



# **Matched Analysis of Student Survey Responses**

October 2022

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# Introduction

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The Higher Education Progression Partnership South Yorkshire (HeppSY) is part of the Uni Connect Programme, funded by the Office for Students. The main focus of Uni Connect is to provide targeted higher education (HE) outreach to young people in Years 9 to 13 living in particular geographic areas. From August 2021 this broadened out to include the targeting of adult learners (learners aged 19 and above). HeppSY is working in partnership with Sheffield Hallam University, The University of Sheffield and South Yorkshire schools and colleges.

The Uni Connect programme aims to increase the HE participation rate for students from underrepresented backgrounds and to support young people in making well-informed decisions about their future (OfS, 2020). Evaluation is an important aspect of the Uni Connect programme as it can provide evidence for the effectiveness of the outreach activity that has been delivered, support continuous development of the programme, informed by empirical data, and contribute to the broader evidence base on widening participation, leaving a resource for future outreach programmes.

As an important part of our impact evaluation, several matched cohort analyses have been submitted to the OfS evidence bank by HeppSY. The cohort analyses involve tracking groups of students longitudinally to determine associations and causal relationships between participation in outreach activity and outcomes related to HE progression, attitudes, and knowledge. This type of analysis is important as it encompasses a broad range of the outreach activities delivered as part of the HeppSY programme, and is well suited to tracking outcomes over time for relatively large sample sizes. However, a limitation of this type of analysis is that the profiles of outreach activity vary substantially across students, meaning that even if there is evidence for programme effectiveness on a particular measure, it is not usually possible to determine which aspects of the programme were necessary and sufficient in achieving that outcome. These cohort analyses are therefore complemented by additional evaluation activities conducted by HeppSY, which are designed to examine the effectiveness of specific sustained interventions targeted at particular student groups, based on detailed theory of change models.

A previous cohort analysis of HeppSY data, using data from Wave 1 (data collected Oct - Nov 2018) and Wave 2 (Nov - Dec 2019) of the annual survey (designed and hosted by CFE Research) found that increased engagement in programme activity, indexed by the number of contact hours that students participated in between waves, predicted higher expectations of applying to HE<sup>1</sup> and higher

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1 <https://www.heppsy.org/assets/2021/02/201020-HeppSY-Cohort-Evaluation-Contact-Hours-and-Expectations-of-Appling-to-HE-Aged-18-or-19-Full-Report-v5.pdf>

HE knowledge<sup>2</sup> at Wave 2, after controlling for prior (Wave 1) expectations and knowledge (HeppSY Cohort Evaluation, 2020). However, a separate longitudinal analysis using Wave 2 and Wave 3 (Nov - Dec 2021) survey data found no effect of HeppSY activity on students' expectations of applying to HE (HeppSY Cohort Evaluation, 2021)<sup>3</sup>. One possible reason for the absence of an effect is that 95% of the contact hours between survey waves took place prior to the pandemic-related school closures in March 2020, meaning students had received minimal outreach in the 8-9 months preceding the Wave 3 survey. Additionally, any positive effects of the programme may have been attenuated by the significant changes and uncertainty in students' lives caused by the pandemic, including school closures and wider societal impacts.

The aim of the present analysis was to test whether an association between HeppSY programme engagement, and expectations of applying to HE and HE knowledge would be observed over a longer timeframe – with responses at Wave 2 and Wave 4 of the survey serving as pre- and post-intervention measures. As with the Wave 2 – Wave 3 analysis (HeppSY Cohort Evaluation, 2021), pre-intervention measures (i.e., Wave 2 survey responses) were therefore collected prior to Covid-related school closures. However, for the present analysis, post-intervention responses were collected throughout November and December 2021, meaning students had been back in classroom learning for longer, and had also (on average) participated in outreach activity more recently compared to the cohort analysis using Wave 3 responses as the post-intervention measures. It was therefore expected that, in line with previous cohort analyses of Wave 1 and Wave 2 survey responses, level of engagement in HeppSY (and partner) activity would have a positive association with expectations of applying to HE and self-reported HE knowledge.

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2 <https://www.heppsy.org/assets/2021/02/201204-HE-Knowledge-Matched-Analysis-Report-Full-Report-v3.pdf>

3 Not published on the website but submitted to the OfS Uni Connect Evidence Bank

# Method

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## Datasets and Data Collection

### CFE Survey

The student survey data used here were collected as part of the Wave 2 and Wave 4 CFE annual learner survey. Wave 2 responses were collected from Year 9 to 13 students in HeppSY partner schools and colleges throughout November and December 2019, and Wave 4 responses were collected throughout November and December 2021. HeppSY co-ordinated with Key Points of Contact (KPOC) in partner institutions, who administered the survey to their students on our behalf. The Wave 2 and Wave 4 survey datasets contained useable data from 12,246 and 7,071 students, respectively.

