Pre-tertiary subject choice as predictors of undergraduate attainment and academic preparedness in Psychology

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RUNNING HEAD: Pre-tertiary subjects as predictors of attainment and preparedness

Abstract:

In the UK, psychology degrees are designed to equip students with skills such as critical thinking, research methods, and analytical debate. Many of the key skills and subject-specific content that is taught in the first year of a psychology programme is also introduced in A-level and AS-level study of psychology. Therefore, one would expect psychology A-level graduates to be both personally and academically more prepared for the unique challenges of their psychology degree, compared to students who had not studied A-level psychology. Here, we report findings from two mixed-methods studies which suggest that generally, mathematical-based A-level subjects, but not psychology A-level, more effectively prepare students for some of the academic skills required to succeed on a psychology degree. However, studying psychology A-level prepares students well for subject-specific content, which is highly valued in first-year students. We discuss these findings through a lens of constructive alignment, academic preparedness, and successful transitions.

Keywords:

Pre-tertiary education, academic preparedness, transitions, attainment

A pre-tertiary qualification in a student's chosen degree subject should, in theory, facilitate successful transition to university, by providing students with a foundation knowledge of the subject content. Therefore, one would expect students who progress to university with a pre-tertiary qualification in their chosen degree subject to be academically more prepared for the unique challenges of their undergraduate degree, compared with those who have not had this preliminary training. Pre-tertiary education may also inform the decision of which subject to study (Blenkinsop et al., 2006). Indeed, some research shows that students' pre-tertiary grades largely predict both engagement and attainment in undergraduate study. For example, Betts et al. (2008) analysed the academic results of 161 UK psychology students and found that A-level entry qualifications positively predicted performance in the first year of a psychology degree. However, a survey reported that in hindsight, 28% of undergraduate students regretted their choices of A-level subject (Which? University, 2016), which suggests a misalignment between students' expectations and reality of subject-specific study at Higher Education (see Crisp et al., 2009), which is echoed throughout the pedagogic literature (e.g., Cook & Leckey, 1999; Smith & Wertlieb, 2005).

Whilst ample empirical research has considered the psychological and situational factors associated with successful transition to university (see Kitching & Hulme, 2013, for a comprehensive review), there is a notable gap in the literature which examines pre-university learning as an important predictor of success both throughout the first year of university and final degree classification. The majority of research that does consider the predictive power of pre-tertiary education is now more than 20 years old, and thus not reflective of the current education landscape, particularly given recent reforms to pre-tertiary curriculum in the UK (Ofqual, 2018). For example, Mckenzie and Schweitzer (2001) found that pre-tertiary performance accounted for 39% of the variance in first year undergraduate performance. However, Peers and Johnston (1994) demonstrated the low predictive value that A-levels have

as predictors of undergraduate student attainment. While this research is useful background, the need for a contemporary re-evaluation of pre-tertiary education is clear.

As well as a focus on overall pre-tertiary achievement as predictors of attainment in HE, there is also debate as to whether s*ubject-specific* pre-tertiary education facilitates student attainment in the first year (e.g. Hourigan & O'Donoghue, 2007). For example, Huws et al., (2006) examined the relationship between pre-university subject choice and university performance in a sample of 56 UK psychology students and found that only Graduate Certification of Secondary Education (GCSE) Science and English grades were significant predictors of university performance, but there was no relationship between A-level grades and student attainment at undergraduate level. In contrast, Betts et al. (2008) found that students who had studied psychology at A-level performed better in the first year of the undergraduate programme, with differences then levelling out after this point. Similarly, Rowley et al. (2010) also found that psychology students who had studied a pre-tertiary qualification in psychology felt more prepared for their degree at the beginning of their first year compared with students who had not studied psychology before. Again, differences in preparedness levelled out by the end of students' first year.

