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Abstract

What is the role of students' language background in school success within the multi-lingual and highly stratified education system in Luxembourg? Considering achievement differences in terms of the primary effects of social and ethnic origin, we assume that students of a disadvantaged social origin (e.g. working class), with an immigrant background, who speak languages at home other than Luxembourg's official languages show lower school achievements and are placed into lower school tracks. Analyses are based on the data of Luxembourgish primary (grades 4/5) and secondary students (grades 7/8) from two consecutive survey waves in 2016/2017 (for the international project SASAL – *School Alienation in Switzerland and Luxembourg*). The results indicate language background has only marginal effects, but social and immigrant origin has stronger effects.

Keywords

Educational inequalities, achievement, language background, social origin, immigrant origin, Luxembourg

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Introduction

Educational inequality is a key issue of educational research because it is one of the central mechanisms behind the (re)production of inequalities. Educational disadvantages translate into disadvantages in labour market opportunities, income, political participation, subjective well-being, health and even life expectancy (Hadjar and Becker, 2009, 2016; Vila, 2000). While one can think of various axes of inequality, students' social origin and gender are most frequently studied (Breen et al., 2010; Hadjar and Uusitalo, 2016), with students' ethnic origin receiving increasing attention in the social sciences (Dronkers and Korthals, 2016; Kristen et al., 2008; Van de Werfhorst and Van Tubergen, 2007). Research provides evidence that a large part of immigrants' disadvantages in the education system is explained by their (often lower) social origin (Becker et al., 2013), but other underlying mechanisms are less frequently taken into account. This also applies to further individual traits and, in particular, the students' language backgrounds (Dronkers and Korthals, 2016). Theoretical frameworks such as the concept of the primary and secondary effects of ethnic origin and empirical evidence indicate that language proficiencies have a distinct impact on students' educational achievements (Dollmann and Kristen, 2010; Kristen et al., 2016; Wagner, 2016).

The education system in Luxembourg offers outstanding opportunities to study educational inequalities along the axes of social and immigrant origin – and particularly to focus on language backgrounds – for at least three reasons: first, Luxembourg shows one of the highest proportions of immigrants in Europe and beyond. Second, the education system in Luxembourg is prone to educational inequalities due to its highly stratified structure and its positioning in a conservative welfare-state regime (Hadjar and Uusitalo, 2016). Third, Luxembourg's education system is multilingual – not only regarding the home languages of the students, but also in the languages of instruction vis-a-vis the three official languages (Luxembourgish, French, German) in Luxembourg (Université du Luxembourg/LUCET/Ministère de l'Éducation nationale, de l'Enfance et de la Jeunesse, SCRIPT, 2018). The language-integrated learning process, in which French progressively becomes the language of instruction in some secondary school tracks (after German has been the alphabetisation language in primary school), contains a major cognitive burden for the Luxembourgish school population. This leads to difficulties in understanding subject-specific content (University of Luxembourg/LUCET, 2015). Although immigrant origin is linked with language background, these are not highly confounded. Due to the multilingual environment, immigrants may speak one of the official languages in Luxembourg at home. Luxembourgish is usually the language most spoken among native families, but French or German may also be spoken in some Luxembourgish families. Thus, education in Luxembourg 'is concerned with issues relating to language, learning, diversity and social equity' and at the same time reproduces 'a normative linguistic hierarchy which, for some pupils, bears little similarity to their family language practices and social reality' (Le Neves, 2011: 3). Taking these features into account,

findings from Luxembourg are of interest to countries with stratified education systems such as Germany, Switzerland, Austria and the Netherlands, and countries with notable immigrant populations such as the UK, Belgium, Switzerland and Sweden.

Vis-a-vis these features of the Luxembourgish context, the present study centres on two research questions: First, *What role does a student's language background play in his or her success within the multilingual and highly stratified education system in Luxembourg?* Second, *Do language backgrounds explain some part of the educational inequalities related to immigrant origin?* This paper contributes to a growing literature on the mechanisms behind inequalities in educational achievements within the particular institutional context in Luxembourg. Achievement is conceptualised in terms of school grades. We consider both Grade Point Average (GPA; main subjects: German, French, Mathematics) and (separately) Mathematics grades as dependent variables. Furthermore, we consider attending a low educational track as an indicator of prior achievement, because tracking decisions rely heavily on performance on classroom assignments and national achievement testing (e.g. University of Luxembourg/LUCET, 2015). The data include a sample of primary (grade 5) and secondary school students (grade 8) in Luxembourg who participated in an international panel study on school alienation. These specific time points in the educational career have been selected because grade 5 is the start of the crucial period of gathering evaluations for tracking decisions in the transition from primary to secondary school in grade 6, and in grade 8, students have already spent one year in their secondary school.

Following this introduction, the specific mechanisms of educational inequalities related to social origin, immigrant origin and language background are examined, followed by a consideration of the education-system impacts and an outline of the institutional characteristics of Luxembourg. Hypotheses related to the Luxembourgish case are derived based on conceptual considerations, and these hypotheses are introduced then. The quantitative research design – including the data set and operationalisation – is described subsequently. The results of descriptive and multivariate mixed-effects linear regression models are presented, considering school achievement in terms of students' GPA and their grades in mathematics. The final section summarises the main findings and discusses the paper's strengths, limitations and its possible implications.

Conceptual and contextual considerations: Educational inequalities and the education system of Luxembourg

The theoretical framework of this study links three conceptual approaches: social inequalities are theorised referring to Boudon's (1974) concept of the primary and secondary effects of social origin and immigrant-specific inequalities, employing the concept of primary and secondary effects of ethnic origin (Kristen and Dollmann, 2010; Van de Werfhorst and Van Tubergen, 2007). Bourdieu's

approach (1991) on linguistic habitus and capital provides an adequate base to analyse the effects of language background on performance, focusing on language acquisition as one aspect behind the primary effects of ethnic/immigrant origin.

Theoretical concept: Effects of social origin, immigrant origin and language background on educational attainment

To establish the link between language background and educational attainment, it is crucial to first examine how individual characteristics such as social origin and immigrant origin affect educational achievement and situate the aspect of language background within this framework. Indeed, language background is one dimension of the primary effects of ethnic/immigrant origin (Griga and Hadjar, 2013; Kristen and Dollmann, 2010). It is also important to keep in mind that a large part of the disadvantage experienced by immigrants in terms of academic achievement can be explained by the fact that they often belong to the working class and lack resources (Becker et al., 2013).

