# School Absenteeism and Academic Achievement: Does the Reason for Absence Matter?

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*Studies consistently show associations between school absences and academic achievement. However, questions remain about whether this link depends on the reason for children's absence. Using a sample of the Scottish Longitudinal Study (n = 4,419), we investigated whether the association between school absenteeism and achievement in high-stakes exams at the end of compulsory and postcompulsory schooling varies with the reason for absence. In line with previous research, our findings show that overall absences are negatively associated with academic achievement at both school stages. Likewise, all forms of absences (truancy, sickness absence, exceptional domestic circumstances, and family holidays) are negatively associated with achievement at the end of compulsory and postcompulsory schooling. First difference regressions confirm these negative associations, except for family holidays. These findings suggest that, in addition to lost instruction, other mechanisms such as behavioral, health-related, and psychosocial pathways may account for the association between absenteeism and achievement. The findings have implications for designing tailored absenteeism interventions to improve pupils' academic achievement.*

Keywords: *academic achievement, school absences, school attendance, truancy, secondary education*

## Introduction

Previous research overwhelmingly shows that school absenteeism is negatively associated with students' academic achievement (e.g., Aucejo & Romano, 2016; Gottfried, 2010, 2011; Gottfried & Kirksey, 2017; Kirksey, 2019; Morrissey et al., 2014). For instance, studies have found that children who are more frequently absent in early kindergarten obtain lower working memory and cognitive flexibility scores in early childhood (Ansari & Gottfried, 2021; Gottfried & Ansari, 2021) and receive lower literacy and grade point average scores at age 15 (Ansari & Pianta, 2019). Additionally, elementary and high school absenteeism was associated with lower academic achievement in high school, high school completion, and graduation from a 4-year college (Smerillo et al., 2018). Overall, students who are frequently absent from school miss out on teacher-led lessons, peer interactions, or other activities that may stimulate their learning and development (Kirksey, 2019; Morrissey et al., 2014), possibly leading to detrimental consequences for student achievement.

However, being absent from school can result from various reasons, including truancy, sickness, or family holidays.

Although these specific reasons for school absence can be differently associated with students' academic achievement, there is a dearth of research examining the extent to which associations between absenteeism and achievement vary by these precise reasons (Hancock et al., 2018). Most existing research analyzing the association between absenteeism and academic achievement focused on overall school absences during the school year (Ansari & Pianta, 2019; Aucejo & Romano, 2016; Gottfried, 2010, 2011; Kirksey, 2019; Morrissey et al., 2014; Smerillo et al., 2018). Where researchers have investigated specific reasons, they have mainly considered truancy (Bosworth, 1994; Buscha & Conte, 2014), with evidence supporting the negative relationship with achievement.

Only a few studies have examined associations between different forms of absenteeism and achievement in a single study (e.g., Gershenson et al., 2017; Gottfried, 2009; Hancock et al., 2018; U.K. Department for Education, 2016). These studies examined excused and unexcused absences and found that the latter was more strongly associated with school performance (Gershenson et al., 2017; Gottfried, 2009). However, such broad categorizations may not fully

account for the diverse reasons for school absence and their association with educational outcomes. Other studies suggest that associations between school absences and academic achievement vary across more detailed absence reasons (Hancock et al., 2018; U.K. Department for Education, 2016). While these studies provide some nuances relating to different forms of absenteeism, they were based on student-reported school absences, restricted to the last 6 months of schooling (Hancock et al., 2018), or the categories for specific reasons were not mutually exclusive (Hancock et al., 2018; U.K. Department for Education, 2016).

The present study aims to advance our understanding of the association between school absenteeism and students' educational outcomes. Specifically, we investigate whether different reasons for absenteeism (truancy, sickness, exceptional domestic circumstances, and family holidays) vary in their association with students' results in high-stakes examinations at the end of secondary schooling—a stage of schooling for which more research on absenteeism is needed (Kirksey, 2019). By considering the different reasons for absenteeism in a single study, we can estimate their unique associations with student achievement. Such an approach also enables us to examine whether some forms of school absences are more negatively associated with students' achievement, thereby providing guidance on which form of absence requires greater attention for intervention (Hancock et al., 2018). Most importantly, investigating associations between precise reasons for school absence and academic achievement can help us understand possible mechanisms of how absences decrease academic achievement.

### Forms of Absenteeism and Student Achievement

According to the faucet theory, students enhance their skills through frequent exposure to schooling, and they stop making educational gains once the exposure is turned off (Alexander et al., 2001). Hence, students who receive fewer hours of instruction during the school year are disadvantaged in their learning, receive lower grades, perform more poorly on exams, and are more likely to drop out after compulsory schooling (Morrissey et al., 2014). Support for this argument comes from empirical studies showing that more time spent on instruction in the classroom is associated with better academic achievement (Bodovski & Farkas, 2007; Fitzpatrick et al., 2011; Heatly et al., 2015; Marcotte & Hemelt, 2008). Students frequently absent from school may also feel less integrated into their class and struggle to participate in classroom activities and interactions with peers and teachers, which is harmful to their learning (Korpershoek et al., 2020). While missing out on school, peer interactions and directed learning and instruction are crucial for understanding negative associations between school absence and academic achievement, it is also important to consider why students are absent from school. Investigating specific

reasons for absenteeism may help us understand whether other mechanisms are at play in accounting for these negative associations.

Depending on their link with other underlying processes associated with learning outcomes, different reasons for absenteeism may be more or less associated with academic achievement and provide further insights into possible mediating pathways of this relation. For instance, *truancy* may be negatively associated with students' academic achievement because of its links with student–teacher relationships. Evidence indicates that teachers negatively perceive students' externalizing problems, resulting in greater student–teacher conflict and lower student-teacher closeness (Roorda & Koomen, 2021). Teachers also report higher irritation and frustration toward students who miss school due to truancy (Wilson et al., 2008). As a result, teachers may be less willing to support students who miss school due to truancy to enable them to catch up with missed lessons. Additionally, truant students experience greater alienation from their peers, teachers, and schools (Finn, 1989; Wilson et al., 2008) and possibly receive limited support to help with learning. They may further be academically disengaged, having neither an incentive to catch up with the content of missed school lessons nor feel the need to pay attention to new class material when present (Balfanz et al., 2007; Southworth, 1992). Finally, truancy is associated with problem behaviors such as alcohol and substance abuse (Eaton et al., 2008; Hallfors et al., 2002) or crime and delinquency (Rocque et al., 2017; Zhang et al., 2007). These behaviors are, in turn, negatively associated with pupils' performance on exams and can exacerbate the detrimental impact of being absent from school on academic achievement (Fergusson & Horwood, 1995; Jeynes, 2002).

On the one hand, *sickness absence* may be less negatively associated with students' academic achievement than other absenteeism forms. First, pupils who have been involuntarily sick may be motivated to make up for the lost time and put more effort into engaging with missed lesson content. Second, teachers and parents may be more willing to support students in catching up on lesson content if students missed lessons due to authorized reasons such as sickness. On the other hand, sickness absences may signal underlying health conditions, including mental health problems that have a long-term impact on learning and achievement. Evidence shows that sickness absences are associated with more doctor visits and unauthorized absences (Pijl et al., 2021), suggesting more sustained consequences for student achievement.

