

A statistical analysis of Study Smart

Data from 2018/19 to 2022/23

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Executive summary

1. Brief context: What is Study Smart?

1.1 Study Smart is a free online course created especially for new undergraduate students at the University of Reading, with the aim to prepare students to study at university.

1.2 Study Smart focuses on three main areas of university study: 1). academic integrity, 2). communicating at university, and 3). independent learning. The course aims to help students understand how these concepts apply to their studies, with information on how they will be studying, including advice on engaging in seminars, getting the most out of online course material and using digital tools.

1.3 Study Smart is available to students before the start of the semester and can be completed in a few short sessions. It is designed so that students can work through it at their own pace. It is hosted on FutureLearn.

2. Evaluation question

2.1 This evaluation makes use of enrolment data in Study Smart collected from 2018/19 to 2022/23. The key evaluation question is: Would enrolment in *Study Smart* make a difference to students' outcome at the end of their first year (i.e. pass Year 1)?

3. Approach and analysis

3.1 A descriptive crosstab analysis with chi-square test (statistical significance) and Cramer's V (effect size), using enrolment in Study Smart (Yes/No) and Outcome (passed at 1st or 2nd attempt, failed at 1st or 2nd attempt, withdrew or other) was first carried out.

3.2 Propensity Score Matching (PSM) was also carried out with binary logistic regressions to create a matched sample. PSM was used to control for potential confounding variables and to better isolate the effect of Study Smart enrolment on the likelihood of passing Year 1.

4. Overall message

4.1 Across the last five academic years (2018/19 to 2022/23), there is a consistent statistically significant association between Study Smart participation and student outcomes (i.e., passed Year 1 at 1st or 2nd attempt), but the strength of this association varies by year, generally falling within the small or weak range in terms of effect size. In particular, 2018/19 appeared most influential, followed by the year

2019/20 which was the least influential, before stabilising from 2020/21 onwards with a small effect size (Cramer's V) of around 0.1 for the last three years. The effect size indicates the strength of the association, with values typically ranging from 0 (no association) to 1 (perfect association). In this case, the effect sizes generally fall within the small or weak range.

4.2 Propensity Score Matching (PSM) analysis was carried out with a balanced paired matched dataset. This analysis compared students who did and did not enrol in Study Smart, controlling for their likelihood of passing Year 1. The results showed that students who enrolled in Study Smart are more likely to pass Year 1 than those who did not enrol. This outcome is statistically significant and holds even after controlling for students' backgrounds.

All things being equal, students who enrolled in Study Smart are 6.6% more likely to pass Year 1 compared to similar students who did not participate, controlling for nine factors (gender, domicile, age, ethnicity, disability status, disability allowance, household income, POLAR).

4.3 In terms of reach, it appears that a focus on male and non-UK domiciled students may be required to balance the odds of enrolment into Study Smart. But note, the predictive power of the model is very weak.

4.4 Students with higher UCAS tariff entry points are more likely to enrol in Study Smart as well as passing Year 1. Participation in Study Smart alone has a positive association with passing Year 1, suggesting that Study Smart may be most useful for students with lower UCAS entry tariff points. But note, whilst the data is statistically significant, the effect size is weak, meaning factors other than UCAS tariff points and enrolment in Study Smart are also key in students passing Year 1.

5. Caveat

5.1. The analyses provided a direct comparison for only the available variables and therefore cannot control or account for compound factors or variables not recorded. An additional analysis with entry grades (UCAS points) was carried out, but this data had a large range, possibility due to changes (in 2017) and the recording of UCAS tariff points in the data, and therefore should be interpreted with caution. Other variables, such as receiving a financial bursary, are likely to play a role (see 6.1 below). In short, there are unobservable factors of influences.

5.2 It is recognised that the data collected on Study Smart enrolment (Yes/No) does not take into account the level of student engagement, including those who may have enrolled but not fully completed, or only partially completed. Anecdotal evidence suggests that Study Smart has a high completion rate, supported by a strong completion rate in the end of course survey across the years.

6. Recommendations going forward

6.1. For efficiency, the Research and Evaluation team has arranged with PSO that the next iteration of the Financial Bursary Report (from PSO, Spring 2025) will attempt to include enrolment in Study Smart as part of the analysis, providing a more comprehensive picture of how these two initiatives work together to impact student outcomes (e.g., continuation). The expected analysis will overlap significantly and therefore should be combined, as the next PSO report will allow for more variables to be 'controlled' (see the Appendix of the published [Financial Bursary Report \(2023\), p. 8 onwards](#), on the APP Research and Evaluation website).