Primary and secondary effects of social origin. Differentiating between the primary and secondary effects of social origin, the first relates to achievement differences, while the latter refers to (class-specific) differences in educational decisions regarding educational orientations and transitions, controlling for performance effects (Boudon, 1974; Griga and Hadjar, 2013; Thompson and Simmons, 2013). For this analysis of achievement differences in Luxembourg – where tracking decisions are taken by commissions with a limited say from parents or students – the primary effects are of much higher importance. Primary effects refer to achievement differences that relate to class-specific available resources (e.g. economic, cultural and social capital, including linguistic capital; Bourdieu, 1986, 1991) that affect children's cognitive skills and learning conditions (Thompson and Simmons, 2013). Students of privileged social origin (e.g. service class or upper-middle class) benefit from their conditions and may consequently show higher school achievement and attend higher educational pathways (Hadjar et al., 2015; Ress and Azzolini, 2014).

Primary and secondary effects of ethnic/immigrant origin. Kristen and Dollmann (2010: 118–119) theorise that there are primary and secondary effects of ethnic or immigrant origin, beyond the effects of social origin. The primary effects relate to achievement differences between immigrants and non-immigrants, namely lower performance of immigrant-origin students that are rooted in resource deficits related to language barriers and lack of knowledge regarding learning content and education system characteristics (Hadjar and Scharf, 2019; Kristen and Dollmann, 2010; Kristen and Granato, 2007). The secondary effects relate to immigrant-specific educational decisions, namely the higher educational aspirations and higher transition rates among immigrant-origin youths in upper secondary and tertiary education (e.g. Griga and Hadjar, 2013; Hadjar and Scharf, 2019).

Whereas Boudon (1974) mentions class-specific language inequalities, Kristen and Dollmann (2010) focus on the linguistic background and immigrant-specific language differences. Exploring the effects of linguistic background as one cause of differences in educational outcomes and opportunities, the present study focuses on achievement differences in terms of the primary effects of social and immigrant origin, with linguistic resources as one aspect of these effects.

The role of language acquisition in immigrant- and class-specific inequalities. A classic assumption is that students who do not speak the language of literacy at home are more likely to have cognitive disadvantages in meeting the phonetic and grammatical requirements within the language learning process (Bourdieu and Passeron, 1977). The more linguistic differences that exist between the native language and the literacy language, the higher the tendency of students to use the phonetic and grammatical structure of their mother tongue when they are learning a foreign language (Weth, 2015). Hence, according to Griga and Hadjar (2013), not only are immigrant students – who do not speak the country's official language at home – more likely to encounter linguistic barriers affecting their educational performance (a primary effect of ethnic origin), but these students are also more likely to choose differential educational pathways along their school career (a secondary effect of ethnic origin).

Bourdieu (1991) explains this process in relation to linguistic capital and linguistic habitus and provides a similar explanation based on both social and immigrant origins that yields a more holistic approach (Thompson and Simmons, 2013): linguistic capital is linked to class-specific traits of speech (e.g. abstraction, formalism and intellectualism; Bourdieu and Passeron, 1977; Collins, 1993). The linguistic habitus can be defined as language dispositions acquired in the course of learning and using a language in particular contexts, such as in familial and social-educational settings (e.g. immigrant-specific traits; Vann, 2000: 174). Habitus as a system of durable embodied dispositions and practices derives from internalised structures (e.g. social and parental background) with regard to capital forms as available resources and a heterogeneous accumulation of social objective structures (e.g. the education system).

Following Bourdieu's capital approach, educational outcomes and attainments are linked to economic (e.g. parents' financial resources), social (e.g. social and parental support) and cultural (e.g. ethnic, cultural and immigrant background, or parents' level of education) resources (Weth, 2015). Accordingly, Collins (1993: 118) assumes that native students from upper classes are more likely to be advantaged at school, due to their language background being much closer to the linguistic proficiency level expected in educational settings.

Prior research indicates that students from less advantaged social and immigrant origins are more likely to show poor educational performance than native students from advantaged social origins such as those originating from service-class families (see Kristen et al., 2008; Kristen and Dollmann, 2010; Van de Werfhorst and Van Tubergen, 2007). With regard to differences in students' language backgrounds

among immigrant and non-immigrant students, according to the OECD (2018; Agirdag and Vanlaar, 2018), natives and native-speaking immigrant students (second generation) commonly gain better educational achievements than immigrant students with another language background than one of the country's official languages (first generation).

Contextualisation: The case of Luxembourg. Luxembourg is a multilingual and multicultural society. In January 2018 (STATEC, 2019), Luxembourg's population consisted of 602,005 residents, of which 52% are Luxembourgish citizens. The largest immigrant groups are of Portuguese (16% of the total population are Portuguese citizens), French (7.6%), Italian (3.7%), Belgian (3.4%) and German origin (2.2%). However, the number of immigrant-origin residents (e.g. parents not born in Luxembourg) is much higher. Furthermore, there are many daily cross-border commuters who work in Luxembourg while living in the greater region.

Recent studies on inequality (see Griga and Hadjar, 2013; Hadjar et al., 2015; Müller and Shavit, 1998) have not only shown the importance of individual characteristics and resources for social and immigrant origins on educational disparities, but also their importance relative to the *education systems' effects as key drivers for unequal educational outcomes and opportunities*. Talking about education systems therefore involves a description of institutional characteristics that affect educational inequalities in very different ways (see Boudon, 1974; Hadjar and Becker, 2016). Institutional stratification (i.e. the quantity of available school tracks, time of selection procedures and educational mobility among tracks) seems to be most strongly linked to educational inequalities (Hadjar and Gross, 2016).

