Trilingualism, Bilingualism and Educational Achievements:

The Case of Chuvash and Tatar in Rural Russia

Hèctor Alòs i Font, Edgar Demetrio Tovar-García

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Hèctor Alòs i Font
BA in Linguistics, External Collaborator, Center for Sociolinguistics and Communication Research, University of Barcelona. Address: Gran Via de les Corts Catalanes 585, 08007 Barcelona, Catalunya, Espanya. E-mail: hectoralos@gmail.com
Edgar Demetrio Tovar-García
Ph.D. in Economics, Research Professor, Escuela de Ciencias Económicas y Empresariales, Universidad Panamericana. Address: Prolongación Calzada Circunvalación Poniente 49, Zapopan, Jalisco, 45010, México. E-mail: dtovar@up.edu.mx

Abstract. This study examined the relations among trilingualism, bilingualism, and educational achievements of school students in a rural environment in Chuvashia, Russia. Using our survey results of 913 school students of Chuvash ethnicity (67%) and Tatar ethnicity (28%) and ordered logistic regressions we found weak evidence for any positive association between trilingualism or bilingualism and educational achievements. Socio-economic status, cultural capital (approached with number of books at home), health issues, type of settlement, class grade, number of siblings, and gender were controlled. The results also indicated that fluency in Chuvash and in Tatar, mother tongue proficiency, language used at home, and language of instruction in the elementary grades were not adversely related to educational achievements. On the one hand, these findings partially disagree with previous studies, where a positive association was found. It is probable, that the rural versus urban environment explain these differences. On the other hand, the results confirm previous research in the Volga area of Russia that growing concern among authorities on minority language students' educational achievements is baseless. It rather suggests that policy-makers should be more concerned with increasing the equality of opportunities provided by the education system to persons of different socio-economic levels.

Keywords: Trilingualism, bilingualism, educational achievements, language policy, social inequity, rural Russia.

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Russia is one of the countries with the highest language diversity in the world, with 97 indigenous languages [Simons, Fennig 2017]. Of these, 33 are reported to be languages of instruction, however, they are used by a small minority of ethnic minority students, and mostly in primary school [Tishkov et al. 2009]. Subsequently, many concerns

have been expressed about the results of the recent educational reforms, especially about the introduction of a new Unified State Exam (USE) for high school graduation, which has been pointed out to be an important cause of the sharp drop in the use of minority languages as a medium of education [Chevalier 2017; Prina 2016; Suleymanova 2018; Tishkov, Stepanov 2017].

The USE aims to be a standardised measurement of academic achievement across the whole Russian Federation. Nevertheless, as of 2018, students are compulsorily examined in only two subjects: Russian language and mathematics. Passing the exam in any language other than Russian is not legally forbidden, but it is not allowed in practice. Consequently, the USE has been interpreted by parents, teachers and school officials as strengthening the position of the Russian language in education at the cost of minority languages. A similar exam has been also set at the end of grade 9 (Final State Attestation) and currently a new one is being implemented at the end of grade 4. These exams have been also pointed out as a harm to minority-language education [Ir□kl□ Săмah 2017].

Russian authorities are indeed concerned about school achievement in the Russian language. A draft version of a policy document on the school teaching of Russian language and literature presented minority-language education as a harm for the mastering of the Russian language [Working Group on the Conceptual Foundation of the Teaching of the Russian Language and Literature in the Schools under the Chairman of the State Duma of the Federal Assembly of the Russian Federation 2015]. After a wave of protests this document was drastically reshaped; nonetheless, president Putin stated in July 2017 that it is «impermissible to force someone to learn a language that is not [his or her] mother tongue, as well as to reduce the hours of Russian-language [classes in schools] in Russia's ethnic republics» [Meshcheryakov, Coalson 2017]. Shortly afterward, in August 2017, Putin suppressed, by a mere Presidential order, the compulsory teaching of the regional official languages which existed in several republics of Russia, which has put even more pressure on minority language teaching in Russia. Consequently, it is crucial for the future of minority languages as languages of instruction in Russia to know whether they threaten or support educational achievements, particularly for the Russian language, which is a major concern for federal authorities.

Despite the multiplicity of languages used in the Russian educational system and the concerns they raise, the relationship between bilingualism and educational achievement is an under-researched field in Russia. Using a sample of 2003 school students in Tatarstan, Tovar-García [2014] found that bilinguals outperformed monolinguals. Tovar-García and Alòs i Font [2017] analysed a sample of 709 ethnic Tatar school students from Tatarstan and showed that those who speak Tatar at home tend to outperform their schoolmates with Russian as the family language in both humanistic and scientific subjects.

Alòs i Font [2016] on the basis of a survey of 327 primary school students in Shupashkar/Cheboksary came to the conclusion that the command of Chuvash has positive outcomes, especially in connection with the learning of English. Using a different approach, Tishkov and Stepanov [2017: 422] compared the overall results by region in the USE on the Russian language and found that in the Volga Federal District bilingual regions had similar marks to regions where Russians are the overwhelming majority of the population.

All this suggests that bilingualism is a positive factor for educational achievement, at least in Tatarstan and Chuvashia. Nevertheless, in Russia this research has generally been conducted in an urban environment and with a focus on the correlation between educational achievement and the knowledge of a minority language or its use in family, but not as a language of instruction.

