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Pioneering policies and practices tackling educational inequalities in Europe

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Content

Participation in shadow education and academic outcomes of upper secondary school students in Ireland and Germany

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Abstract

Research to date on the impact of shadow education (SE) that mirrors formal education on school achievement has produced inconclusive results. It remains unclear whether SE 'works' in improving students' academic achievement and to what extent it matters in shaping students' post-compulsory school pathways. Less research exists on the participation in and impact of SE and structured non-academic out-of-school activities on academic outcomes across different axes of inequality – socio-economic, racial/ethnic, and gender. To address this gap in research, this paper uses post-hoc harmonisation of two longitudinal cohort studies (GUI and NEPS) to examine the impact of SE on academic outcomes in Ireland and Germany. Furthermore, the paper explores the take-up of non-academic courses/activities (such as cultural and sports participation) and its impact on academic outcomes, thus advancing literature in the field. The different institutional arrangements and incentive structures of the Irish and German education systems facilitate the examination of both the enhancement and remedial purposes of SE. The results of the study show that participation in SE operates in a different way in the two countries, having an 'enhancement' effect in Ireland, while being 'supplementary' in the German context. In both countries, family SES, gender and migrant background influence participation and student outcomes.

Key words: *shadow education, academic outcomes, secondary school, longitudinal data, comparative, Ireland, Germany*

1 Introduction

Academic credentials, particularly tertiary qualifications, play an increasingly important role in determining post-school pathways, especially access to high-paid and more prestigious jobs. In this context, there is an on-going debate on the merits of private vs. public education across the Western world and beyond. However, this debate is ultimately about the choice families have in selecting a school for their children and whether that choice contributes to social inequality. Private schools tend to attract mostly middle-class families, who potentially gain better academic results through smaller class sizes and high-quality facilities (Green et al., 2017). However, some research indicates that differences between private and public schools relate to differences in the socio-economic background and educational level of parents rather than school practices and resources (Frenette and Chan, 2015).

Another avenue to provide additional learning opportunities in the private sphere to improve students' academic outcomes is availing of supplementary tutoring – generally referred to in public and academic discourses as Shadow Education (SE). The practice has now become prevalent across Europe and beyond. The metaphor 'SE' is now widely used in studies on out-of-school tuition, as it tends to mirror education provided by mainstream schooling, aimed at enhancing educational outcomes (Ghosh and Bray, 2020). SE is mainly seen as academic and supplementary in nature – covering tutoring in (mostly examinable) subjects that are part of the mainstream curriculum, and is fee-based (Bray, 1999). However, SE can also reflect 'differentiated demand',[3] and may include non-academic courses (such as art and music) that enhance the cultural capital of participants (Bray, 1999). The latter can be seen as part of 'concerted cultivation' – whereby middle-class parents incorporate organised activities into children's out-of-school time to foster their school performance and enhance their cultural capital (Lareau, 2003). Considering the interest in academic outcomes, much of the current research on SE focusses on academic, rather than non-academic, supplementary courses.

Participation in shadow education and academic outcomes

The take-up level and intensity as well as the cognitive and socio-emotional outcomes of SE tend to vary across jurisdictions (Bray, 2014; Baker and LeTendre, 2005; Byun et al., 2018; Baker, 2020; Bray, 2020).

Considering that the uptake of SE has become a world-wide phenomenon, an increasing number of studies have tried to establish whether participation 'works' in improving students' educational outcomes. Existing research on the impact of shadow education on student academic achievement has produced inconclusive findings, due to the varied focus of research studies and how SE is interpreted (Bray, 2014; Byun, 2014). Drawing on the Korean Education Longitudinal Study (KELS), Byun (2014) found that 'cram schooling' had a significant positive effect on mathematics achievement, possibly due to the fact that many such schools followed the school curriculum and offered practice exams, as well as serving high achievers. Another longitudinal study in Korea (Han and Suh, 2020) showed that participation in SE positively affected academic achievement in mathematics in the short term.

Studies in several other countries have found more mixed results. In a German context, pupils availing of SE (in mathematics, Latin, English and French) received significantly higher school grades than their counterparts who did not avail of SE (Mischo and Haag, 2002). Two more recent studies from Germany, however, do not find global effects of SE on students' grades (Guill et al., 2020b; Ömeroğulları et al., 2020). Loyalka and Zakharov (2016) in Russia found that SE only positively impacted the achievement of high-achieving (and not low-achieving) students. The low achievers tended to participate in low-quality SE which, in turn, contributed to inequality in college access (ibid.). Some studies find only weak or no evidence at all that SE is effective (Luplow and Schneider, 2014; Guill and Bos 2014; Ömeroğulları et al., 2020; Guill et al., 2021). Research in Ireland found no significant effect of SE participation on upper secondary

[3] 'Differentiated demand' refers to different curricula for different groups; while 'excess demand' refers to provision for students unable to gain access to public schools (James, 1988).

exam grades, once positive selection into the group was taken into account (Smyth, 2009). Recent findings, however, indicate that the instructional quality of SE as well as tutor qualifications moderate the effects of SE on student outcomes (Guill et al., 2020b). Some evidence suggests that students who avail of SE tend to have higher self-efficacy stemming from feedback and support provided by the tutor (Montebon, 2016). In addition, there is empirical evidence relating participation in SE to improved motivation and satisfaction (Otto and Karbach, 2019; Guill et al., 2020b; Benckwitz et al., 2022).

Shadow education, structured out-of-school activities and academic outcomes

Research on SE and its contribution to academic achievement has mainly focussed on private tuition in subjects that align with the formal school curriculum. Less is known about how participation in structured non-academic activities such as art, drama, sport etc. outside school hours impacts on student achievement. Some studies have referred to the negative effect of engaging in such activities on students' academic outcomes, referring to the strain these activities may put on their learning (Fredericks, 2012). However, other studies have found that participants in non-academic activities have higher levels of self-development and greater school engagement (Metsapelto and Pulkkinen, 2011; Knifesend and Graham, 2012). Research has also suggested that this participation can enhance within-school achievement (Smyth, 2016; Coulangeon, 2018). It can facilitate children's sense of accomplishment and personal growth, and thus has been linked to higher academic achievement and better socio-emotional wellbeing (Covay and Carbonaro, 2010; Metsäpelto and Pulkkinnen, 2014). Irish research has shown that participation in cultural activities had a positive relationship with primary school children's reading and Maths attainment, while participation in other types of non-academic activities had a differential impact for boys and girls (McCoy et al., 2012). Research from Germany provides evidence that participation in sport and playing a music instrument have favourable effects on educational outcomes, although these effects are more consistent among adolescents with a higher socioeconomic status (Pfeifer and Cornelißen, 2010; Hille and Schupp, 2015; Cabane et al., 2016).