### HEAT

The HEAT dataset included data relating to the OfS-funded HeppSY activity (including activity delivered through Hepp, SHU, and UoS partners) that took place between the two survey waves. This included contact hours, number of engagements, and types of activity participated in, for each individual student.

## Matching

The present analyses were based on student responses to Wave 2 and Wave 4 of the CFE annual survey. Individual student data was matched across the two waves of survey data using fuzzy matching in Excel Power Query. Matches of 90% or higher were accepted, subject to random spot-checks of the data. The linked survey responses were then matched to the HEAT record of HeppSY and partner activity taking place between the two survey waves.

### Sample

754 students were matched across the two survey waves and to the HEAT activity dataset. This report specifically focuses on the 503 students who were in Year 9 at Wave 2 of the survey and were therefore in Year 11 at Wave 4. The reason for the focus on Year 9 students is that there is a clear sampling bias for students who were in Year 10 or Year 11 (N = 232) at Wave 2 of the survey, as only

those who ultimately continued to a Level 3 post-16 course could be matched at Wave 4<sup>4</sup>. Additionally, as the survey waves were two years apart, there were not many students who were already in a post-16 year group at Wave 2 of the survey (N = 19).

## Variables

### Expectations of Applying to Higher Education:

Students were asked, 'how likely are you to apply to higher education at age 18 or 19?' Responses were given on a six-point ordered scale (1 – Definitely won't apply, 2 – Very unlikely, 3 – Fair unlikely, 4 – Fairly likely, 5 – Very likely, 6 – Definitely will apply), with a "Don't know" response option also available.

### Higher Education Knowledge:

At each wave, students were asked how much they knew about a range of HE topics, providing their responses provided on a three-point scale (1 – Nothing, 2- A little, 3 – A lot). Responses to individual items were combined to form HE knowledge scales for each wave (see Table 1). Note that as with our previous analysis using perceived HE knowledge in secondary school students as an outcome variable (HeppSY Cohort Evaluation, 2020), questions relating to HE application processes (e.g., "where to find information about applying") were not included in the scale, as they were assumed to be of lower relevance to these year groups.

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4 Note that HeppSY only aims to collect annual survey data from post-16 students who are enrolled on Level 3 courses/modules.

**Table 1. Higher Education Knowledge Scale**

| Questions  |
|--|
| The subjects that you could study.   |
| The type of course you could take, such as: degree, foundation degree, or higher/degree apprenticeships. |
| The qualifications and grades needed to get into higher education.                                       |
| What student life would be like.   |
| The costs of study.  |
| The financial support available.   |

*Note. Wave 2 scale  $\alpha = .75$ , Wave 4 scale  $\alpha = .78$ .*

**Contact Hours (HEAT):**

Refers to the cumulative number of hours of HeppSY outreach a student participated in between the two survey waves.