Moreover, assuming that bilingualism is a positive factor, could trilingualism have even more positive outcomes? In the educational literature, trilingualism has been studied basically from two points of view. On the one hand, trilingual educational systems are presented discussing different forms of introducing the languages, their advantages, or disadvantages. On the other hand, various studies discuss whether bilingual students learn a new language better than monolingual students do. Our hypothesis here is different. Bilinguals develop a number of cognitive capacities to a greater extent than monolinguals, for instance, executive control [Bialystok 2011] and language awareness [Rutgers, Evans 2017]. As a result, in certain circumstances that include the support of a student's first language [Cummins 1976], several studies have found that bilinguals obtain better academic outcomes than monolinguals, for example, for speakers of Tatar as discovered by Tovar-García and Alòs i Font [2017] and for speakers of Catalan, Galician and Basque in Spain, and Turkish in Belgium as cited by these authors.

In fact, some studies have suggested that some cognitive capacities could be greater among multilinguals. For instance, Kavé et al. [2008], in comparing bilingual, trilingual and multilingual elderly persons on cognitive-screening tests, found that multilinguals outperformed trilinguals, and trilinguals outperformed bilinguals. More recently, Brito, Sebastián-Gallés and Barr [2015], using an experimental design with 18-month-old infants, found that memory performance is better for bilinguals in comparison with monolinguals, but there are no differences between bilinguals and trilinguals. In the present research we hypothesise that similar positive results should be found on the educational achievements of trilinguals and bilinguals in our sample. We do not necessarily put forward that trilingualism could be a cause of higher academic achievements, but we initially hypothesise a stronger correlation with them.

It should be added that, in the present study, we consider 'bilinguals' or 'trilinguals' respondents that declared a good command of

one or two societal minority languages (Chuvash and/or Tatar), assuming that all students are fluent in Russian. Thus, we are considering 'bilingualism' and 'trilingualism' in terms of *proficiency*, and not of *use* (see Cenoz [2013a]).

1. The current study

The present research was conducted in a rural region of Chuvashia, specifically in the Kaśal/Komsomol'skii and Patăryel/Batyrevskii districts (municipalities). We selected these two districts due to the composition of their populations, where Chuvash people are the majority, Tatars are the second ethnic group, and Russians are a minority. In 2010, the population of Kaśal/Komsomol'skii was 26,951. Chuvash accounted for 67.5% of the district's population, Tatars for 27.4%, and ethnic Russians for 4.5%. The population of Patăryel/Batyrevskii was 38,620. Chuvash accounted for 70.7% of the district's population, Tatars for 27.3%, and ethnic Russians for 1.6% (2010 Census). Marriages between Chuvash and Tatars are rare, seemingly because Chuvash are generally Orthodox Christians and Tatars are, as a rule, Sunni Muslims. In our sample, only six students reported this kind of marriage.

Three towns have a little more than 5,000 inhabitants: the two administrative centres of the districts and another village. Almost all villages are monoethnnic. Even in the two administrative centres, the population is largely Chuvash, and the few Tatar families living there arrived recently. However, according to our sample, Chuvash people tend to live in smaller villages (median: 812 inhabitants) than Tatars (median: 1745 inhabitants).

A rural sample is a novelty in Russian studies on educational achievements, which so far have investigated whole regions or urban areas. Since minority-language education in Russia, as a rule, is offered only in villages, it seems better to study its results analysing a sample of village students in order to avoid socio-economic and sociocultural gaps between the urban and rural populations that could hamper the analysis.

Tatar families speak Tatar at home and seldom combine it with Russian. The great majority of Chuvash not living in the administrative centres speak Chuvash at home, but it is not rare that they use some Russian, too. Chuvash in the administrative centres are experiencing a rapid language shift. Although 3/4 of school students' parents of Chuvash ethnicity speak with their own parents mostly in Chuvash, 1/3 of them speak only in Russian with their children, 1/3 mostly in Russian, but also in Chuvash, 1/6 mostly in Chuvash, but also in Russian, and 1/6 only in Chuvash. Russians and the few people of other nationalities, as a rule, live in the administrative centres, speak Russian at home and have a poor command of Chuvash and/or Tatar.

The family language situation correlates with the school education. In Russia, the school system consists of 11 years of education. Grades

5 to 9 correspond to secondary education and grades 10 and 11 to post-secondary (high school) education. Primary school education in the Kaśal and Patăryel district centres is done exclusively in Russian. In all other villages (with a few exceptions in the Kaśal district) children receive their primary education in Chuvash or Tatar. Consequently, almost all Tatars learn in Tatar (except a few who learn in the administrative centres), while Chuvash children may learn in Chuvash or Russian. It should be added that although 20% of the overall population live in the administrative centres, 30% of children learn in the administrative centre schools.

From grade 5 onwards, education shifts to Russian. Chuvash and Tatar cease to be languages of instruction and are taught only as subjects. At the same time, while most Chuvash and Tatar primary schools are in separated villages, from grade 5 some Chuvash and Tatar children living outside the administrative centres come to learn in the same school, sometimes in the same classes. This increases the degree of socialization between Chuvash and Tatars. As a rule, Chuvash and Tatar children speak with each other in Russian, but in some cases Tatar students speak Chuvash with Chuvash classmates (especially where Tatars are a tiny minority in the school).