In exploring the potential contribution of SE, it is necessary to be clear about the focus: academic outcomes in subjects that mirror the school curriculum (academic achievement as measured by various cognitive tests or examinations), other types of student outcomes associated with participation (such as self-efficacy), or outcomes in courses that are not necessarily academic/ examinable (e.g. drama, music). However, all these areas can be intertwined, as students who believe that they are capable of achieving success are likely to put in more effort into learning. It is also important to be clear about the spheres where this additional tutoring takes place, as it may be provided free of charge by teachers in some instances.

Factors linked to participation in shadow education

Participation in SE has been linked to a number of factors. At the micro level, socioeconomic background, parents' educational aspirations, gender, racial/ethnic minority background and

students' prior academic achievement are found to impact on educational decisions, including participation in SE (Entrich, 2018; Stevenson and Baker, 1992; Buyn and Park, 2012).

The fee-based nature of private tutoring means that only those students whose families are in a position to pay for it can avail of this service, thus potentially contributing to educational inequality if SE boosts performance. Parents from more affluent backgrounds and with high aspirations for their children are more likely to decide to pay for their children's participation in SE (Entrich, 2018; Stevenson and Barker, 1992), thus supporting the argument that SE contributes to social reproduction. However, drawing on data from the 2012 German Life Courses into Early Adulthood (LifE) study, Entrich and Lauterbach (2020) note that contrary to many international studies, participation in SE in Germany does not drive social inequality, and the uptake to achieve higher educational credentials is largely independent of social origin.

While family socio-economic background, parental education and expectations feature strongly in studies exploring the uptake of SE, fewer studies have focussed on gender. In Germany, SE is found to be mostly used by boys from non-academic but high-income families whereas for girls, family background played no role in the take-up of SE (Entrich and Lauterbach, 2020). In the same vein, in Japan, male students have been found more likely to participate in SE (Stevenson and Barker, 1992). However, another study in Japan showed that girls with higher scores in mathematics were more likely to avail of SE (Takashiro, 2021). In order to understand the intersection of gender and participation in SE, it is useful to consider subject-specific performance by gender and the likelihood of take-up of specific subjects in SE (Entrich and Lauterbach, 2020).

Relatively little is known about participation in SE by ethnic origin. In the US, the effects of participation in SE have been found to vary by ethnic origin (Byun and Park, 2012). In the UK, take-up of private tutoring was higher among non-white ethnic groups compared to white Europeans (Ireson and Rushforth, 2009). To our knowledge, there is no recent research in the European context that considers take-up of SE by migrant background. It is possible that in many countries low family SES captures migrant-origin young people, but they are not distinguishable in the reported research findings.

Education systems and school context also matter. Participation in SE tends to be higher in countries with high stakes school-leaving exams that impact on entry to universities (Zwier et al., 2021; Baker et al., 2001; Buchmann et al., 2010). At school level, students attending schools with a strong orientation toward higher education participate more often in SE (Smyth, 2009; Bray and Lynkins, 2012). In Japan, Matsuoka (2015) found that students in schools with a socioeconomically advantaged student body are more likely to participate in SE and that higher SES students tend to avail of SE, especially when in higher SES schools. Recent evidence sheds light on peer spill-over effects as an important predictor of participation in SE (Kim et al., 2022; Pan et al., 2022).

Much of the previous comparative research on SE and academic achievement draws on large international datasets such as PISA and TIMMS. However, the cross-sectional nature of these datasets means that the effect of SE participation on outcomes cannot be determined. Using

longitudinal data enables us to look more precisely at the potential impact of SE participation while taking account of the profile of those taking part, especially their previous academic achievement. Most studies have looked at the uptake of paid out-of-school classes in subject areas that 'mirror' the school curriculum, but little information is available on the potential importance of structured out-of-school activities (such as cultural participation) relative to formal private lessons. For the purposes of this paper, we differentiate between academic-focussed private tuition (hereafter referred as SE) and structured non-academic courses/activities. This paper extends the knowledge in this area by including the comparison of the effect of SE and other out-of-school activities. A further contribution lies in drawing on two large-scale representative longitudinal datasets in two very different educational systems in terms of the focus on vocational education, timing of tracking and the proportion of young people going on to higher education, the Growing Up in Ireland (GUI) study and the German National Educational Panel Study (NEPS).

The paper addresses the following questions:

1. In Ireland and Germany, how does participation in academic-focused SE vary by socio-economic characteristics, migrant background and gender?
2. Does academic performance (upper secondary grades) differ between those taking SE and those not taking SE in Ireland and Germany, controlling for social background, gender and prior achievement?
3. Does participation in structured non-academic activities outside school impact on exam grades? If so, is the effect larger or small than that of SE?

2 Theoretical underpinnings and related literature

SE, particularly private tutoring, is likely to benefit learning outcomes since it gives students more time to acquire knowledge and skills. According to the Model of School Learning (Carroll, 1963), the effectiveness of learning is associated with the time needed for, and actually spent on, learning. When applied to SE, private tutoring is believed to be effective since it increases the time spent on learning in addition to the time provided in formal education. However, the potential impact of SE depends on a number of other variables, as discussed in this section.