Educational stratification or external differentiation (Van de Werfhorst and Mijs, 2010) refers to the (vertical) segregation of students into various (academic and vocational) school tracks, which feature different school curricula, requirements, qualifications and certifications. Stratified education systems are also characterised by an early selection of students into distinct school tracks, low mobility between the parallel tracks and a strong link between educational pathways and distinctive future educational and occupational opportunities (see Ballarino et al., 2016; Esser, 2016; Hadjar and Gross, 2016; Müller and Shavit, 1998). Examples of education systems with low stratification include Sweden, Norway and Estonia, while countries such as Germany, Switzerland and Luxembourg feature a higher degree of educational stratification (see Ballarino et al., 2016; Hadjar and Gross, 2016). Although the intention behind stratification or external differentiation is to create homogeneous learning environments and to foster students' performance capacities (Mühlenweg, 2007), it deprives students in lower educational tracks from common socialisation with peers who achieve higher educational performance and who could serve as role models for better school performance (Hadjar and Gross, 2016). Early selection is another crucial driver of inequalities in stratified education systems, as social disparities in learning abilities may not be reduced until students are selected into differential school tracks (Hadjar and

Becker, 2016). Existing educational disparities based on origin effects therefore increase in relation to the stratification and institutional distinctions of the education systems, whereby higher tracks are more likely to show an underrepresentation of more disadvantaged students (Griga and Hadjar, 2013). The earlier decision-making demands parental reliability on resources and information regarding the presence of educational transitions (see Kristen and Dollmann, 2010; Thompson and Simmons, 2013). In sum, the educational inequalities structured by social and immigrant origin are stronger within highly stratified education systems (cf. Hadjar and Gross, 2016; Müller and Shavit, 1998).

The Luxembourgish school system. In comparison to other countries in Europe, Luxembourg encompasses a highly stratified and selective education system that has been organised trilingually (Fehlen, 2001: 68; Hu et al., 2015).

Pre-primary and primary school (*École fondamentale*) encompasses eight years of compulsory education, structured along four, two-year learning cycles (pre-schooling: *Éducation précoce* and *éducation préscolaire*: Cycle 1.1/1.2; *Enseignement primaire*: Cycles 2.1–4.2). Towards the end of each two-year cycle, teachers evaluate whether students meet the requirements to continue to the next cycle based on evaluations within the cycle regarding a list of competences to be acquired (*socles de compétences*). Performance in French and German language arts, as well as mathematics, are most decisive (Weth, 2015) during the transition between the primary school cycles and from primary to secondary school – including decisions regarding placement in one of the secondary school tracks outlined below, which takes place after the last cycle (Cycle 4.2) at the age of eleven. With the transition to secondary school, students are placed in one of several distinctive parallel secondary school tracks starting at grade 7: the academic track leading finally to a general university-entrance certificate (ES: *Enseignement Secondaire*) or one of the technical tracks (EST: *Enseignement Secondaire Technique*) – namely *EST-théorique* as a track that also allows transition into tertiary education, *EST-polyvalente* and *pratique* as lower technical and strongly vocation-oriented tracks and the vocational track *EST-préparatoire*, also referred to as *Modulaire*, that mainly prepares for the later transition to vocational training or direct transition to the labour market, which is the lowest educational track in Luxembourg (Backes and Hadjar, 2017). *PROCI* (*Projet pilote cycle inférieur*) – an integrative project implemented in a few secondary schools – is part of the technical secondary school track that, in contrast to the other tracks, consists of students of different performance levels. The compulsory orientation (*décision d'orientation*) relative to the placement decision into one of the secondary school tracks is decided by a committee – including primary and secondary teachers and school inspectors – in accordance with a psychologist and the children's parents on the basis of the pupils' school performance during primary school, as well as the results of standardised testing (*épreuves communes*) in the two literacy languages and mathematics during grade 5 (*épreuves standardisées*; Backes and Hadjar, 2017; Glock and Krolak-Schwerdt, 2014; Weth, 2015). Characterised by less mobility between

schooling tracks (Backes and Hadjar, 2017), students within the Luxembourgish education system rarely experience upward mobility between the school tracks. Upward and downward mobility are highly selective, with the former being more among students who are female and of privileged social origin, while downward mobility is often experienced by students who are male and of low social origin (Backes and Hadjar, 2017).

The school student population. Resembling the multi-ethnic population of Luxembourg, the schooling system is also characterised by a high proportion of foreigners. If nationality is considered, in the 2016/2017 school year in primary education (pre-schooling, primary schooling), 54% of the student population were Luxembourgish citizens, while students of Portuguese nationality – as the largest immigrant group – made up 22% of the school population. If language at home – and thus, not only nationality but also ethnic origin – is considered, only 36% of the student population in primary school speaks Luxembourgish (as the language most frequently used), while 28% speak Portuguese. In secondary schooling, 62% of the students are Luxembourgish nationals, while 23% are Portuguese nationals. Regarding languages, 46% of the student population in secondary schools speaks Luxembourgish at home, while 27% mentioned Portuguese as the language most often spoken at home. Students of Luxembourgish origin are overrepresented in the academic tracks of secondary schooling, while Portuguese students, in particular, are overrepresented in the vocational tracks and show a higher risk of early school leaving (Ministry of National Education, Children and Youth, 2018).

The multilingual school curriculum in Luxembourg. A main aim of the schooling system is the best preparation of students to gradually acquire the country's official languages, namely Luxembourgish – a Germanic language and German dialect (Keller, 1961) – French and German. Thus, the specialty of the Luxembourgish school curriculum is its focus on language literacy courses to serve the trilingual nature of the country (approx. 40% of the school curriculum; Hu et al., 2015; Le Neves, 2011: 3).

The command of Luxembourg's three official languages is prepared, introduced and enhanced during primary education (*Enseignement fondamental*) – occupying around 43% of the school lessons (Hu et al., 2015: 64; Weth, 2015: 23). Luxembourgish is used in verbal communication among students and in student–teacher interactions as a medium of instruction, and it is already taught in the first pre-schooling cycle (Cycle 1.1). Luxembourgish is later used as a language of tuition in many school subjects, particularly as a '*hidden curriculum*' (Weth, 2015: 23). From the very beginning of primary school (Cycle 2.1), German is taught as a language of literacy, becoming the primary school's language of instruction. Although German cannot be equated to Luxembourgish, both languages share some obvious phonological and grammatical similarities, so German language arts is not perceived as foreign language teaching in Luxembourg (Kühn, 2011). From the second half of cycle two (Cycle 2.2), French is introduced into the

curriculum, while in the third cycle (Cycle 3.1), pupils are confronted with French literacy (Engel de Abreu et al., 2015). On the basis of the '*plan d'études*', school subjects such as mathematics, science and '*éducation morale et sociale*'/'*vie et société*' are taught in German, while subjects such as music, arts and sports may be taught in the language of the teachers' choice (Weth, 2015). Pupils facing significant difficulties in any of the three languages are provided with pedagogical support (*Appuis pédagogique*) during or after classroom lessons.