Chuvash and Tatar are two distant, mutually incomprehensible Turkic languages. Russian is an Indo-European language, lexically, morphologically and syntactically very different from both Chuvash and Tatar. Chuvash, alongside Russian, is an official language of Chuvashia. At the time of the data collection, in the administrative centres it was taught 2 or 3 hours per week from grades 1 to 9, Tatars in Tatar schools or classes studied it 1 or 2 hours per week. In both cases, Chuvash was taught as a 'state language', i. e. students were supposed to have no previous knowledge of it. The results of this kind of teaching of Chuvash are reported to be quite poor in cities, but in the rural environment we study, even in administrative centres, everyday contact with Chuvash is undoubtedly closer than in cities, which results in a better knowledge of it. This explains that no children living in the administrative centre, irrespectively of their ethnicity, report they 'do not understand Chuvash at all', and only 9.6% 'poorly understand it' (for instance, a survey on urban students showed 15.3% that 'do not understand Chuvash at all' after 9 years of learning it, and 26.5% 'poorly understand it' [Alòs i Font 2015: 56].

On the other hand, from grade 5 onwards Russian language and literature are generally taught for the same number of hours in all schools, regardless of the hours they devote to Chuvash and Tatar, which are significantly more outside the district centres. Schools outside the administrative centres sometimes even spend an additional hour per week on Russian language. Seemingly, the growing concern among parents on students' achievement in Russian language is pushing schools to dedicate to Russian part of the hours they are free to allocate.

Nevertheless, it is important to point out that schools in administrative centres are places for intensive socialization in Russian with little room for minority languages. According to our survey, although 80% of the students in administrative centres speak Chuvash or Tatar at home (in different degrees), more than a half of them speak only Russian with schoolmates, and 70% with teachers. For its part, Tatar is learned as a school subject only by Tatars, and mostly only Tatar students know it.

All this creates an interesting variety of language situations in these districts. One case is the students living and studying in the administrative centres that are able to speak only in Russian. Other students from the administrative centres are bilingual in Russian and Chuvash or Tatar. In many cases, they are unbalanced bilinguals with Russian as the dominant language. Chuvash students who live outside the administrative centres are all bilingual in Russian and Chuvash but have different degrees of exposure to Russian depending on how much it is used at home, whether they study in the administrative centre or not, and the proportion of Tatars studying in their school.

Tatars have the least contact with Russian as they mostly only speak Tatar at home and the majority of them live in relatively large ethnically-homogenous villages. We can broadly distinguish two groups of them. A minority learns together with Chuvash children, especially from grade 5. Sometimes they are immersed in a big Chuvash majority, and speak Chuvash with classmates. However, two thirds of Tatars attend the school of their village or a nearby Tatar village where more than 90% of students are Tatars and the vast majority of chats with schoolmates and teachers are in Tatar. Of course, besides school classes, Russian is very present in their everyday life through TV, the Internet, most of what they read, when visiting the doctor or the shops in the administrative centre, etc.

2. The main variables under analysis and methodology

In 2016, from February to April, we undertook a survey of 913 school students in grades 7 to 11 from the two mentioned districts. The school students reported information about the level of proficiency in their mother tongues, the language of instruction in their schools, their academic achievements, and several socio-economic characteristics of their families. In the survey, 11 students studied in the mentioned districts, but did not live there, and as a result the used sample consists of 902 students. Of these, 313 are from Kaśal/Komsomol'skii and 589 from Patăryel/Batyrevskii, from eight and ten randomly selected schools, respectively.

The sample is around 31% of total students (2,984) in grades 7 to 11 in the two districts. Moreover, the structure of the sample highly corresponds with the ethnic composition in both districts, as well as the proportion of students studying in the district centres and outside

them for both districts.[1] Schools were randomly selected, giving them a weight proportional to the number of students and keeping the number of schools in the sample for each district proportional to the number of inhabitants. As a rule, three classes were randomly chosen in every school, trying to always get one post-secondary class. All students present on the day of the polling were surveyed by one of the authors. The survey used an ad-hoc questionnaire which needed 20 to 35 minutes to be completed, basically depending on the age of the students.

Coleman et al. [1996] suggest that the main factors impacting educational outcomes are family resources, including cultural and social capital. Recent research in Russia (e.g Roshchina 2010; Tovar-García 2014; Kapuza et al. 2017) has supported this, and points to parental education and family income as key explanatory variables. Tovar-García [2014] added a language variable to the independent variables, and found that a minority family language has a positive impact in educational achievement in Tatarstan. These findings, as said before, have been further supported by other results in Tatarstan [Tovar-Garcia, Alòs i Font 2017] and Shupashkar/Cheboksary [Alòs i Font 2016]. On the basis of this framework, the variables of the current research are presented in the next section.

2.1. Dependent variable: Educational achievement

Students in grades 7 to 9 reported their school grades obtained in the last quarter and students in grades 10 and 11 reported their school grades from the first semester of the school year. In our sample, the students reported school grades from 2 to 5 (whole numbers), where 3 is the minimum pass mark.

