Educational differentials in activity limitations across the European Union: methodological issues and first results.

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in the framework of the JA-EHLEIS programme

Context

In the framework of the European health monitoring, the indicator of healthy life years (HLY) has been selected as one of the European Union (EU) structural indicators. The HLY is a summary measure of health expectancy based on the global activity limitation indicator (GALI) which is part of the yearly European Study on Income and Living Conditions (EU-SILC) conducted for 27 European countries. This work addresses the feasibility of disaggregating the HLY by socioeconomic status (SES), between ages 30 to 79 using the EU-SILC dataset. This objective is challenging due to both, issues in data comparability and robustness in this survey, and due to country specific association between health and SES indicators. Indeed, social, health and educational systems have been developing differently across European countries and generations, inducing an association between country and generation-specific, and health and the level of education. Analysing the educational differences in health requires accounting for three issues.

The first issue relates to the overall impact of education on health, in other terms the health return of being educated. This relates to the intrinsic beneficial effect of knowledge to access health information, to understand health risks and to manage own health. There is also an indirect effect of education on health related to the provision of socioeconomic position and the associated work and life conditions. Finally, the childhood circumstances that might condition schooling and the level of education also determines adult's health and its relationship to education. Accumulation theory describes a process in which education can have an increasing effect over the life course. The result is an overall health advantage for those in the high education group and a disadvantage of the low (or no) educated.

A second concern is how this overall effect interacts with the educational context of a country for a given period. Depending on the access to education, its various levels (low and high) would be more or less selective; as a result, the health return of education may be influenced by the level of selection and the relative socioeconomic situation. In a country (or generation) with limited access to higher education, the majority of the population is situated in the low education category while a selective group is high educated. The relative advantage of the latter in terms of type of occupation and related work conditions as well as the childhood circumstances that allowed this group to reach education would result in a notable health return of high education. On the contrary, for countries (or generations) that benefitted from a large access to education, high educated are not selected compared to the groups with no or low diploma; in these circumstances, a noted effect would be the health disadvantage of the low educated group rather than the health advantage of the high education group. This effect is illustrated by the changing association between health return of a given educational category.

The third issue relates to national contexts regarding health. On the one hand, health differences depends on whether health care is largely open or restricted to a part of the population - due to health care availability, health care costs and the social security systems; and one can expect that welfare states might reduce the health disadvantage of being low educated and the health advantage of being high educated. On the other hand, health differences also depend on the health practices and exposures, as well as on the overall quality of the health care system.

Finally, concentrating on data, it is noteworthy that health measured used in these study are often self-reported and therefore influenced by individual knowledge of their own health and the propensity to report health conditions. This is also country and education-dependent.

Each country and generation constitutes a specific combination of these issues from which results the magnitude of the educational differentials in health. Therefore, comparing health inequalities between countries is challenging. In this paper, we analyse EU-SILC 2009 dataset to discuss these issues and present results on educational differentials in activity limitation across the European Union. We present the preliminary results of the study and discuss the outcomes and further developments.

Data and analysis

The EU-SILC is a survey conducted in 29 countries (EU27, Norway and Iceland) by the national statistical offices with EU recommendation to collect comparable information. One of the three health questions that comprises the EU-SILC dataset is the GALI, an indicator used to compute the European summary measures HLY. This question has been implemented in the EU-SILC questionnaire in 2004 in a selection of European countries; since 2008, after a specific effort to harmonize the wording of the question, it can be used to monitor the health of the European. Representing the functional dimension of health, GALI is a good candidate for this study. Indeed compared to other health indicators (self-perceived health, chronic diseases), disability appeared to be less impacted by the SES self-reporting bias. It depends less on the knowledge due to diagnosis as people are asked whether they think they are limited in usual activities due to health problems. Nevertheless, attention should be paid to the cultural differentials in health report that may impact the level of GALI reported across Europe. For this study we use the 2009 EU-SILC which gathers information for 576 208 individuals. We consider three educational groups using the International Standard Classification of Education (ISCED) categories: 0-2 for the lowest educated, 3-4 for the intermediary and 5-6 for the highest educated group. For each education group, we analyzed the EU-SILC sample distribution to check the representativeness of the data. The response rate as well as representativeness of the educational categories varies: in this study, we did not consider the ages above 80 year old due to the large proportion of missing data for education; three countries (Malta, Luxembourg and Iceland) were not included in the analysis; we recommend caution for the results in Ireland (over-representation of low educated), Spain (low educated missing), Czech Republic (proxy issue and distortion of the sample educational distribution) and Slovakia (elementary occupations missing).

