School absences, academic achievement, and adolescents' post-school destinations

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ABSTRACT

Most research on the consequences of school absenteeism has focused on academic achievement rather than post-school outcomes. Using the Scottish Longitudinal Study ($n = 2{,}941$), we investigated the link between overall absences, truancy, sickness-related absences, and upper secondary school leavers' post-school destinations. We also examined how upper secondary school achievement explains these associations. Overall school absences during the first year of upper secondary schooling decreased the likelihood of continuing further and higher education. However, they increased the likelihood of being employed or not being in education, employment, or training (NEET). Sickness absences and truancy also reduced the likelihood of pursuing further and higher education. Truancy did not significantly increase the risk of NEET, but sickness absences did. Both absence types did not significantly influence the likelihood of being employed. Academic achievement mediated 78%-100% of the link between overall absences, sickness absences or truancy and entry into further and higher education versus being employed. While achievement explained 38%–55% of the link between all absences and further and higher education versus NEET, it did not explain the link between absences and NEET versus being employed. The study emphasises the necessity of reducingunexcused and excused school absences and mitigating their effects.

Introduction

Globally, school absenteeism is a pervasive problem with severe repercussions for the educational trajectories of children. For example, students who are frequently absent miss out on teacher-led lessons, peer interactions, and learning-enhancing activities (Morrissey et al., 2014). Consequently, higher absenteeism rates are associated with poorer academic achievement (e.g. Aucejo & Romano, 2016; Gershenson et al., 2017; Gottfried, 2010), high school dropout (e.g. Alexander et al., 1997; Balfanz et al., 2007) and lower educational attainment later in life (Ansari et al., 2020; Liu et al., 2021; Smerillo et al., 2018).

The detrimental consequences of absenteeism are also likely to extend beyond educational achievement to post-school outcomes. Developmental and economic theories contend that an individual's long-term capabilities and outcomes are based on skills acquired earlier in life (Heckman, 2006). Thus, absences from school may lead to losses in various learning domains and the accumulation of the necessary human capital needed to succeed in post-secondary education and the labour market (Heckman et al., 2006). For example, Ansari et al. (2020) discovered that higher absenteeism rates between kindergarten and the final year of middle school were associated with fewer years of post-secondary education later in life. Smerillo et al. (2018) also found a negative association between chronic absence in the early middle grades and the likelihood of high school graduation by age 21, while Liu et al. (2021) demonstrated that ten days of absence in the 9th grade across all subjects decreased the likelihood of high school graduation and college enrolment by 2%.

Regarding labour market outcomes, Hibbett et al. (1990) showed that truancy was linked to lower-status occupations, less stable career patterns, and higher unemployment in Great Britain. Similarly, Attwood and Croll (2006, 2015) found that, in the English context, truancy was associated with dropping out of school at age 16 and a greater likelihood of becoming unemployed after leaving school. Other studies indicate that more than 10% of absences in lower secondary schooling substantially increased the long-term risk of not being in education, employment, or training (NEET) three years after completing compulsory schooling in England (UK Department for Education, 2018). For Scotland, Furlong (2006) showed that truant students were more likely to be NEET three years after leaving school. Finally, using Swedish administrative data and longer-term outcomes, Cattan et al. (2023) demonstrated that frequent primary school absences significantly reduced final educational attainment and labour income across the lifespan.

Differences in academic achievement are a key mechanism through which school absences may impact on post-school outcomes. Students who are frequently absent from school attain lower test scores in reading and mathematics (e.g. Gershenson et al., 2017; Gottfried, 2010; Smerillo et al., 2018), lower coursework grades and grade point average (GPA) (e.g. Ansari & Pianta, 2019; Gottfried, 2010) and perform less well in high-stakes exams at the end of lower and upper secondary schooling (e.g. Klein et al., 2022). On the other hand, school achievement is a strong predictor of individuals' likelihood of post-secondary enrolment (Iannelli et al., 2016), degree completion (French et al., 2015), gaining employment (Bynner & Parsons, 2002) and higher earnings (French et al., 2015; Hodge et al., 2021). Others have found that low school achievement is the most important predictor of young people's risk of NEET (Feng et al., 2015; Furlong, 2006; UK Department for Education, 2018). However, despite the existence of links between school absences and academic achievement on the one hand and academic achievement and post-school destinations on the other, there is a paucity of research examining the extent to which academic achievement explains the relationship between school absences and later destinations. For England and Wales, Bradley and Crouchley (2020) found that truancy primarily affects the higher risk of NEET via lower academic achievement among individuals leaving school after completing compulsory schooling.

Absences from school may be detrimental to adolescents' post-school destinations for reasons other than academic performance. For instance, they are associated with students' problem behaviours (Ansari & Pianta, 2019; Hallfors et al., 2002) and the

development of social-behavioural skills (Gottfried, 2014; Santibañez & Guarino, 2021). These developmental dispositions are associated with adolescents' likelihood of enrolling in post-secondary education or achieving positive labour market outcomes (e.g. Daly et al., 2015; Heckman et al., 2006; Lleras, 2008). Consequently, the importance of these skills and behaviours for adolescents' post-school destinations may determine the extent to which school achievement mediates the relationship between absenteeism and these destinations. In other words, school achievement may play a greater or lesser role depending on its significance relative to other skills and behaviours concerning post-school outcomes. Although these nuances are critical for policy decisions about where to direct support to help students frequently absent from school succeed beyond compulsory schooling, they have yet to be investigated.