To measure educational achievements we use the average grade (expressed as a round whole number) in eight subjects: Russian language, literature, foreign language, history, algebra, geometry, physics, and chemistry. For the full sample, the average grade is 4.16. In addition, we investigate the specific impact of bilingual environment on school grades in mathematics (average grade in algebra and geometry: 4.04), in Russian language (the average grade is 4.04) and foreign language (4.17). See Table 1.

We also use as an additional dependent variable the Final State Attestation (FSA). This is an exam written by students to pass grade 9, reflecting their general educational qualifications. Moreover, FSA is necessary to continue studying in high school; subsequently, only students in grades 10 and 11 reported their results in FSA for Russian language and mathematics. Note that this exam is independent of the school management.

[1] 67.0% of the respondents considered themselves Chuvash and 28.3% Tatar, while, according to Census data, Chuvash represent 67.5% of the population and Tatars 27/3%. 16.6% of respondents live in the district centres vs. 15.8% of the population.

Table 1. **Descriptive statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
Average grade	901	4.16	0.68	3	5
Russian language	899	4.04	0.73	2	5
Foreign language	898	4.17	0.73	3	5
Mathematics	900	4.04	0.77	3	5
FSA Russian language	344	4.64	0.60	3	5
FSA Mathematics	344	4.51	0.58	3	5
TRILINGUAL	902	0.05	0.22	0	1
CHUVASHPROFICIENCY	890	2.68	1.53	1	5
TATARPROFICIENCY	864	1.89	1.50	1	5
CHUVASHPROFICIENCY × Chuvash ethnicity	884	2.25	1.93	0	5
TATARPROFICIENCY × Tatar ethnicity	858	1.18	1.93	0	5
CHUVASHUSAGE	891	2.99	1.76	1	5
TATARUSAGE	900	2.04	1.70	1	5
CHUVASHUSAGE × Chuvash ethnicity	885	2.61	2.16	0	5
TATARUSAGE × Tatar ethnicity	894	1.33	2.15	0	5
CHUVASHSCHOOL	875	0.51	0.50	0	1
TATARSCHOOL	880	0.25	0.43	0	1
CHUVASHSCHOOL × Chuvash ethnicity	870	0.49	0.50	0	1
TATARSCHOOL × Tatar ethnicity	874	0.25	0.43	0	1
SES index	902	0.00	1.00	-2.28	3.39
Father ISEI	696	31.77	14.25	16	88
Mother ISEI	605	44.17	16.04	16	90
Father works	857	0.69	0.46	0	1
Mother works	895	0.67	0.47	0	1
Father education	833	3.64	1.56	1	7
Mother education	861	4.02	1.61	1	7
Number of books	897	2.99	1.02	1	6
Health issues	900	3.30	0.68	1	4
Living in the administrative centre	902	0.17	0.37	0	1
Studying in the administrative centre	902	0.29	0.46	0	1
Grades 10th and 11th	902	0.38	0.49	0	1
Number of siblings	891	1.49	0.92	0	6
Female	902	0.57	0.50	0	1
Chuvash ethnicity	896	0.67	0.47	0	1
Tatar ethnicity	896	0.28	0.45	0	1

Source: Authors' calculations

Thus, we have six dependent variables: four school grades (in Russian language, mathematics, foreign language, and the average in eight subjects), and two grades in the FSA (Russian and mathematics). All of these variables were also classified as dummies. First, the variables take the value of 1 for those students reporting grades of 3 (low performing students). Second, the variables take the value of 1 for those students reporting grades of 5 (high performing students).[2]

Descriptive statistics (Table 1) show high grades in all subjects. All dependent variables have a mean over 4 and the FSA scores are the highest with a mean over 4.5. Higher FSA scores are understandable as all of the high-scoring students passed the exam and had high enough grades to feel ready to study in high school. Especially surprising is the almost full lack of grade 2 (fail), which has been reported only in a single school and in a single subject (Russian language).[3] Interviews with teachers in these and other schools have confirmed that teachers avoid grade 2 mostly because of pressures from school and ministry officials.

2.2 Independent linguistic variables

We use as a proxy variable of trilingualism the answers to the questions on fluency in Chuvash and in Tatar. For each language, school students selected one of four options: 1) I speak fluently or fluently enough, 2) I speak with difficulties, but I understand, 3) I poorly understand, and 4) I do not understand at all. This variable takes values of 1 for students reporting speaking fluently in Chuvash and in Tatar, and coded 0 otherwise (TRILINGUAL). Of the trilingual students, 42 are Tatars and 6 are Chuvash, this is about 5% of the surveyed students. It is important to recognize this small number of trilingual students. Therefore, the findings on this variable are valid for the region under study, but we should not generalize them.

To test the impact of bilingualism on educational achievements we use three major explanatory variables: proficiency, language used at home, and language of instruction in the elementary grades.

The students reported in the language in which they speak more fluently, in Chuvash (Tatar) or in Russian, selecting one of five options: 1) Much easier to speak in Chuvash (Tatar) than in Russian, 2) A little easier to speak in Chuvash (Tatar) than in Russian, 3) At the same level, 4) A little easier to speak in Russian than in Chuvash (Tatar), and 5) Much easier to speak in Russian than in Chuvash (Tatar). These variables, proficiency in Chuvash (CHUVASHPROFICIENCY) and proficiency in Tatar (TATARPROFICIENCY), were reverse coded (value 5 for option 1, and so

[2] We used these variables for robustness tests using logit regressions. Only five students reported a grade of 2 in Russian language, and we removed them from this classification.