Existing research on SE has highlighted a socioeconomic gap in access to private out-of-school tutoring across different countries, indicating the 'enrichment' aspect of SE particularly for high-performing students and countries with higher levels of institutional differentiation (Entrich, 2021). In countries with more moderate differentiation, access to SE is perceived to be more equal and as possibly having less of an impact on inequality (ibid.). There is a consensus across research studies that socioeconomic background and parental involvement have a strong impact on participation in SE (Gao and Xue, 2021; Stevenson and Baker, 1992; Jansen et al., 2021). The drive by higher SES families to maintain and improve upon their advantage also fits with Rational Choice Theory (RCT), which assumes that individuals are conscious decision-makers determined to obtain or maintain their advantage, while calculating the costs and benefits of their decisions (Erikson and Jonsson, 1996; Breen and Goldthorpe, 1997; Esser,

1999). Research drawing on RCT shows that family background strongly influences the making of educational decisions – such as school choice – in order to ensure the best 'match' for their child, with parents selecting the highest ranked alternative (Wilson, 2016). In order to gain and maintain a status advantage, families from higher SES are more likely to support their children's SE participation, seen as a means to improve their academic performance and gain access to more prestigious schools (Entrich, 2018). Participation in SE is more prevalent in countries where the education system is highly competitive and high-stakes testing plays a crucial role in educational advancement (Zhang et al., 2021). Students who avail of academic-focussed SE are expected to perform better in examinations as they have an opportunity to spend additional time studying school subjects. However, research on the link between academic achievement and participation in SE has produced inconclusive results due to the variability in practices and intensity of SE in different countries as discussed above.

In contrast, in order to explain persistent educational inequality across different social contexts, various studies have drawn on Bourdieu's cultural reproduction theory (Reay et al., 2009; Liu, 2018). This theory is useful in understanding social class differences in the transmission of advantage from one generation to the next through the different types of capital at their disposal. The cultural capital of the more advantaged group can be converted into social and economic advantage in later life. Through the strategy of 'concerted cultivation', more advantaged parents engage their children in highly organised activities to foster their skills, attitudes and behaviours that translate into greater school success compared to their less advantaged counterparts (Lareau, 2003). Through concerted cultivation, social class status is transferred from parents to their children. Building on Bourdieu's cultural capital thesis, Boudon's (1974) positional theory of "primary and secondary effects" further endeavours to explain social differentials through educational choices. Primary social reproduction is mediated through the direct influence of a family's cultural capital on children's academic achievement, while secondary social reproduction occurs when families' cultural capital is mediated by choices students make about their educational careers, including targeting academically-orientated schools. These choices, in turn, impact on their future educational outcomes and life chances. Research has shown that children from families with higher socio-economic backgrounds who are more likely to attend more academically orientated schools are the most likely to use SE in order to enhance their school performance and prepare for higher education entry (Smyth, 2009). The cultural capital acquired at home influences children's attitudes and dispositions and drives the social advantage of some social groups. More advantaged groups are also more likely to have the financial resources to invest in their children's education outside school compared to their less advantaged counterparts.

Schools can contribute to the reproduction of social inequality in converting social advantage into academic advantage (Bourdieu, 1986). An Irish study (Smyth, 2009) on the influence of social context on the decision to participate in shadow education showed that students in more academically orientated schools with a greater focus on entry to tertiary education (and also characterised by a largely middle-class intake) are more likely to participate in SE. A combination of the two factors – family socioeconomic background and achievement-focussed school

climate – may result in a "hot house" effect in which students feel pressure to excel in their studies, thus contributing to the take-up of SE (ibid.).

Socio-cultural factors, such as gender, immigrant and socioeconomic background, intersect with school characteristics in complex ways in shaping the educational experiences and outcomes of young people whereby some groups hold a more advantageous position. This is also likely to be reflected in the participation in SE.

Considering the different rationale for participating in SE in Ireland and Germany, this paper explores whether there are differences in the socio-economic background of Irish and German students taking part in academic-focussed SE. Existing research has provided variable results regarding take-up of SE by gender. Whether differences exist in this sphere and whether boys and girls 'benefit' from SE equally in the two countries is the second tenet of this paper. Differences in the characteristics of migrants in Ireland and Germany are likely to influence the take-up of SE. We expect to find differences between native-born and migrant youth regarding the take-up of SE once socioeconomic background is controlled for. We also expect to find differences regarding participation in SE by prior achievement in the two countries. Academic grades may also be influenced by participation in structured non-academic courses; whether academic-focussed and non-academic courses have similar or different effect on academic outcomes will be discussed, thus advancing the literature in the field.

3 The characteristics of education systems in Ireland and Germany

Ireland

Most secondary schools in Ireland are non-fee-paying and comprise different sectors: voluntary secondary; vocational and community/comprehensive. About half of students do not attend their local school, which is evidence of active school choice by families (Smyth, 2008). Secondary-level education consists of a 3-year junior cycle (lower secondary) followed by a 2-year or 3-year senior cycle (upper secondary) depending on whether an optional Transition Year[4] is taken. Take-up of Transition Year is high (around 70% of the cohort) but is more prevalent among more middle-class and high-achieving students. An upper secondary education is often considered the minimum qualification for successful entry into higher or further education or entry into the labour market.

The Irish system is predominantly general rather than differentiated in nature. However, a small proportion – around 5 per cent – of the cohort take an alternative upper secondary programme (Leaving Certificate Applied) which does not permit direct access to higher education. This

[4] The Transition Year (TY) is a one-year programme taken after lower secondary school (Junior Cycle) and before the two-year upper secondary school (Leaving Certificate) programme. It is provided in the majority of schools, usually on an optional basis, but is somewhat less likely to be offered in schools serving disadvantaged communities. The programme aims to offer students a broad variety of learning experiences, also incorporating work experience.

group is predominantly made up of those from more disadvantaged backgrounds (Banks et al., 2018).

During their secondary school career, students take two nationally standardized examinations: the Junior Certificate at the end of lower secondary education and the Leaving Certificate at the end of upper secondary education. Subjects are normally studied at either Ordinary or Higher Level at upper secondary level. Two subjects, Irish and Mathematics, can be studied at Foundation Level.

Entry into higher education in Ireland takes place through the Central Applications Office (CAO). Secondary school students are allocated points based on their Leaving Certificate exam results (6 best subjects). The number of entry-level points needed for any course depends on the number of places and the number of applicants for those places, so the entry level varies from year to year. There are marked social class differences in the uptake of State exams at the end of lower secondary (Junior Certificate) and upper secondary (Leaving Certificate) level and the results achieved (Smyth, 2016b). Exam results in the high stakes Leaving Certificate are important in determining access to higher education in general and to more prestigious courses (such as medicine) as well as to employment chances so inequalities in exam grades will reinforce inequalities in broader life chances.