In a first step, we present the GALI prevalence of the EU 25 countries and Norway[1] for the population aged 30 to 79 years old, and for the higher (5-6) and the lower (0-2) educated groups highlighting the country-specific distribution of the population in these educational groups. We replicate the description in three age groups in order to illustrate changes across generations: 30-49 year old, 50-64 year old and 65-79 year old.

In a second step, we use a logistic regression to highlight the three different issues described in the introduction. The logistic regression includes (1) the overall level of education to account for the common pattern linking poor functional health and low level of education; (2) the country to account for country differences in health and social context; (3) the interaction between the country and the levels of education in order to highlight whether health differences are due to country specific effect towards high and/or low educational groups. The model is run for each generation (age group) to show the variation in the parameters.

[1] Note: Austria (AT), Bulgaria (BU), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IE), Latvia (LV), Lithuania (LT), Netherland (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SL), Spain (ES), Sweden (SE), United Kingdom (UK).

Results (Figures and tables available in annex)

The descriptive results highlight the large variation of GALI in the EU countries. Prevalence of GALI in the 30-79 age group goes from 16% in Sweden to 41% in Slovakia in 2009. There is no significant difference in the range of the GALI prevalence between the former EU countries and the new comers. However, there is large variation in educational GALI differentials: the prevalence in the lower educated ranges from 54% in Slovakia to 20% in Bulgaria. The largest values are found in the new comers as well as in Germany. Regarding the higher educated the GALI prevalence ranges from 34% in Slovakia to 10% in Norway and in Cyprus. The magnitude of the higher *vs.* lower education GALI gap is driven by the country specific educational distribution.

The size of the lower and higher educated groups matters when looking at the magnitude of the difference between these groups. Countries like Portugal or Italy have a large proportion of their population in the lower educated group, with prevalence close to the average, and a small (selected) proportion in the highest educated with a much lower prevalence. In some countries, mainly among the new comers, the selection is in the other way round: the lower educated represents a relatively low proportion of the population; its prevalence is high compared to the national value. In countries like Germany, Austria or the UK, where the distribution in the top and bottom groups are more similar, national prevalence falls between the prevalence of these two groups; the magnitude of the gap depends on the degree of selection in the high/low education groups. We replicate the analysis the 30-49 year old, 50-64 year old and 65-79 year old age groups.

In the oldest age-group, and in most countries, the largest part of the population belongs to the low education category, but the share is largest in the former EU countries than in the new comers, with larger access to schooling, and in which the reduction of the share of the lowest educated has also been more pronounced across generations. In the meantime, the national prevalence of GALI gets closer to the prevalence in the higher educated group. In some of the former EU countries, the proportion of the lower educated remains relatively high in the younger age group such as in Portugal (30-49), especially in the southern EU countries. In Germany, Austria or the Netherland, the differentials in GALI prevalence between higher and lower educated has increased from the oldest to the youngest age group as simultaneously the share of the higher educated has grown and the share of the lower educated has shrunk. Finland has a particular pattern: It has the highest prevalence in the younger age group where the share of the higher educated has become larger and the difference between the higher and lower educated is small.

The next step of the analysis is to measure a possible country specific effect on higher and/or lower educational group. We comment the coefficients of the logistic regression which model the odds ratios of GALI associated with age, sex (with reference to women), the overall educational level effect (with reference the intermediary level), the overall country effect (with reference to Sweden) and the possible additional country-education effect (with reference to Swedish intermediary education).