[3] In fact, the scarce variability of the Russian grade system hinders its effectiveness as a measurement of educational achievement. Research based on it has to cope with this limitation.

on) and included in the regression analysis in the following section as interaction terms between proficiency and ethnicity. That is, the variable is multiplied by a dummy variable on ethnicity (Chuvash or Tatar).[4]

The school students also reported the language used for communication with their relatives: father, mother, and siblings. In the three cases, they indicated the languages they use and, if they speak more than one, which one they use most of all, if any. On this basis we built two 5-level indicators for the use of Chuvash and Tatar, from 1 standing for "I use only another language" to 5 "I use only Chuvash (Tatar)", the value 3 corresponds to students reporting the use of Chuvash (Tatar) and another language (Russian) at the same level. The use of Chuvash at home was calculated as the mean of its use with the father, mother, and siblings, and the same was done for Tatar. The average use of Chuvash at home is 3.0 and among Chuvash people it is 3.9 (CHUVASHUSAGE). Similarly, the average use of Tatar is 2.0 and among Tatars it is 4.7 (TATARUSAGE). This variable is also entered into the regression analysis as an interaction term with ethnicity.

Finally, we coded 1 as school students who entirely studied at elementary school (grades 1 to 4) in their ethnic tongues. Thus, we built two dummy variables, one for students with Chuvash as their language of instruction (CHUVASHSCHOOL) and similarly one for Tatar (TATARSCHOOL). Consequently, schools with Russian language are the reference group, and those students who moved from school to school and studied in different languages (a mix of Russian, Chuvash or Tatar) were excluded.[5] About 50% of the surveyed school students studied elementary school in Chuvash (73% of Chuvash), and about 25% of students studied elementary school in Tatar (87% of Tatars).

2.3 Control variables

As control variables of the impact of trilingualism and bilingualism we use indicators related with socio-economic status, number of books at home to approach cultural capital, and an ordinal variable for students' health issues, as recommended by the literature [DiMaggio 1982; Huurre et al. 2006; Kuzmina, Popov, Tyumeneva 2012; Roshchina 2010]. We also include dummy variables controlling for type of settlement, class grade, number of siblings, and gender.

We developed a socio-economic status index (SES) using principal component analysis. [6] This index includes information on parental employment and education as reported by students. Firstly, we built a

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[4] Students reporting only Chuvash ethnicity (or Tatar ethnicity) were coded 1. Therefore, students reporting two ethnicities were excluded from this classification. As a result, we lost six individuals, but we lost more observations due to non-responses on proficiency.

[5] Only 13 individuals studied the elementary school in different languages, but we lost more observations due to non-responses.

[6] This method reduces a large set of variables (correlated) to a small set (uncorrelated) that still contains most of the information (variability) in the large

dummy variable coded 1 for employed parents (mothers and fathers) and 0 otherwise (including students without parents). It is interesting to note the high rate of unemployment: only 68% of fathers and 67% of mothers were reported with a current formal job (there is no information for 5% of fathers and 0.8% of mothers). Later, we classified the reported jobs using the International Standard Classification of Occupation (ISEI) developed by Ganzeboom and Treiman [1996]. In our case, this index takes values from 16 to 90. For mothers, the mean is 44 and the standard deviation is 16; for fathers, the mean is 32 and the standard deviation is 14. Finally, we classified with an ordinal variable from 1 to 7 the level of the parents education, where, 1 corresponds to parents with a school education (9 years or less years of education) and 7 corresponds to parents with a postgraduate education: 33% of fathers and 26% of mothers have school education and 20% of fathers and 30% of mothers have higher education or postgraduate education.

We used an ordinal variable from 1 to 6 to measure the number of books at home, where 48% of students reported having between 26 and 100 books. Similarly, students reported how frequently they got sick, in an ordinal variable (HEALTH) from 1 (frequently) to 4 (never): 1.9% of students reported that they frequently got sick.

We built four dummy variables. First, students living in the administrative centre of the district are coded 1 (17%), and second, students studying in the administrative centre are coded 1 (29%). This controls and allows comparisons between rural areas and the most urbanised locations of the district. Third, students in grades 10 and 11 are coded 1 (38%), which allows comparisons between students in secondary school and students in high school. Fourth, schoolgirls are coded 1 (57%). Finally, we include as a control variable the number of siblings. The number of siblings has been pointed out as adversely affecting education performance, probably as a result of parents' resource dilution (time, money, etc.) [Downey 1995].[7]

3. Results

The baseline empirical model is given by equation (1).

$$\text{(1)}\quad \text{Educational Achievement}_i = \beta_0 + \beta_1 \text{TRILINGUAL}_i + \text{Bilingual Environment}_i'\beta + \\ + \text{Control}_i'\phi + u_i.$$

where the subscript *i* denotes the *i*-th school student, β and φ are vectors of regression coefficients to be estimated, and u_i is the error term.

set. In our case, we reduce our variables on socioeconomic status to only one variable, building an index.