After the transition into secondary school, French is progressively introduced as a second tuition language. English is incorporated into the curriculum from grade 8 in the ES and EST tracks. Furthermore, in the second year of the ES academic track, students can choose to learn Latin. Further languages such as Spanish, Italian or Portuguese can be studied as an option with a limited knowledge acquirement (Hu et al., 2015; Wagner, 2016; Weber and Horner, 2012) according to the track and profile chosen.

Finally, considering the *state-of-research regarding educational inequalities in the Luxembourgish multilingual and highly stratified school system*, educational research and educational monitoring emphasise the prevalence of disadvantages in educational attainment in Luxembourg. Risk groups include low-social origin students (e.g. working class), immigrant-origin students (including Portuguese students) and male students. These student groups show lower competences, lower school grades and a lower likelihood of placement in more prestigious secondary educational tracks such as the academic ES track (Backes and Hadjar, 2017; Hadjar and Uusitalo, 2016; OECD, 2018; University of Luxembourg/LUCET, 2015; Wagner, 2016).

Many students, especially immigrants, do not meet the educational requirements and, in particular, those related to language literacy in both French and German. Language backgrounds also structure educational opportunities in the education system: students with a Romance language background (e.g. French, Portuguese, Italian, Spanish and Cape Verdean Creole) encounter comparably strong linguistic difficulties with the German language, particularly in primary school and the EST secondary track. Romance-speaking students tend not to achieve the minimum linguistic requirements for the multilingual curriculum (Hu et al., 2015; Le Neves, 2011). Native Luxembourgish students face fewer difficulties with German literacy, presumably due to the similarities in phonological and grammatical structure of both languages (Wagner, 2016). The statistical underrepresentation of immigrant students in the academic track ES (approx. 20%) is another expression of inequalities structured by language background. Lower language competency in German during primary school makes students more likely to be placed into lower school tracks in which German remains the main language of instruction (Wagner, 2016). Hadjar et al. (2015) show that, although Germanic-speakers have a clear advantage and show the highest effect of linguistic background on educational attainments – particularly in primary school, when German is the language of instruction – students with a Romance language background show an advantage with the French language in secondary school. Because French

is one of the official languages, native-speaking students might not face much of a burden with French literacy (Wagner, 2016: 47–50), and Romance-speakers are particularly more likely to continue facing significant difficulties in German in secondary school (Hadjar et al., 2015).

Hypotheses

Investigating the role of students' language background in their success within the multilingual and highly stratified education system in Luxembourg, the following hypotheses have been derived based on the presented literature review of inequality theories and the Luxembourgish context:

Hypothesis 1: *Students from less-advantaged social origins attain lower educational achievements.*

Hypothesis 2a: *Students with an immigrant origin attain lower educational achievements.*

Hypothesis 2b: *Students with a linguistic background other than the country's official school language attain lower educational achievements.*

Hypothesis 2c: *The lower educational achievements of students with immigrant origin are explained by their specific language backgrounds that differ from the country's official school languages.*

Data, measures and methods

The study of the role of language backgrounds in achievement inequalities is based on quantitative data employing mixed-effects linear regression.

Data: Selection procedure, sampling strategy and empirical data collection

The presented research on educational inequalities within the Luxembourgish system is based on a longitudinal panel study from the international collaborative research project *School Alienation in Switzerland and Luxembourg* (SASAL), which was carried out by research groups at the University of Bern and the University of Luxembourg between 2015 and 2019 (Hascher and Hadjar, 2018; Morinaj et al., 2017). This project centred on how primary and secondary school students perceive learning, teachers and their classmates and schooling in general. A core aim of the study was to identify causes and consequences of school alienation. The project included quantitative and qualitative sub-studies. While a panel survey followed students during the final years of primary schooling and the first years of secondary schooling, qualitative in-depth interviews and group

discussions focused on the transition from primary to secondary school. Participants in the SASAL project were selected based on a multi-level sampling approach considering the heterogeneity of classrooms in different institutional contexts and focusing on certain areas (e.g. urban versus rural areas, industrial versus service class-dominated towns) in the countries that have been parallelised to allow for comparisons.

The data used for the present study on language and educational achievement stem from two survey waves in Luxembourg: data from primary school students cover grade 4 (Cycle 3.2) and grade 5 (Cycle 4.2) and secondary school data relate to grades 7 and 8. In total, 17 primary schools (36 classrooms) and four secondary schools (32 classrooms) were selected. The quantitative questionnaire included item batteries to cover school alienation, participation in lessons, deviant behaviour in school, school achievement and students' well-being, as well as sociodemographic questions relating to parental educational level, the professions of the father and/or mother and language use at home and during leisure-time activities. Information on school grades (given by the teachers) is administrative. The student questionnaire was designed in German and in French (although only a minority of students chose this questionnaire language), employing back translation and validity checks to guarantee the survey's reliability and validity. As both primary and secondary school students were surveyed, the questionnaire included slight differences to ensure the appropriate understanding of both target groups (Morinaj et al., 2017).

Measures

The effects of language background, immigrant origin and social origin on achievement are modelled regarding three *dependent (outcome) variables*: students' GPA in primary and secondary schooling; mathematics grades in primary and secondary schooling (this is of particular interest when focusing on the language background because the language of instruction for mathematics changes from German to French after the transition to secondary school); and placement into a low-aspiration level secondary school track (vocational *Modulaire* track) as an expression of prior achievement (rather than educational decisions that play only a marginal role at this stage in Luxembourg). All information on grades and tracking was gathered from classroom teachers and school secretaries to secure high data quality. While primary school grades (grade 5, 2017) were assigned using an eight-point scale ranging from A+, A, B+, B and C, C+ (as successful grades) to D+ and D (fail) – and have been inverted for our analyses so that high scores indicate higher achievement – secondary school grades range from 0 to 60, with higher scores indicating higher achievement (below 30: fail). While the GPA for primary schooling (grade 5) includes four grades for four different aspects of German language arts (e.g. listening and reading comprehension), French language arts (e.g. listening and reading comprehension) and mathematics (e.g. space and form, numbers and operations), the secondary school GPA (grade 8)

includes one grade each for German language arts, French language arts and mathematics. Accordingly, the mathematics grade for primary school students relates to four sub-grades, while it relates to only one grade in secondary schooling. Because grading scales differ between primary and secondary school, the GPA and mathematics grades have been z-standardised. The secondary school track attended in grade 8 as an expression of prior achievement is measured along the institutional structure of the Luxembourgish education system. As a dependent variable, the binary variable ‘attending the Modulaire track’ is introduced for the low-aspiration secondary vocational school track (reference: higher vocational and academic secondary tracks).