Here, we question whether a pre-tertiary qualification in the chosen degree subject confers an advantage, by specifically focussing on psychology study in a contemporary context. These enquiries are important, given how regularly the pre-tertiary curriculum is reformed (Banyard, 2014); the closest research in terms of scope and design now no longer reflects recent changes to the landscape of HE and the core content within the A-level psychology curriculum (e.g. Betts et al., 2008; Peers & Johnston, 1994). Our focus on psychology is informed by a number of factors. Psychology is one of the most popular undergraduate degree subjects in the US (Gurung et al., 2016) and the UK (Quality Assurance Agency, 2019). 74,175 students in the UK studied a psychology degree in the 2017/18

academic year (HESA, 2017) and these numbers continue to grow. Psychology education at the pre-tertiary level (i.e. in the UK, A-level) has also maintained steady interest (Gill, 2014). Due to its wide appeal, psychology students enter university from a wide variety of academic backgrounds (Bowyer & Carroll, 2016). As such, there is likely to be a large variance in psychology student's pre-university experiences, which may influence university attainment.

Our interest in the specific context of psychology is also informed by the uniqueness of psychology as an undergraduate discipline. Psychology is often taught for the first time at A-level (or equivalent) despite recent developments in GCSE psychology curricula and a re-alignment of A-level study in the UK (Association of Colleges, 2014). Therefore, the pre-tertiary stage of education is of heightened importance in the context of effectively preparing future psychology undergraduates for university-level learning. As such, University and pre-tertiary psychology curricula should be constructively aligned (as per Biggs, 1996), in terms of both content (i.e. core knowledge) and skills (i.e. assessment), as they largely inform each other.

Due to the diversity of psychology students' educational backgrounds, this provides a useful opportunity to investigate which pre-tertiary subjects, if any, confer an academic advantage at degree level. For example, whilst there is considerable overlap between psychology teaching at pre-tertiary and first-year degree study (Kitching & Hulme, 2013), psychology students often report feeling unprepared for the mandatory mathematical and statistical aspects of a psychology degree (Onwuegbuzie & Wilson, 2003). Macher et al. (2012), for example, surveyed 147 psychology undergraduates who were enrolled in a statistics course in a psychology degree at an Austrian University. They found that a student's 'statistics anxiety' was the strongest predictor of their academic performance. Therefore, students who had studied mathematics-based subjects, and thus presumably suffer less statistics anxiety,

should fare better in terms of their attainment in the first year. Other subjects that include core mathematical concepts may also effectively equip students for their psychology degree.

It is, therefore, important to ascertain how effectively pre-tertiary subject-specific training prepares students for Higher Education. In the studies presented here we aimed to (1) determine whether pre-tertiary performance in general predicts student attainment in the first year of the degree; (2) understand whether pre-tertiary education in the chosen degree subject confers an academic advantage during the first year of degree study in a BSc psychology undergraduate programme; (3) understand these findings through the perspective of the lived student experience, by asking students to reflect on their preparedness for the academic challenge of their degree, and how pre-tertiary education may have influenced this.

To address these aims, we conducted two studies. In study one, we analysed pre-existing administrative student outcomes data to determine whether pre-tertiary performance in general, and subject-specific learning, predicts first year performance. In the second study we held a focus group and constructed a questionnaire to understand the findings from study 1 through the lens of the lived student experience. This mixed-methods approach allows us to gather a rounded view of the student experience of psychology teaching at both pre-tertiary and higher education level, reflecting on how the two can be better aligned.

Study 1

Participants

In order to assess the impact of studying specific A-level subjects on subsequent attainment in the first year of a psychology degree, we examined four years' worth of administrative data, with 704 students in total. This was a small-scale exploratory study, which aimed to assess how pre-tertiary qualifications may prepare students for a psychology degree in our specific undergraduate context. This data was collected at a large UK research-

intensive Russell Group University, spanning the years 2013-2015. All students within the dataset were enrolled onto a psychology BSc degree. The entry criteria for this undergraduate programme is typically AAA or AAB. This data set included students' entry grades, A-level subjects, and first-year undergraduate degree attainment. Ethical approval was granted by the local ethics board (Reference: PSYC-73).