As with sickness absenteeism, students and teachers may be more willing to catch up on lesson content when missing due to *exceptional domestic circumstances* (e.g., a domestic crisis causing severe disruption to the family home), thereby reducing its harmful impact on achievement. Alternatively, pupils and parents may not have the mental headspace or the

resources to engage thoroughly with missed learning content due to their challenging family circumstances, leading to more detrimental consequences for student achievement. Finally, although school absences due to *family holidays* have engendered much debate, especially in the United Kingdom (e.g., BBC News, 2019), they may be least associated with children's learning since students are usually absent for a limited amount of time. Furthermore, parents may only decide to go on holidays during term-time if they anticipate that their children can make up for the missed work or generally do well (Hancock et al., 2018).

### The Current Study

Despite the possibility that these forms of school absence may vary in their association with student achievement and provide valuable insights into the mechanisms, few studies have examined this potential heterogeneity. We add to previous research by investigating associations between different reasons for absences and student achievement using linked census and administrative school data from Scotland. Scottish primary education lasts for 7 years (from P1 to P7) and secondary education lasts for 6 years (from S1 to S6). At the end of compulsory (Stage S4) and postcompulsory schooling (Stages S5/S6), students in Scotland undertake national examinations, which are highly consequential for school continuation, entry into higher education, and labor market outcomes (Iannelli & Duta, 2018; Iannelli et al., 2016). Given our tentative theoretical considerations, we do not postulate specific hypotheses but follow an exploratory approach, asking the following three research questions:

**Research Question 1:** To what extent are overall school absences associated with academic achievement at the end of compulsory schooling?

**Research Question 2:** To what extent are overall school absences associated with academic achievement at the end of post-compulsory schooling?

**Research Question 3:** Do these associations vary with the type of school absence (truancy, sickness, exceptional domestic circumstances, and family holidays)?

### Method

#### Data and Sample

The Scottish Longitudinal Study (SLS) links 2001 census data, administrative school records, and Scottish Qualifications Authority (SQA) data, allowing us to harness reliable and comprehensive information on the reasons for absenteeism and students' achievement in national examinations. The SLS is a large-scale, anonymized record linkage study designed to capture a representative sample of the Scottish population. SLS members were selected by using 20 semirandom birthdates and cover 5.3% of the Scottish population. We obtained ethical approval for the study from the University of Strathclyde ethics committee.

Our SLS sample ($n = 6,031$) consists of two student cohorts in their final year of compulsory schooling (Stage S4) in state-funded schools in 2007 and 2008, respectively, who were followed into postcompulsory secondary schooling (Stages S5 and S6).

To access information on essential covariates from Scotland's Census 2001, we excluded pupils who did not live in Scotland during the 2001 census from our analytic sample ($n = 812$). We also excluded pupils who did not live with their parents ($n = 214$) during the 2001 census because they lacked key household information and background characteristics. In addition, pupils who attended special schools/units, that is, schools that provide an education for children with very specific or severe additional support needs (special educational needs in other contexts), those recorded to have repeated a school year, and those who appeared to have skipped a consecutive school stage ($n = 62$) were also excluded from our analytic sample. Finally, we also excluded pupils due to lack of SQA achievement records ($n = 128$) or nonresponse (missing/edited) on any of the variables used ($n = 396$). The most common variables affected by nonresponse (missing/edited) were parental class, parental education, and mother's age. Our final sample consists of 4,419 pupils at compulsory schooling (S4) and 3,135 at the postcompulsory stage (S5/S6).

#### Measures

Our measures included academic achievement as the dependent variable, reasons for absenteeism as our main independent variables, and a rich list of covariates (for summary statistics of all variables, see Appendix Table A1).

*Academic Achievement.* Students' *academic achievement* was measured using grades obtained from national standardized examinations at the end of compulsory schooling (S4, age 15–16 years) and postcompulsory schooling (S5/S6, age 16–18 years). At the end of compulsory schooling, students in Scotland, for the first time, take high-stakes national standardized exams in about eight subjects (Standard Grades), of which only English and mathematics are compulsory. Students can choose to take exams at a given level of difficulty (i.e., Foundation, General, and Credit) depending on their future educational plans. Some students exit school after this stage, while others progress to the postcompulsory stage (S5/S6).

At the end of S5/S6, students take exams in "Highers" and "Advanced Highers," of which the latter is more difficult. They can also take "Intermediate 1" and "Intermediate 2" exams (equivalent to S4 Standard Grades General and Credit levels). Since there are no compulsory subjects in S5/S6, students can choose to complete exams in any number of

subjects at any level in any postcompulsory school stage (S5 or S6). Grades in S4 and S5/S6 are awarded for each subject using an alphanumeric system to determine admissions to higher education and high-demand programs. These examinations are set and administered by the SQA, the national body responsible for awarding qualifications in Scotland.

To effectively deal with the Scottish system's complex nature, we operationalized academic achievement as a continuous outcome using the extended version of the Universities and Colleges Admissions Service Scottish tariff points system (for more details, see Appendix B and section 3.3 in Scottish Government, 2012). This converts achievement across all subjects for each student into tariff points. Universities use these tariff points in combination with subject choices for decisions on admissions to their institutions. The average tariff point among S4 pupils was 181.77 (*SD* = 73.78), while the average tariff point among pupils in postcompulsory schooling was 208.47 (*SD* = 141.92). To allow for the comparison of estimates across compulsory and postcompulsory stages, tariff points at each stage were standardized (*z* score).

*Absenteeism. Overall absences* were measured as the proportion of days a pupil was absent from school, regardless of the reason for being absent. Schools are expected to record a daily register of attendance twice a day (morning and afternoon) to note attendance and absences (Scottish Government, 2007). To account for differences in the number of possible days between different school authorities and students, we divided the total number of days attended by each student's total number of possible days. Then, we subtracted the resulting proportion from one to obtain the proportion of overall absences.

Schools in Scotland also report specific reasons for absence following guidelines for recording absenteeism set by the government (Scottish Government, 2007). These may be due to authorized reasons where parents contact the school and provide reasons why their child cannot attend school or is not at school. Schools can authorize absences for reasons such as illness, exceptional domestic circumstances, or family holidays. Where a child does not attend school and the parent has not contacted the school to indicate that their child will be absent, it is to be assumed that the child is either missing or truanting until the school receives an explanation. Schools must contact parents or the child's emergency contact to find out why children were absent (Scottish Government, 2007).

*Sickness-related absence* refers to the proportion of days a pupil was absent from class due to sickness and for which no alternative educational arrangements were provided. It includes any time a pupil was off sick, with proof of illness such as a parental letter or medical certificate. *Truancy* was measured as the percentage of days a pupil was absent for which no adequate explanation was provided (e.g., sickness, exceptional domestic circumstances) for the absence.

As with the other forms, absences due to family holidays and exceptional domestic circumstances were measured as the proportion of days absent in the respective school year. *Family holidays* measured the proportion of days families have taken their children out of school to go on holiday during the school year. Absences due to short-term *exceptional domestic circumstances* cover situations such as the period immediately after an accident or illness, a period of severe or critical illness of a close relative, or a domestic crisis causing severe disruption to the family home.

On average, students missed a proportion of 0.14 days overall (*SD* = 0.12), 0.05 days due to sickness (*SD* = 0.07), 0.02 days due to truancy (*SD* = 0.05), and less than 0.01 days due to family holidays (*SD* = 0.01) and exceptional domestic circumstances (*SD* = 0.02) in the final year of compulsory schooling (S4). Figures are similar in postcompulsory schooling (S5/S6) for all forms of absences (see again Appendix Table A1).