In Ireland, participation in SE has grown. This is evident in research by Smyth (2009), which showed that 45 per cent of students who had completed upper secondary school in 2003 had availed of private supplementary tuition, while this number was substantially lower at 32 per cent in 1994. Participation tends to be more prevalent among the middle-class (professional) group and those attending fee-paying schools and rates of entry to higher education are higher among those who participated in private tuition (ibid.). More recent research on SE has shown a 'normalisation' of SE, with over half of final year students opting for private tuition (McCoy and Byrne, 2022). This could be explained by the fact that Ireland is characterised by very high rates of transition to higher education and high results are needed to access the more prestigious courses. The high stakes nature of the final secondary school exam motivates families who can afford it to opt for fee-based SE (Smyth, 2009), thus contributing to educational inequality. However, this investment is not always a guarantee of better exam performance (Smyth, 2009).

Germany

The German education system, on the other hand, is characterised by a high degree of stratification, early tracking and a historical importance of the vocational sector.[5] Students enter compulsory school at the age of six. Following four years of primary school, students are tracked into lower secondary school types (usually *Gymnasium*, *Realschule*, *Hauptschule* and schools

[5] Education policy in Germany is the responsibility of the 16 federal states (Länder). As a consequence, the institutional arrangements vary across federal states. Most notably, the education systems in German federal states differ regarding the length of primary school, the number of school types at lower secondary level, and the admission process to secondary education (see Helbig and Nikolai, 2015; KMK, 2021; Autor:innengruppe Bildungsberichterstattung 2022)

with several educational programmes) at the age of ten. These school types differ in terms of academic requirements and provide specific qualifications. Once students have completed nine years of compulsory schooling, students enter upper secondary education either in general education, vocational schools or VET. Around a third of students in Germany acquire a university entry certificate (*allgemeine Hochschulreife*) at the end of upper secondary school, whereas around half of the student population complete VET (e.g., Autor:innengruppe Bildungsberichterstattung, 2022; Destatis, 2021). Overall, many scholars agree that in the German education system, various forms of educational outcomes are marked by inequalities related to social and migrant origin. These inequalities emerge in early childhood and persist throughout students' educational trajectories (e.g., Kristen and Granato, 2007; Maaz et al., 2008; Schneider and Tieben, 2011; Buchholz et al., 2016; Skopek and Passaretta, 2021).

Similar to other European countries, SE is increasingly prevalent in Germany (Entrich, 2021; Zwier et al., 2021). Although estimates from survey data vary substantially due to differences in question wording, attended school type and educational level, around 20-30% of students participate in SE (Entrich and Lauterbach, 2019; Lorenz and Stubbe, 2020). Studies suggest that the majority of students attending SE do so with a focus on mathematics, on a short-term basis with low intensity and in school years preceding educational transitions (Lorenz and Stubbe, 2020; Guill et al., 2021). Moreover, several studies indicate that prior achievement and track placement are highly predictive of participation in SE (Luplow and Schneider, 2014; Guill and Lintorf, 2019; Guill et al., 2020a). Participation in SE also varies between the federal states (*Länder*) (Guill and Lintorf, 2019).

The comparison of two very different education systems will provide an opportunity to explore the complexity of participation in SE in a nuanced way. In Ireland, performance in the Irish "high-stakes" Leaving Certificate exams is crucial for educational outcomes later on. Participating in SE is one strategy that aims to improve results in this exam. In contrast, in Germany, good grades in school are important throughout secondary education. On the one hand, there is an imminent threat of getting retained or changing to a less selective track if school performance is not good enough. On the other hand, the German education system allows students to enter a more selective track if they perform well in school. Put differently, incentives to invest in SE – either for remedial or enhancement purposes – exist throughout secondary education.

Participation in structured out-of-school activities is also important for children's personal and cognitive development and wellbeing. Benefits accrue also for academic achievement (Covay and Carbonaro, 2010). However, accessibility to such activities varies, especially if participation is fee based (Smyth, 2016a).

4 Approach, data and method

This study uses longitudinal data from Ireland and Germany, allowing us to control for a rich array of other factors associated with educational success, including different dimensions of family background, gender, migrant status, and prior educational achievement, among others. The analysis of SE/structured nonformal learning presented in this paper involves two steps.

Step 1: Analysing how individual background characteristics relate to participation in SE. Step 2: Analysing whether and to what extent SE/nonformal learning relates to achievement.

Data

Growing Up in Ireland

For Ireland, the analysis draws on data from a large-scale longitudinal representative study, Growing Up in Ireland (GUI). GUI is funded by the Department of Children, Equality, Disability, Integration and Youth (DCEDIY), with a contribution in Phase 2 from The Atlantic Philanthropies and is managed by the DCEDIY in association with the Central Statistics Office. The work is being carried out by a consortium of researchers led by the Economic and Social Research Institute (ESRI) and Trinity College Dublin (TCD). The primary aim of the study is to provide a strong evidence base to improve the understanding of children's and young people's development across a range of domains, including education. This information is used to inform government policy in relation to children, young people and their families. The analyses in this paper draw on Cohort '98, Waves 1 to 4 (ESRI, 2021). This cohort started in 2008 with 8,500 children aged 9 years. Information was collected from parents, teachers, principals and the children themselves. This cohort was revisited at age 13 years, 17/18 years and at age 20. The analyses presented here are based on 4,602 young people who had attended 591 different secondary schools.[6] Because the focus is on SE take-up in the final year of upper secondary education, early school leavers are excluded from the analyses.

German National Educational Panel Study (NEPS)

For analysing the effects of SE on academic outcomes in Germany, longitudinal data from the German National Educational Panel Study (NEPS) is used (NEPS Network 2021)[7]. The NEPS study is carried out by the Leibnitz Institute for Educational Trajectories (LIfBi) at the University of Bamberg and encompasses six panel cohorts with multiple survey waves each. The analyses will draw on data from Starting Cohort 3 (SC3), which collects information on the educational pathways of fifth graders throughout secondary education and into higher education. This information used in this study is provided by both students and their parent(s) and covers the period from 2010 to 2016. The analyses draw on an unbalanced panel with 23,511 observations of 5,564 individual students.

[6] The analyses of upper secondary performance are based on 4,500 cases because of missing information on grades for some students.