Analysis method

We first calculated the average attainment across all 110 compulsory credits in the first year of the degree. Participants were students who completed all 110 credits in the first year. We then used linear regression in order to examine whether studying specific subjects predicted that score. Specifically, we first calculated the UCAS tariff from the three A level subjects that were taken by that student. We excluded participants with fewer than three A levels, or with other qualifications. The UCAS tariff is calculated such that an A* scores 140, A 120, B 100, etc. In order to make the calculated parameters more meaningful for interpretation, the z-score for this variable was used in the analysis.

We then created binary variables, as to whether the students had studied each of Psychology, Maths, Biology, English Language, English Literature, and Sociology. We then created a model in which first year degree performance was predicted just from A-level points score. A second model was created with both A-level points and the binary subject related variables. The models were compared, and the estimates and predictors examined for significance. An alpha level of 0.05 was adopted throughout. Analysis was conducted using R with package tidyverse.

Results

Table 1 displays descriptive statistics for the entire sample of 704 students. Although a pre-tertiary psychology qualification is not a pre-requisite for acceptance on this

undergraduate psychology programme, the vast majority (92.5%) of students in our data had studied psychology A-level.

[Table 1 here]

Overall, there was a strong correlation between total number of A-level points and students' attainment in the first year of the psychology degree. Adding the binary subject variables improves the model significantly ($F_{(6,696)} = 8.02$, $p < 0.001$), demonstrating that A-level subject study has a significant effect on first-year performance. Examination of the estimates shows that studying Biology or Maths both significantly predict an improved performance in the first year of a psychology degree. Biology increases the estimated grade by 0.53 points, just over half of one standard deviation. Maths increases the estimated grade by 0.28 points, just over a quarter of a standard deviation. Incoming grades are also important, such that an increase of one grade at A level predicts a 0.14 point increase in first year performance. While there are significant predictors, and the model with A-level subjects in is better than the model that only has A-level points (and the model itself is significant, $F_{(7,696)} = 9.79$, $p < 0.0001$), the model only explains 8% in the variance in first year performance.

Discussion

While the use of local administrative data means that there is an inherent skew in our results, such that the majority of students who enrol on this undergraduate programme typically do not enter with a maths pre-tertiary qualification, this study allowed us to ascertain broad trends in students' academic attainment. This study was conducted primarily to explore how pre-tertiary qualifications may account for differences in academic attainment in our local context, so future work should also consider translating these investigations to other, more

diverse contexts where less skewed samples can be obtained, for example, by collating student success data across subject areas (e.g., van Herpen et al., 2017) and institutions (van Rooij et al., 2018). To establish more representative patterns of student transitions, these local studies should also then be synthesised systematically (e.g., van der Zanden et al., 2018). Regardless, our data show a clear correlation between A-level points and performance in the first year of an undergraduate psychology degree, with evidence for certain A-level subjects (Biology and Maths) predicting higher performance. To explore these findings data in light of the lived student experience we undertook Study 2.

[Table 2 here]

Study 2

This study had two elements to it: first, to contextualise this administrative data, and second, to understand some of the remaining variance unexplained by pre-tertiary grades. To this end we conducted a focus group study with current psychology students who had studied psychology at pre-tertiary level. We aimed to understand how students considered their A-level study as a key factor in their undergraduate attainment. The themes generated from our qualitative pilot study then informed Likert-style questions for a quantitative questionnaire that was administered to a broader sample of students.

Focus Group

For our qualitative questionnaire development focus group, participants were three students ($N_{male} = 1$, $N_{female} = 2$) currently studying psychology at a Russell Group University, all of whom had previously studied psychology at A-level. One participant also studied biology A-level and one studied mathematics A-level. One student was in the first year of undergraduate study and the other two were in second year. Participants were recruited through email mailing lists and were each paid £10.00 in exchange for participation. Ethical

approval was granted by the University of *[redacted for anonymous review*] School of Psychology Ethics Board on 7th May 2019 (Ref: PSC-690).