For the 30-79 age group, we find that age, sex, and the higher level of education are positively associated with GALI, but not the lower education group compared to the intermediary group. We also find a country effect, which is due to the variation in the level of health and the variation in the self-report propensity. For some countries we find a significant additional effect of education - an increased (or a reduced) effect toward lower and/or higher education - on top of the overall effect of education. The sign and the size of the coefficients show the magnitude of the difference compared to Sweden intermediary group; the signs and sizes of the two coefficients for the 0-2 and the 5-6 columns in a given country document the magnitude of the gap in this country and whether this gap is rather due to a greater advantage of the higher educated or disadvantage of the lower educated.
Compared to Sweden, where the prevalence of the intermediary educational group is low, we find no overall effect of being in the lower group but a country specific effect in all countries but Finland.

Interestingly, almost no country has a specific effect for the higher educational group except Bulgaria and Denmark where the higher educational group have significant higher odds ratio (OR) compared to Sweden intermediary group when age, sex and the overall effect of education and countries are controlled. Bulgaria and Denmark show an increased OR for both the lower and higher educated groups: compared to the reference situation (Sweden) the prevalence is higher but for both the higher and the lower educated the gap being therefore similar than in Sweden. For the other countries, the educational gap is larger than in Sweden due to the excess risks in the lower educated group but not in higher. We found a variation in the size of this excess risk. In some countries, in addition to the excess risks in the lower educated, we found negative coefficients associated to the higher educated (even if not statistically significant) meaning a greater advantage than the Swedish intermediary group (and educated group in the other countries).

Repeating the analysis in the three age groups demonstrates changing patterns by generation. Most of the effect towards the lower education group concerns the 50-65 years old age group. In this age group, Czech Republic experiences a large gap due to a greater advantage (negative coefficient) associated to the higher educated while in the 30-49 age group the large gap is rather due to the greater disadvantage of the lower educated (positive and large coefficient) for the lower educated. The model also shows an increased OR in the younger age group also for 6 other countries (RO, NL, HU, GR, DK, AT). For Finland the coefficient indicate a disadvantage for the higher educated (positive coefficient) compared to the reference group and an advantage (negative but non significant coefficient) for the lower educated; this results in a small gap between education group at these ages. Finally, in the 65-79 age group, Hungary and Italy have a significant increased OR for the lower educated and Norway and Italy a significant reduced OR for educated compared to the reference.