6.2. A more developed evaluation of Study Smart is possible with the inclusion and revision of the empirical data that were and will be collected at the beginning and end of the Study Smart course, including pre and post questionnaire. For example, using [TASO's ASQ](#) as well as open-ended comments and feedback to build a richer picture and reflection of what worked for students.

6.3. Study Smart should build a [Theory of Change](#) mapping out the expected outputs and intended short, medium and longer-term outcomes. Consider completing the [APP Evaluation Plan](#). The Research and Evaluation team is available to support.

6.4. The Study Smart initiative should ensure that participation is as high as possible across schools. It will also be useful to understand why students in some schools are less likely to enrol in Study Smart.

6.5. Linked to the above (6.4), it is important to review and explore the roles played by the school, staff and students. Qualitative data should be considered, such as interviews, focus groups and reflections, to provide nuanced perspectives on its effectiveness and areas for improvement.

Appendix: Additional information on data analysis

A. Data overview of Study Smart enrolment

2018/19 academic year

Outcome	Study Smart (No)	Percentage	Study Smart (Yes)	Percentage
Passed at 1st or 2nd attempt	997	78.01%	2360	88.82%

$\chi^2 = 92.51$, $p < 0.0001$, Cramer's $V = 0.151$

Example interpretation of the table:

- The column *Study Smart (No)* indicates all the students in Year 1 who did not enrol in Study Smart, which totalled 1278. Of these, 997 students (78.01%) passed their Year 1 at the 1st or 2nd attempt.
- The column *Study Smart (Yes)* indicates all the students in Year 1 who did enrol in Study Smart, which totalled 2657. Of these, 2360 students (88.82%) passed their Year 1 at the 1st or 2nd attempt.
- As such, there were 3,935 first-year students in 2018/19.
- Please note that for data suppression, those who failed at 1st or 2nd attempt, or withdrew, are not included in this version.
- A chi-square test indicates that the differences in outcomes between those who enrolled and did not enrol in Study Smart are statistically significant. In short, the association between taking part in Study Smart and passing at 1st or 2nd attempt is statistically significant and not due to chance.
- The effect size (Cramer's V) between enrolment in Study Smart and their respective outcomes was weak or small (under 0.2, at 0.151), which means while there is a statistically significant association between enrolment in Study Smart and passing Year 1, the strength of this association is not particularly strong, but still noteworthy. So, while Study Smart has a positive impact, other factors are likely to have played a significant role in student outcomes.
- For the subsequent academic years (see below), there are still statistically significant differences between taking part in Study Smart and passing at the 1st or 2nd attempt, but the effect sizes are smaller than in 2018/19, which means the strength of the association is weaker.

2019/20 academic year

Outcome	Study Smart (No)	Percentage	Study Smart (Yes)	Percentage
Passed at 1st or 2nd attempt	1420	90.16%	2123	93.15%

$\chi^2 = 15.07$, $p = 0.0018$, Cramer's $V = 0.056$

2020/21 academic year

Outcome	Study Smart (No)	Percentage	Study Smart (Yes)	Percentage
Passed at 1st or 2nd attempt	1356	85.50%	2151	92.16%

$\chi^2 = 28.39$, $p < 0.0001$, Cramer's $V = 0.099$

2021/22 academic year

Outcome	Study Smart (No)	Percentage	Study Smart (Yes)	Percentage
Passed at 1st or 2nd attempt	1343	79.66%	2111	88.55%

$\chi^2 = 67.65$, $p < 0.0001$, Cramer's $V = 0.125$

2022/23 academic year

Outcome	Study Smart (No)	Percentage	Study Smart (Yes)	Percentage
Passed at 1st or 2nd attempt	1331	81.21%	2358	88.48%

$\chi^2 = 48.93$, $p < 0.0001$, Cramer's $V = 0.103$

B. Binary logistic regression: Study Smart enrolment patterns (model 1) and Passing Year 1 (model 2)

MODEL 1: Enrolment in Study Smart (Yes) against selected demographic data.

Question: Are there any patterns in those who enrol in Study Smart?

Caveat: The Nagelkerke R Square was 0.051 and a Cox & Snell R Square was 0.037, which suggests that the logistic regression model explains a relatively small proportion of the variance in the dependent variable, Study Smart (Yes/No), based on the independent variables included in the model.