*Covariates.* Based on theoretical and empirical considerations, we selected covariates that are likely to be correlated with students' academic achievement and school absenteeism. Our analyses adjust for a range of students' family, socioeconomic, demographic, and health characteristics.

*Parental education* was measured with the highest educational qualification among parents using five categories: (1) No qualification (13%); (2) Lower secondary qualification (Standard Grade or equivalent; 31%); (3) Upper secondary qualification (Highers/Advanced Highers or equivalent; 19%); (4) College below degree (Higher National Certificates (HNC)/ Higher National Diplomas (HND) or equivalent; 11%); and (5) First degree/postgraduate degree or equivalent (27%).

*Social class* was measured with the eight-class "analytical" version of the National Statistics Socioeconomic Classification (NS-SEC): (1) Higher managerial, administrative, and professional occupations (13%), (2) Lower managerial, administrative, and professional occupations (29%), (3) Intermediate occupations (15%), (4) Small employers and own account workers (7%), (5) Lower supervisory and technical occupations (9%), (6) Semiroutine occupations (14%), (7) Routine occupations (8%), and (8) Never worked and long-term unemployed (3%). We used the highest class among both parents and, in single-parent households, the present parent's class.

*Free school meal (FSM) registration* was measured as a binary variable, indicating whether a student was registered as entitled to FSMs (1) or not (0). In both S4 and S5, 8% of students were registered for FSMs.

*Housing tenure* differentiated between students living in socially rented accommodation (27%) and an owner-occupied or privately rented accommodation (73%).

*Neighborhood deprivation* was measured using quintiles of the Scottish Index of Multiple Deprivation (SIMD), ranging from most deprived (SIMD 1) to least deprived (SIMD

5) neighborhoods. The SIMD ranks 6,505 small areas, each containing around 350 households from most deprived to least deprived according to seven life course domains (employment; income; health; education, skills, and training; geographic access to services; crime; housing).

*Family structure* differentiated between families where both parents were present (71%), families where one household member is a step-parent (7%), and single-parent households (21%). The *number of siblings* is categorized as no siblings (16%), one sibling (54%), and two or more siblings (30%). A binary indicator also measured whether at least one *grandparent was present* in the household (1%) or not.

*Student health* is a subjective measure from the 2001 census indicating whether children's health had been "good/fairly good" (92%) or "not good" (8%) over the past 12 months.

*Long-term parental illness* captures whether at least one of the pupils' parents had a limiting long-term illness, health problems, or a disability (15%). *Parental caring responsibilities* records whether at least one parent present in the household gave any help or support to family members, friends, neighbors, or others because of long-term physical or mental ill-health or disability, or problems related to old age (18%).

*Additional support needs (ASN)*, also known as special educational needs in other contexts, is a binary indicator indicating whether students were identified with ASN (No = 0, Yes = 1). In Scotland, a student is identified with ASN if they are likely to be unable to benefit from school education without additional support. It can be due to disability (e.g., language and speech disorder), learning environment (e.g., inflexible curricular arrangements), family circumstances (e.g., children in the care of their local authority), or social and emotional factors (e.g., experiencing bullying behavior). In S4 and S5, 4% of students were classified as having ASN.

*Temporary exclusion* (defined as out-of-school suspensions in other contexts) accounts for incidents in which students were suspended from school for a fixed period at least once during the school year. While the percentage of temporarily excluded students was 5% in S4, it was 2% in S5.

We further controlled for demographic characteristics such as *student sex*, *student age, mother's age at birth*, *residence* (rural vs. urban), *ethnicity* ("White" vs. "Other ethnic background"), and *school cohort* (starting S4 in 2007 vs. 2008).

### Analytic Strategy

Our analysis proceeded in several steps. First, we examined the association between overall absenteeism and academic achievement at the end of compulsory schooling (S4) using linear regression estimated by OLS ($n$ = 4,419). Our interpretation of the estimates relies on the correct parametric specification. We assume linear relationships between school absences and student achievement, as Kirksey (2019) and Gershenson et al. (2017) did not find any evidence for nonlinear relationships. Our model is displayed in equation 1:

$$Y\_S4_{ij} = \beta_0 + \beta_1 Abs\_S4_i + \beta_2 Z_i + \delta_j + \varepsilon_{ij} \tag{1}$$

where the tariff point score in S4 (Y) for student $i$ in school $j$ was modeled as a function of the percentage of overall absences (Abs) of student $i$ in S4, covariates (Z), and school fixed effects ($\delta_j$). School fixed effects control for possible differences in the school-level environment such as the curriculum, organization, or leadership that may be common causes of school absenteeism and academic achievement. To account for the nested nature of the data (pupils $i$ within schools $j$), we clustered standard errors (*SE*s) at the school level.

In a further model, we examined associations between different forms of school absences (truancy, sickness absence, exceptional domestic circumstances, and family holidays) and academic achievement at the end of compulsory schooling. This model is based on the same equation as above, except we consider multiple reasons for school absence instead of overall absenteeism. Hence, it estimates whether different forms of absenteeism are uniquely associated with student achievement net of the other reasons for absence.

In a second step, we examined associations between overall and specific forms of school absenteeism in postcompulsory schooling (S5) and academic achievement in postcompulsory schooling (S5/S6, $n$ = 3,135). Again, we estimated two models, either including overall absenteeism or the specific reasons for absenteeism (see equation 2 for overall absences). In these models, we further conditioned on previous academic achievement ($Y\_S4_i$). It is important to note that S4 and S5/S6 are the only stages in the Scottish education system in which students are assessed in national exams. Therefore, previous academic achievement in S4 serves as a proxy for individual student fixed effects as long as unobserved student-level determinants of achievement such as motivation and diligence are time-invariant (Gottfried, 2010). Since some students dropped out after compulsory schooling in S4 ($n$ = 1,284), we corrected for selective dropout by using inverse probability of censoring weights (Hernán & Robins, 2006). For more information on the procedure, see Appendix C.

$$Y\_S5/S6_{ij} = \beta_0 + \beta_1 Abs\_S5_i + \beta_2 Z_i + \beta_3 Y\_S4_i + \varepsilon_{ij} \tag{2}$$

Last, we used first-difference models (Allison, 2009) to estimate the associations between within-student changes in absences (overall and for specific reasons) on academic

achievement progress by using longitudinal information on student absences and achievement from both the compulsory and postcompulsory stages ($n = 3{,}135$). The first-difference model is shown in equation 3:

$$\Delta Y_i = \beta_1 \Delta Abs_i + \beta_2 \Delta Z_i + \Delta \varepsilon_i \qquad (3)$$

where $\Delta$ denotes the change from $t = $ S4 to $t = $ S5. The model controls for changes in FSM registration and ASN across these stages.

## Findings

### School Absenteeism and Academic Achievement at Compulsory Schooling (S4)

Table 1 shows the association between overall absences and academic achievement at the end of compulsory schooling when adjusting for our covariates and school fixed effects (M1). The second model (M2) indicates associations between specific reasons for absence (truancy, sickness absence, exceptional domestic circumstances, and family holidays) and academic achievement at the compulsory stage. Proportions of days absent were transformed into percentages for each measure of absence to allow for the interpretation of effect sizes in percentage points.