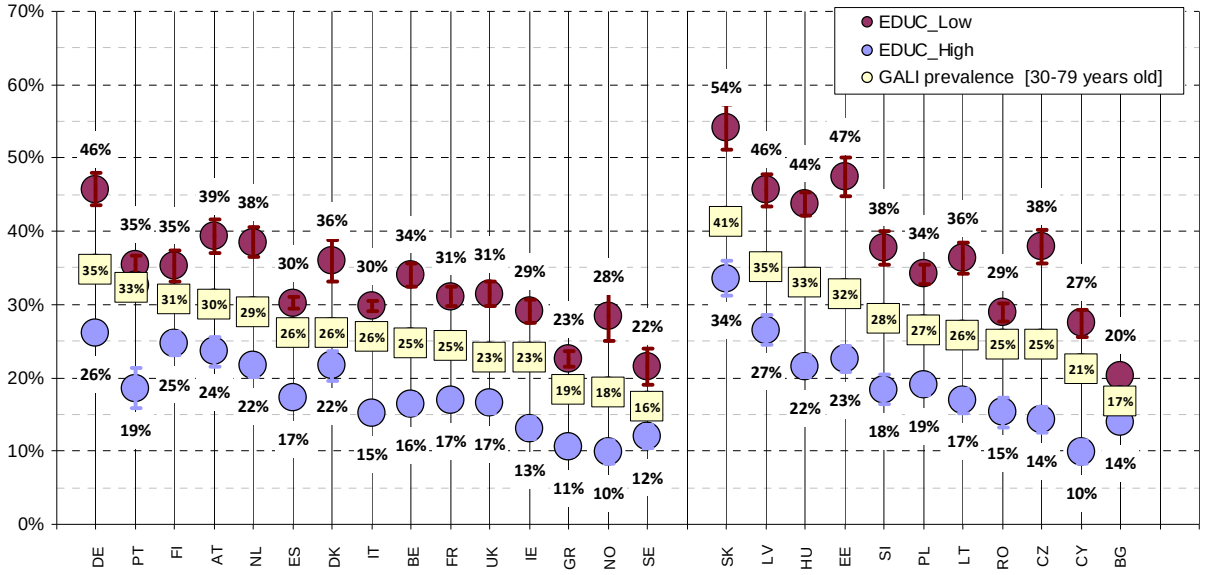
Discussion

This exploratory analysis shows the combination effects that result from different magnitude of educational variations in activity limitation across Europe. The distribution of the population between educational groups correspond to the degree of selection of each group which may impact the observed level of health, due to the health disadvantage of those who could not attain the average level of education and of being lower educated in the life course. Indeed, lower educated people are more often in lower qualified occupation and are more frequently exposed to detrimental work and life conditions. On the contrary, higher educated group are characterized by a better background that has facilitated school attainment and the health advantage of being better qualified and protected in terms of work and life conditions. But this study shows that country specific effect can be observed on the top of these overall educational effects: in some countries, higher educated are less protected (DK, BG) or lower educated group are less exposed (FI). More generally, we find that southern countries have usually large increased risks for their lower educated groups.

These results should be confirmed by testing other models to analyse the data. Multilevel analysis would be another way to take into account the country specific effect. This methodology would allow us controls for macro indicators such as the distribution of the populations across educational level or country specific context such as the care expenses. This first exploration of the data is encouraging and is a first illustration of the complex patterns underlying the variation in the educational differentials across countries. The effect of education in interaction with the country-specific contexts should be accounted for when interpreting educational differentials and to understand the mechanisms behind social determinants of health within the EU.

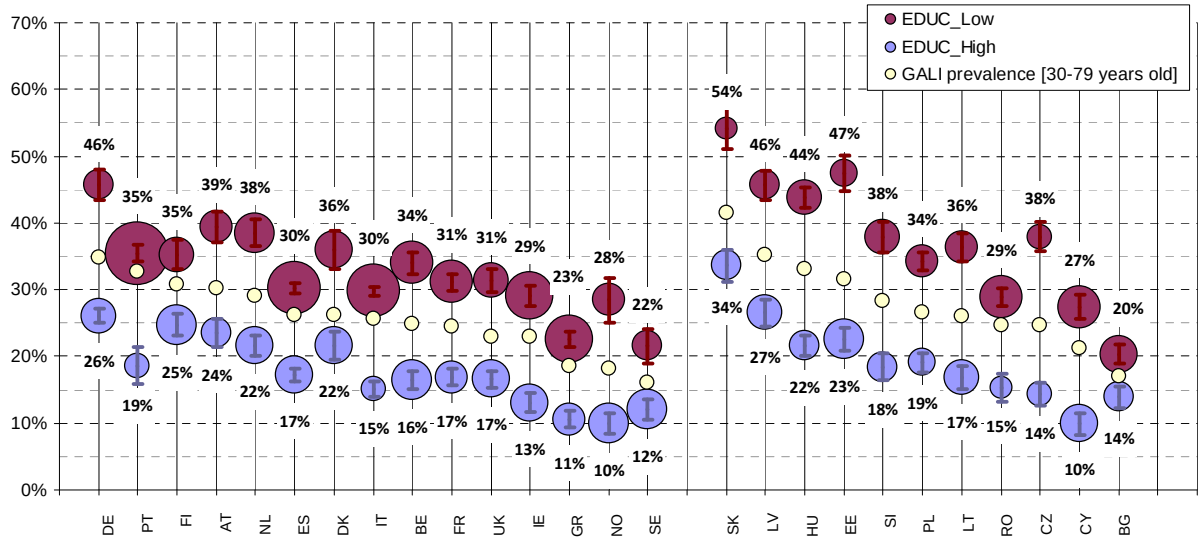
ANNEX. FIGURES AND TABLES

Figure 1: GALI prevalence in 25 EU countries and Norway in 2009 in the 30-79 years old age group.