Crucially, absenteeism can occur for a variety of reasons. For example, students may be absent for excused reasons such as sickness or unexplained reasons such as truancy. While previous research has primarily focused on the harmful effects of unexcused absences on achievement (e.g. Gershenson et al., 2017; Gottfried, 2009), recent research has revealed that excused absences due to sickness are equally detrimental to educational achievement (Klein et al., 2022). The few existing studies on absences and post-school outcomes have also primarily focused on truancy (Attwood & Croll, 2006, 2015; Furlong, 2006; Hibbett et al., 1990), with one study investigating the effect of overall absences (Cattan et al., 2023).

Whether and to what extent truancy and sickness absences relate differently to post-school outcomes is still unknown. A direct link between truancy and post-school destinations may indicate the role of social-behavioural skills, given their known associations with post-school destinations (Lleras, 2008). In contrast, the link between sickness absence and post-school destinations, net of school achievement, may indicate the role of longer-term health issues, including mental health, that impact educational and labour market outcomes (e.g. Currie, 2009; Egan et al., 2015). In other words, the extent to which these pathways are more or less important to post-school outcomes may influence the mediating role of school achievement, an issue that has so far received little research attention.

The current study

The present study aims to develop novel understanding of the relationship between school absenteeism (overall, sickness absence, and truancy) and post-school destinations. Importantly, we investigate the extent to which these associations are mediated by academic achievement. The role of school achievement as a mediator may vary depending on the type of absences and provide us with crucial information about the likelihood of other potential mediating pathways (e.g. the role of socio-emotional skills). Understanding these possible underlying causes of the association between school absences and post-school destinations will enable policymakers to identify interventions that may help frequently absent students gain access to post-secondary education and the labour market.

Our research questions are as follows:

- To what extent are school absences related to post-school destinations (employment, further and higher education, and NEET)?

- Does the association between school absences and post-school destinations vary by the reason for absence (truancy, sickness)?
- To what extent does school achievement mediate the association between school absences and post-school destinations?
- Does the mediating role of school achievement vary by the reason for absence (truancy, sickness)?

Context

Scotland has a comprehensive schooling system, with children predominantly remaining in the same school environment until the end of compulsory schooling (S4, age 15–16). Primary education in Scotland lasts seven years (from P1 to P7), while secondary education covers six years (from S1 to S6), with S1 to S4 being a period of compulsory schooling. Students in Scotland take national examinations at the end of lower secondary (S4) and upper secondary (stages S5/S6, ages 16–18) schooling. At the compulsory stage (S4), students take exams in two mandatory subjects (mathematics and English), while in the upper secondary stage (S5/S6), there are no mandatory subjects. At both stages, students can choose the number of subjects and qualification level within each subject for which they wish to sit exams.

Schools in Scotland document specific absence reasons in accordance with Scottish Government directives (Scottish Government, 2019). If children or adolescents are absent from school, their absence is matched against the information provided by their parents, including the anticipated return date. They assume that children and adolescents are absent from school without parental knowledge if the parent has not reported the absence. The absence is recorded as unexcused until the school receives a valid explanation after following up with parents or guardians.

Data and methods

Data

We used unique data from the Scottish Longitudinal Study (SLS), providing comprehensive information on pupils' school attendance in upper secondary schooling, school achievement, and immediate post-school destinations. The SLS is a large-scale, anonymised record linkage study designed to capture a representative sample of the Scottish population. Data can be linked from various statistical and administrative sources such as national census data (1991, 2001, 2011), vital events data (births, deaths, marriages), the National Health Service's (NHS) central register data (migration into and out of the country) and education data (2007–2013). SLS members were selected using 20 semi-random birthdates covering 5.3% of the Scottish population. We used 2001 and 2011 census data, administrative school census, attendance, exclusion data, and Scottish Qualifications Authority (SQA) data from 2007 to 2010. It allows us to harness reliable and comprehensive information on the reasons for absences, students' achievement, and post-school destinations. We obtained ethical approval for the study from Strathclyde Institute of Education ethics committee.

Participants

Our analytical SLS sample consists of two student cohorts who attended state-funded schools in upper secondary schooling (S5/S6) in the academic years 2008–2009 and 2009–2010 and were tracked to their post-school destinations at the 2011 census. We concentrated on regular students and excluded students who attended special schools, were known to have repeated a school year, skipped a subsequent grade, or were in foster care. Additionally, students had to have SQA achievement records and be present during the 2001 and 2011 censuses. This is because post-school destination outcomes and important sociodemographic covariates were extracted from census data.

We focused on students in upper secondary school (S5/S6) because this allowed us to control for prior academic performance (S4) in our analysis. To account for selective school dropout from lower (S4) to upper secondary school ($n = 1,098$), we weighted all analyses with inverse probability of censoring weights (see the section on Analytic Strategy). Given that only 9% ($n = 368$) of cases were affected by item non-response on any of the variables considered, a complete case analysis ($n = 2,941$) was conducted.