Table 1 illustrates that, on average, a percentage point increase in days absent overall is associated with a decrease of 0.03 standard deviations ($SE = 0.00$, $p < .01$) in the tariff score in S4, holding all other covariates constant. When considering different forms of absences, we find that both for sickness absence and truancy, a percentage point increase in days of absence due to these reasons is, on average, associated with a decrease in academic achievement by 0.04 standard deviations ($SE = 0.00$, $p < .001$)). Missing 1 percentage point of days more due to family holidays is associated with a decrease by 0.03 standard deviations ($SE = 0.01$, $p < .05$), while it is a drop by 0.02 standard deviations ($SE = 0.00$, $p < .01$) for a percentage point increase in days absent due to exceptional domestic circumstances. We explicitly tested for differential relations between these forms of absences and academic achievement using Wald tests (see Appendix Table D1). While we can reject the equality hypothesis for truancy, $F(1, 360) = 14.71$; $p < .001$, and sickness absence, $F(1, 360) = 18.05$; $p < .001$, in relation to exceptional domestic circumstances, all other effect comparisons do not reveal any statistically significant differences at the 5% level.

### School Absenteeism and Academic Achievement at Postcompulsory Schooling (S5/S6)

To adjust for previous academic achievement after S4, we estimated linear models by OLS and using data for students who continued schooling into postcompulsory stages (S5/

TABLE 1

*Summary of Ordinary Least Squares Regressions Predicting Academic Achievement (Tariff Points) at the End of Compulsory Schooling (S4) From Overall Absenteeism and Specific Forms of Absenteeism*

| Variable | M1 | M2 |
|---|---|---|
| Overall absenteeism (S4) | −0.03 (0.00)*** | |
| Truancy (S4) | | −0.04 (0.00)*** |
| Sickness absence (S4) | | −0.04 (0.00)*** |
| Exceptional domestic circumstances (S4) | | −0.02 (0.00)** |
| Family holidays (S4) | | −0.03 (0.01)* |
| *Sex* (Ref. Male) | | |
| Female | 0.17 (0.02)*** | 0.16 (0.02)*** |
| *Place of residence* (Ref. Urban) | | |
| Rural | 0.02 (0.04) | 0.04 (0.04) |
| *Ethnicity* (Ref. "White") | | |
| "Other ethnic background" | 0.18 (0.06)** | 0.18 (0.07)** |
| Child's age | −0.01 (0.04) | 0.00 (0.04) |
| Mother's age at birth | 0.01 (0.00)*** | 0.01 (0.00)** |
| *School cohort* (Ref. 2008) | | |
| 2007 | −0.01 (0.03) | −0.01 (0.03) |
| *Parental education* (Ref. No qualifications) | | |
| First degree | 0.54 (0.04)*** | 0.57 (0.05)*** |
| College below degree | 0.34 (0.05)*** | 0.36 (0.05)*** |
| Upper secondary qualification | 0.34 (0.05)*** | 0.37 (0.05)*** |
| Lower secondary qualification | 0.18 (0.04)*** | 0.20 (0.04)*** |
| *Parental class* (Ref. Higher managerial, administrative, and professional occupations) | | |
| Lower managerial, administrative, and professional occupations | −0.17 (0.04)*** | −0.18 (0.04)*** |
| Intermediate occupations | −0.28 (0.04)*** | −0.29 (0.05)*** |
| Small employers and own account workers | −0.28 (0.05)*** | −0.31 (0.06)*** |
| Lower supervisory and technical occupations | −0.31 (0.05)*** | −0.33 (0.06)*** |
| Semiroutine occupations | −0.35 (0.05)*** | −0.36 (0.05)*** |
| Routine occupations | −0.30 (0.06)*** | −0.33 (0.06)*** |
| Never worked | −0.31 (0.08)*** | −0.31(0.09)** |
| *FSM registration* (S4, Ref. Not registered) | | |
| Registered | −0.07 (0.04)** | −0.10 (0.05)* |
| *Housing tenure* (Ref. Owned/private rented) | | |
| Social rented | −0.11 (0.03)** | −0.15 (0.04)*** |
| *SIMD* (ref. SIMD 5 = least deprived) | | |
| SIMD4 | −0.03 (0.04) | −0.01 (0.04) |
| SIMD3 | −0.12 (0.04)** | −0.12 (0.04)** |
| SIMD2 | −0.12 (0.05)* | −0.13 (0.05)** |
| SIMD1 = most deprived | −0.13 (0.05)** | −0.16 (0.05)** |
| *Family structure* (Ref. Two-parent family) | | |
| One parent and one step-parent | −0.11 (0.04)** | −0.14 (0.04)** |
| Single parent | 0.04 (0.03) | 0.01 (0.03) |
| *Number of siblings* (Ref. No) | | |
| One sibling | −0.01 (0.03) | −0.01 (0.03) |
| Two or more siblings | −0.03 (0.04) | −0.06 (0.04) |
| *Grandparent present* (Ref. No) | | |
| Yes | −0.03 (0.09) | −0.12 (0.09) |
| *Additional support needs* (S4, Ref. No) | | |
| Yes | −0.86 (0.07)*** | −0.89 (0.07)*** |
| *Child health* (Ref. Good) | | |
| Not good | −0.02 (0.04) | −0.05 (0.05) |
| *Long-term parental illness* (Ref. No) | | |
| Yes | −0.02 (0.03) | −0.03 (0.03) |
| *Parent caring responsibility* (Ref. No) | | |
| Yes | −0.04 (0.03) | −0.05 (0.03) |
| *Temporary exclusion* (S4, Ref. No) | | |
| Yes | −0.24 (0.06)*** | −0.47 (0.06)*** |
| Constant | 0.37 (0.57) | 0.11 (0.59) |
| School fixed effects | Yes | Yes |
| *n* | 4,419 | 4,419 |
| $R^2$ (within) | 0.46 | 0.41 |

*Note.* Scottish Longitudinal Study, own calculations. Cluster-robust standard errors are in parentheses. Ref. = reference category; FSM = free school meal; SIMD = Scottish Index of Multiple Deprivation; M1 = model 1; M2 = model 2.
*$p < .05$. **$p < .01$. ***$p < .001$.

S6; see the second equation outlined in the analytic strategy section). Selective dropout after S4 is addressed by inverse probability of censoring weights (see Appendix C). As with Stage S4, we estimated two models, including overall absenteeism or specific forms of absenteeism.

Table 2 shows the association between the percentage of missing school in S5 due to overall absences or academic achievement after postcompulsory schooling (S5/S6). Model M1 considers overall absences and adjusts for all covariates already included in the analyses at the compulsory stage (and adding time-varying covariates from S5), while model M2 additionally adjusts for academic achievement in S4. Model M1 shows that a percentage point increase in days absent is associated with a statistically significant decrease in the tariff score by 0.03 standard deviations ($SE = 0.00$, $p < .001$). Hence, the magnitude of the association is similar to what we found for compulsory schooling. While model M2 illustrates a reduced association by one third when adjusting for previous academic achievement, this association between overall absences and postcompulsory academic achievement remains statistically significant with a 0.02 standard deviation ($SE = 0.00$, $p < .001$) decrease in tariff score for each percentage point increase in days absent.