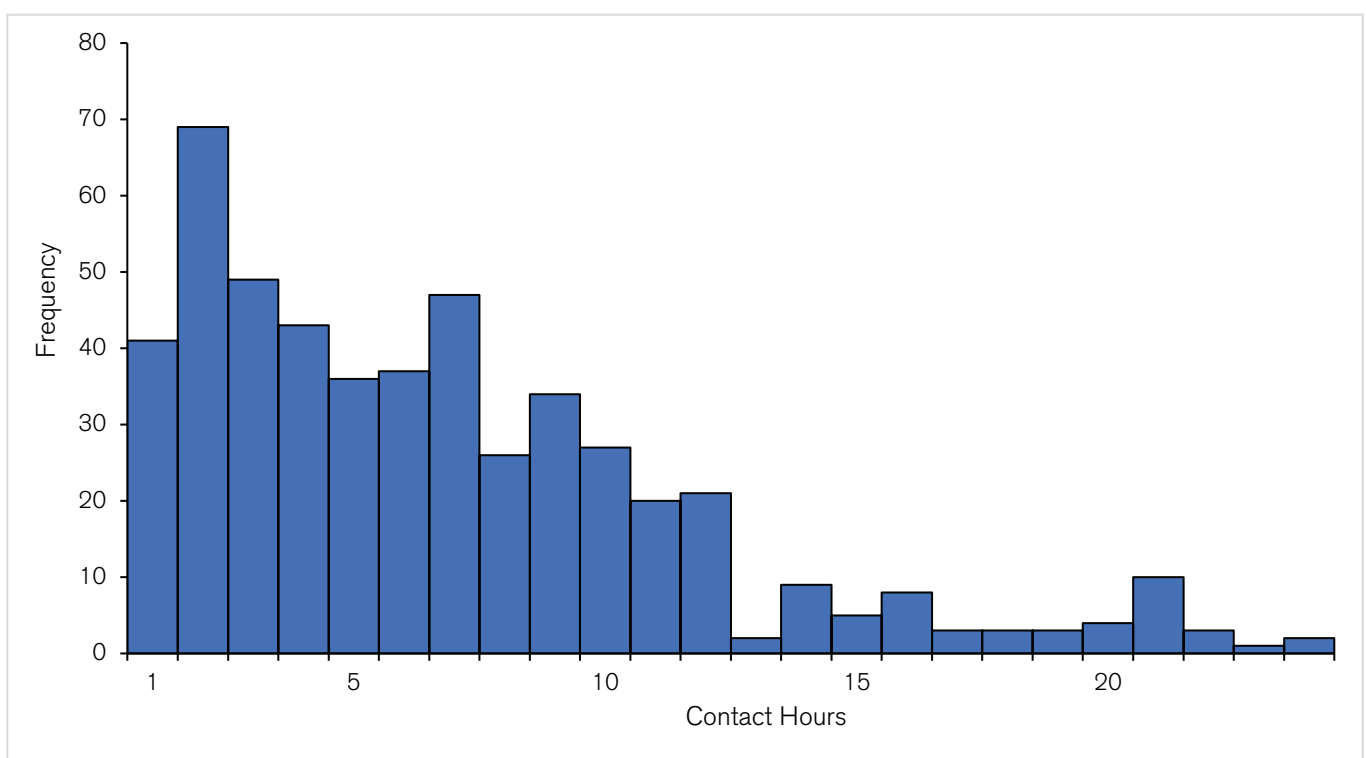
**Uni Connect Status:**

Variable to denote whether a student lived in a Uni Connect target postcode or not.

## Activity Data

The median number of contact hours that students participated in was 5.5, with a range of 0.5 to 24 hours (see Fig. 1). The most common activity that students participated in was coded as “General HE information”, with students participating in a median of 4 contact hours and 5 sessions, and all but one student participating in this type of session at least once (see Table 2.).

**Figure 1. Frequency of Students by Contact Hours**





**Table 2. Student Engagement by Activity Type**

| Activity Type          | Unique Students Participated | Median Engagements per Student | Median Contact Hours per Student |
|------------------------|------------------------------|--------------------------------|----------------------------------|
| General HE Information | 502                          | 5.0                            | 4.0                              |
| Skills & Attainment    | 183                          | 0.0                            | 0.0                              |
| Mentoring              | 67                           | 0.0                            | 0.0                              |
| Subject Insight        | 45                           | 0.0                            | 0.0                              |
| HE Campus Visit        | 38                           | 0.0                            | 0.0                              |
| Other                  | 147                          | 0.0                            | 0.0                              |
| <b>All Activities</b>  | <b>503</b>                   | <b>7.0</b>                     | <b>5.5</b>                       |

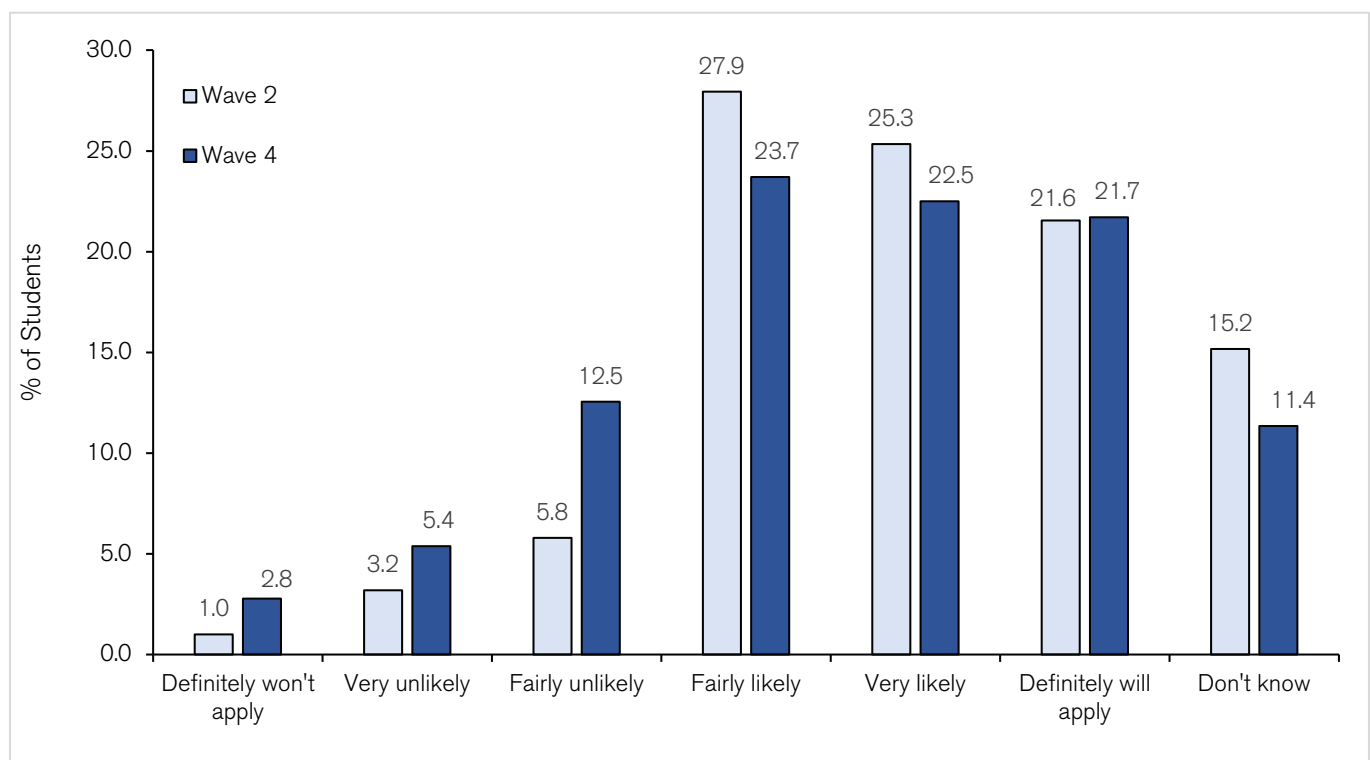
*Note. The unique students column reflects the number of individual students that participated in each activity type at least once. The median engagements column reflects the median number of activities that each student participated in for each activity type. The median contact hours column reflects the median number of contact hours that each student participated in for each activity type.*