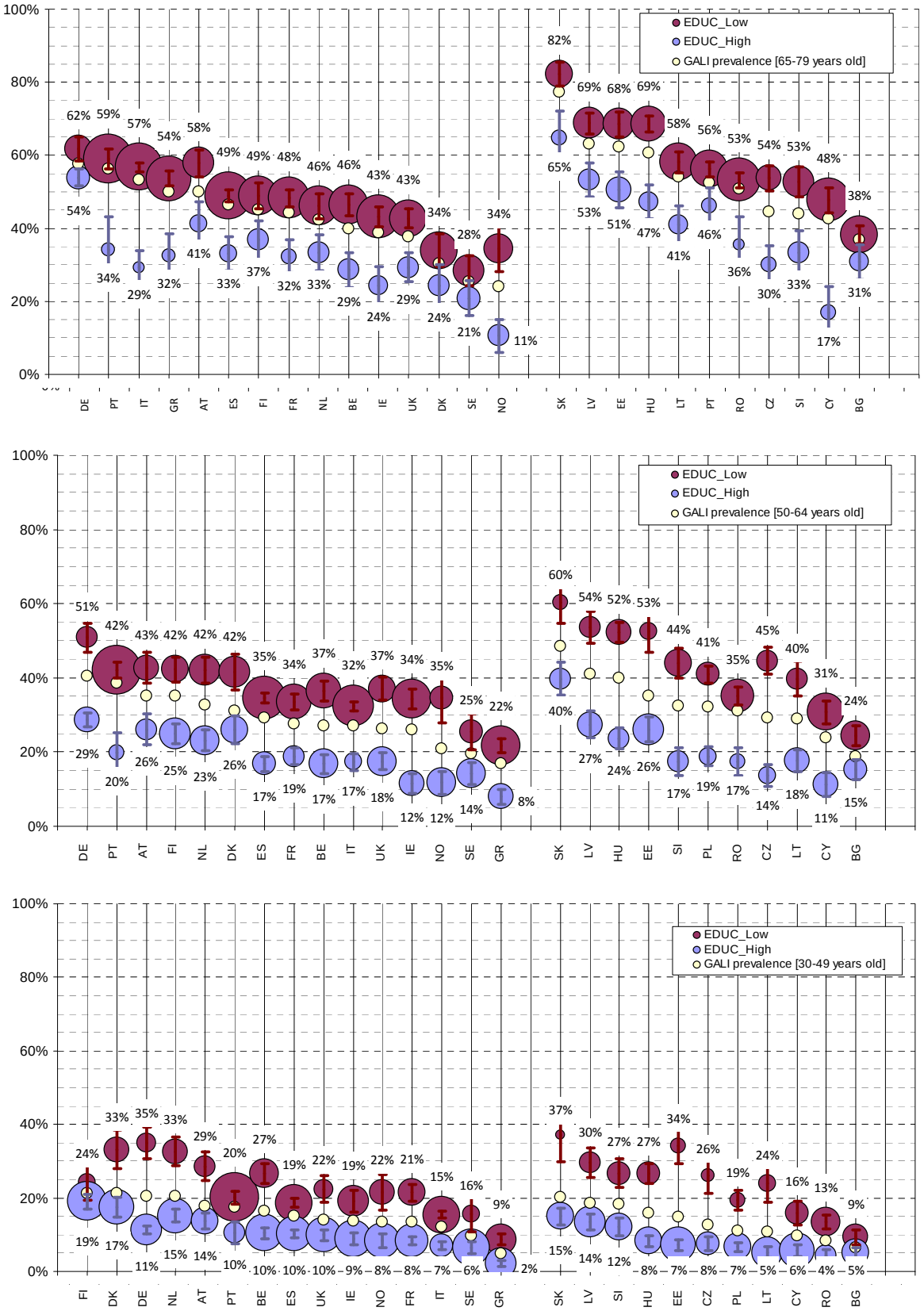
Note: Austria (AT), Bulgaria (BU), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IE), Latvia (LV), Lithuania (LT), Netherland (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SL), Spain (ES), Sweden (SE), United Kingdom (UK).

Figure 2: GALI prevalence in 25 EU countries and Norway in 2009 in the 30-79 years old age group and relative size of the higher and lower educated groups.



Note: Austria (AT), Bulgaria (BU), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IE), Latvia (LV), Lithuania (LT), Netherland (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SL), Spain (ES), Sweden (SE), United Kingdom (UK).

Figure 3: GALI prevalence in 25 EU countries and Norway in 2009 and relative size of the higher and lower educated groups, in three age groups (30-49 ; 50-64; 65-79 year old).