Regarding specific reasons for absence, all forms are negatively associated with postcompulsory academic achievement in model M3. While the magnitude of negative associations is similar to those at the compulsory stage for sickness absence ($b = -0.03$, $SE = 0.01$, $p < .001$) and truancy ($b = -0.04$, $SE = 0.00$, $p < .001$), associations are more strongly negative for family holidays ($b = -0.05$, $SE = 0.02$, $p < .001$) and exceptional domestic circumstances ($b = -0.07$, $SE = 0.02$, $p < .001$). For instance, missing 1 percentage point more of days due to exceptional domestic circumstances is associated with a decrease of 0.07 standard deviations in the postcompulsory tariff score. Model 4 shows that previous academic achievement is an important confounder for these specific forms of absenteeism, reducing their associations by one third (exceptional domestic circumstances), half (truancy) or more than half (sickness absence and family holidays). Nevertheless, all associations remain statistically significant, with highest magnitude of effect for exceptional domestic circumstances ($b = -0.05$, $SE = 0.02$, $p < .01$), followed by truancy ($b = -0.02$, $SE = 0.00$, $p < .001$), family holidays ($b = -0.02$, $SE = 0.01$, $p < .05$) and sickness absence ($b = -0.01$, $SE = 0.00$, $p < .05$). Again, we tested for differential relations between forms of absences and academic achievement at the postcompulsory stage. We cannot reject equality hypotheses for all forms of absences at the 5%-level (see Appendix Table D1).

### First Difference Models

Finally, Table 3 shows our first difference regression results (see the third equation in the analytic strategy). They test whether changes in overall absenteeism (M1 and M2), and specific forms of absences (M3 and M4) between S4 and S5 were associated with changes in achievement in national examinations across compulsory (S4) and postcompulsory stages (S5/S6).

The first difference models confirm previous results showing statistically significant negative associations with academic achievement, except for family holidays. These associations remained largely unchanged when controlling for time-variant covariates in models 2 and 4 (FSM registration and ASN). A 1 percentage point change in overall absences was associated with reducing academic achievement by 0.03 standard deviations ($SE = 0.00$, $p < .001$). A 1 percentage point change in sickness absences was associated with lowering academic achievement by 0.03 standard deviations ($SE = 0.00$, $p < .001$), while truancy change was associated with a reduction of 0.05 standard deviations ($SE = 0.01$, $p < .001$). As with the analysis on postcompulsory schooling, missing out on school due to exceptional domestic circumstances was more strongly associated with reduced academic achievement ($b = -0.07$, $SE = 0.02$, $p < .01$).

### Discussion

This article investigated whether school absences are associated with students' results in high-stakes national examinations at the end of compulsory and postcompulsory schooling in Scotland. We further examined whether the association between school absences and student achievement varies with the reason for absence (truancy, sickness, exceptional domestic circumstances, and family holidays). We contribute to the literature by drawing on population-level census and administrative school data from Scotland, recording more precise reasons for absence. Our findings align with previous research in the U.S. context showing that children's overall school absences during a school year are negatively associated with academic achievement (e.g., Aucejo & Romano, 2016; Gottfried, 2010, 2011; Gottfried & Kirksey, 2017; Kirksey, 2019; Morrissey et al., 2014). Being 1 percentage point of school days more absent was associated with reducing students' achievement by 3% of a standard deviation (estimate from the first difference model). To put this into perspective, a percentage point increase in days absent during the school year is equivalent to more than a third of the difference in academic achievement between students on FSMs and those who are not, and to more than a fourth of the difference between students living in social housing and those not (see FSM registration and social housing estimates in model M1 in Table 1). This finding is consistent with the faucet theory suggesting that missing school reduces learning exposure, leading to detrimental consequences for educational achievement (Alexander et al., 2001).

Our study's main contribution is evidence for unique associations between specific reasons for school absence

TABLE 2

*Summary of Ordinary Least Squares Regressions Predicting Academic Achievement (Tariff Points) at the End of Postcompulsory Schooling (S5/S6) From Overall Absenteeism and Specific Forms of Absenteeism*

| | M1 | M2 | M3 | M4 |
|---|---|---|---|---|
| Overall absenteeism (S5) | −0.03 (0.00)*** | −0.02 (0.00)*** | | |
| Truancy (S5) | | | −0.04 (0.00)*** | −0.02 (0.00)*** |
| Sickness absence (S5) | | | −0.03 (0.01)*** | −0.01 (0.00)* |
| Exceptional domestic circumstances (S5) | | | −0.07 (0.02)*** | −0.05 (0.02)** |
| Family holidays (S5) | | | −0.05 (0.01)*** | −0.02 (0.01)* |
| Previous academic achievement (S4) | | 0.01 (0.00)*** | | 0.01 (0.00)*** |
| *Sex* (Ref. Male) | | | | |
| Female | 0.15 (0.03)*** | 0.12 (0.04)** | 0.16 (0.03)*** | 0.12 (0.04)** |
| *Place of residence* (Ref. Urban) | | | | |
| Rural | −0.02 (0.04) | −0.05 (0.04) | 0.01 (0.04) | −0.03 (0.04) |
| *Ethnicity* (Ref. "White") | | | | |
| "Other ethnic background" | 0.37 (0.09)*** | 0.16 (0.09) | 0.35 (0.09) | 0.14(0.09) |
| Child's age | −0.07 (0.05) | 0.07 (0.05) | −0.08 (0.05) | 0.07 (0.05) |
| Mother's age at birth | 0.01 (0.00)*** | 0.01 (0.00)** | 0.01 (0.00)** | 0.01 (0.00)* |
| *School cohort* (Ref. 2008) | | | | |
| 2007 | −0.04 (0.03) | −0.11 (0.04)** | −0.04 (0.03) | −0.11 (0.03)** |
| *Parental education* (Ref. No qualifications) | | | | |
| First degree | 0.63 (0.08)*** | 0.22 (0.08)** | 0.58 (0.08)*** | 0.19 (0.07)** |
| College below degree | 0.37 (0.07)*** | 0.07 (0.09) | 0.31 (0.08)*** | 0.04 (0.08) |
| Upper secondary qualification | 0.28 (0.07)*** | −0.01 (0.07) | 0.22 (0.08)** | −0.05 (0.06) |
| Lower secondary qualification | 0.17 (0.08)*** | −0.03 (0.08) | 0.11 (0.07) | −0.06 (0.07) |
| *Parental class* (Ref. Higher managerial and professional occupations) | | | | |
| Lower managerial and professional occupations | −0.21 (0.05)*** | −0.13 (0.04)** | −0.22 (0.05)*** | −0.12 (0.04)** |
| Intermediate occupations | −0.36 (0.06)*** | −0.22 (0.06)*** | −0.35 (0.07)*** | −0.21 (0.06)*** |
| Small employers and own account workers | −0.33 (0.06)*** | −0.21 (0.07)** | −0.32 (0.08)*** | −0.20 (0.06)** |
| Lower supervisory and technical occupations | −0.41 (0.08)*** | −0.15 (0.08) | −0.38 (0.08)*** | −0.12 (0.08) |
| Semi-routine occupations | −0.44 (0.07)*** | −0.29 (0.07)*** | −0.41 (0.07)*** | −0.27 (0.06)*** |
| Routine occupations | −0.34 (0.10)** | −0.24 (0.08)** | −0.37 (0.10)*** | −0.25 (0.08)** |
| Never worked | −0.38 (0.11)** | −0.01 (0.11) | −0.39 (0.12)** | 0.01 (0.11) |
| *FSM registration* (S4, Ref. Not registered) | | | | |
| Registered | 0.07 (0.10) | −0.10 (0.08) | 0.08 (0.10) | −0.11 (0.08) |
| *FSM registration* (S5, Ref. Not registered) | | | | |
| Registered | −0.19 (0.10) | 0.06 (0.09) | −0.18 (0.10) | 0.08 (0.09) |
| *Housing tenure* (Ref. Owned/private rented) | | | | |
| Social rented | −0.07 (0.05) | 0.08 (0.05) | −0.06 (0.05) | 0.09 (0.05) |
| *SIMD* (Ref. SIMD 5=least deprived) | | | | |
| SIMD4 | −0.10 (0.05) | 0.00 (0.03) | −0.10 (0.05) | 0.01 (0.04) |
| SIMD3 | −0.18 (0.05)*** | −0.03 (0.04) | −0.18 (0.05)** | −0.03 (0.04) |
| SIMD2 | −0.07 (0.06) | 0.05 (0.05) | −0.07 (0.06) | 0.05 (0.05) |
| SIMD1 = most deprived | −0.10 (0.06) | −0.03 (0.06) | −0.18 (0.06)** | −0.06 (0.05) |
| *Family structure* (Ref. Two-parent family) | | | | |
| One parent and one step-parent | −0.25 (0.07)*** | −0.18 (0.05)*** | −0.25 (0.06)*** | −0.18 (0.05)*** |
| Single parent | 0.04 (0.05) | 0.07 (0.05) | 0.02 (0.05) | 0.02 (0.05) |
| *Number of siblings* (Ref. No) | | | | |
| One sibling | 0.08 (0.04)* | 0.04 (0.04) | 0.08 (0.05) | 0.03 (0.04) |
| Two or more siblings | 0.04 (0.05) | 0.06 (0.05) | 0.03 (0.05) | 0.05 (0.05) |
| *Grandparent present* (Ref. No) | | | | |
| Yes | 0.05 (0.13) | 0.05 (0.12) | 0.04 (0.12) | 0.04 (0.11) |
| *Additional support needs* (S4, Ref. No) | | | | |
| Yes | −0.53 (0.15)*** | −0.09 (0.14) | −0.49 (0.16)** | −0.05 (0.15) |
| *Additional support needs* (S5, Ref. No) | | | | |
| Yes | −0.25 (0.13) | 0.06 (0.13) | −0.28 (0.15) | 0.06 (0.14) |
| *Child health* (Ref. Good) | | | | |
| Not good | −0.03 (0.06) | 0.04 (0.06) | −0.10 (0.08) | 0.01 (0.07) |
| *Long-term parental illness* (Ref. No) | | | | |
| Yes | −0.02 (0.05) | 0.04 (0.04) | −0.01 (0.06) | 0.05 (0.04) |
| *Parent caring responsibility* (Ref. No) | | | | |
| Yes | −0.07 (0.04) | −0.03 (0.04) | −0.09 (0.04) | −0.04 (0.04) |
| *Temporary exclusion* (S4, Ref. No) | | | | |
| Yes | −0.30 (0.10)** | −0.15 (0.09) | −0.36 (0.11)** | −0.18 (0.09) |
| Temporary exclusion (S5, Ref. No) | | | | |
| Yes | 0.05 (0.14) | 0.01 (0.13) | −0.02 (0.16) | −0.03 (0.14) |
| Constant | 0.82 (0.71) | −2.66 (0.71)*** | 1.00 (0.75) | −2.74 (0.74)*** |
| *n* | 3,135 | 3,135 | 3,135 | 3,135 |
| $R^2$ | 0.43 | 0.63 | 0.39 | 0.62 |