[7] We built the correlation matrix of the key variables used in this research, but we do not present it here in order to save space.

Educational Achievement includes the six dependent variables described in the previous section. Note that these variables are ordinal, allowing four (ordered) response categories, taking values of 2, 3, 4 or 5. Consequently, the econometric literature suggests the use of ordered logistic models, with robust standard errors, to estimate the regression coefficients. This method can be seen as an extension of the well-known logistic regression that applies to dichotomous dependent variables (used here for robustness checks). These are probabilistic models, that is, the estimated coefficients allow for measuring the probability of an event, in our case, the probability of being classified in one of the grading categories. TRILINGUAL was previously described and Bilingual Environment includes the dependent variables PROFICIENCY, USAGE and SCHOOL for Chuvash and Tatar described in the previous section. We also included their interaction terms with ethnicity, which allows for the avoidance of biases due to ethnic concerns.

Table 2 shows the estimated coefficients and the main results. In general, the variable TRILINGUAL and the variables of bilingual environment do not reach statistical significance, with a few exceptions. Mainly, when the dependent variable is FSA Mathematics, some variables of bilingual environment show statistical significance, yet with mixed and contradictory signs (see column 6 in Table 2). For instance, proficiency in the Tatar language has a positive effect on the probabilities of obtaining higher grades in the FSA Mathematics, yet its interaction term with Tatar ethnicity has a negative effect, which lacks any logic. The variables on the usage of Tatar language and on the attendance of Chuvash schools show similar concerns. Consequently, there is no robust effect.

For their part, most control variables show significant associations with the variables on academic achievements and have the expected signs. The coefficient of the SES index is positive and significant in all regressions, that is, the wealthier students are more likely to obtain the higher grades. We can say the same about the healthier students. The number of books, proxy variable of cultural capital, also predicts good educational achievements, but it lacks statistical significance in the case of the FSA.

As was already found in the literature (for example, Roshchina [2010]), girls outperform boys in academic achievements. Students living in the administrative centre are not more likely to obtain the higher grades, but studying in the administrative centre increases the probability of obtaining higher grades in the FSA. Students in grades 10 and 11 are also more likely to obtain higher grades. As predicted, there is also evidence that the number of siblings has a negative effect on the probabilities of obtaining the higher grades in Russian language, foreign language, and mathematics.

As was expected, there are high correlations between independent variables, particularly between the bilingual variables and the interaction terms. This may be causing contradictory results, as in the

Table 2. **Regression coefficients**

Independent variables	Pred Sign	Dependent variables (1) Average grade	(2) Russian language	(3) Foreign Language	(4) Mathe-matics	(5) FSA Russian language	(6) FSA Mathe-matics
TRILINGUAL		0.42	0.26	–0.24	0.39	1.56	0.73
Bilingual environment							
CHUVASHPROFICIENCY		–0.18	–0.36**	–0.16	0.01	–0.25	0.40
TATARPROFICIENCY		–0.78	–0.67	–0.10	–1.29	2.54	3.53***
CHUVASHPROFICIENCY × Chuvash ethnicity		0.04	0.26	–0.04	–0.15	0.12	–0.64
TATARPROFICIENCY × Tatar ethnicity		0.66	0.63	0.01	1.14	–2.34	–3.32***
CHUVASHUSAGE		–0.03	0.19	0.13	–0.27	–0.14	–0.29
TATARUSAGE		0.02	0.61	–0.64	0.46	0.55	–1.08*
CHUVASHUSAGE × Chuvash ethnicity		–0.03	–0.12	–0.13	0.17	0.21	0.47
TATARUSAGE × Tatar ethnicity		–0.11	–0.75	0.54	–0.57	0.10	1.53**
CHUVASHSCHOOL		–1.52*	–0.78	–1.66**	–1.28	0.53	–1.90*
TATARSCHOOL		–0.14	1.26***	–0.04	–0.15	–0.54	–0.89
CHUVASHSCHOOL × Chuvash ethnicity		1.25	0.63	1.50*	1.07	–0.27	1.57*
TATARSCHOOL × Tatar ethnicity		Omitted because of collinearity					
Control variables							
SES index	+	0.73***	0.56***	0.55***	0.51***	0.31*	0.46***
Number of books	+	0.27***	0.28***	0.21***	0.16**	0.12	–0.07
Health issues	+	0.18*	0.19*	0.20*	0.28***	0.41**	0.36**
Living in the administrative centre		–0.38	–0.21	–0.16	–0.23	–0.53	–0.41
Studying in the administrative centre		–0.55*	–0.07	–0.16	–0.31	1.17**	0.85**
Grades 10th and 11th		0.64***	0.61***	0.56***	0.78***		
Number of siblings		–0.09	–0.18**	–0.14*	–0.16**	–0.23	–0.13
Female	+	1.55***	1.68***	1.63***	1.10***	1.48***	0.64***
Observations		802	800	800	802	317	317
Pseudo R^2		0.17	0.15	0.15	0.12	0.10	0.09

* $p > 10\%$; ** $p > 5\%$; *** $p > 1\%$.

case of the FSA Mathematics. First, the literature suggests that collinearity due to interaction terms can be considered as a negligible problem [Friedrich 1982]. Second, the software (Stata 13) automatically removes variables with collinearity concerns. For instance, in our baseline specification the software removed the interaction term between TATARSCHOOL and Tatar ethnicity.