Measures

Our measures included post-school destinations as the dependent variable, overall and specific reasons for absenteeism as our main independent variables, achievement at upper secondary schooling as our mediator, and a rich list of covariates, including attainment at compulsory schooling (for summary statistics of all variables, see Supplementary Material Table S1).

Post-school destinations

At the time of the 2011 census, students' post-school destinations were measured with three categories: further and higher education (73%), employment (18%), and NEET (9%). This snapshot measurement of destinations does not account for longer-term membership in these categories.

Individuals' post-school destination is recorded as 'further and higher education' if they are enrolled as a student at the time of the Census 2011. This may include studying for an undergraduate or postgraduate degree at a higher education (HE) institution or studying for any courses or qualifications lower than a degree in further education (FE). Thus, further and higher education includes any continuation in study after leaving upper secondary schooling.

Given the small sample of upper secondary students who enter employment directly and the lack of variance in the occupational strata among this group, we refrained from analysing occupational attainment among the employed. Individuals with NEET status are either unemployed, actively seeking work and able to start within two weeks, or economically inactive due to caring for home/family, being permanently ill/disabled, or other reasons. The vulnerable group of adolescents who become NEET during the school-to-work transition is of great policy concern in the UK and internationally (Bynner & Parsons, 2002; Feng et al., 2015; Mascherini et al., 2012). This is because being NEET early in one's career has long-term scarring effects on future labour market inclusion and wages (e.g. Feng et al., 2015; Mascherini et al., 2012), reinforcing its relevance as a marker of long-term disadvantage.

School absenteeism

The administrative attendance data were used to derive measures of school absences in upper secondary schooling. We calculated *overall absences* as the proportion of days a student was absent from school, regardless of the reason. To account for differences in the number of possible days between different school districts and students, we divided the total number of days attended by the total number of possible days for each student. We subtracted the resultant proportion from one to determine the absence rate. *Sickness-related absences* indicate the proportion of days a student missed school due to sickness and for which no alternative educational arrangements were made. It includes all instances in which a student was absent due to sickness, supported by documentation such as a note from a parent or a medical certificate. *Truancy* was measured as the proportion of days a student was absent without a sufficient explanation (e.g. sickness, exceptional domestic circumstances). All absence measures were calculated for the first year of upper secondary school (S5), given that many students earned their qualifications at the end of S5 and did not enter S6. Twelve per cent of school days were missed by students on average (SD = 0.11), with 5% due to illness (SD = 0.06) and 2% due to truancy (SD = 0.05).

Academic achievement at the end of upper secondary schooling (S5/S6)

To measure students' academic achievement at the end of upper secondary schooling (S5/S6, ages 16–18), complete achievement records from SQA data on grades from national standardised examinations were used. Students could take exams in any number of subjects at any level. The main levels were 'Highers' and 'Advanced Highers' exams, which were more difficult. However, some students also took the 'Intermediate 1' and 'Intermediate 2' exams, roughly equivalent to lower secondary achievement levels of Standard Grade General and Credit. Some students finished their exams at the end of S5 and left school. Otherstook S5 exams for some subjects and S6 exams for others. Grades for each subject are awarded using an alphanumeric system and are used to determine admission to higher education and high-demand programmes. To effectively deal with the complex nature of the Scottish system, we operationalised academic achievement as a continuous outcome using the Unified Point Score Scale, an extended version of the Universities and Colleges Admissions Service (UCAS) Scottish tariff points system. This converts each student's achievement across all subjects and levels into tariff points. Universities use these tariff points with subject choices to make admissions decisions. It is also used to measure attainment in the Scottish Government's official statistics (for more details, see Supplementary Material Table S2 and section 3.3 in Scottish Government, 2012). At the end of upper secondary school, students earned an average tariff of 217.59 (SD = 142.57).

Covariates

Theoretical considerations on observable predictors of school absenteeism, achievement, and post-school destinations guided our selection of covariates. Our analyses adjusted for students' prior educational achievement at the end of compulsory schooling (S4), socio-economic status, health, behavioural, and demographic characteristics. Summary statistics of all covariates can be found in Supplementary Material Table S1.

Since unobserved student-level determinants of achievement, such as motivation and diligence, are time-invariant, previous educational achievement can serve as a proxy for individual student fixed effects (Gottfried, 2010). SQA achievement grades at the end of compulsory schooling (S4, age 15–16) were used to determine *previous academic achievement*. Students took high-stakes national standardised exams in about eight subjects (Standard Grades), with English and mathematics as compulsory. We used the Unified Point Score Scale, an extended version of the Universities and Colleges Admissions Service (UCAS) Scottish tariff points system, as we did for upper secondary achievement.