*Note.* Scottish Longitudinal Study, own calculations. All models are weighted by inverse probability of censoring to correct for nonrandom loss to dropout after compulsory schooling. Cluster-robust standard errors are in parentheses. Ref. = reference category; FSM = free school meal; SIMD = Scottish Index of Multiple Deprivation; M1 = model 1; M2 = model 2; M3 = model 3; M4 = model 4.

*p < .05. **p < .01. ***p < .001.

TABLE 3

*Summary of First Difference Regressions Predicting Change in Academic Achievement (Tariff Points) From Compulsory (S4) to Postcompulsory Schooling (S5/S6)*

|  | M1 | M2 | M3 | M4 |
|---|---|---|---|---|
| Δ Overall absenteeism | −0.03 (0.00)*** | −0.03 (0.00)*** |  |  |
| Δ Truancy |  |  | −0.05 (0.01)*** | −0.05 (0.01)*** |
| Δ Sickness absence |  |  | −0.03 (0.00)*** | −0.03 (0.00)*** |
| Δ Exceptional domestic circumstances |  |  | −0.08 (0.02)** | −0.07 (0.02)** |
| Δ Family holidays |  |  | −0.02 (0.01) | −0.02 (0.01) |
| Adjusted for Δ FSM and Δ ASN | No | Yes | No | Yes |
| $n$ | 3,135 | 3,135 | 3,135 | 3,135 |
| $R^2$ | 0.05 | 0.05 | 0.04 | 0.05 |

*Note.* Scottish Longitudinal Study, own calculations. Cluster-robust standard errors are in parentheses. FSM = free school meal registration; ASN = additional support needs; M1 = model 1; M2 = model 2; M3 = model 3; M4 = model 4.
*$p < .05$. **$p < .01$. ***$p < .001$.

and students' academic achievement (Hancock et al., 2018; U.K. Department for Education, 2016). In line with other research (e.g., Bosworth, 1994; Buscha & Conte, 2014), absences due to truancy were negatively associated with students' academic achievement at the compulsory and postcompulsory stage. Likewise, sickness-related absences were negatively associated with pupils' results in high-stakes national examinations at both stages. Absences due to exceptional domestic circumstances had a stronger negative association with academic achievement at the postcompulsory than at the compulsory stage. Except for family holidays, these findings of unique associations with academic achievement were corroborated in first difference models.

The negative associations of absences due to truancy, sickness, and exceptional domestic circumstances with achievement may suggest that there are other mechanisms at play, in addition to predictions by the faucet theory. In line with our theoretical considerations, three additional pathways may explain the absenteeism–achievement relationship. The first, *a behavioral pathway*, proposes that school absences associated with truancy exacerbate risky behaviors such as alcohol consumption, drug abuse, or criminal activities that, in turn, cause lower academic achievement (e.g., Eaton et al., 2008; Fergusson & Horwood, 1995; Flannery et al., 1999; Hallfors et al., 2002; Jeynes, 2002; Rocque et al., 2017). In other words, absences may not only be a detriment to student achievement because students are not receiving classroom instruction but also because of what they do when missing out on schooling. The second, *a health pathway*, argues that absences due to sickness may signal the role of long-term underlying health conditions (including mental health) that negatively affect educational achievement (Shaw & McCabe, 2008). In other words, health conditions may have both a direct and an indirect effect through absenteeism on educational achievement. The third, *a*

*psychosocial pathway*, argues that absences generally reduce interactions with peers and teachers, leading to less integration in the school environment and a feeling of alienation. These psychosocial effects make it difficult for students to participate in classroom activities and are harmful to their learning (Korpershoek et al., 2020).