Note: Austria (AT), Bulgaria (BU), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IE), Latvia (LV), Lithuania (LT), Netherland (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SL), Spain (ES), Sweden (SE), United Kingdom (UK).

Table 1: Coefficient of the multivariate logistic regression of activity limitation (GALI) controlling for age, sex, educational level, country and interaction between country and educational level (age 30-79 years old)

	Category	30-79		Category	30-79	Category	30-79
AGE	Additional year	0,05 ***					
SEX ref H	F	0,11 ***					
EDUC ref 3-4	0-2	0,01					
	5-6	-0,4 ***					
COUNTRY ref SE	AT	0,68 ***	CONTRY X EDUCATION ref SE x 3-4	0-2 AT	0,44 ***	5-6 AT	0,18
	BE	0,36 ***		0-2 BE	0,45 ***	5-6 BE	0,04
	BG	-0,1 *		0-2 BG	0,34 **	5-6 BG	0,29 *
	CY	0,09		0-2 CY	0,50 *	5-6 CY	-0,10
	CZ	0,41 ***		0-2 CZ	0,61 ***	5-6 CZ	-0,20
	DE	1,02 ***		0-2 DE	0,34 ***	5-6 DE	0,00
	DK	0,41 ***		0-2 DK	0,38 **	5-6 DK	0,46 **
	EE	0,91 ***		0-2 EE	0,58 *	5-6 EE	-0,10
	ES	0,42 ***		0-2 ES	0,30 **	5-6 ES	0,08
	FI	0,93 ***		0-2 FI	0,00	5-6 FI	0,05
	FR	0,35 ***		0-2 FR	0,35 ***	5-6 FR	0,04
	GR	-0,3 ***		0-2 GR	0,80 ***	5-6 GR	-0,10
	HU	0,83 ***		0-2 HU	0,58 ***	5-6 HU	-0,10
	IE	0,23 *		0-2 IE	0,42 **	5-6 IE	0,00
	IT	0,17 **		0-2 IT	0,58 ***	5-6 IT	0,06
	LT	0,50 ***		0-2 LT	0,50 **	5-6 LT	-0,20
	LV	0,99 ***		0-2 LV	0,48 **	5-6 LV	0,00
	NL	0,69 ***		0-2 NL	0,29 **	5-6 NL	0,12
	NO	0,05		0-2 NO	0,46 **	5-6 NO	-0,10
	PL	0,50 ***		0-2 PL	0,45 ***	5-6 PL	0,00
	PT	0,42 ***		0-2 PT	0,58 ***	5-6 PT	0,11
	RO	0,29 ***		0-2 RO	0,41 ***	5-6 RO	-0,10
	SI	0,64 ***		0-2 SI	0,40 *	5-6 SI	0,00
	SK	1,27 ***		0-2 SK	0,69 ***	5-6 SK	0,02
	UK	0,35 ***		0-2 UK	0,29 **	5-6 UK	0,06

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Table 2: Coefficients of the multivariate logistic regression of activity limitation (GALI) d'activité controlling for age, sex, educational level, country and interaction between country and educational level ; 30-49 years old, 50-64 years old, 65-79 years old