Enrolment in Study Smart by selected demographic variables

Step 1 ^a	B	S.E.	Wald	df	Sig.	Exp(B)
Gender = Male	-.691	.030	542.024	1	<.001	.501
Ethnicity = BAME	-.195	.031	38.784	1	<.001	.823
Disability declared = Yes	-.031	.041	.545	1	.461	.970
DSA = Yes	.226	.072	9.788	1	.002	1.253
HHI < £25K = Yes	-.084	.033	6.388	1	.011	.919
Mature = Yes	-.145	.055	7.014	1	.008	.865
Domicile UK = Yes	.402	.042	92.446	1	<.001	1.495
POLAR = Q1-2 = Yes	.024	.039	.394	1	.530	1.025
Constant	.569	.044	169.586	1	<.001	1.767

a. Variable(s) entered on step 1: Gender = Male, Ethnicity = BAME, Disability declared = Yes, DSA = Yes, HHI <£25K, Age on entry = Mature, Domicile = UK, POLAR = Q1-2.

Note on interpretations below: The odds ratio quantifies the odds of an event happening in one group relative to its odds in another, offering a more specific ratio of these odds.

Interpretation: Odds ratio

- **Gender (Male):** Being male decreases the odds of participating in Study Smart by 50% compared to females (OR = 0.501, $p < .001$).
- **Ethnicity (Black, Asian, and Minority Ethnic backgrounds):** Individuals from Black, Asian, and Minority Ethnic backgrounds have 0.823 times the odds of participating in Study Smart compared to those from White backgrounds (OR = 0.823, $p < .001$).
- **Disability Declared:** Declaring a disability does not significantly affect the odds of participating in Study Smart (OR = 0.970, $p = .461$).
- **Disability Support Allowance (DSA):** Receiving a disability support allowance increases the odds of participating in Study Smart by 25.3% (OR = 1.253, $p = .002$).
- **Household Income (<£25K):** Having a household income less than £25K decreases the odds of participating in Study Smart by 8.1% (OR = 0.919, $p = .012$).
- **Mature Student:** Being a mature student decreases the odds of participating in Study Smart by 13.5% compared to non-mature students (OR = 0.865, $p = .009$).
- **UK Domicile:** Being UK domiciled increases the odds of participating in Study Smart by 49.5% compared to non-UK domiciled students (OR = 1.495, $p < .001$).
- **POLAR Q1-2:** Being in POLAR Q1-2 does not significantly affect the odds of participating in Study Smart (OR = 1.025, $p = .530$).

Tentative takeaway message:

A focus males and non-UK domiciled students may be required to balance the odds of enrolment into Study Smart. But note that the predictive power of the model is very weak/low.

MODEL 2: Passing Year 1 (pass at 1st/2nd attempt – converted into binary Yes/No, where 1 is Yes and all others No/0), with participation in Study Smart (Yes/1) and selected demographic data.

Question: Are there any patterns in those who passed Year 1 (at 1st and 2nd attempt) by selected demographic variables, including enrolment in Study Smart (Yes/No).

Caveat: The Nagelkerke R Square was 0.043 and a Cox & Snell R Square was 0.023, which suggests that the logistic regression model explains a relatively small proportion of the variance in the dependent variable, passing Year 1 based on the independent variables included in the model.

Passing Year 1 by selected demographic data and enrolment in Study Smart

Step 1 ^a	B	S.E.	Wald	df	Sig.	Exp(B)
Gender = Male	-.238	.044	29.573	1	<.001	.788
Ethnicity = BAME	-.267	.045	35.351	1	<.001	.765
Disability declared = Yes	-.040	.059	.451	1	.502	.961

DSA = Yes	.429	.113	14.513	1	<.001	1.536
HHI < £25K = Yes	-.357	.046	59.124	1	<.001	.700
Mature = Yes	-.406	.071	32.678	1	<.001	.666
Domicile UK = Yes	-.347	.068	26.348	1	<.001	.707
Study Smart = Yes	.589	.044	180.619	1	<.001	1.803
POLAR = Q1-2 = Yes	-.210	.053	15.894	1	<.001	.810
Constant	2.321	.075	963.005	1	<.001	10.181

a. Variable(s) entered on step 1: Gender = Male, Marker: Ethnicity = BAME, Disability declared = Yes, DSA = Yes, HHI < £25K, Age on entry = Mature, Domicile = UK, Enrolled in Study Smart Yes, POLAR = Q1-2.

Note on interpretations below: The odds ratio quantifies the odds of an event happening in one group relative to its odds in another, offering a more specific ratio of these odds.