Participants were invited to participate in a focus group to discuss '*students' reflections on their A-levels*'. The interviewer was an early career teaching assistant and PhD student who was not known to the participants (MP). At the beginning of the focus group, participants were given a pack of cards, with each card containing a different A-level subject. Participants were prompted to imagine "if [they] were doing [their] A-level choices again or were advising someone else who wants to do a psychology degree" and then were asked to identify which three A-level subjects "[they] think would be the most helpful in terms of both content and the skills that you think these subjects develop." A list a questions designed by the research team for the focus group can be openly accessed here: https://osf.io/sjpzv/?view_only=6577ad91ae604ec1902d3fcc2c8144f1)

The remainder of the focus group comprised semi-structured questions which allowed time for participants to develop their answers through engaging in wider discussion throughout the session. A sample of questions were pre-designed following consultation and refinement within the research team, for example, "What kind of skills do you think psychology A-level was trying to develop?", "How do you think your A-levels have or have not equipped you for university assessment?" and "Do you feel that the psychology degree relies on people having done a psychology A-level?"

The focus group lasted for one hour in total. The focus group was audio-recorded and transcribed verbatim. An anonymised version of the verbatim transcript was analysed by 3 independent coders (MP, RH, and RC) using thematic analysis. This followed Braun and Clarke's (2006) recommendations for thematic analysis, in which codes are first assigned to the data, before the generation of superordinate themes. These independent codes were

collated, and coders met to collectively thematically analyse the transcript, identifying four superordinate themes.

Results

Codes from the three independent coders generated three overarching themes within the dataset. These were: *concern for content, assessment style,* and *approach to learning*. Here we contextualise these themes with some notable verbatim quotes from participants.

Theme 1: *Concern for content*

Participants spoke in depth about the lack of confidence that they felt throughout their transition to undergraduate study and how this was somewhat tempered by the core psychology knowledge that was taught at A-level. Throughout the focus group, participants discussed how familiarisation with core content (e.g. classic psychology studies and terminology) eased their transition and made them feel more comfortable in lectures. Participants often expressed this confidence by comparing their experiences to other students who had not had this pre-tertiary training in 'the basics' of the subject knowledge. For example, when asked how psychology A-level had prepared participants for the content of their degree-level learning, Participant 3 noted the impact that foundation training has on confidence:

> "…[A level study] has a really good effect on your confidence. If you don't have the basics, going in to the first piece of work it would be so overwhelming; so stressful and difficult to grasp. Whereas people who have that groundwork are more like 'ok – I see what I'm working with'."

Due to this, participants also reported feeling at ease knowing that the content in the first year of the degree has some overlap with pre-tertiary psychology. For example, one participant reflected on feeling assured that she was not entering the degree with no subject-specific knowledge:

"there is also like a lot of things that if you've done it at A-level it's kind of nice to not come in [to university] with a blank slate and be like 'oh, I don't know anything'."

Importantly, when prompted to consider the aspects of the degree that they felt most prepared for and when guided to consider the skills that A-level psychology afforded them, all participants responded in a way that was driven by a concern for content over skills. This led to discussions about the students' concerns for feeling comfortable and familiar with the 'jargon' of undergraduate study, rather than feeling prepared for the skills, such as reading published literature or critical thinking, that are required at degree level. Participants reported that they felt the most prepared for 'psychology content':

"When we did our first practical, I kind of know what's happening. It's all just an expanded version. And the lectures, like sometimes they cover stuff we've done in depth. So, I know what's going on"

Whereas, participants reported that they felt less confident in some of the subject-specific academic skills, as demonstrated by participant 1 and 2:

"[in A-level] …there wasn't enough time for us to develop the skills of learning how to evaluate"

"…[in university] you're told 'read these different things from these different sources' but in A-level you're not really encouraged to learn academic skills, it's literally just about memory"