[7] This paper uses data from the National Educational Panel Study (NEPS; see Blossfeld and Roßbach, 2019). The NEPS is carried out by the Leibniz Institute for Educational Trajectories (LIfBi, Germany) in cooperation with a nationwide network.

Variables

Table 1: Variable harmonisation

	Ireland (GUI)	Germany (NEPS)
Dependent variable		
Exam grades at upper secondary school level	*Grades (points) in Leaving Certificate exam*	*GPA of yearly grades in German and math*[8]
Independent variables		
SE: participation	*Took part in SE in final year of secondary*	*Participation in SE*[9] *at the time of the survey.*
Sex	*Male v. female*	*Male v. female*
Parental education (higher of two)	*Tertiary education v. lower*	*Tertiary education v. lower*
Income	*Quintiles based on net equivalised household income*	*Quintiles based on net equivalised household income*
Parental employment status	*Employed v. not employed*	*Employed v. not employed*[10]
Migrant background (both parents born abroad or one parent if lone-parent family)	*Migration background v. no migration background*	*Migration background v. no migration background*
Prior achievement	*Lower secondary performance in quintiles*	*Previous year's GPA*
Participation in structured non-academic activities	*Participation in the past year in:* • *Art, drama, dance or music clubs/groups/rehearsals* • *Sports clubs/teams*	• *Regular participation in organised cultural groups, music or arts lessons,* • *Regular participation in a sports club*
Track	• *Leaving Certificate Applied programme v. all others* • *Took Transition Year programme v. did not take*	*Gymnasium v. Realschule v. Hauptschule v. Other (incl. Gesamtschulen)*
Academic self-concept	*How well gets on in exams or tests, grouped into four categories*	*Composite measure based on four items*

Note: See Kroezen and Alieva (2022) for more information on data harmonisation.

Methods

The modelling approach for the two countries is different, reflecting variation in the grading systems used as well as the nature of the survey data.

For Ireland, analyses focus on take-up of SE in the last year of upper secondary education and the consequences for academic performance in the high-stakes upper secondary school exit exam (Leaving Certificate exam) that determines entry to higher education. Because upper secondary grades are measured in terms of points (based on grades received and subject levels taken), the outcome is approximately normally distributed so linear regression models are used.

[8] Rounded down and inverted.
[9] Participation in "Nachhilfe".
[10] In the German data, "not employed" includes those with marginal and irregular employment.

Multilevel models are used to take account of the clustering of students within secondary schools, given that SE participation has been found to vary across schools (Smyth, 2009).

In Germany, long-term stability in achievement is key and grades are recorded in terms of a small number of categories. German grades are based on a six-point scale, reversed for the current analyses so that higher values mean better grades. Given the panel structure of NEPS with yearly observations, a modelling approach is required that not only captures variance between units but also accounts for temporal dependencies within units. For analysing participation in SE, random-effects logit models for unbalanced samples are estimated. To assess whether and to what extent SE and structured non-academic courses are related to grades, random-effects ordered logistic models are used (e.g., Woolridge, 2020; Rabe-Hesketh and Skrondal, 2022).

A potential limitation of the modelling approach used is that it does not fully account for selection into SE. However, a range of family background characteristics and prior achievement are taken into account which should capture some of the selectivity. Nonetheless, the fact that comparable measures of student motivation and ambition are not available in the two surveys means that some aspects of potential selection cannot be accounted for.

5 Results

The results for Ireland and Germany are initially presented separately, with the concluding section focusing on the implications of the comparison.

Results for Ireland

The results for take-up of SE in Ireland are presented in Table 2. In Ireland, young women were significantly more likely (1.4 times more likely) to take part in SE than young men. The analyses show the value of taking a multidimensional approach to educational inequality, with parental occupational status, household income and parental employment status all significantly related to the likelihood of taking private tuition. Take-up rates are higher where parents hold a higher-status job and where the household is in the highest income quintile, and lower where neither parent is in paid employment. Levels of participation were also much lower among migrant young people (at just over three-quarters of the rate of take-up of their Irish-origin peers).

The relationship with prior achievement was not linear, with the lowest take-up among those in the lowest quintile, rates rising to the fourth quintile and declining slightly among those with the highest grades. Take-up is much lower among those taking the non-college-bound track, the Leaving Certificate Applied programme, and higher among those who had taken the optional Transition Year programme.[11]

[11] This is an optional programme which may be taken at the beginning of upper secondary education. It offers students a range of subjects and activities as well as the chance to take part in work experience.

There was no systematic relationship between academic self-concept and SE take-up. SE take-up was higher among those who took part in sports clubs and structured cultural activities. This is not to be interpreted as causal but is designed to analyse the overlap between the two kinds of out-of-school activities. Differences between individual schools in SE take-up rates are significant, even taking account of all of the other factors.

Table 2: Multilevel logistic regression model of the factors associated with take-up of shadow education in the final year of upper secondary education in Ireland

Dependent variable: Take-up of shadow education	**Odds ratio (SE)**
Fixed Part	
Constant	0.341
Female	1.387***
Parental ISEI	1.006**
Missing information on ISEI	0.829
Mother has tertiary education	1.090
Income quintile (Ref. Lowest):	
2nd	1.164
3rd	1.441**
4th	1.467**
Highest	2.094***
Missing information on income	1.721***
Lone-parent family	0.851
Migrant	0.763*
Neither parent in paid employment	0.677**
Lower secondary grades (Ref. Q1):	
Q2	1.353*
Q3	1.617***
Q4	1.824***
Q5	1.513**
No grade info.	1.262
Leaving Certificate Applied track	0.126***
Took Transition Year	1.399***
Self-concept (Ref.: Just below/below average):	
Average	1.182
Just above average	1.339
Above average	1.174
Sports club	1.374***
Cultural participation	1.250**
Random Part	
School variance	0.078*

Note: *** p<.001, ** p<.01, * p<.05. N = 4,500 young adults within 589 secondary schools. Data: GUI Cohort '98. Own calculations.

Table 3 shows that the relationship between SE and upper secondary grade in Ireland varies by level of prior achievement. It is evident that the 'returns' to SE are higher for those with lower prior grades (in the lowest two quintiles) (see Figure 1). Analyses not allowing for this interaction effect (not shown here) show that the average effect for SE is only slightly larger than the coefficients for sports and cultural activities.