We measured pupils' socioeconomic status with five indicators from the 2001 census and school census. *Parental education* was measured with the highest educational qualification of either the father or mother in the student's household at the 2001 census, distinguishing between 'no qualification', 'lower secondary qualification' (Standard Grade or equivalent), 'upper secondary qualification' (Highers/Advanced Highers or equivalent), 'sub-degree' (Higher National Certificates (HNC)/Higher National Diplomas (HND) or equivalent), and 'first degree/postgraduate degree or equivalent'. The eight-class 'analytical' version of the National Statistics Socioeconomic Classification (NS-SEC) was used to capture *parental class* at the 2001 census. We used the highest class of both parents and, in single-parent households, the class of the present parent. Third, *FSM registration* was measured as a binary variable, indicating whether a student was registered as eligible for free school meals in upper secondary schooling. *Housing tenure* differentiated between students living in socially rented accommodation and owner-occupied or privately rented accommodation at the 2001 census. Finally, *neighbourhood deprivation* was assessed using the Scottish Index of Multiple Deprivation (SIMD) quintiles, which ranged from the most deprived (SIMD 1) to the least deprived (SIMD 5) neighbourhoods.

Three health characteristics were derived from the 2001 census. First, *student health* is a subjective measure indicating whether children's health in the previous year was 'good/fairly good' or 'not good'. Second, *long-term parental illness* was defined as limiting long-term illness, health problems, or disability in at least one of the student's parents. Third, parental caring responsibility assessed whether at least one parent in the household assisted or supported family members, friends, neighbours, or others due to long-term physical or mental illness or disability, or problems associated with old age (18%).

Additional support needs (ASN), also known as special educational needs in other contexts, are measured using a binary indicator that indicates whether students were classified as having ASN. *Temporary exclusion* (also known as out-of-school suspensions in other contexts) accounts for incidents in which students were suspended from school for a set period at least once during their first year of upper secondary school.

Additionally, we took into account factors like *student sex, 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). *Family structure* distinguished between households with a step-parent, single-parent households, and households including both natural parents. There are three categories for the *number of siblings*: no siblings, one sibling, and two or more siblings. Additionally, a binary indicator assessed whether the household included at least one *grandparent*.

Analytic strategy

To address the first and second research questions and investigate associations of school absences with our categorical outcome of post-school destinations (further and higher education, employment, NEET), we used multinomial logistic regressions and calculated average marginal effects (AMEs) for ease of interpretation. If multiplied by 100, AMEs can be interpreted as percentage point differences in the probability of being in each category of post-school destination. As a measure of school absence, we include either overall absences or both truancy and sickness-related absences in our models. In the latter model, we estimate whether these absences are uniquely associated with post-school destinations net of the other reason.

To answer the third and fourth research questions, we use mediation analysis. To break down the effects of school absences on our three categorical outcomes into direct and indirect effects via school achievement, we applied the Karlson-Holm-Breen (KHB) method (Karlson et al., 2012) to our multinomial logistic regression. The KHB method achieves comparable regression coefficients across nested non-linear probability models by equalising the explained variance of the models. The method performs a linear regression of school absences and covariates on our mediator educational achievement. It then includes the model's residuals as an explanatory variable in the outcome model that does not include achievement. Because school absences and residuals are uncorrelated, the total effect of school absences is unchanged. However, the model fit of the outcome model without achievement and the outcome model with achievement is identical, i.e. they have the same scaling parameter.

We weighted all analyses with inverse probability of censoring weights to correct for non-random selection into our sample of upper secondary students (Hernán & Robins, 2006). Using these weights created a pseudo-population that would have been observed had selection into upper secondary schooling been random regarding our covariates (e.g. academic achievement, school absenteeism, sociodemographic, behavioural and health characteristics). For more information on inverse probability of censoring weighting, see Supplementary Material, including Tables S3 and S4.

Findings

Table 1 shows AMEs for overall absences in the first year of upper secondary schooling (S5) on further and higher education, employment and being NEET adjusting for all covariates, including previous academic achievement at the end of compulsory schooling (S4). All models are weighted by the inverse probability of censoring weights to correct for non-random loss to dropout after compulsory schooling (S4).

A percentage point increase in overall absences increases school leavers' likelihood of employment by 0.2 percentage points [AME = 0.002; SE = 0.001], raises the probability of being NEET by 0.3 percentage points [AME = 0.003; SE = 0.001], but reduces the likelihood of continuing education by 0.5 percentage points [AME = −0.005; SE = 0.001]. In other words, those with higher overall absences are more likely to enter employment or be NEET rather than pursue further and higher education. All effects

Table 1. Summary of multinomial logistic regression predicting post-school destinations (employment, NEET, further and higher) from overall absences among upper secondary school leavers.