	Category	30-49	50-64	65-79		Category	30-49	50-64	65-79	Category	30-49	50-64	65-79
AGE	Add. year	0,04 ***	0,05 ***	0,06 ***									
SEX ref H	F	0,11 ***	0,09 ***	0,16 ***									
EDUC ref 3-4	0-2	0,28	0,11	0,17									
	5-6	-0,6 ***	-0,5 ***	-0,1									
COUNTRY ref SE	AT	**0,43 *** **	**0,69 *** **	**0,98 *** **	CONTRY X EDUCATION ref SE x 3-4	0-2 AT	**0,41 ***	0,20	0,25	5-6 AT	**0,45 ***	0,05	0,00
	BE	**0,43 *** **	0,12	**0,46 ***		0-2 BE	0,28	**0,51 ***	0,30	5-6 BE	0,11	0,12	0,00
	BG	**-0,6 *** **	**-0,2 ***	**0,58 *** **		0-2 BG	0,18	0,33	-0,10	5-6 BG	0,45	0,36	0,00
	CY	-0,10	0,00	0,47		0-2 CY	0,22	0,39	0,37	5-6 CY	0,08	-0,10	-0,30
	CZ	0,06	**0,38 *** **	**0,83 *** **		0-2 CZ	**0,65 ***	**0,56 ***	0,21	5-6 CZ	0,18	**-0,40 ***	-0,30
	DE	**0,77 *** **	**0,99 *** **	**1,40 *** **		0-2 DE	**0,37 ***	0,23	0,00	5-6 DE	-0,10	0,00	0,05
	DK	**0,59 *** **	**0,25 ***	0,16		0-2 DK	**0,47 ***	**0,60 ***	0,10	5-6 DK	**0,56 ***	**0,53 ***	0,01
	EE	**0,49 ***	**0,80 *** **	**1,68 *** **		0-2 EE	0,47	0,44	0,09	5-6 EE	-0,30	0,00	-0,30
	ES	**0,33 *** **	0,11	**0,72 *** **		0-2 ES	0,00	**0,44 ***	0,16	5-6 ES	0,23	0,14	0,00
	FI	**0,84 *** **	**0,87 *** **	**0,78 *** **		0-2 FI	-0,20	0,00	0,09	5-6 FI	**0,41 ***	-0,10	0,00
	FR	**0,16 ***	**0,22 ***	**0,73 *** **		0-2 FR	0,27	**0,26 ***	0,10	5-6 FR	0,16	0,14	-0,10
	GR	**-1,1 *** **	**-0,5 *** **	**0,81 *** **		0-2 GR	**0,55 ***	**0,45 ***	0,27	5-6 GR	0,00	-0,20	-0,20
	HU	**0,32 ***	**0,90 *** **	**1,37 *** **		0-2 HU	**0,43 ***	**0,37 ***	**0,33 ***	5-6 HU	0,00	-0,20	-0,20
	IE	**0,27 ***	-0,10	**0,47 ***		0-2 IE	0,00	**0,70 ***	0,19	5-6 IE	0,20	0,00	-0,30
	IT	0,00	0,00	**0,84 *** **		0-2 IT	0,14	**0,49 ***	**0,38 ***	5-6 IT	0,18	**0,29 ***	**-0,4 ***
	LT	0,07	**0,43 ***	**1,28 *** **		0-2 LT	0,36	0,41	0,00	5-6 LT	-0,30	-0,20	-0,30
	LV	**0,57 *** **	**1,00 *** **	**1,62 *** **		0-2 LV	0,33	0,33	0,11	5-6 LV	0,26	-0,10	-0,20
	NL	**0,60 *** **	**0,58 *** **	**0,77 *** **		0-2 NL	**0,42 ***	**0,29 ***	0,00	5-6 NL	**0,40 ***	0,05	0,00
	NO	**0,27 ***	0,00	-0,10		0-2 NO	0,16	**0,57 ***	0,30	5-6 NO	0,06	-0,10	**-0,7 ***
	PL	0,00	**0,54 *** **	**1,10 *** **		0-2 PL	0,37	**0,28 ***	0,06	5-6 PL	0,09	-0,10	0,03
	PT	0,22	0,26	**0,79 ***		0-2 PT	0,15	**0,62 ***	0,53	5-6 PT	0,31	0,11	0,00
	RO	**-0,5 *** **	**0,51 *** **	**1,04 *** **		0-2 RO	**0,38 ***	0,06	0,00	5-6 RO	0,01	-0,20	-0,20
	SI	**0,54 *** **	**0,56 *** **	**0,79 *** **		0-2 SI	0,22	0,41	0,16	5-6 SI	0,20	-0,20	-0,10
	SK	**0,71 *** **	**1,27 *** **	**2,35 *** **		0-2 SK	0,49	0,31	0,12	5-6 SK	0,24	0,14	-0,40
	UK	**0,29 ***	**0,22 ***	**0,50 *** **		0-2 UK	0,19	**0,44 ***	0,10	5-6 UK	0,22	0,05	0,00

Note: Austria (AT), Bulgaria (BU), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IE), Latvia (LV), Lithuania (LT), Netherland (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SL), Spain (ES), Sweden (SE), United Kingdom (UK).