Theme 2: ***Assessment style***

Throughout the focus group, all participants noted a particular difference in assessment and feedback style between A-level and undergraduate study. Given the participant's concern for 'doing well' at both pre-tertiary and undergraduate level learning, the concern for 'getting to grips' with requirements and expectations for assessment was particularly salient within the focus group. Because of this, participants discussed how they

grappled with adjusting to a new style of assessment and feedback, noting in particular the transition to university-level assessment, which was thought of as being more reliant on 'deeper learning' rather than memory-based rote learning in A-levels. Participant 1, for example, explained the challenge of adapting to assessment practice in university from pre-tertiary education, which she deemed to be more content-driven than university:

> "[At A-level] it's been drilled into our head that 'this is the structure of how to evaluate' so like: point, evidence, explain, link."

Participants spent time in the focus group reflecting on the depth of their psychology learning, paying particular attention to A-level study and the context of assessment. Overall, participants commented on how pre-tertiary study was perceived to be reliant on memory and rote-learning, promoting a more 'breadth' approach, whereas they perceived undergraduate teaching of psychology to be more concerned with depth of understanding. Therefore, when preparing for assessments, again, students' concerned themselves mainly with content rather than developing their skills. Participant 3 noted this in a discussion about assessment and feedback:

> "But when it came to the [A-level] exam we just pretty much had to know each study and the evaluation as well. We just had to spit it out from our memory instead of actually like applying the skills."

Theme 3: ***Approach to teaching***

Towards the end of the focus group, the interviewer asked participants what the most challenging aspect of their degree has been so far. Participants took some time to discuss how the fundamental learning styles and approach to psychological teaching differs between pre-tertiary and higher education. Participants reported struggling, in some cases, to adapt to the challenges of degree-level learning, particularly in the context of skills such as independent

study and critical thinking. This was discussed in relation to 'structure' of learning, which is summarised in a quote from Participant 1:

> "…I also think coming straight from A-level to degree, the structure of how you learn things is so different. … It's a lot more of your own responsibility to decide what you think is the most important information in each slide of the lecture."

Participants also collectively reflected upon how content was often prioritised over critical thinking in A-level study. For some, this resulted in frustration and a sense that rote learning not only is beneficial for doing well in assessments, but also is encouraged more implicitly within the structure of the curriculum. For example, this exchange between participant 2 and 1 demonstrates the participant's attempts to articulate the structured nature of pre-tertiary psychology and how it differs from a university-level approach.

> "I feel like [A-level structure] is very 'set'…
>
> "…rather than teaching you how to think critically"
>
> "Yeah, they just gave [the content] to us and was like 'learn this'."

These superordinate themes, contextualised with student's verbatim responses, were used to develop the online survey for the second quantitative phase of this study. This ensured that the research had a strong sense of student voice and reflected students' first-hand experiences.

Quantitative survey

The focus group in our qualitative pilot study identified three themes that might underpin the relationships that were also found in the regression analysis in Study 1. In the section part of Study 2, we aimed to further explore these themes through a quantitative questionnaire targeting current psychology students.

Participants were current undergraduate psychology students, who had either studied psychology A-level (N = 57) or had not (N = 44), recruited through Prolific Academic. The

participants were roughly split between those currently in the first (20.9%), second (29.1%) and third/final (47.7%) year of study; 2.3% were in a year abroad or placement year. The majority of participants were studying full time (73.6%). Participants were paid the equivalent of £6 per hour for participation. Ethical approval was granted by the local School of Psychology Ethics Board on 7th May 2019 (Ref: PSC-690).

Materials and Procedure

We developed a questionnaire to further explore the themes in the preliminary qualitative study and the predictive relationships in Study 1. Independently, the research team devised questionnaire items based on the three core themes of the focus group, before refining and collating the items to ensure no overlap.