# Results

## Expectations of Applying to Higher Education

Students' expectation of applying to HE at Wave 2 and Wave 4 are displayed in Figure 2. While HE expectations were high across both waves, a Wilcoxon signed-rank test revealed that they were significantly lower at Wave 4 compared to Wave 2,  $N = 381$ ,  $z = 2.57$ ,  $p = .01$  (note that for the Wilcoxon signed-ranks test, students that gave "Don't know" responses at either wave were excluded to maintain the ordinal nature of the scale. A McNemar-Bowker test utilising the full response scale indicated that response frequencies also significantly differed between waves,  $p = .04$ ).

**Figure 2. Expectations of Applying to Higher Education**



## Regression Analysis

Students that did not respond to the expectations of applying to HE question were excluded from the regression analysis ( $N = 3$ ), along with students who responded “Don’t know” at Wave 4 ( $N = 57$ ), to allow the outcome to be treated as ordinal<sup>5</sup>. This left a final sample of 443 students across 30 schools, with observations ranging from 1 – 78 students per school.

To account for the hierarchical structure of the data, with individual student observations nested within schools, a multi-level ordinal logistic regression model was initially computed, with random intercepts for schools. However, as school did not account for a substantial nor statistically significant proportion of the variance in Wave 4 expectations (intraclass correlation [ICC] = 0.02), the analysis then proceeded with a single-level ordinal logistic regression model.

Independent variables were added to the ordinal regression model in blocks. See Table 3 for the model coefficients. First, the prior (Wave 2) HE expectations measure (dummy coded) was added, which significantly improved fit compared to a null model,  $X^2(6) = 81.25, p < .001$ . Gender and UCP status were then added, which jointly improved model fit,  $X^2(4) = 24.45, p < .001$ . Gender was a significant independent predictor, with male students, students who had reported their gender as ‘other’, and students who did not report their gender all more likely to report lower HE expectations than female students. UCP status was not a significant predictor of HE expectations, but it was retained in the model due to its theoretical importance in programme evaluation.

Finally, contact hours was added, which was not a significant predictor of Wave 4 expectations,  $X^2(1) = 0.06, p = .80$ . Contact hours also did not significantly interact with any other variables in the model.

To check the proportional odds assumption for ordinal logistic regression, a likelihood-ratio test was conducted, which revealed no evidence of non-proportionality of odds across categories of the outcome variable ( $p = .61$ ).

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5 An alternative approach is to recode “Don’t know” responses as the mid-point on the scale. Treating the data this way did not alter the significance of any of the results.