Previous studies found that unexcused absences are more negatively associated with children's academic achievement than excused absences (Gershenson et al., 2017; Gottfried, 2009). As a result, unexcused absences are more frequently the focus of research and policy attention. For instance, a recent meta-analytical review of risk factors of school absenteeism did not include studies on excused school absences (Gubbels et al., 2019). However, our findings indicate that unexcused (e.g., truancy) and excused absences (e.g., sickness absence) were not significantly differently associated with student achievement. Given the negative associations of sickness absence and absences related to exceptional domestic circumstances with student achievement in our study, researchers should devote equal attention to understanding how excused, and unexcused absences impact student learning and educational outcomes.

Several caveats need to be considered when interpreting the results. *First*, causal interpretations of our estimates rest on the strong and unverifiable assumption that there are no (important) unmeasured confounders. *Second*, our findings cannot be generalized to the Scottish pupil population because our sample, for instance, excludes pupils who did not live in Scotland in 2001 and minority populations (e.g., students in special schools/units). *Third*, our analyses focused on the final stages of secondary schooling, for which achievement measures from national exams were available. *Fourth*, although administrative school records on school absences have advantages over self-reported survey information (Keppens et al., 2019), the recording of absences and the associated reasons may vary for pupils and across schools, thereby raising the

possibility of measurement error and concerns about the validity of how reasons for absences were documented.

Despite these caveats, our findings may have significant implications for policy and practice. Specifically, associations between different reasons for absenteeism and children's academic achievement have implications for designing interventions. First, apart from preventing absenteeism, interventions may be concerned with improving the mitigation of absences that cannot be avoided (e.g., sickness absences). It is crucial to provide support mechanisms for children to recover lost learning during school absences, whether the absence is excused or unexcused. The harmful impact of these absences may be reduced by providing additional school support via tutoring during and after school or by strengthening parental involvement in schooling at home, for instance, by providing clear guidance for parents on how their children can catch up with missed lessons content. Second, interventions to prevent school absenteeism will depend on how well they focus on why students miss out on schooling. For academic outcomes to improve, it seems more beneficial to implement interventions that reduce school absenteeism caused by specific reasons, for example, truancy. Third, a multiagency approach is required when implementing strategies to improve school attendance or mitigate the harmful impact of school absences on student achievement. This is because school absences will inevitably involve other professionals such as health workers or social services, addressing the reasons behind absenteeism.

While investigating more precise reasons for absences can help us better understand the potential mechanisms by which absences reduce student achievement, future research may find stronger identification strategies for investigating causal relationships between specific forms of absenteeism and academic achievement. It may also directly examine the mediating pathways between specific forms of absenteeism and academic achievement. Disentangling direct and indirect effects via the immediate consequences of missing school will provide policymakers with further direction on how to tackle the detrimental impact of school absenteeism on educational outcomes. In addition, investigating the timing of absences due to specific reasons during the school year may shed further light on the causes of unequal consequences for student achievement (Gottfried & Kirksey, 2017).

In conclusion, the current study provides a deeper understanding of the association between school absenteeism and academic achievement by focusing on specific reasons for school absences. Uniquely, it proposes three additional pathways by which school absences may be associated with lower educational achievement, signaling key areas for future research and interventions to reduce the harmful consequences of school absenteeism for academic achievement.

## Appendix A

### *Summary Statistics*

TABLE A1
*Summary Statistics (n = 4,419)*

| Variable | M/Proportion | SD |
| --- | --- | --- |
| *School Stage S4* | | |
| Absenteeism measures | | |
|   Overall absenteeism | 0.14 | 0.12 |
|   Sickness-related absenteeism | 0.05 | 0.07 |
|   Family holidays | 0.00 | 0.01 |
|   Exceptional domestic circumstances | 0.00 | 0.02 |
|   Truancy | 0.02 | 0.05 |
| Tariff points | 181.77 | 73.78 |
| Free school meal registration (FSM) | | |
|   Yes | 0.08 | |
|   No | 0.92 | |
| Additional support needs (ASN) | | |
|   Yes | 0.04 | |
|   No | 0.96 | |
|   Temporary exclusion (Yes = 1) | 0.05 | |
| *School Stage S5*[a] | | |
| Absenteeism measures | | |
|   Overall absenteeism | 0.13 | 0.12 |
|   Sickness-related absenteeism | 0.05 | 0.06 |
|   Family holidays | 0.00 | 0.01 |
|   Exceptional domestic circumstances | 0.00 | 0.01 |

*(continued)*

TABLE A1  (CONTINUED)

| Variable | M/Proportion | SD |
| --- | --- | --- |
|   Truancy | 0.03 | 0.06 |
| Tariff points | 208.47 | 141.92 |
| Free school meal registration | | |
|   Yes | 0.08 | |
|   No | 0.92 | |
| Additional support needs (ASN) | | |
|   Yes | 0.04 | |
|   No | 0.96 | |
|   Temporary exclusion (Yes = 1)_ | 0.02 | |
| *Time-constant covariates* | | |
| Parental education | | |
|   No qualification | 0.13 | |
|   Lower secondary qualification | 0.31 | |
|   Upper secondary qualification | 0.19 | |
|   College below degree | 0.11 | |
|   First degree/Higher degree | 0.27 | |
| Parental class | | |
|   Higher managerial, administrative, and professional occupations | 0.13 | |
|   Lower managerial, administrative, and professional occupations | 0.29 | |
|   Intermediate occupations | 0.15 | |
|   Small employers and own account workers | 0.07 | |
|   Lower supervisory and technical occupations | 0.09 | |
|   Semiroutine occupations | 0.14 | |
|   Routine occupations | 0.08 | |
|   Never worked or long-term unemployed | 0.03 | |

*(continued)*

TABLE A1  (CONTINUED)

| Variable | M/Proportion | SD |
|---|---|---|
| Housing tenure | | |
|   Social rented | 0.27 | |
|   Private rented/owned | 0.73 | |
| Scottish Index of Multiple Deprivation (SIMD) | | |
|   SIMD 1 (most deprived) | 0.18 | |
|   SIMD 2 | 0.19 | |
|   SIMD 3 | 0.22 | |
|   SIMD 4 | 0.20 | |
|   SIMD 5 (least deprived) | 0.21 | |
| Cohort member's sex: female | 0.47 | |
| Ethnicity | | |
|   White | 0.97 | |
|   Other ethnic background | 0.03 | |
| Place of residence | | |
|   Urban | 0.77 | |
|   Rural | 0.23 | |
|   Child's age at S3 | 14.05 | 0.28 |
| Family structure | | |
|   Two-parent family | 0.71 | |
|   One parent and one step-parent | 0.07 | |
|   Single-parent | 0.21 | |
| Number of siblings | | |
|   No siblings | 0.16 | |
|   One sibling | 0.54 | |
|   Two or more siblings | 0.30 | |
| Grandparent present | | |
|   Yes | 0.01 | |
| Mother's age at birth | 27.91 | 5.00 |
| School cohort starting S4 | | |
|   2007 | 0.50 | |
|   2008 | 0.50 | |
| Student health | | |
|   Good | 0.92 | |
|   Not good | 0.08 | |
| Long-term parental illness | | |
|   Yes | 0.15 | |
|   No | 0.85 | |
| Parent caring responsibility | | |
|   Yes | 0.18 | |
|   No | 0.82 | |

*Note*. Scottish Longitudinal Study, own calculations.
[a]Statistics pertain to children who have been continuously observed until postcompulsory schooling (n = 3,135) and were weighted to correct for nonrandom dropout from school.