	Employment	NEET	Further and higher education
Overall absences (S5)	0.002 (0.001)**	0.003 (.001)***	−0.005 (0.001)***
Academic achievement (S4)	−0.001 (0.001)***	−0.001 (0.000)***	0.001 (0.000)***
Sex (Ref. Male)			
Female	−0.035 (0.016)*	−0.008 (0.013)	0.043 (0.019)*
Place of residence (Ref. Urban)			
Rural	0.012 (0.021)	0.018 (0.016)	−0.030 (0.022)
Ethnicity (Ref. 'White')			
'Other ethnic background'	−0.069 (0.034)*	−0.028 (0.027)	0.097 (0.042)*
Child's age	0.031 (0.030)	−0.010 (0.025)	−0.021 (.034)
Mother's age at birth	−0.002 (0.002)	−0.001 (0.001)	0.003 (0.002)
School cohort (Ref. 2008)			
2007	0.180 (0.017)***	0.072 (0.015)***	−0.252 (0.019)***
Parental education (Ref. No qualifications)			
First degree	−0.045 (0.039)	0.022 (0.032)	0.023 (0.028)
College below degree	−0.038 (0.043)	0.010 (0.032)	0.028 (0.048)
Upper secondary qualification	−0.043 (0.036)	0.017 (0.026)	0.027 (0.042)
Lower secondary qualification	−0.010 (0.035)	0.009 (0.021)	0.001 (0.038)
Parental class (Ref. Higher managerial, administrative, and professional occupations)			
Lower managerial, administrative, and professional occupations	0.050 (0.022)*	−0.037 (0.025)	−0.012 (0.027)
Intermediate occupations	0.089 (0.029)**	−0.013 (0.035)	−0.076 (0.036)*
Small employers and own account workers	0.021 (0.036)	−0.008 (0.037)	−0.013 (0.043)
Lower supervisory and technical occupations	0.036 (0.034)	0.011 (0.037)	−0.046 (0.044)
Semi-routine occupations	0.043 (0.036)	0.010 (0.037)	−0.052 (0.046)
Routine occupations	0.131 (0.055)*	−0.032 (0.036)	−0.099 (0.059)
Never worked or long-term unemployed	0.053 (.064)	−0.037 (0.044)	−0.015 (0.072)
FSM registration (Ref. Not registered)			
Registered	−0.053 (.044)	0.026 (0.033)	0.027 (0.049)
Housing tenure (Ref. Owned/Private rented)			
Social rented	−0.004 (0.026)	0.053 (0.020)**	−0.049 (0.029)
SIMD (Ref. SIMD 5 = least deprived)			
SIMD4	0.013 (0.025)	−0.019 (0.023)	0.007 (0.027)
SIMD3	−0.018 (0.027)	−0.009 (.025)	0.027 (0.029)
SIMD2	−0.026 (0.029)	−0.017 (0.027)	0.043 (0.034)
SIMD1 = most deprived	−0.045 (0.032)	0.010 (0.030)	0.034 (0.036)
Family structure (Ref. Two-parent family)			
One parent and one stepparent	0.002 (0.034)	0.010 (0.027)	−0.012 (0.035)
Single parent	−0.063 (0.022)**	−0.005 (0.020)	0.068 (0.027)*
Number of siblings (Ref. No)			
One sibling	−0.003 (.023)	0.006 (0.019)	−0.003 (0.027)
Two or more siblings	0.010 (0.027)	0.013 (0.021)	−0.023 (0.032)
Grandparent present (Ref. No)			
Yes	−0.025 (0.071)	−0.040 (0.037)	0.065 (0.075)
Additional support needs (Ref. No)			
Yes	−0.106 (0.034)*	0.008 (0.041)	0.098 (0.058)
Child health (Ref. Good)			
Not good	−0.036 (0.036)	−0.004 (0.026)	0.040 (0.042)
Long-term parental illness (Ref. No)			
Yes	0.050 (0.022)*	−0.007 (0.020)	−0.043 (0.027)
Parent caring responsibility (Ref. No)			
Yes	0.026 (0.023)	−0.003 (0.017)	−0.023 (0.026)
Temporary exclusion (Ref. No)			
Yes	0.166 (0.078)*	0.012 (0.052)	−0.178 (0.079)*
N	2,941	2,941	2,941

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

are statistically significant using conventional criteria. Assuming linearity, an increase in overall absences by 12 percentage points (the average in our sample) corresponds to a 6-percentage point decrease in participation in further and higher education and 3.6- and 2.4-percentage point increases in the risk of being NEET or entering employment, respectively.

Table 2 shows the AMEs for sickness absences and truancy in the first year of upper secondary schooling (S5) on post-school destinations controlling for covariates. A percentage point increase in sickness-related absences increases the likelihood of being NEET by 0.4 percentage points [AME = 0.004; SE = 0.001] and reduces the likelihood of continuing studies in further and higher education by 0.5 percentage points [AME = −0.005; SE = 0.001]. However, sickness-related absences did not significantly affect school leavers' likelihood of being employed [AME = 0.001; SE = 0.001] as a key post-school destination. Assuming linearity, an increase in sickness absences by 5 percentage points (the average in our sample) corresponds to a 2.5-percentage point decrease in participation in further and higher education and a 2-percentage point increase in the risk of being NEET, respectively.

A one percentage point increase in truancy is associated with a 0.7-percentage point [AME = −0.007; SE = 0.003] decrease in the likelihood of being in further and higher education. Assuming linearity, a 2-percentage point increase in truancy (the average in our sample) corresponds to a 1.4-percentage point decrease in the likelihood of participating in further and higher education. At the 5% significance level, truancy was not significantly associated with the likelihood of being employed [AME = 0.004; SE = 0.001] or being NEET [AME = 0.003; SE = 0.001].