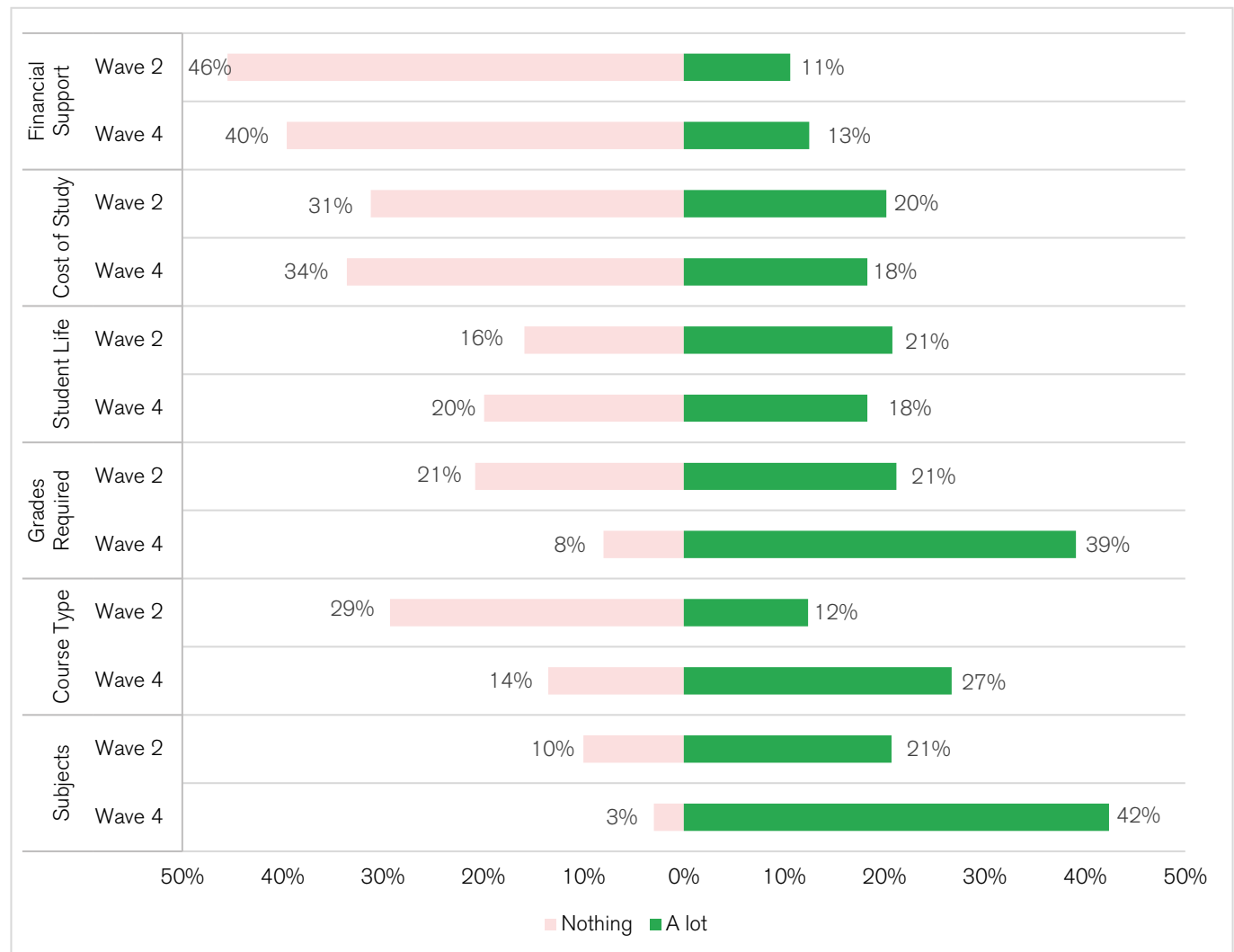
**Table 3. Coefficients for Ordinal Logistic Regression on Wave 4 Expectations**

| Variable                            | Log Odds | Std. Error | Lower CI | Upper CI |
|-------------------------------------|----------|------------|----------|----------|
| <b>W2 Expectations (Don't Know)</b> |          |            |          |          |
| Definitely won't apply              | -1.73    | 0.86       | -3.41    | -0.05    |
| Very unlikely                       | -1.56    | 0.55       | -2.64    | -0.49    |
| Fairly unlikely                     | -0.41    | 0.41       | -1.20    | 0.39     |
| Fairly likely                       | 0.21     | 0.28       | -0.34    | 0.76     |
| Very likely                         | 0.74     | 0.28       | 0.19     | 1.30     |
| Definitely will apply               | 1.61     | 0.31       | 1.00     | 2.21     |
| <b>Gender (Female)</b>              |          |            |          |          |
| Male                                | -0.88    | 0.20       | -1.26    | -0.50    |
| Other                               | -1.48    | 0.68       | -2.82    | -0.15    |
| Not provided                        | -0.68    | 0.29       | -1.25    | -0.11    |
| <b>UCP Status (UCP)</b>             | -0.09    | 0.18       | -0.44    | 0.27     |
| <b>Contact Hours</b>                | -0.00    | 0.02       | -0.04    | 0.03     |

Note. CI = 95% confidence interval. Reference category for categorical variables is shown in brackets.