Participants who indicated that they had previously studied psychology at pre-tertiary level were given a set of questions related explicitly to how their psychology studies prepared them for university, whereas students who had not studied A-level psychology received questions that were re-worded to refer to 'A-levels' in general. The wording of questions was matched to be as similar as possible in both questionnaires (the full materials can be accessed here: https://osf.io/sjpzv/?view_only=6577ad91ae604ec1902d3fcc2c8144f1)

Participants first provided demographic information, including year and mode of study (e.g. full time, part time, distance learning) and each provided their A-level subjects and corresponding exam board. Participants were asked to "*Imagine that a student is selecting their A-level choices and they want to go on to study a Psychology degree*". Participants were then presented with a list of 18 A-level subjects (e.g. Mathematics, Biology, Drama, English Language) and were asked to identify the three that they "will most effectively prepare the student for studying psychology", by way of selecting '1st choice', '2nd choice' or '3rd choice' for three of the subjects. This emulated the opening activity in the focus group.

Participants were also asked to identify how prepared they felt for the content (defined to participants as "knowledge and taught information") of their psychology degree on a 1 *(not all prepared*) to 10 (*completely prepared*) Likert scale. This question was then repeated to measure participants' self-reported preparedness for 'skills', defined as "i.e. the assessment and teaching methods, such as essay writing" on the same scale.

To further investigate students' feelings of preparedness, and in line with participants' concerns in the focus group and informed by the British Psychological Society's core accreditation standards for undergraduate psychology programmes, we asked participants to identify on a 1 (Completely disagree) to 7 (Completely agree) Likert scale the extent to which they felt prepared for nine core academic skills, including: critical thinking, evaluating published papers, literature searching, and essay writing. Using the same scale, participants then reported the extent to which they believed they 'had sufficient opportunity to practice' the core nine skills during their pre-tertiary education.

The second section of the questionnaire contained Likert-style items ranging from 1 (*entirely disagree*) to 7 (*entirely agree*), with statements covering topics such as academic preparedness ('*I felt prepared for the content of my degree*'), confidence ('*studying A-level psychology meant I felt confident that I had the necessary skills for studying a psychology degree*'), and teaching style ('t*he teaching style in psychology A-level was very similar to that of my psychology degree*'). These items were created in light of the themes generated in the focus group.

Participants completed the questionnaire online, hosted on the survey platform Qualtrics. The whole study took approximately 10 minutes to complete. Participants were provided with a free textbox at the end of the survey to supply any feedback.

Results

Retrospective A-level subject choice

Due to the number of comparison tests, we adopt a p value of 0.01 throughout these analyses. In the first part of the questionnaire, participants were presented with a list of A-level subjects and were asked to identify the three that "*will most effectively prepare the student for studying Psychology*". We assessed how often each subject was selected (Fig. 1). Psychology was selected most frequently across participants. Biology and Statistics were the next most frequently selected subjects. A Chi-squared test showed that students who had *not* studied A-level were significantly more likely to recommend that other prospective students study A-level psychology, by way of selecting it as their first choice *(N* = 56), compared with those who had studied it at A-level (*N = 32*), X^2 (2, *N* = 98) = 11.23, *p* = 0.004.