Table 3 shows the findings of our mediation analysis, breaking down the total effect of overall school absences on adolescents' post-school destinations into direct and indirect effects via academic achievement in S5/S6. Estimates for total, direct, and indirect effects are shown as logit coefficients for the following contrasts: employment vs. further and higher education (1), NEET vs. further and higher education (2), and NEET vs. employment (3). Furthermore, for each contrast, the table shows the percentage of the total effect that can be explained by academic achievement at the end of upper secondary schooling (S5/S6).

Overall school absences significantly increase the risk of being in employment rather than full-time education, net of covariates (total effect). Academic achievement accounts for nearly all (83%) of the total effect of school absences on employment vs. further and higher education. Accordingly, there is no statistically significant direct effect of overall absences on entering employment rather than further and higher education after upper secondary school. Regarding NEET vs. further and higher education, frequently absent students are more likely to be NEET than to continue their education. Academic achievement, on the other hand, accounts for less than half of this total effect (44%). Overall absences continue to have a statistically significant direct effect on being NEET rather than continuing education, net of academic achievement. Increased school absences are associated with a higher risk of being NEET vs. employment. However, academic achievement does not explain this association. Overall absences have a statistically significant direct effect on being NEET vs. employment, net of achievement.

Table 4 summarises our findings regarding the role of academic achievement as a mediator in the relationship between sickness absences or truancy and post-school

Table 2. Summary of multinomial logistic regression predicting post-school destinations (employment, NEET, further and higher education) from sickness absences and truancy among upper secondary school leavers.

	Employment	NEET	Further and higher education
Sickness absences (S5)	0.001 (0.001)	0.004 (0.001)***	−0.005 (0.002)**
Truancy (S5)	0.004 (0.002)	0.003 (0.002)	−0.007 (0.003)*
Academic achievement (S4)	−0.001 (0.000)***	−0.001 (0.000)***	0.001 (0.000)***
Sex (Ref. Male)			
Female	−0.033 (0.016)	−0.010 (0.013)	0.043 (0.019)*
Place of residence (Ref. Urban)			
Rural	0.010 (0.021)	0.015 (0.016)	−0.025 (0.022)
Ethnicity (Ref. 'White')			
'Other ethnic background'	−0.067 (0.034)*	−0.026 (0.028)	0.094 (0.044)*
Child's age	0.034 (0.030)	−0.009 (0.024)	−0.026 (0.033)
Mother's age at birth	−0.002 (0.002)	−0.000 (0.001)	0.002 (0.002)
School cohort (Ref. 2008)			
2007	0.182 (0.017)***	0.073 (0.016)***	−0.255 (0.019)***
Parental education (Ref. No qualifications)			
First degree	−0.042 (0.038)	0.031 (0.031)	0.011 (0.044)
College below degree	−0.035 (0.042)	0.019 (0.032)	0.016 (0.048)
Upper secondary qualification	−0.040 (0.035)	0.028 (0.027)	0.012 (0.042)
Lower secondary qualification	−0.006 (0.034)	0.017 (0.020)	−0.011 (0.037)
Parental class (Ref. Higher managerial, administrative, and professional occupations)			
Lower managerial, administrative, and professional occupations	0.049 (0.022)*	−0.038 (0.025)	−0.011 (0.027)
Intermediate occupations	0.089 (0.029)**	−0.016 (0.036)	−0.073 (0.037)*
Small employers and own account workers	0.022 (0.036)	−0.012 (0.037)	−0.009 (0.043)
Lower supervisory and technical occupations	0.033 (0.034)	0.004 (0.037)	−0.037 (0.044)
Semi-routine occupations	0.040 (0.036)	0.008 (0.037)	−0.048 (0.045)
Routine occupations	0.128 (0.054)*	−0.030 (0.038)	−0.098 (0.059)
Never worked or long-term unemployed	0.053 (0.063)	−0.035 (0.046)	−0.019 (0.070)
FSM registration (Ref. Not registered)			
Registered	−0.054 (0.044)	0.023 (0.032)	0.030 (0.048)
Housing tenure (Ref. Owned/Private rented)			
Social rented	−0.005 (0.026)	0.054 (0.020)**	−0.049 (0.029)
SIMD (Ref. SIMD 5 = least deprived)			
SIMD4	0.012 (0.025)	−0.020 (0.024)	0.007 (0.028)
SIMD3	−0.018 (0.026)	−0.012 (0.025)	0.030 (0.029)
SIMD2	−0.025 (0.030)	−0.018 (0.028)	0.044 (0.034)
SIMD1 = most deprived	−0.042 (.032)	0.015 (0.030)	0.026 (0.037)
Family structure (Ref. Two-parent family)			
One parent and one stepparent	0.002 (0.034)	0.012 (0.026)	−0.014 (0.035)
Single parent	−0.061 (0.022)**	0.004 (0.020)	0.057 (0.028)*
Number of siblings (Ref. No)			
One sibling	−0.004 (0.023)	0.008 (0.018)	−0.005 (0.026)
Two or more siblings	0.009 (0.027)	0.015 (0.021)	−0.025 (0.032)
Grandparent present (Ref. No)			
Yes	−0.022 (0.073)	−0.040 (0.038)	0.062 (0.075)
Additional support needs (Ref. No)			
Yes	−0.109 (.032)**	−0.001 (0.037)	0.110 (0.053)*
Child health (Ref. Good)			
Not good	−0.032 (0.036)	0.007 (0.025)	0.025 (0.040)
Long-term parental illness (Ref. No)			
Yes	0.050 (0.022)*	−0.009 (0.020)	−0.040 (0.027)
Parent caring responsibility (Ref. No)			
Yes	0.028 (0.023)	−0.004 (0.017)	−0.024 (0.026)
Temporary exclusion (Ref. No)			
Yes	0.163 (0.071)*	0.019 (0.052)	−0.182 (0.075)*
N	2,941	2,941	2,941