## Higher Education Knowledge

Responses to each of the HE knowledge questions at both waves are displayed in Figure 3. Using overall HE knowledge scale scores (which did not significantly differ from a normal distribution at either wave,  $ps > .16$ ), a paired-samples t-test revealed that self-reported HE knowledge was significantly higher at Wave 4 ( $M = 12.37$ ,  $SD = 2.58$ ) compared to Wave 2 ( $M = 11.58$ ,  $SD = 2.52$ ),  $t(478) = 5.70$ ,  $p < .001$ .

**Figure 3. Higher Education Knowledge Item Scores**


*Note. Responses to each question were given on a three-point scale (Nothing, A little, A lot). “A little” responses, not displayed on the chart, are the balance between “Nothing” and “A lot” responses, and 100% (e.g., at Wave 2, 21% of students said they knew nothing about the grades required, 21% said they knew a lot, meaning 58% said that they knew a little).*

## Regression Analysis

Students that did not respond to one or more of the HE knowledge items were excluded from the analysis (N = 24), leaving a final sample of 479 students across 31 schools, with observations ranging from 1 – 90 students per school.

A null multi-level regression model with random intercepts was first computed, with individual students as Level 1 cases and school as the Level 2 grouping variable. The ICC was 0.06, and the multi-level structure significantly improved model fit compared to a single-level model ( $\chi^2 = 17.20$ ,  $p < .001$ ). The analysis therefore proceeded using a multi-level model.

Prior (Wave 2) HE Knowledge was added to the regression model first, which significantly improved fit compared to a null multi-level model,  $X^2(1) = 37.31, p < .001$ . Gender and UCP status were then added, which did not significantly improve the model,  $X^2(4) = 4.71, p = .32$ , and neither variable was a significant independent predictor. Gender was subsequently dropped from the model, though UCP status was again retained due to its theoretical importance to the programme.

Contact hours was then added, but it was not a significant predictor of Wave 4 HE knowledge,  $X^2(1) = 0.12, p = .73$ . Next, two-way interactions between contact hours and UCP status, and contact hours and prior (Wave 2) HE knowledge were added. The interaction between contact hours and UCP status was not significant and was subsequently removed from the model. However, the interaction between contact hours and Wave 2 HE knowledge did significantly improve model fit relative to a model without the interaction term,  $X^2(1) = 7.04, p = .01$ .

The residuals for the final model were approximately normally distributed and there was no indication of substantial heteroscedasticity. Outliers and influential cases were examined using Cook's distance. Based on the conventional cut-off value of  $4/n$  (e.g., Van der Meer, Te Grotenhuis, & Pelzer, 2010), 25 potentially influential Level 1 cases were identified. However, re-running the model excluding these cases did not change the significance of any of the results.

**Table 4. Coefficients for Multilevel Regression on Wave 4 HE Knowledge**

| Variable                        | b     | Std. Error | Lower CI | Upper CI |
|---------------------------------|-------|------------|----------|----------|
| W2 HE Knowledge                 | 0.43  | 0.07       | 0.29     | 0.58     |
| UCP Status (UCP)                | -0.08 | 0.25       | -0.57    | 0.42     |
| Contact Hours                   | 0.00  | 0.03       | -0.05    | 0.06     |
| Contact Hours * W2 HE Knowledge | -0.02 | 0.01       | -0.04    | -0.01    |