Interpretation: Odds ratio

- **Gender (Male):** Being male decreases the odds of passing Year 1 by 21.2% compared to females (OR = 0.788, $p < .001$).
- **Ethnicity (Black, Asian, and Minority Ethnic backgrounds):** Individuals from Black, Asian, and Minority Ethnic backgrounds have 0.765 times the odds of passing Year 1 compared to those from White backgrounds (OR = 0.765, $p < .001$).
- **Disability Declared:** Declaring a disability does not significantly affect the odds of passing Year 1 (OR = 0.961, $p = .502$).
- **Disability Support Allowance (DSA):** Receiving a disability support allowance increases the odds of passing Year 1 by 53.6% (OR = 1.536, $p < .001$).
- **Household Income (<£25K):** Having a household income less than £25K decreases the odds of passing Year 1 by 30.0% (OR = 0.700, $p < .001$).
- **Mature Student:** Being a mature student decreases the odds of passing Year 1 by 33.4% compared to non-mature students (OR = 0.666, $p < .001$).
- **UK Domicile:** Being UK domiciled decreases the odds of passing Year 1 by 29.3% compared to non-UK domiciled students (OR = 0.707, $p < .001$).
- **Study Smart Enrolment:** Enrolling in Study Smart increases the odds of passing Year 1 by 80.3% (OR = 1.803, $p < .001$).
- **POLAR Q1-2:** Being in POLAR Q1-2 decreases the odds of passing Year 1 by 19% (OR = 0.810, $p < .001$).

Tentative takeaway message:

Students who enrol in Study Smart are more likely to pass Year 1. But note, the predictive power of the model is very weak/low and key variables were not included in the model, especially prior attainment (such as UCAS points).

C. Binary logistic regression: Accounting for prior entry grades (results only)

Analysis: Students' entry grades (UCAS tariff) were used as a proxy for prior attainment to create a new variable that regrouped available grades (84.2%, 16,909 students) into quartiles based on frequency (Q1 = 0-104, Q2 = 105-120, Q3 = 120-144, Q4 – 145 or above). This was then analysed by enrolment in Study Smart as well as passing year 1.

Caveat: The effect sizes are weak and the quality of data for UCAS tariff is not very clear nor consistent, with omissions of over 3,000 entries due to no UCAS tariffs.

Possible interpretation:

- **UCAS tariff and enrolment in Study Smart:** Students with higher UCAS tariff points are more likely to enrol in Study Smart. For example, for the upper 25% of UCAS tariff points, 66.8% enrolled in Study Smart, whereas for the lower 25%, 57.6% enrolled. The chi-square test ($X^2 = 187.513$, $p < .001$) shows a significant association between UCAS tariff points and enrolment in Study Smart, but with Cramer's V at 0.105, the effect size is small, indicating a weak relationship despite the statistical significance.
- **Comparison of UCAS tariff quartiles and enrolment in Study Smart:** When controlling for UCAS tariffs, particularly in the middle 50% (Q2), enrolment in Study Smart seems to help with passing Year 1 more so than those with higher UCAS tariffs. This indicates that while UCAS tariff points contribute to the likelihood of passing Year 1, participation in Study Smart also plays a role, potentially levelling the playing field for those with average UCAS scores.
- **Possible next steps:** Explore the viability of Propensity Score Matching (PSM), using a selection of entry grades (e.g., the most popular, e.g., 96, 104, 112, 120, 128, 136 – all with 1,000+ as base), then split by Study Smart Yes/No and then create PSM score based on WP markers, for example, and analyse by Passing Year 1 at 1st or 2nd attempt. This may be done with the recent cohorts, where most students should apply the latest UCAS tariff points.

Tentative takeaway message:

In sum, while higher UCAS tariff points correlate with both enrolment in Study Smart and passing Year 1, participation in Study Smart has a positive association with passing Year 1, independent of UCAS tariff points. Also, Study Smart may be most useful for students with lower UCAS entry tariffs. But note the chi-square statistics and Cramer's V values indicate that these associations are statistically significant but have a very weak effect size, which suggests that factors other than UCAS tariff points and enrolment in Study Smart are also important in determining Year 1 success.

D. Propensity Score Matching (PSM)

To examine the data with greater control variables, a Propensity Score Matching (PSM) was carried out to provide a subset of data with enrolment in Study Smart (denoted by Yes or No) as the group indicator, by the predictors.