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

Table 3. Decomposing the total effect of overall absences on upper secondary school leavers' post-school destinations into direct and indirect effects via academic achievement in S5/S6 (*KHB* method).

Overall absences	Employment vs. further and higher education	NEET vs. further and higher education	NEET vs. employment
Total effect	0.030*** (0.008)	0.049*** (0.011)	0.020* (0.010)
Direct effect	0.004 (0.008)	0.027* (0.012)	0.024* (0.011)
Indirect effect via achievement	0.025*** (0.003)	0.022*** 0.004	−0.004 (0.004)
% Explained	83	44	0
N	2,941	2,941	2,941

Notes: Scottish Longitudinal Study, own calculations.
Logit coefficients derived from *KHB* method using multinomial logistic regressions; models condition on all covariates; all models are weighted by inverse probability of censoring weights to correct for non-random loss to dropout after compulsory schooling (S4).
*p < .05, **p < .01, ***p < .001. Robust standard errors in parentheses.

Table 4. Decomposing the total effect of sickness-related absences and truancy on upper secondary school leavers' post-school destinations into direct and indirect effects via academic achievement in S5/S6 (*KHB* method).

	Employment vs. further and higher education	NEET vs. further and higher education	NEET vs. employment
Sickness absences			
Total effect	0.026*** (0.014)	0.064*** (0.015)	0.037* (0.016)
Direct effect	0.000 (0.014)	0.040** (0.015)	0.040* (0.016)
Indirect effect via achievement	0.026*** (0.004)	0.024*** (0.005)	−0.002 (0.004)
% Explained	100	38	0
N	2,941	2,941	2,941
Truancy			
Total effect	0.047* (0.020)	0.060* (0.025)	0.013 (0.023)
Direct effect	0.011 (0.020)	0.027 (0.025)	0.016 (0.024)
Indirect effect via achievement	0.036*** (0.007)	0.033*** (0.007)	−0.003 (0.006)
% Explained	77	55	0
N	2,941	2,941	2,941

Notes: Scottish Longitudinal Study, own calculations.
Logit coefficients derived from *KHB* method using multinomial logistic regressions; models condition on all covariates; all models are weighted by inverse probability of censoring weights to correct for non-random loss to dropout after compulsory schooling (S4).
*p < .05, **p < .01, ***p < .001. Robust standard errors in parentheses.

destinations. Patterns of direct and indirect effects via achievement, to varying degrees, resemble overall absences. In the case of sickness absences, academic achievement entirely mediated the total effect on entering employment rather than further and higher education, while achievement accounts for more than one-third (38%) of the effect of sickness absence on being NEET vs. further and higher education. Academic achievement played no role in the link between sickness absences and an increased risk of being NEET rather than employed. Both the NEET vs. further and higher education and NEET vs. employment comparisons show statistically significant direct effects of sickness absences net of academic achievement.

For truancy, academic achievement accounts for more than three quarters (77%) of the effect on the risk of employment vs. further and higher education. Academic achievement differences also explain more than half (55%) of the relationship between truancy and being NEET rather than in further and higher education. There is no statistically significant direct association between truancy and the likelihood of being NEET as opposed to being in further and higher education. Lastly, we found no statistically significant total effect of truancy on being NEET vs. employed.

Discussion

Our paper investigated the link between school absences and post-school destinations among upper secondary school leavers in Scotland. Prior research on the relationship between school absenteeism and labour market outcomes is limited and primarily focused on truancy (Attwood & Croll, 2006, 2015; Bradley & Crouchley, 2020; Furlong, 2006; Hibbett et al., 1990). Importantly, we assessed the extent to which academic achievement explains the association between school absences and post-school destinations.

We found that overall school absences in upper secondary schooling were associated with a lower likelihood of continuing further and higher education. In contrast, school absences increased the probability that individuals enter employment or be classified as NEET after leaving upper secondary schooling. The findings for NEET are similar to those for England, where persistent absences in lower secondary schooling substantially increased the risk of NEET three years after completing compulsory schooling (UK Department for Education, 2018). However, a novel finding of this study is that the association between overall absences and post-school destinations was stronger for further and higher education, followed by NEET and employment. In other words, overall absences are more influential in determining whether students end up in further and higher education than being NEET or employed. The consequences of school absences for post-school destinations are significant in terms of effect sizes. For instance, an increase in school absences from zero to the average increases the likelihood of being NEET by 3.6 percentage points, a 40% (9.0 + 3.6/9.0) increase in relative terms.