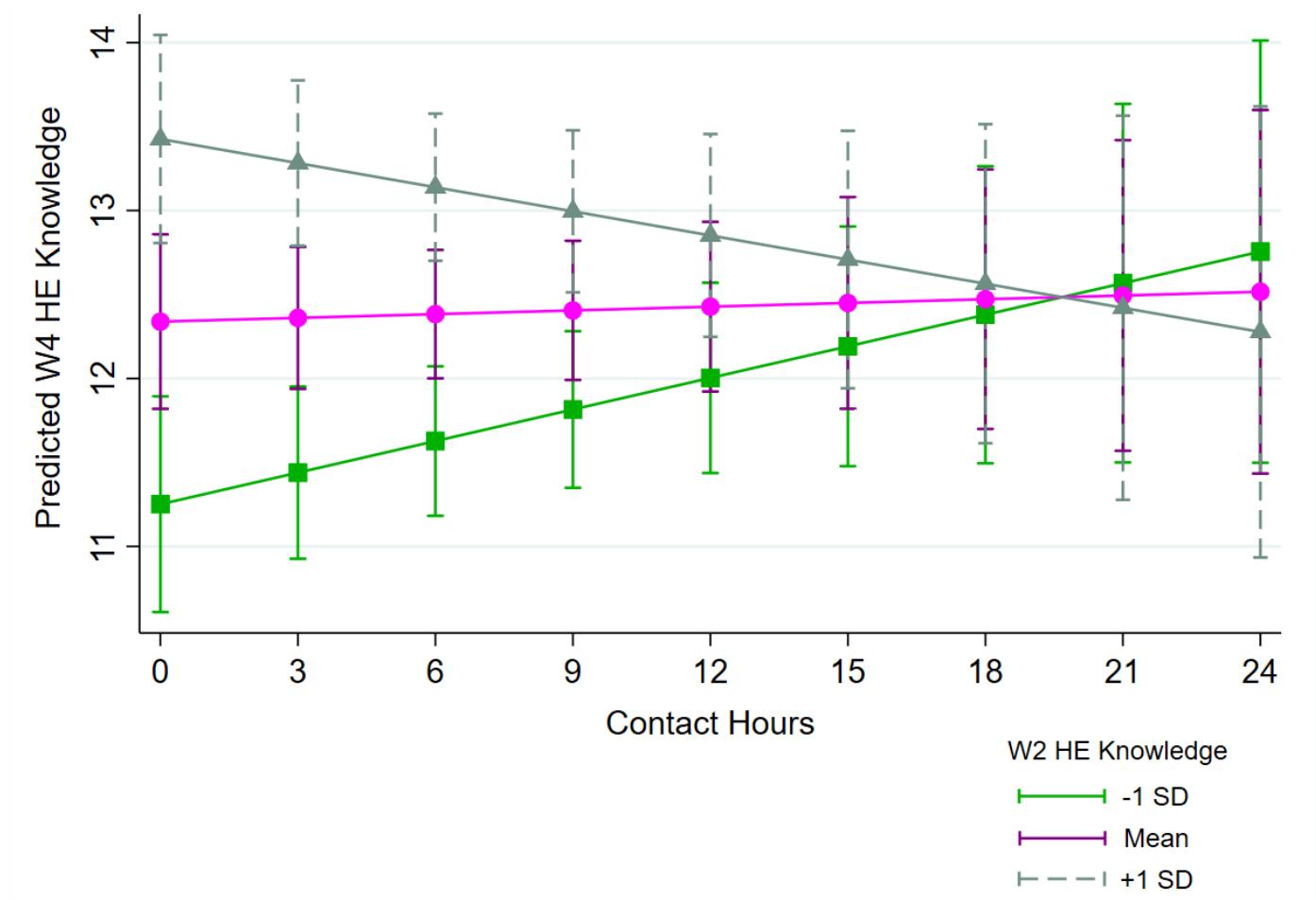
*Note. b = unstandardised coefficient. CI = 95% confidence interval.*

*W2 = Wave 2. UCP = Uni Connect Partnership*

*Intraclass correlation = 0.08*

To follow up on the significant interaction, simple slopes analysis was conducted to determine the effect of contact hours at  $-1$  SD, mean, and  $+1$  SD Wave 2 HE knowledge. This revealed that the effect of contact hours was not significant at  $+1$  SD ( $p = .19$ ) or mean ( $p = .80$ ) Wave 2 HE Knowledge scores but was marginally significant at  $-1$  SD ( $p = .07$ ) (see Fig. 4).

**Figure 4. Interaction between Wave 2 HE Knowledge and Contact Hours on Wave 4 HE Knowledge.**



Note. W2 = Wave 2, W4 = Wave 4. HE = Higher Education. SD = standard deviation. Error bars reflect 95% confidence intervals.

## Contact Hours Grouped

To determine whether a particular range of contact hours may be particularly effective (or ineffective), the prior regression models were repeated using a grouped contact hours variable. The grouped contact hours variable was computed by breaking the continuous contact hours variable into five groups based on three hour cut-points (0-3 hours [N = 132], 3-6 hours [N = 117], 6-9 hours [N = 118], 9-12 hours [N = 58], > 12 hours [N = 54]).

For the ordinal logistic regression on Wave 4 HE Expectations variable, the effect of grouped contact hours was not significant, and the results are not discussed further here.

For the multilevel regression on Wave 4 HE Knowledge, the addition of grouped contact hours (dummy coded) to a model including prior (Wave 2) HE Knowledge, and UCP status, was significant,  $X^2(4) = 9.44, p = .05$ . Relative to the 0-3 hours reference category, the 6-9 hours group were associated with significantly higher Wave 4 HE Knowledge scores,  $p = .05$  (see Table 6).