Considering the main *independent variables*, language background in terms of linguistic capital was operationalised for the students’ main languages spoken at home one year (grade 4/grade 7) before the information on the dependent variables were gathered. As Luxembourgish and German show similarities in phonological and grammatical structure (Horner and Weber, 2008; Keller, 1961; Wagner, 2016) and including both languages in the same category is a common feature in educational reporting in Luxembourg (e.g. University of Luxembourg/LUCET, 2015), both languages were recoded into the same category (reference category). Because the Portuguese- and French-speaking communities are widely represented in Luxembourgish schools, the models include both Romance language backgrounds as separate categories. All other language backgrounds were recoded into an ‘other’ category. Although Slavic students represent a large ethnic group in Luxembourg (Hu et al., 2015: 69), they are not classified within their own category, because our sample did not include enough cases.¹

For immigrant origin, natives are defined as Luxembourg-born students with both parents born in Luxembourg. According to the OECD (2018) classification, immigrant-origin students include 2.5-generation immigrants (mixed-heritage; student and one parent born in Luxembourg, the other parent born abroad); second-generation immigrants (both parents born outside Luxembourg, student born in Luxembourg); and first-generation immigrants (both students and parents foreign-born).

The operationalisation of social origin effects was based on the occupational level of the students’ parents. Based on the *International Standard Classification of Occupations* (ISCO), the highest occupational position from either parent was classified into three categories for socio-economic status: working, middle or upper-middle class (Hadjar and Scharf, 2019).

The *control variable* was student gender (two categories: male and female as reference category). After screening the school classrooms and asking teachers, other gender operationalisation (e.g. gender continuum, transgender or intersexual) categories were omitted. School track was included as a control (categories: EST-PROCI track for the mixed technical school track, EST tracks, EST-Modulaire track as lowest track; reference: academic track ES) in the models relating to achievement in secondary schooling, while school track – as outlined above – also serves as a dependent variable in certain analyses.

Finally, to take into account the nested sampling structure and the similarities within and differences between classrooms, mixed-effects regression models were estimated (cluster: classrooms).

Sample description

The data set encompasses two waves of the SASAL study, so that the language spoken most often at home as a potential cause (variables in wave 1) is measured at a different time than the potential effect (variables in wave 2), although the language(s) spoken at home appear(s) to be rather stable. The first wave of the survey in 2016 encompassed respondents from Cycle 3.2 (grade 4) and grade 7, and at time point 2 in 2017, the respondents attended Cycle 4.1 (grade 5) and grade 8. The wave 1–wave 2 sample used in the analyses consisted of 869 students, 404 primary school students (52% male) and 465 secondary school students (56.8% male).

Concerning social class distribution, more than half of the student sample originates from the middle classes (54%), 29% from the upper-middle/service classes and 17% from the working classes. Concerning the students' language background, following the classification used in the models, 51% of the students have a Luxembourgish-German language background, 26.7% a Portuguese language background and 8.7% a French background. The proportion of other language backgrounds (including Serbian, Italian, Spanish, Chinese, Dutch and Kreol) is 13.7%.

For the sample of secondary school students and their affiliation with one of the distinct school tracks in grade 8, almost half of the students attended one of the EST technical tracks (25.3% higher EST tracks, 23.2% the Modulaire or lowest EST technical track), while 34% of the students attended the ES academic secondary track and 17% attended the PROCI integrative technical track.

Finally, for the interpretation of the results, some intersections between socio-economic and language background variables may be of interest. While the majority of Luxembourgish/German- and French-speaking students came from privileged socio-economic backgrounds (upper-middle class), Portuguese and other languages are overrepresented within the lower classes (working and middle class).

Results

The results section centres on mixed-effects regression models of several dependent student achievement variables: GPA and grades in mathematics (Table 1) in primary (grade 5) and secondary school (grade 8, Table 2) and attending the lowest school track (EST-Modulaire) in secondary school (grade 8, Table 3). Four models introducing the variables stepwise are shown: Model I is a control model, showing the effects of student language background as the variable of interest when not controlled for any of the other variables. Model II analyses the language background when, as in all models, it is controlled for gender and social origin, and the

Table 1. School achievement in primary school (mixed-effects linear regression models).

	Model I Language only	Model II Language, controls (gender, class of origin)	Model III Immigrant origin, controls (gender, class of origin)	Model IV Language, immigrant origin, controls (gender, class of origin)
Dependent: School achievement (Grade Point Average) (wave 2)				
Language spoken at home (Ref. Luxembourgish-German)				
Portuguese	-.42** (-.68/- .17)	-.15 (-.40/.10)		-.05 (-.24/.33)
French	.12 (-.25/.49)	.01 (-.34/.36)		-.16 (-.20/.52)
Other	-.37* (-.68/- .08)	-.21 (-.49/.07)		-.05 (-.35/- .25)
Social origin (Ref. upper middle class)				
Middle class		-.65*** (-.88/- .42)	-.70*** (-.92/- .48)	-.69*** (-.92/- .47)
Working class		-1.03*** (-1.35/- .70)	-1.03*** (-1.34/- .73)	-1.02*** (-1.34/- .70)
Immigrant origin (Ref. non-immigrants)				
2.5. Generation immigrants			-.09 (-.40/.22)	-.10 (-.41/- .22)
2. Generation immigrants			-.24† (-.50/.01)	-.27† (-.57/.02)
1. Generation immigrants			-.51** (-.79/- .22)	-.53** (-.85/- .21)
Gender (Ref. female)				
Male		-.19* (-.38/- .00)	-.18† (-.36/.01)	-.18† (-.36/.01)
N	327	327	327	327
R-Square (OLS)	.05	.19	.22	.22
Wald Chi-square	15.90	69.39	82.35	84.00
Constant	.16†	.69***	.87***	.86***

(continued)