Sports and cultural participation are both significantly related to higher grades (with a gap of over 7 points), even controlling for social background, gender and prior achievement. Analyses were also conducted of the interaction between prior achievement and other out-of-school activities. The effect of cultural activities did not vary across the grade distribution (analyses not shown). There is some evidence that the positive effect of sport applies to those in the second and third achievement quintile groups but there is no obvious explanation as to why this is so.

Table 3: Multilevel regression model of the influence of shadow education and out-of-school activities on upper secondary exam grades in Ireland

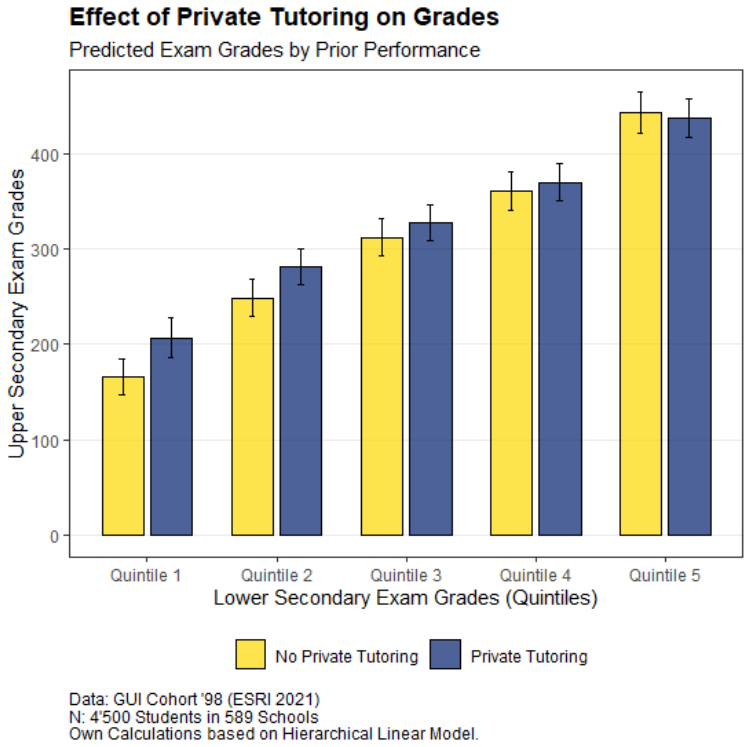
Dependent variable: Upper secondary exam grades	**Coefficient (SE)**
Fixed Part	
Constant	161.483
Female	2.074
Highest parental ISEI	0.186
Information missing on ISEI	-5.527
Parent(s) have tertiary education	16.971***
Net equivalence income quintile (Ref. Lowest):	
2nd	5.158
3rd	5.479
4th	7.086
Highest	13.997*
Information missing on income	10.671
Lone-parent family	-10.639*
Migrant	0.116
Neither parent in paid employment	-8.749
No grade info.	71.550***
New points system	1.107
Took Transition Year	14.687***
Self-concept school (Ref.: Just below/below average):	
Average	46.063***
Just above average	98.243***
Above average	146.926***
Took part in shadow education (SE)	39.711***
Sports club	7.196*
Cultural participation	7.770*
Lower secondary grades (quintiles):	
Q2	83.070***
Q3	146.297***
Q4	194.942***
Q5	276.029***
Grades*SE	
Q2*SE	-7.873
Q3*SE	-25.153*
Q4*SE	-31.491**
Q5*SE	-49.073***
Random Part	
School variance	566.383***
Individual variance	8595.684***

Note: *** p<.001, ** p<.01, * p<.05. N = 4,500 young adults within 589 secondary schools. Data: GUI Cohort '98. Own calculations.

The other factors operate in accordance with previous research on academic performance in Ireland and elsewhere. Even controlling for earlier grades, parental education and household income are both significantly related to upper secondary grades (with gaps of 17 and 14 points respectively). Parental occupational status is also related to higher grades but its effect is mediated through prior achievement. Furthermore, grades are lower (by almost 11 points) for those from lone-parent households. Migrant students do not differ in achievement from their peers of similar socio-economic background. Not surprisingly, lower secondary performance is

strongly related to grades two to three years later. Grades are higher among those who took the Transition Year programme and among those with higher self-concept.

Figure 1: Effect of private tutoring on grades by prior achievement levels in Ireland



Results for Germany

To investigate the take-up of SE in Germany, random-effects logistic models are estimated. Table 4 presents the results of these models in terms of log odds along with robust standard errors in parentheses.

Regarding take-up of SE, the regression models in Table 4 suggest that sociodemographic characteristics are of surprisingly little importance in Germany. While students from families in the highest income quintile are 1.647 times more likely to attend SE when compared to their counterparts in the lowest income quintile, other socioeconomic factors are not significantly related to participation in SE. Females are more likely to take up SE, although this gender gap is relatively small (log odds = 0.236, $p < 0.05$). Students with a migration background do not differ from their non-migrant counterparts regarding participation in SE.

Rather, whether students participate in SE seems predominantly driven by school-related factors. Most notably, the higher last year's GPA was, the less likely it is for students to participate in SE. Each additional grade point reduces the likelihood of SE participation by a factor of 0.388 – or put differently, the predicted probability of attending SE lessons amounts to 33.2% [+/- 2.2 Pp.] for students with an insufficient GPA and to 11.8% (+/- 0.8 Pp.) for students with a very good GPA. In a similar vein, students with a strong academic self-concept

are substantially less likely to take up SE. Students participating in structured non-academic learning or organised sports do not differ in their propensity to participate in SE compared to those who do not take part in these activities. Lastly, students in the academically least demanding track (Hauptschule) are less likely to take up SE when compared to students in the academically most demanding track (*Gymnasium*) (log odds = -0.510, $p < 0.05$).