**Table 6. Coefficients for Multilevel Regression on Wave 4 HE Knowledge using Grouped Contact Hours**

| Variable                                 | b     | Std. Error | Lower CI | Upper CI |
|--|-------|------------|----------|----------|
| W2 HE Knowledge                          | 0.29  | 0.04       | 0.20     | 0.37     |
| UCP Status (UCP)                         | 0.02  | 0.25       | -0.48    | 0.51     |
| <b>Contact Hours Grouped (0-3 Hours)</b> |       |            |          |          |
| 3-6 Hours                                | 0.62  | 0.35       | -0.07    | 1.31     |
| 6-9 Hours                                | 0.77  | 0.39       | 0.00     | 1.54     |
| 9-12 Hours                               | -0.50 | 0.49       | -1.46    | 0.45     |
| 12+ Hours                                | 0.41  | 0.48       | -0.53    | 1.35     |

Note. *b* = unstandardized coefficient.

W2 = Wave 2. UCP = Uni Connect Partnership.

Intraclass correlation = 0.08.



# Discussion

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The present analysis revealed no significant relationship between programme engagement (quantified as number of contact hours) between Wave 2 and Wave 4, and expectations of applying to HE for secondary school students. Across all HeppSY cohort analyses, the effect of HeppSY programme engagement on secondary school students' expectations of applying to HE is therefore mixed – with a positive association observed between Wave 1 and Wave 2, and no effect observed between Wave 2 and Wave 3, or between Wave 2 and Wave 4. It is possible that the difference in findings relate to the pandemic, since the analyses failing to find an effect have both used a pre-intervention measure taken prior to Covid-19 lockdowns and post-intervention measures taken after significant educational and societal disruption. However, it is worth noting that there has been no clear shift in overall HE expectations compared to before the pandemic for secondary school students (based on HeppSY survey data). Another possible reason for the absence of an effect of programme engagement is that there was a ceiling effect due to high HE expectations at the baseline (Wave 2) measure. While this is plausible, note that, as with the Wave 1 – Wave 2 cohort analysis, there was a downward shift in expectations between Year 9 (Wave 2) and Year 11 (Wave 4). It was therefore theorised that rather than increasing HE expectations, greater programme engagement may reduce the likelihood of a decrease in expectations between waves.

This Wave 2 – Wave 4 cohort analysis also found that higher levels of programme engagement between waves did not predict greater self-reported HE knowledge. However, the relationship was dependent upon prior HE knowledge, with a more positive effect of increased contact hours observed for students who had reported low HE knowledge at Wave 2. While this may indicate that a targeted approach would be appropriate, whereby outreach is prioritised based on existing HE knowledge, there are important caveats to consider. In particular, the data relate only to students' *perceived* HE knowledge – further research would be required to determine how closely this aligns with more objective measures. In some domains, people with a limited understanding of a topic often overestimate their knowledge (e.g., Dunning, 2011), so there is a risk that prioritisation based on perceived HE knowledge may miss some proportion of students with objectively low HE knowledge. Additionally, objective increases in HE knowledge may not always be accompanied by changes in perceived HE knowledge, meaning students with high baseline HE knowledge may have benefited from activity, even though it was not reflected in their survey responses. This seems plausible due to the three-point scale used for the HE knowledge questions, which may not have been sensitive enough to detect underlying changes HE knowledge – especially for students who reported high levels of HE knowledge at Wave 2 and were already close to the maximum scale score.

Another notable finding was that level of programme engagement had a positive association with perceived HE knowledge up to a point, but this relationship was no longer evident at particularly high levels of engagement. Relative to students who received fewer than three hours, students who received 6-9 hours of contact between the two waves tended to report higher Wave 4 HE knowledge scores, whereas this was not the case for students receiving 9-12 or more than 12 hours of contact (the effect of 3-6 contact hours was marginal). This suggests targeting of approximately 3-4.5 contact hours per academic year may be optimal for increasing perceived HE knowledge; though the same caveats discussed above apply, in that the current analysis cannot assess objective HE knowledge.

## Conclusion

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In summary, this longitudinal analysis of students' survey responses across a two-year period indicated no significant association between participation in HeppSY outreach and expectations of applying to HE at follow-up, after controlling for baseline expectations. There was also no significant overall relationship between participation in HeppSY outreach and students' perceived HE knowledge at follow-up. However, there was an interaction effect, whereby the number of HeppSY contact hours that students participated in had a more positive association with post-test perceived HE knowledge among students who reported lower baseline HE knowledge. Additionally, there was some evidence that certain ranges of contact hours across the two-year period were associated with increased HE knowledge at follow-up, with six to nine hours particularly effective, and effectiveness diminishing among students receiving more than nine hours of contact. Further research is required to investigate the relationship between self-report and objective measures of HE knowledge before concrete recommendations can be made regarding student targeting and the optimum amount of activity to deliver across an academic year.



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