## Appendix B

### Unified Point Score

TABLE B1
*Unified Point Score Scale*

| Course level | Award | Tariff points |
|---|---|---|
| Advanced higher | A | 120 |
| CSYS | A | 120 |
| Advanced higher | B | 100 |
| CSYS | B | 100 |
| Advanced higher | C | 80 |
| CSYS | C | 80 |
| Advanced higher | D | 72 |

*(continued)*

TABLE B1  (CONTINUED)

| Course level | Award | Tariff points |
|---|---|---|
| Higher | A | 72 |
| Higher | B | 60 |
| Higher | C | 48 |
| Higher | D | 42 |
| Intermediate 2 | A | 42 |
| Standard Grade | 1 | 38 |
| Intermediate 2 | B | 35 |
| Intermediate 2 | C | 28 |
| Standard grade | 2 | 28 |
| Intermediate 2 | D | 24 |
| Intermediate 1 | A | 24 |
| Standard grade | 3 | 22 |
| Intermediate 1 | B | 20 |
| Advanced higher | Unit | 20 |
| Intermediate 1 | C | 16 |
| Standard grade | 4 | 16 |
| Higher | Unit | 12 |
| Intermediate 1 | D | 12 |
| Standard grade | 5 | 11 |
| Standard grade | 6 | 8 |
| Access 3 | Cluster | 8 |
| Intermediate 2 | Unit | 7 |
| Intermediate 1 | Unit | 4 |
| Standard grade | 7 | 3 |
| Access 3 | Unit | 2 |
| Access 2 | Unit | 1 |

*Note*. https://dera.ioe.ac.uk/15020/1/00395665.pdf.

## Appendix C

### Inverse Probability of Censoring Weighting

The censoring weight *cw* is formally defined as the ratio of the unconditional probability that student *i* is observed in the sample and the same probability conditional on covariates. Since probabilities are unknown, they are estimated via logistic regression.

$$cw_i = \frac{P(C_i = 0)}{P(C_i = 0 \mid Z_i)}$$

Table C1 shows the logistic regression estimating the denominator of the censoring weight for dropout after the compulsory stage (S4). Table C2 presents summary statistics for the censoring weight.

TABLE C1
*Summary of Model Estimating Denominator of Censoring Weight (Logistic Regression), n = 4,419*

| | |
|---|---|
| Overall absence | 5.82 (0.64)*** |
| Sickness absence | 0.29 (1.00) |
| Truancy | 5.42 (1.73)** |
| Family holidays | −8.16 (4.43) |
| Exceptional domestic circumstances | 19.67 (8.76)* |
| *Sex* (Ref. Male) | |

*(continued)*

## TABLE C1  (CONTINUED)

| | |
|---|---|
| Female | −0.50 (0.10)*** |
| *Place of residence* (Ref. Urban) | |
| Rural | −0.04 (0.12) |
| *Ethnicity* (Ref. "White") | |
| "Other ethnic background" | −1.00 (0.36)** |
| Child's age | 0.55 (0.17)** |
| Mother's age at birth | −0.03 (0.01)** |
| *School cohort* (Ref. 2008) | |
| 2007 | 0.33 (0.10)** |
| *Parental education* (Ref. No qualifications) | |
| First degree | −0.58 (0.18)** |
| College below degree | −0.30 (0.19) |
| Upper secondary qualification | −0.09 (0.16) |
| Lower secondary qualification | 0.01 (0.13) |
| *Parental class* (Ref. Higher managerial and professional occupations) | |
| Lower managerial and professional occupations | 0.02 (0.20) |
| Intermediate occupations | 0.06 (0.24) |
| Small employers and own account workers | 0.33 (0.25) |
| Lower supervisory and technical occupations | 0.44 (0.24) |
| Semi-routine occupations | −0.03 (0.25) |
| Routine occupations | 0.25 (0.26) |
| Never worked | −0.27 (0.34) |
| *FSM registration* (Ref. Not registered) | |
| Registered | 0.01 (0.17) |
| *Housing tenure* (Ref. Owned/Private rented) | |
| Social rented | 0.10 (0.11) |
| *SIMD* (Ref. SIMD 5=least deprived) | |
| SIMD4 | 0.07 (0.14) |
| SIMD3 | 0.10 (0.15) |
| SIMD2 | −0.12 (0.16) |
| SIMD1=most deprived | −0.21 (0.17) |
| *Family structure* (Ref. Two-parent family) | |
| One parent and one step-parent | 0.03 (0.16) |
| Single parent | −0.05 (0.13) |
| *Number of siblings* (Ref. No) | |
| One sibling | 0.30 (0.13)* |
| Two or more siblings | 0.47 (0.14)** |
| *Grandparent present* (Ref. No) | |
| Yes | −0.02 (0.33) |
| *Additional support needs* (Ref. No) | |
| Yes | −0.51 (0.24)* |
| *Child health* (Ref. Good) | |
| Not good | −0.19 (0.17) |
| *Long-term parental illness* (Ref. No) | |
| Yes | −0.24 (0.11)* |
| *Parent caring responsibility* (Ref. No) | |
| Yes | −0.12 (0.12) |
| *Temporary exclusion* (Ref. No) | |
| Yes | 0.58 (0.24)* |
| Tariff points after S4 | −0.02 (0.00)*** |
| Constant | −5.86 (2.47)* |

*Note*. Scottish Longitudinal Study, own calculations. Cluster-robust standard errors in parentheses.
*$p < .05$. **$p < .01$. ***$p < .001$.

## TABLE C2
*Summary Statistics for Inverse Probability Weight (Dropout After S4)*

| | | | Percentiles | | | |
|---|---|---|---|---|---|---|
| | *M* | *SD* | 1st | 25th | 75th | 99th |
| Censoring weight (CW$_d$) | 1.03 | 1.83 | 0.71 | 0.73 | 0.93 | 4.29 |

*Note*. Scottish Longitudinal Study, own calculations. Statistics pertain to uncensored sample.

## Appendix D

*Testing Equality of Forms of Absences*

### TABLE D1
*Testing Equality of Forms of Absences (Wald Tests)*

| | |
|---|---|
| *Compulsory schooling (S4)* | |
| Truancy | |
|  Sickness absence | $F(1, 360) = 0.02; p = .8986$ |
|  Family holidays | $F(1, 360) = 1.50; p = .2209$ |
|  Exceptional domestic circumstances | $F(1, 360) = 14.71; p = .0001$ |
| Sickness absence | |
|  Family holidays | $F(1, 360) = 1.43; p = .2330$ |
|   Exceptional domestic circumstances | $F(1, 360) = 18.05; p = .0000$ |
| Family holidays | |
|  Exceptional domestic circumstances | $F(1, 360) = 0.75; p = .3855$ |
| *Postcompulsory schooling (S5/S6)* | |
| Truancy | |
|  Sickness absence | $F(1, 348) = 0.25; p = .6193$ |
|   Family holidays | $F(1, 348) = 0.02; p = .8824$ |
|   Exceptional domestic circumstances | $F(1, 348) = 3.08; p = .0803$ |
| Sickness absence | |
|  Family holidays | $F(1, 348) = 0.15; p = .7008$ |
|  Exceptional domestic circumstances | $F(1, 348) = 2.15; p = .1431$ |
| Family holidays | |
|  Exceptional domestic circumstances | $F(1, 348) = 3.44; p = .0646$ |

*Note*. Scottish Longitudinal Study, own calculations.

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## Open Practices

The data access file for this article can be found at https://doi.org/10.3886/E157401V1.

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