Table 4: Random-effects logistic models on participation in private tutoring in Germany

Dependent variable: Take-up of shadow education	**Log odds (SE)**	
Highest parental ISEI	-0.002	
	(0.004)	
Parent(s) have tertiary education	-0.056	
	(0.139)	
Net equivalence income: quintiles (Ref. Lowest)		
No Information on Income	0.142	
	(0.212)	
2nd	-0.010	
	(0.161)	
3rd	-0.124	
	(0.174)	
4th	0.144	
	(0.178)	
Highest	0.499	**
	(0.196)	
Neither parent in paid employment	-0.158	
	(0.115)	
Lone-parent family	0.062	
	(0.151)	
Female	0.236	*
	(0.108)	
Migration background	0.185	
	(0.185)	
GPA of mathematics and German	-0.946	***
	(0.049)	
Self-concept school	-0.853	***
	(0.086)	
Participated in non-formal learning	0.046	
	(0.087)	
Participated in organised sport	0.150	
	(0.088)	
Educational track (Ref. Gymnasium)		
Hauptschule	-0.510	*
	(0.247)	
Realschule	-0.086	
	(0.136)	
Other	-0.108	
	(0.147)	
Intercept	1.886	***
	(0.364)	
ln(Var(Intercept))	2.358	
	(0.060)	
SD(Intercept)	3.250	
	(0.097)	
ICC	0.763	
	(0.011)	
Number of observations	22426	
Students	5541	
AIC	14857.44	
BIC	15017.80	

Note: *** p<.001, ** p<.01, * p<.05. Data: NEPS SC3. Own calculations.

After having established how students select into SE, the relationship between SE and educational achievement is analysed. To this end, random-effects ordered logistic regression models of GPA are estimated. Results of these models are presented in Table 5 displaying log odds and robust standard errors in parentheses.

Table 5: Random-effects ordered logistic model on grade point average (GPA) in Germany

Dependent variable: GPA in mathematics and German	**Log odds (SE)**	
Highest parental ISEI	0.010	***
	(0.001)	
Parent(s) have tertiary education	0.164	**
	(0.051)	
Net equivalence income: quintiles (Ref. Lowest)		
No information on income	0.136	
	(0.074)	
2nd income quintile	-0.043	
	(0.062)	
3rd income quintile	-0.034	
	(0.067)	
4th income quintile	-0.031	
	(0.068)	
5th income quintile	0.079	
	(0.074)	
Neither parent in paid employment	-0.159	***
	(0.043)	
Lone-parent family	-0.112	*
	(0.056)	
Female	0.402	***
	(0.042)	
Migration background	-0.355	***
	(0.066)	
Prior GPA of mathematics and German	1.323	***
	(0.039)	
Self-concept school	0.819	***
	(0.036)	
Attended private tutoring	0.771	***
	(0.182)	
Participated in non-formal learning	0.151	***
	(0.037)	
Participated in organised Sport	0.014	
	(0.037)	
Attended private tutoring * GPA of mathematics and German	-0.478	***
	(0.064)	
τ 1	-1.229	
	(0.249)	
τ 2	1.790	
	(0.155)	
τ 3	5.309	
	(0.152)	
τ 4	8.866	
	(0.160)	
τ 5	12.823	
	(0.183)	
Var(Intercept)	1.220	
	(0.088)	
Number of Observations	23511	
Students	5564	
AIC	44604.19	
BIC	44789.69	

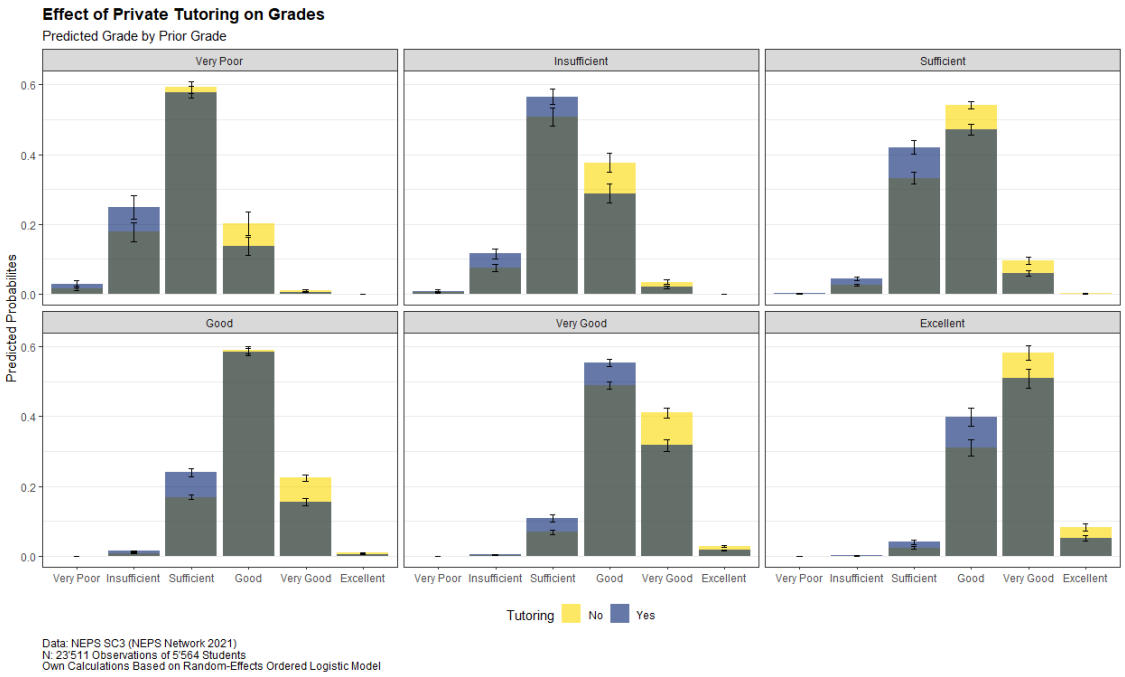
Note: *** p<.001, ** p<.01, * p<.05. Data: NEPS SC3. Own calculations.

As Table 5 illustrates, academic achievement in terms of overall GPA (mathematics and German combined) is strongly dependent on students' social origin. Holding other covariates constant, students whose parents have a high occupational status and hold a tertiary degree are more likely to achieve higher grades. Unlike the positive effect for students in the highest income quintile, the aforementioned effects prove robust when school-related factors are controlled for (analyses not shown). In line with previous research on educational achievement, females have significantly higher grades while students with a migration background have lower grades on average.

Unsurprisingly, the school-related factors indicate a strong positive relationship. Using prior GPA as an illustration, each additional grade point in prior GPA increases the odds of achieving an excellent GPA one year later versus achieving any lower grades by a factor of 3.755 (log odds = 1.323, $p < 0.001$). Simply put, high-achieving students are very likely to have higher grades one year later again – and vice versa.