When examining the specific reasons for school absences, sickness absences and truancy play a larger role in determining whether students pursue further and higher education than whether they are NEET or gainfully employed. The negative effect of truancy on the likelihood of pursuing further and higher education was larger than that of sickness absences. Moreover, sickness absences significantly increased the risk of being NEET, whereas truancy did not, a finding contradicting Furlong (2006) in the Scottish context. In other words, the primary risk of truancy is the inability to pursue further and higher education. However, absenteeism due to sickness carries the risk of not pursuing further and higher education in addition to being NEET. Finally, sickness absences and truancy did not significantly increase the likelihood of being in employment.

Crucial to this study was determining the extent to which academic achievement explains associations between absences and post-school destinations. We found that academic achievement is an important mechanism through which overall, sickness or truancy-related absences influence post-school destinations. The significance of academic achievement was influenced more by the type of destination than by the type of absence. For all types of absence analysed, we found that achievement accounted for nearly the entire association between absences and whether a student pursues further and higher education or employment (ranging from 77% to 100%). Due to their poorer academic achievement, absent students were more likely to be employed than pursue further and higher education.

Academic achievement accounted for a much smaller proportion (approximately half or less) of the association between overall, sickness-related, and truancy-related absences and the likelihood of being in further and higher education vs. NEET. One explanation is that absences also increase the risk of being NEET via other social and behavioural dispositions (e.g. Rodwell et al., 2018) and long-term health factors. Concerning the specific forms of absences,

we found that academic achievement was more influential in explaining the effect of truancy than sickness absences. Academic achievement predominantly accounts for the effect of truancy on the likelihood of being NEET vs. entering further and higher education, a finding in line with the results of Bradley and Crouchley (2020) for England and Wales. In other words, low progression to further and higher education among truant students is mainly due to lower academic achievement. Comparatively, the smaller role played by academic achievement in the effect of sickness absences on NEET suggests that underlying health conditions are influential in driving the effect of absences on the risk of being NEET.

Finally, we analysed the effect of absences on the likelihood of being NEET vs. employed. Our findings indicate that academic achievement is negligible in explaining the positive effect of absences on the risk of NEET vs. being employed. This suggests that poor academic performance because of school absences does not influence the likelihood of being NEET vs. employed. We hypothesise that factors such as long-term health conditions (Currie, 2009; Egan et al., 2015) or disability (Holte, 2018) are more important than socio-behavioural factors in explaining why students with frequent absences become NEET, given that sickness absences in our study increased the risk of being NEET, while truancy did not. However, the mechanisms by which sickness absences affect the likelihood of being NEET are unknown and require further research.

Our investigation has several limitations. First, causal interpretations of our estimates of associations between school absences and post-school destinations assume that we observed and accounted for all relevant confounding variables. Although we adjusted for several sociodemographic characteristics and prior academic achievement, unobserved covariates, such as psychosocial factors, may bias the associations between school absences and post-school destinations. Second, because our findings are restricted to upper secondary school students, they cannot be generalised to all school leavers. It is possible that we might reach a different conclusion if we had examined the link between absences and the destinations of students who leave school after completing compulsory schooling. Third, we measured students' early post-school destinations at the time of the 2011 census. There is some heterogeneity in measuring students' destinations, with students leaving S6 in 2010 and those leaving S5 in 2008 being measured up to one year and three years after leaving, respectively. Most importantly, we cannot determine whether school absences correlate with long-term NEET status due to the short duration of our outcome measure. Therefore, future research should investigate the relation between school absences and long-term educational and labour market outcomes.

Despite these limitations, our research findings have significant policy and practice implications. First, reducing school absenteeism and supporting absent students in catching up on missed lesson content will improve their academic achievement and, consequently, their likelihood of further and higher education. If chronically absent students receive academic support, their likelihood of continuing education beyond secondary school will increase. For children to improve their academic outcomes, policies and interventions should go beyond merely promoting school attendance and include academically-focused support for those absent from school. Academic support is particularly important for those who might miss school due to sickness or unavoidable reasons. Given that those who are absent are more likely to enter employment after upper secondary schooling, investing in high-quality training pathways that enable greater skill development will reduce the risk of precarious work and ensure their success in the longer term.

In addition, frequent sickness absences had a detrimental impact on adolescents' participation in post-secondary education or the workforce. They reduced students' likelihood of entering the workforce net of their academic achievement, suggesting that these absences signal longer-term health problems that directly impede young people's labour market participation. This economic inactivity due to sickness may lead to long-term scarring effects on future labour market inclusion and wages, as well as mental health issues, social isolation, or a reduced sense of belonging (e.g. Feng et al., 2015; Mascherini et al., 2012). Early interventions focusing on improving students' health and wellbeing in school will effectively help prevent their exclusion from later education and the labour force. Lastly, our study suggests that support for reducing truancy-related absences should involve tackling the underlying causes of truancy, such as behavioural issues. Additionally, academically focused support, more individualised instruction within and beyond the classroom, and high-quality apprenticeships will enable truant students to pursue further and higher education and gain access to skilled positions in the labour market.

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