Table 1. Continued

	Model I Language only	Model II Language, controls (gender, class of origin)	Model III Immigrant origin, controls (gender, class of origin)	Model IV Language, immigrant origin, controls (gender, class of origin)
Dependent: Mathematics achievement (wave 2)				
Language spoken at home (Ref. Luxembourgish-German)				
Portuguese	-.31* (-.57/-.05)	-.07 (-.34/-.19)		.12 (-.18/.42)
French	-.03 (-.42/.35)	-.15 (-.52/.22)		-.01 (-.38/.41)
Other	-.37* (-.67/.07)	-.23 (-.53/.06)		-.07 (-.40/.25)
Social origin (Ref. upper middle class)				
Middle class		-.56*** (-.80/-.32)	-.57*** (-.81/-.34)	-.59*** (-.83/-.35)
Working class		-.88*** (-1.29/-.54)	-.83*** (-1.15/-.51)	-.86*** (-1.20/-.52)
Immigrant origin (Ref. non-immigrants)				
2.5. Generation immigrants			-.09 (-.42/.24)	-.09 (-.42/.25)
2. Generation immigrants			-.26† (-.53/.01)	-.28† (-.60/.03)
1. Generation immigrants			-.47** (-.78/-.17)	-.50** (-.84/-.16)
Gender (Ref. female)				
Male		.01 (-.20/.21)	.01 (-.18/.21)	.02 (-.18/.22)
N	324	324	324	324
R-square (OLS)	.03	.12	.14	.15
Wald Chi-square	9.04	41.11	49.66	51.44
Constant	.15†	.51***	.66***	.67***

Note: Significance levels: †.10, *.05, ***.001; cluster: school classrooms (36 primary school classrooms).
Data source: SASAL project Luxembourg, wave 1 + 2.

Table 2. Secondary school tracking: Modulaire track (logit regression models).

Average marginal effects (AME) (95% confidence intervals)	Model I Language only	Model II Language, controls (gender, class of origin)	Model III Immigrant origin, controls (gender, class of origin)	Model IV Language, immigrant origin, controls (gender, class of origin)
Dependent: Attending Modulaire track (wave 2)				
Language spoken at home (Ref. Luxembourgish-German)				
Portuguese	.15*** (.07/.23)	.01 (−.07/.09)		−.05 (−.15/.05)
French	−.02 (−.19/.14)	.03 (−.12/.19)		−.02 (−.18/.15)
Other	.12* (.00/.24)	.02 (−.09/.13)		−.01 (−.13/.11)
Social origin (Ref. upper middle class)				
Middle class		.26*** (.19/.52)	.35*** (.18/.51)	.36*** (.19/.52)
Working class		.46*** (.29/.64)	.42*** (.25/.59)	.44*** (.27/.61)
Immigrant origin (Ref. non-immigrants)				
2.5. Generation immigrants			.09 (−.03/.20)	.10 (−.02/.22)
2. Generation immigrants			.05 (−.06/.15)	.07 (−.05/.18)
1. Generation immigrants			.13* (.02/.24)	.17* (.04/.30)
Gender (Ref. female)				
Male		.18*** (.10/.25)	.17*** (.09/.24)	.17*** (.10/.25)
N	443	443	443	443
Pseudo R-square	.03	.17	.18	.18
Constant	−1.70***	−4.54***	−4.86***	−4.95***

Note: Significance levels: †.10, *.05, **.01, ***.001; cluster: school classrooms (32 secondary school classrooms).

Data source: SASAL project, Luxembourg, wave 1 + 2.

Table 3. Achievement in secondary school (mixed-effects linear regression models).

	Model I Language only	Model II Language, controls (gender, class of origin, track)	Model III Immigrant origin, controls (gender, class of origin, track)	Model IV Language, immigrant origin, controls (gender, class of origin, track)
Dependent: School achievement (Grade Point Average) (wave 2)				
Language spoken at home (Ref. Luxembourgish-German)	-.22* (-.44/- .01)			
Portuguese	.12 (-.20/.43)	-.09 (-.32/.14)		-.01 (-.28/.26)
French	.01 (-.29/.32)	.11 (-.20/.42)		.20 (-.15/.55)
Other		-.14 (-.17/.45)		.23 (-.11/.58)
Social origin (Ref. upper middle class)				
Middle class		-.27* (-.50/- .05)	-.27* (-.49/- .05)	-.26* (-.48/- .03)
Working class		-.32* (-.64/- .00)	-.33* (-.64/- .03)	-.29† (-.61/.03)
Immigrant origin (Ref. non-immigrants)				
2.5. Generation immigrants			-.16 (-.42/.10)	-.18 (-.45/.08)
2. Generation immigrants			-.12 (-.35/.11)	-.19 (-.46/.08)
1. Generation immigrants			-.11 (-.38/.16)	-.17 (-.49/.15)
Secondary school track (Ref. ES)				
PROCI			-.45* (-.89/- .00)	-.44† (-.88/.01)
EST		-.44† (-.89/.01)	-.34 (-.74/.07)	-.33 (-.74/.08)
MODULAIRE		-.32 (-.73/.09)	-.06 (-.48/.36)	-.06 (-.48/.37)
Gender (Ref. female)				
Male		-.21* (-.39/- .03)	-.22* (-.40/- .04)	-.21* (-.39/- .03)
N	420	420	420	420
R-square (OLS)	.03	.12	.12	.12
Wald Chi-square	1.10	26.64	25.95	29.28
Constant	-.04	.50**	.59***	.57***

(continued)