The pattern for participation in SE reveals an interesting finding. Holding all other covariates constant, the average negative estimate (log odds = -0.588, $p < 0.001$, not shown here) indicates that students participating in SE are less likely to achieve a high GPA. Introducing an interaction term relating the effect of tutoring with prior achievement drastically affects the point estimate of SE, which now suggests a positive effect of private tutoring. However, as indicated by the interaction term, every additional grade point in prior achievement reduces this effect by 0.478 log odds. Put differently, while SE positively affects the later GPA of low-achievers, the opposite is true for high achievers – albeit this is likely confounded by the selection into SE.

Figure 2: Effect of private tutoring on grades by prior achievement levels in Germany



To illustrate the diverse effect of private tutoring on GPA in substantive terms, Figure 2 depicts predicted GPA by prior achievement, contrasting whether or not students attended SE. The panels in the top row of Figure 2 illustrate how SE seems to help students with low prior achievement to improve their grade or at least prevents them from achieving lower grades. For example, the top middle panel indicates that students with an insufficient GPA who attended private tutoring are significantly more likely to achieve a sufficient GPA one year later, but significantly less to improve to a good grade compared to students who did not take part in SE.

6 Discussion

Shadow education has become increasingly prevalent across countries. The industry has grown, responding to the demands of families and students who seek to enhance educational performance by offering private tutoring in subject areas that align with the school curriculum. In addition to academic-focussed SE, participation in non-academic out-of-school activities, such as cultural participation and sports, may enhance in-school learning and broader personal development. Given the prevalence of participation in SE, an increasing number of research studies have tried to explore the effectiveness of participation in SE in improving academic outcomes. Research evidence on whether SE 'works' has produced mixed results, however, with some finding a positive impact (Byun, 2014; Han and Suh, 2020) whereas others find only a weak or no impact (Smyth, 2009; Guill et al., 2020). In some cases, the findings from the same country have been contradictory (see Mischo and Haag, 2002; Ömeroğulları et al., 2020 in Germany). Some research has also shown that participation in SE only 'works' for high achieving students (Loyalka and Zakharov, 2016).

However, there has been a lack of comparative research on SE in different educational systems, a lacuna addressed by this article. This study set out to explore the impact of participating in SE in Ireland and Germany, countries with very different education systems regarding the degree of stratification, timing of tracking and the extent of vocational orientation. The analyses presented here show that SE plays a different role in the two systems and has different consequences for students' educational outcomes. The pattern of participation in SE reflects the different incentives and rewards for students in the two systems.

In Germany, students have already been tracked by ability at a much earlier stage (at the end of primary school) but within tracks, they must reach a 'sufficient' grade every year to avoid having to repeat a school year. As a result, take-up of SE is higher among lower-achieving students who feel they cannot keep up with the demands of school. The effects of participation in Germany appear to be confined to these low-achieving students who are trying to reach the threshold for 'sufficient' grades. Existing research has shown that participation in SE is more prevalent among students from more affluent families (Matsuoka, 2015), confirming the 'investment' logic whereby higher SES families make a conscious decision to maintain their advantage by availing of SE in order to improve their academic outcomes and post-school options. In Germany, however, students participating in SE most likely do so in order to keep up with their studies at school. Furthermore, some previous studies in the German context show

that participation in SE does not always translate into improved academic achievement across the board (Guill et al., 2021; Ömeroğulları et al., 2020) but the findings presented here suggest that low-achieving students can benefit to some extent from SE. They can recover from poor grades and are more likely to improve to a sufficient grade or maintain their sufficient grades.

Compared to Germany, the dynamics of participation in SE is different in Ireland, where performance in the high-stakes upper secondary exam is highly consequential for entry to tertiary education (and for employment chances). Tests and exams at previous stages matter as a feedback mechanism to students (and for access to higher-level subjects) but exam failure does not result in a requirement to repeat a school year. SE is therefore used by students, especially those around the middle of the achievement distribution, to enhance their chances of doing well in the exam and take-up is highly differentiated by social background and gender. However, in practice, the 'returns' to SE accrue to lower-achieving students with little, if any, gain in performance for middle- to high-achieving groups. Considering the 'weight' of the final exam at the end of the upper secondary school, a considerable number of students now avail of SE (known as 'grinds' in the Irish context). In line with McCoy and Byrne (2021), this study has found that participation in SE varies by social background, with those from more advantaged families more likely to participate in SE. Differences between Ireland and Germany are also evident in SE participation by gender – in both cases girls are more likely to participate in private tuition, but in case of Germany the gender gap is small. Previous research has indicated differences in the take-up of SE by ethnic background (Byun and Park, 2012; Ireson and Rushforth, 2009). In this study, we have found that students with a migration background do not differ from their non-migrant counterparts regarding participation in SE, once their socioeconomic background is controlled for. It may be that migrant families and their children mobilise their social and cultural capital to 'align' with that of the native families.

The article provides new insights into the relative roles of formal and non-formal learning outside school in influencing in-school performance by looking not only at SE but also at participation in sports and cultural activities. In Germany, taking part in organised sports has no influence on grades but in Ireland, sports involvement is associated with higher grades and the effect size is almost on a par with that for SE take-up. In both countries, participation in cultural activities is significantly related to higher grades. While Fredricks (2012) highlights the negative impact of 'over scheduling' extra-curricular activities, our findings show that participation in cultural activities has a positive impact on the academic achievement of upper secondary school students in both countries while there are some advantages to sports participation in Ireland.

SE is used as an opportunity for enhanced learning, whilst mirroring the school curriculum. Being mostly fee-paying, it may place an additional financial burden on the families who want to ensure better academic outcomes for their children. The disparity between more and less affluent parents in being able to avail of SE may contribute to inequality in the education system by helping low-achieving middle-class students avoid the downward mobility resulting from lower grades. The comparative approach taken in this paper shows the difficulties in suggesting 'universal' policy implications regarding participating in SE as the motivation for availing of supplementary tutoring may differ across countries. The paper therefore cautions against direct

'policy borrowing' from other countries, as the educational systems differ. Secondly, we suggest that if sufficient help is available at school level to students who need it, it may reduce the need for private supplementary tutoring that may, by its fee-paying nature, contribute to inequalities in education.

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