Nevertheless, thinking that collinearity could affect our estimations, we ran several other regressions removing and combining different bilingual variables. The main findings remain qualitatively the same. For instance, Table 3 shows the results using as key independent variables only the interaction terms between bilingual variables and ethnicity. In addition, we built indices for these bilingual variables adding the responses on PROFICIENCY, USAGE and SCHOOL for Chuvash and Tatar and including interaction terms with ethnicity. These indices reach statistical significance only in a few cases and in relation to the Chuvash language, but there are no robust effects (see Table 4). Thus, generally speaking, the results do not suggest that trilingual or bilingual students are more likely to be in the higher categories of the grading system.

As additional robustness checks we estimated very similar models using binary dependent variables classifying students as low performing or high performing, as was described in Section 3. Consequently, we used logit regressions with robust standard errors. The core findings are very similar to those reported in Tables 2–4. There are no robust impacts of trilingualism or bilingualism on the probabilities of being classified as low or high performing student (these results are not shown in tables in order to conserve space).

4. Discussion and conclusion

Looking at the results of Tables 2–4, as well as those of the above–mentioned additional regressions, SES had a key role in explaining educational achievements. This is consistent with previous research in developing countries and Russia [Tovar–García 2014; Tovar–García, Alòs i Font 2017; Kapuza et al. 2017]. However, in our case it is important to note that SES is a crucial factor in a rural milieu, where economic stratification is weaker than in cities. We did not expect this result, but it deserves more attention in future studies with a focus on the impact of SES on educational outcomes in rural communities.

The results also showed that school grades for post–secondary students are higher than those of secondary students. It is likely that two factors explain this. On the one hand, the FSA causes a selection of school students, leading the weakest ones to professional schools. On the other hand, the proximity of the Unified State Exam is probably compelling post–secondary students to study harder.

Another interesting result is the relationship between achievement and living or studying in an administrative centre. Living in one of them does not appear to correlate in any way, but studying in one has a pos-

Table 3. **Regression coefficients**

Independent variables	Pred Sign	Dependent variables (1) Average grade	(2) Russian language	(3) Foreign Language	(4) Mathematics	(5) FSA Russian language	(6) FSA Mathematics
TRILINGUAL		0.30	0.06	−0.34	0.37	1.19	0.91
Bilingual environment							
CHUVASHPROFICIENCY × Chuvash ethnicity		−0.13	−0.09	−0.19**	−0.13	−0.11	−0.20
TATARPROFICIENCY × Tatar ethnicity		−0.10	−0.04	−0.08	−0.12	0.16	0.21
CHUVASHUSAGE × Chuvash ethnicity		0.02	0.13	0.05	−0.04	0.14	0.25
TATARUSAGE × Tatar ethnicity		0.08	−0.11	0.07	0.04	−0.01	−0.01
CHUVASHSCHOOL × Chuvash ethnicity		0.02	−0.02	0.02	0.11	0.22	−0.17
TATARSCHOOL × Tatar ethnicity		0.22	1.39***	0.19	0.22	−0.30	−0.28
Control variables							
SES index	+	0.75***	0.58***	0.56***	0.52***	0.31*	0.42***
Number of books	+	0.27***	0.28***	0.22***	0.17***	0.09	−0.08
Health issues	+	0.20*	0.20*	0.21*	0.31***	0.41**	0.39**
Living in the administrative centre		−0.14	−0.07	−0.01	0.01	−0.36	−0.14
Studying in the administrative centre		−0.32	0.04	0.00	−0.10	1.08**	1.03**
Grades 10th and 11th		0.62***	0.59***	0.53***	0.78***		
Number of siblings		−0.11	−0.19**	−0.15*	−0.19**	−0.22	−0.09
Female	+	1.56***	1.69***	1.66***	1.12***	1.46***	0.65***
Observations		802	801	801	803	317	317
Pseudo R^2		0.17	0.15	0.15	0.12	0.09	0.07

* $p > 10\%$; ** $p > 5\%$; *** $p > 1\%$.

itive impact in all regressions for both FSA on Russian language and mathematics. High school students studying in administrative centres (but not necessarily living in them) have better FSA scores. Since we know only where high school students are currently studying, but not where they used to study in secondary school, and there is a somewhat bigger concentration of students in the district centres during the last years of schooling, we cannot conclude that studying in administrative centres is better for educational achievement than studying in other schools. Still, it is not unlikely that schools in administrative centres have higher qualified teachers and better technical resources that could explain the above mentioned result. In this case, the fact that no