Table 3. Continued

	Model I Language only	Model II Language, controls (gender, class of origin, track)	Model III Immigrant origin, controls (gender, class of origin, track)	Model IV Language, immigrant origin, controls (gender, class of origin, track)
Unstandardised B (95% confidence intervals)				
Unstandardised B (95% confidence intervals)				
Dependent: Mathematics achievement (wave 2)				
Language spoken at home (Ref. Luxembourgish-German)				
Portuguese	.00 (–.22/.23)	.12 (–.12/.36)		.20 (–.08/.48)
French	.17 (–.16/.50)	.16 (–.17/.48)		.24 (–.11/.60)
Other	.04 (–.28/.36)	.12 (–.20/.45)		.21 (–.14/.57)
Social origin (Ref. upper middle class)				
Middle class		–.27* (–.50/–.03)	–.24* (–.47/–.01)	–.25* (–.49/–.02)
Working class		–.29† (–.62/.04)	–.25 (–.57/.07)	–.27 (–.60/.06)
Immigrant origin (Ref. non-immigrants)				
2.5. Generation immigrants			–.29* (–.56/–.02)	–.34* (–.61/–.06)
2. Generation immigrants			–.08 (–.31/.16)	–.21 (–.49/.07)
1. Generation immigrants			–.06 (–.34/.23)	–.21 (–.54/–.12)
Secondary school track (Ref. ES)				
PROCI		–.15 (–.61/.32)	–.10 (–.57/.36)	–.13 (–.60/.33)
EST		–.23 (–.65/.20)	–.25 (–.68/.18)	–.25 (–.68/.18)
MODULAIRE		–.16 (–.60/.28)	–.14 (–.58/.30)	–.15 (–.59/.30)
Gender (Ref. female)				
Male		–.03 (–.22/.15)	–.02 (–.21/.16)	–.02 (–.21/.16)
N	420	420	420	420
R-square (OLS)	.00	.04	.05	.05
Wald Chi-square	1.10	8.91	11.98	15.00
Constant	–.04	.26	.37*	.38*

Note: Significance levels: † .10, * .05, ** .01, *** .001; cluster: school classrooms (32 secondary school classrooms).
Data source: SASAL project, Luxembourg, wave 1 + 2.

secondary school models additionally include school track as a differential setting that also has an impact on grading. Model III includes students' immigrant origin and control to see its explanatory value if language background is not considered. Model IV encompasses all of the variables to explore the effects of social and immigrant origin vis-a-vis the effects of language background. Language background and immigrant origin are linked to a certain extent, but as language backgrounds may vary both within the non-immigrant population and the immigrant population, multicollinearity is not a problem.

School achievement (GPA, mathematics) in primary school

Grade point average. Model I provides a first impression of the effects of language background when neither social origin nor any of the other variables are taken into account. Portuguese-speaking students and those who speak languages other than Luxembourgish or German at home appear to have lower grades than Luxembourgish-German speakers. Controlling for gender and social origin (but not for immigrant origin) in Model II, languages in terms of linguistic capital do not appear to be linked to GPA. Differences in Model I seem to be fully explained by other variables, particularly by the effects of social origin. The effects of immigrant origin, which are the focus of Model III, indicate that second- and first-generation students are less successful in school than non-immigrants. These effects go beyond differences caused by social origin. The effects of social origin are comparably strong, with students of upper-middle-class origin performing significantly better than students originating from middle- and lower-class families. Considering both immigrant and language background simultaneously in Model IV, the effect of immigrant origin for first-generation immigrants appears to remain robust, as do the effects of social origin, while the language background, again, shows no effect (Table 1).

Mathematics grade. The results in Model I indicate that Portuguese-speaking students and those who speak languages other than Luxembourgish or German at home appear to have lower grades in mathematics than Luxembourgish-German speakers. Controlling for social origin and gender in Model II, however, reveals that these differences are only due to hidden, third-variable impacts, with social origin as the most important one. Students of working-class and middle-class origin appear to have lower grades in mathematics. Model III shows that first-generation immigrant students seem to be at an additional disadvantage. In Model IV, social and immigrant origin are still the most robust predictors. Language background plays no role in mathematics achievement, which does not seem to be additionally hampered by a lack of skill in German as the language of instruction in primary school due to the condition that German is not spoken at home (Table 1).

Tracking in the stratified education system: The Modulaire track in secondary schooling

The next step of the analysis focuses on the tracking decision, as track selection is crucial for later life in terms of further educational pathways, labour market opportunities and life chances. As indicated, the secondary school track in the Luxembourgish education system with the lowest aspiration level is the EST-Modulaire track. While only modules are graded here and the main aim is to provide students with experiences of success, attending this low educational track most often leads to early school leaving, with the lowest chances on the labour market. We again analyse the impact of social origin, gender as control, immigrant and language backgrounds (Table 2). Modelling the language background effects only (Model I) reveals disadvantages for Portuguese-speaking students and students with a language background other than Luxembourgish or German who (compared to students from Luxembourgish-German language backgrounds) are more likely to be placed in the lowest educational track in Luxembourg (Modulaire). Again, the language background effects appear to be fully explainable via other effects, as they show no significant impact in the other models. The probability of working-class offspring attending this low-aspiration track is more than 40% higher than for service-class offspring. Males also show a higher probability (Models II–IV). Considering immigrant origin – while controlling for social origin and gender – reveals that first-generation immigrants have a more than 10% higher probability of attending the lowest educational track in Luxembourg's secondary education (Models III, IV).

School achievement (grade point average, mathematics) in secondary school

Grade point average. Model I indicates that – taking none of the other variables into account – Portuguese-speaking students are at a disadvantage regarding their grades in secondary school. However, looking at Model II, these disadvantages are probably caused by other factors, such as social origin and tracking, because – again – there do not appear to be any linguistic background effects on general school marks: in secondary schooling, students of working- or middle-class origin perform worse than upper-middle class students. Immigrant origin shows no significant effect on achievements in Model III, which is certainly due to the effects of dominant social origin and school track: compared to students in the highest (academic) secondary track ES, students selected into the integrative PROCI track (within technical secondary education) show lower general educational attainment, while school grades in the other tracks (EST and Modulaire) do not differ significantly from the ES students. Considering both immigrant and language background in Model IV again reveals no such effects. Disparities along these factors seem to be fully explained by social origin (Table 3).

Mathematics grade. Finally, mathematics as a specific school subject is considered. This subject is of particular interest for this study on the role of language

background, as the language of instruction changes from German to French in most secondary school settings. Taking a preliminary look at differences between certain language backgrounds in Model I, there are no significant differences between the language groups in mathematics grades, even if the effects of social origin, gender, immigrant origin or tracking are not separated out. The results of Model II indicate, again, no significant effects for language spoken at home. A striking finding relates to the students who speak French at home, as they do not even have a benefit from French as the language of instruction. Concerning the effects of social origin, middle-class students perform significantly lower. Regarding the effects of immigrant origin, Model III reveals that only the 2.5-immigrant generation – that is, students born in Luxembourg with one parent born in Luxembourg and the other parent born abroad – shows a significant disadvantage in comparison to non-immigrants in the secondary school sample. Among this group, it is likely that the Luxembourg-born parent is a third-generation immigrant with the grandparents being born outside Luxembourg. Considering both language background and immigrant origin at the same time in Model IV, does not change the picture (Table 3).

