjective job

characteristics that may serve as non-material rewards, e.g., level of autonomy, participation in decision-making, or availability of promotion channels. Thus, further research is required to examine the balance between non-material rewards and personal resources, and its association with teacher attrition.

To sum up, most of the resources and the rewards tested in this study as well as the pattern of the interaction behave as expected by Tuma and Sorensen's theory. Still, the salary level at which the dropout probabilities equalize is somewhat disturbing, and there are some reasonable alternative explanations to the findings shown here. Thus, it seems that the resource-reward theory still deserves some more attention within the literature addressing teacher attrition. The current study contributes to the literature in this field by offering the relevance of this perspective. Although both higher education levels and salary levels of teachers were explored before in the context of teacher attrition, their interaction was not considered. The introduction of this interaction revealed the difference contributed by level of education and its relationship with salary as it affects teacher dropout.

The findings also raise some important questions for further inquiry and discussion. As at least partially demonstrated, teachers with higher human capital tend to dropout more frequently than their counterparts; this leads to the question of the correlation between human capital and teacher effectiveness. Does the overall quality or level of teaching decline as a result of attrition among teachers with strong human capital? It is assumed that higher education provides teachers with a broad foundation of professional knowledge and expertise, academic skills, and advanced methods of discipline, content, and pedagogy which, in turn, make a positive contribution to student achievement. Some studies support this assumption (Chu et al., 2015; Clotfelter et al., 2007; Croninger et al., 2007). Others have found no relationship between teachers' academic education and student achievement (Hanushek, 2011; Krieg, 2005; Nye et al., 2004). Ingersoll (2005) claims that teachers' education has a significant effect on student achievement, yet many teachers actually teach subject areas that do not correspond to their field of study, and this trend impairs students' learning. Unfortunately, the database used does not include measures of teacher effectiveness. Therefore, it is impossible to conclude that the high attrition rates among teachers with high human capital necessarily means that the overall quality or level of teaching decreases as a result, at least if measured in terms of student achievement. Still, the departure of highly-educated teachers may affect other aspects of school activity which should be examined in the context of quality of teaching, such as the social-ethical dimension, cultural capital, and school climate. Another aspect to consider is that the exit of teachers with strong human capital resources can lead to the hiring of personnel with lower human capital, thereby diminishing the social status of the teaching profession, resulting in a vicious circle which eventually will have an adverse effect both on teachers' rewards and on students' learning processes. In this light, it seems that even if there is no correlation between teachers' educational levels and students' achievements, the retention of highly-educated teachers should be of interest to policymakers.

So, what can be done? According to the resource-reward model, which is at least partially supported by the current findings, a key component in reducing teacher attrition is related to improving teachers' terms of employment. First, policymakers should carefully examine teachers' terms of employment and consider initiating improvements, especially in terms of salary and the opportunities for a full-time position. Recent reforms in the Israeli educational system aimed to promote a fundamental change in teachers' job rewards. The consequences of these reforms with respect to terms of employment and satisfaction have been partially examined (National Authority for Measurement and Evaluation, 2010; Oplatka, 2010). These studies demonstrated that the reforms led to a slight improvement in teachers' salaries. Veteran teachers enjoyed these

improvements more than novice teachers whose salaries remained poor. As the latter are the teachers prone to dropping out, this suggests that these reforms did not fully examine or consider teachers' career decisions vis-à-vis rewards. However, the compensation for higher educational levels was also raised, as mentioned above, and the way it affects attrition of highly educated teachers should be explored in order to complete the picture offered here.

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Acknowledgements

This study was supported by the Israeli Ministry of Education and MOFRT Institute.

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education policy analysis archives

Volume 29 Number 76

May 31, 2021

ISSN 1068-2341



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