Table 4. **Regression coefficients**

Independent variables	Pred Sign	Dependent variables (1) Average grade	(2) Russian language	(3) Foreign Language	(4) Mathematics	(5) FSA Russian language	(6) FSA Mathematics
TRILINGUAL		0.30	0.03	–0.33	0.37	1.17	0.90
Bilingual environment							
Index Chuvash Language × Chuvash ethnicity		–0.06	0.001	–0.07**	–0.07**	0.04	0.02
Index Tatar Language × Tatar ethnicity		–0.0002	0.04	0.004	–0.02	0.03	0.06
Control variables							
SES index	+	0.75***	0.57***	0.56***	0.52***	0.30*	0.39***
Number of books	+	0.28***	0.29***	0.22***	0.17***	0.09	–0.07
Health issues	+	0.20*	0.19*	0.21*	0.30***	0.41**	0.39**
Living in the administrative centre		–0.22	–0.07	–0.10	–0.06	–0.42	–0.06
Studying in the administrative centre		–0.38	–0.17	–0.05	–0.17	1.06**	1.03***
Grades 10th and 11th		0.63***	0.59***	0.55***	0.78***		
Number of siblings		–0.12	–0.19**	–0.15*	–0.18**	–0.21	–0.08
Female	+	1.58***	1.70***	1.67***	1.12***	1.46***	0.63***
Observations		802	800	800	802	317	317
Pseudo R^2		0.16	0.14	0.15	0.11	0.09	0.07

* $p > 10\%$; ** $p > 5\%$; *** $p > 1\%$.

significant correlations for school grades are found would mean that teachers in administrative centres are stricter than in other schools. A similar result was found for teachers in Kazan vis–à–vis teachers from other towns in Tatarstan [Tovar–García, Alòs i Font 2017]. Consequently, if studying in a district centre possibly has a positive impact on educational achievement, a fundamentally important question is whether this may be due to the use of Russian as the only language of instruction, to the Russian–language atmosphere, or to the fewer hours that students devote to minority–language education.

Now, in regard to bilingualism, the regression analysis did not show any consistent impact of family or school bilingualism on educational achievement, neither positive, nor negative. Neither has any correlation been found for trilingualism. These findings differ from previous and recent studies on other languages and bilingual contexts, such as Spanish and English in the USA, or Catalan, Galician, Basque, and Spanish in Spain. In particular, our findings disagree with the pos-

itive impact of the Tatar language on educational outcomes in Tatarstan or the positive impact of the Chuvash language on educational outcomes in Chuvashia [Alòs i Font 2016; Tovar–García, Alòs i Font 2017]. The major difference between our research and the above–mentioned studies is the sample under study. Here, we studied rural students and the cited studies were more focused on urban students, where the ethnic Russian population is larger. Thus, the role of the urban and the Russian populations may explain the lack of evidence for positive impacts of bilingualism and trilingualism.

Nevertheless, there are a couple of results that deserve additional comments. First, on school grades for Russian language, a positive association appears for Tatars with Tatar as the language of instruction in primary schools (see Tables 2 and 3). This could be interpreted as a positive result of learning in the mother tongue, yet it is not supported with similar results in FSA or the average grade, nor by similar results for Chuvash students. Perhaps teachers in Tatar schools tend to give slightly higher grades in Russian language to encourage their students. Second, a negative correlation appears for Chuvash speakers in relation with a foreign language (see Tables 3 and 4). Likewise, there is no backing up of this result in other regressions, and the literature shows, as a rule, a positive correlation between bilingualism and foreign or third language learning (see Cenoz [2013b] for an up–to–date review on the question). Therefore, if there is really a negative correlation between Chuvash bilingualism and foreign language learning (which cannot be concluded from the data), it is likely that this concern lies in a teacher having a lower qualification, or less effective technical equipment in little village schools. We do not have access to this kind of information, so we could not include these factors among the independent variables in the regression analysis. Cenoz [2009: 149, 151] points out that, while "the studies carried out in immersion programs and in other bilingual programs indicate that bilinguals have advantages over monolinguals in the acquisition of an addition languages (…), studies on the influence of bilingualism on third language acquisition carried out in regular programs are more mixed". In our case, we have, according to Baker's [2011] terminology, mainstreaming/submersion education in the district centres, and transitional education for bilinguals outside them, that is, not (full–fledged) bilingual education programs.

An additional possible explanation of the lack of correlation between bilingualism and educational achievement in our study, especially in foreign language learning, may be a certain minimum degree of bilingualism for all school students in this region. Note that only 17 respondents (1.9%) claim a poor understanding of both Chuvash and Tatar, and only 21 respondents (2.3%) have declared no use of Chuvash or Tatar at all with parents, brothers, sisters, grandparents, uncles, aunts, cousins, nor at school, in shops or writing an SMS or in social sites.

A third hypothesis could be that we considered bilingualism and trilingualism as depending on proficiency rather than on use. Although for this particular sample of minority–language speakers there are few cases of respondents proficient in two languages that do not use both in an almost daily basis, this is not the case for many 'trilingual' Tatar who live and study in a predominantly Tatar environment and may seldom use Chuvash outside Chuvash language classes.

In conclusion, the findings suggest no difference in the academic achievements in the Russian language and other subjects, regardless of the language(s) students speak at home or the language in which they learned in primary school. Therefore, parents, school officials, and authorities should not fear the use of minority languages in family or as a medium of instruction, because this will not negatively impact educational outcomes, even on the Russian language. Instead, the results point out noticeable differences depending on the student's SES and the location of the school, suggesting that the Russian educational system has problems in bringing about greater equality of opportunity. Further research should concentrate, on the one hand, on explaining the differences in students' achievement between schools in administrative centres and other villages, and, on the other hand, the SES factors that are playing a relevant role in the rural context, despite the likely low economic stratification of Chuvash (and Russian) villages.

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