Conclusion

The main aim of this paper was to analyse the links between students' language background and educational achievements in primary and secondary school, as measured by GPA and mathematics grades, as well as attendance in a certain school track as an indicator for prior achievement. At the same time, the effects of social and immigrant origin were considered.

Results summary

Summarising our results in light of the theory-driven hypotheses shows that three out of five hypotheses received some support: as stated in Hypothesis 1, the results indicate that *students from less-advantaged social origins attain lower educational achievements (GPA, mathematics)* in primary and secondary school, with working-class students being comparably most disadvantaged. Even in complex models introducing immigrant and language backgrounds, social origin remained a robust and significant predictor of achievement. Hypothesis 2a received some support regarding Luxembourgish primary schools, because *immigrant-origin students attain lower educational achievements*. For secondary schooling, immigrant origin showed no impact on general achievement in terms of GPA, and seemed to play a minor role in mathematics achievement. Hypothesis 2b only received marginal support, with speakers of Portuguese and languages other than Luxembourgish-German appearing to be disadvantaged in simple models, without taking into account social origin or immigrant origin. As soon as these variables were considered, *being a student with a linguistic background other than the country's official school language had no impact on educational achievements* – both in primary school

with German as language of instruction and in secondary school where, in certain tracks and school subjects (such as mathematics), French is the language of instruction. Accordingly, Hypotheses 2c – assuming that the effects of immigrant origin were explained by language background – was not supported in the Luxembourgish data.

Discussion

This analysis of the Luxembourgish case, with its highly stratified education system and high proportion of immigrants, provides implications for the theories outlined earlier. Simultaneously considering other individual-level determinants, such as immigrant origin and language background, students' social origin showed a highly significant effect. Considering the primary effects of ethnic origin according to concepts by Kristen and Dollmann (2010) and Van de Werfhorst and Van Tubergen (2007), school achievement appeared to be linked to students' immigrant origin in primary school, with non-immigrants receiving better school grades than students of immigrant origin. In secondary school, this effect is less pronounced, as students are already selected into different school tracks and immigrant-origin students are more often selected into less prestigious tracks with lower aspiration levels. As Luxembourg is a highly stratified country, where students are segregated in secondary school tracks, the general assumption of a higher prevalence of educational inequalities (Hadjar and Becker, 2016; Van de Werfhorst and Mijs, 2010) in such education systems is supported.

The idea that language is a crucial factor for the lower achievement of immigrant students (controlling for social origin) and thus, in primary effects, of ethnic origin (Kristen and Dollmann, 2010) was not supported in the Luxembourgish case. At least it appears there are no language effects that go beyond the effects of social and immigrant origin. Portuguese-speaking students – as a particularly disadvantaged group in the Luxembourgish education system (cf. University of Luxembourg/LUCET, 2015) – do not have lower achievement due to their language, but due to their lower social and immigrant origin. Romance-speakers – including French- or Portuguese-speakers – did not benefit at all in mathematics from the use of French as a language of instruction in some secondary school tracks. This suggests that linguistic capital (Fehlen, 2001, following the concept of Bourdieu, 1991) is not a strong mechanism behind educational inequalities related to immigrant background, while other capital resources such as cultural and economic capital linked to social origin seem to strongly determine disadvantages in education. Because linguistic capital is also linked to social origin, however, it does play a role. Based on the finding that language per se does not have a direct influence on students' educational achievements and does not appear to be the direct cause of disparities in educational achievement, but rather a representation of inequalities related to social and immigrant origin, two arguments concerning teachers appear to be plausible: first, teachers may use more than just the official language of instruction in the classroom, such as by switching to French or

(in the few cases that teachers know Portuguese) to Portuguese in settings where German is the language of instruction with a high proportion of Portuguese-speaking students, or explaining complex mathematical issues in Luxembourgish rather than French in secondary school. Second, teachers may take into account multilingualism when grading, giving a bonus to students whose native language is not the language of instruction. While language command – as proven in other studies (e.g. Agirdag and Vanlaar, 2018) – has an impact on competencies in reading and mathematics, teachers' evaluations may make a difference and balance school marks and tracking decisions in regard to such language background differences, ultimately reducing disadvantages due to language background. The result is presumably also an indicator for reasonable language integration of immigrants into Luxembourgish multilingualism at school and in society.

In comparison with previous studies on different multilingual educational settings, the presented results for the Luxembourgish case do not indicate that the language of instruction or switching the language of instruction *per se* lowers the educational performance of certain ethnic groups, but rather that social origin is a main axis of disadvantage. In other settings, disadvantages more strongly relate to language. For example, in Latvia, the performance of Russian-speaking students in secondary schools decreased when Russian was no longer the only language of instruction, but became the second language of instruction (Ivlevs and King, 2014). A study from Texas (Chin et al., 2013), however, did not show that bilingual teaching programmes (English/Spanish) had any effect on student performance among students who speak Spanish at home. Our results support the conclusion of Chin (2015: 1) that quality rather than the language of instruction is of importance.

Limitations

Certain methodological limitations must be mentioned: one possible explanation for why the linguistic background might not have shown any significance is that the measurement of the language background in this paper only relates to the language most spoken at home. It could be claimed that this item alone does not represent an adequate construct of the variable. The inclusion of languages used by students within the social environment would also be possible. Furthermore, while students' participation in the SASAL project depended on their parents' approval, it must be acknowledged that low-achieving students – as well as students with severe language problems – may have been underrepresented within the data sample.

Conclusion

All things considered, our empirical findings suggest that the students' language background does not play a crucial role in their success within the multilingual and highly stratified education system in Luxembourg, but rather that social origin (class) and immigrant origin do. As predicted by well-established theories,

language background has less effect on educational performance and attainment than social class and immigrant status. Luxembourg's multilingual schooling system seems to be able to compensate for potential disadvantages arising from a language background beyond the three central languages in Luxembourgish society and the education system, but - due to its stratified character - it is not able to eliminate disadvantages arising from social and immigrant origin.

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Note

1. Although the data set included information on languages spoken by the students during leisure-time activities with their friends, we refrained from using this information in our analyses. The language most often spoken at home indicates a high student exposure to this language and – presumably – a comparably high level of language literacy. Information on languages used during leisure-time activities with friends may also include languages students are only exposed to infrequently and in which students are not necessarily literate.

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