All viable student characteristic markers are used as predictors ($n = 8$), including gender, UK vs non-UK domicile, as well as six Widening Participation (WP) markers that are collected by the university to reflect historical and existing gaps in student continuation, completion and attainment. These WP markers included 1). age on entry (a focus on mature student), 2). ethnicity (a focus on minority ethnic students), 3). disability declared (a focus on those declared), 4). disability student allowance (a focus on recipients), 5). household income (a focus on those less than £25,000), and 6). reside in POLAR (a focus on those in quintiles 1 and 2). UCAS entry tariff was not included due to over 3,000 missing data (especially from international students), and inconsistencies in the numbers collected (ranged from 6 to 336).

The dataset started with 20,083 eligible students, with only handful removed for statistical purposes ($n = 20,077$ to $20,079$ for different approaches used). Using *Stata* with the *teffects* functions (as well as *psmatch2* separately), a propensity score was calculated using the above criteria for each participant, with a low caliper of 0.01 (i.e., the range of difference in propensity scores for a match to be considered valid), with enrolment in Study Smart the dependent variable.

Covariate balance was assessed before and after matching. Before matching, significant differences were observed between the ‘treated’ (enrolled in Study Smart) and ‘control’ (not enrolled in Study Smart) groups. After matching, the covariates were well-balanced, with standardised biases reduced to near zero, meaning the PSM procedure successfully created comparable groups.

Over the five academic years, the overall baseline rate of passing Year 1 was 87.4%. The mean pass rate for those not enrolled was 0.830 and for those enrolled was 0.901. The difference in means was -0.071 (unmatched). Following PSM, the gap is 6.6%, using a matched sample.

Key message:

Enrolment in Study Smart increases students’ likelihood of passing Year 1 by 6.6% (95% CI [0.056, 0.076], $p < .001$).

The 6.6% gap equates to an additional 512 students passing Year 1 if we only focus on the pass rate of those not enrolled, or just over 100 students each year.

The analysis revealed a significant positive effect of Study Smart on passing Year 1, indicating that students who enrolled in Study Smart were more likely to pass their first year compared to those who did not, controlling for the nine variables in the model (gender, domicile, age, ethnicity, disability declaration, disabled students’ allowance DSA, household income, participation of local areas (POLAR) classification).

Additional data:

Logistic Regression

Variable	Coefficient	Std. Err.	z-value	P> z	95% Conf. Interval Lower	95% Conf. Interval Upper
_cons	0.5694432	0.0437378	13.02	0	0.4837186	0.6551678
POLARQ12	0.0247654	0.0385979	0.64	0.521	-0.050885	0.1004158
Household income	-0.0836435	0.0332886	-2.51	0.012	-0.1488878	-0.0183991
DSA	0.2225666	0.0721747	3.08	0.002	0.0811069	0.3640264
Disability	-0.0301076	0.0414161	-0.73	0.467	-0.1112817	0.0510665
Minority ethnic	-0.1953897	0.031364	-6.23	0	-0.2568619	-0.1339175
Mature	-0.1446889	0.0546631	-2.65	0.008	-0.2518267	-0.0375512
UK domicile	0.4021444	0.0418412	9.61	0	0.3201372	0.4841517
Sex (male)	-0.6911542	0.0297495	-23.23	0	-0.7494621	-0.6328463

Number of obs = 20079

LR chi2(8) = 763.71

Pob > chi2 = 0

Pseudo R2 = 0.0285

Log likelihood = 13014.199

Outcome variable : Enrolment in Study Smart

PSM (teffects psmatch) outcome

Pass Year 1	Coefficient	AI robust std. err.	z	P> z	95% Conf. Interval Lower	95% Conf. Interval Upper
ATE enrolled in Study Smart (1 v 0)	0.0663003	0.005126	12.93	0	0.0562534	0.0763471

Treatment-effects estimation

Estimator : Propensity-score matching

Outcome model : matching

Treatment model : logit

Number of observation = 20079

Matches requested = 1

Min = 1

Max = 1533

Covariate balance summary

Variable	Standardized Differences Raw	Standardized Differences Matched	Variance Ratio Raw	Variance Ratio Matched
POLARQ12	0.0435861	0.0018471	1.072868	1.002861
Household income	0.0068775	0.0005214	1.00527	1.000398
DSA	0.088575	0.0009428	1.386613	1.00313
Disability	0.0688637	0.0005779	1.099339	1.000738
Minority ethnic	-0.1267115	0.0001693	0.943677	1.0001
Mature	-0.0254486	0.0000000000000000521	0.924384	1
UK domicile	0.1737747	-0.0006929	0.743391	1.001403
Sex (male)	-0.3478691	-0.0001656	0.981328	0.999933

	Raw	Matched
Number of observation	20079	24636
Treated observation	12318	12318
Control observation	7761	12318