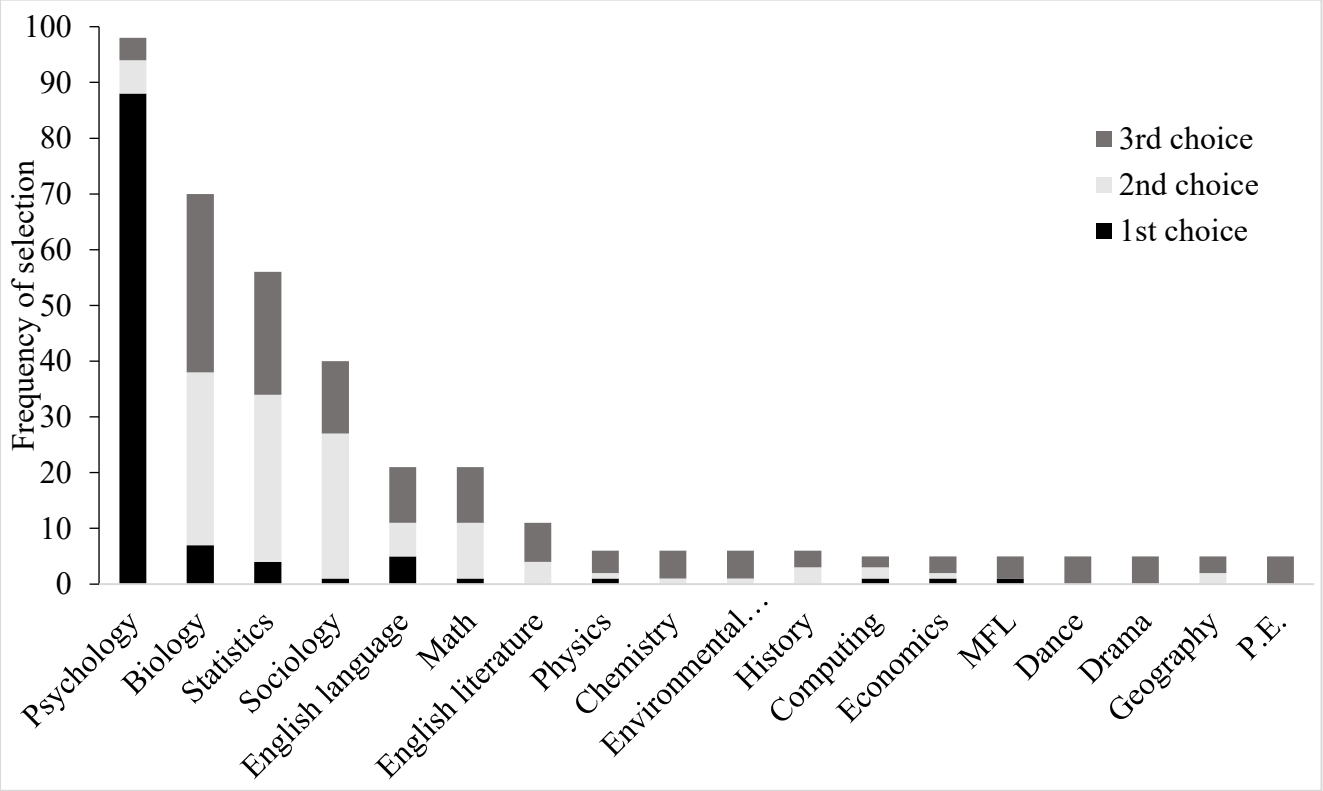

Fig 1. Shows the results from the retrospective A-level choice task.

Academic preparedness

Given that the data are not normally distributed, and the groups are not equal, we ran non-parametric tests to investigate the impact of pre-tertiary qualification on students' self-

reported preparedness. An independent samples Mann-Whitney U test showed that overall, there was a significant difference in preparedness for psychology *content* between students who had studied psychology A-level and those who had not ($U = 308.00$, $p < 0.001$), such that students who had studied psychology A-level reported feeling significantly more prepared for the content of their degree ($M = 6.89$, $SD = 1.51$) compared with those who have not studied psychology A-level ($M = 4.02$, $SD = 1.89$).

However, there were no differences in self-reported *skills* preparedness ($U = 1105.5$, $p = 0.31$) when comparing those who have studied psychology A-level ($M = 5.65$, $SD = 2.42$) and those who have not ($M = 5.14$, SD = 2.27)

Study 1 suggested that other subjects beyond psychology may provide useful pre-tertiary training to prepare students for their degree. To test this, we then compared the responses to the same set of questions between students who had *(*$N = 19$) and had not ($N = 82$) studied an A-level in mathematics. A Mann Whitney U test showed that, overall, there were no differences in both self-reported preparedness for content ($U = 856.00$, $p = 0.5$) when comparing students who had studied Maths A-level ($M = 5.32$, $SD = 2.45$) with those who had not studied Maths A-level ($M = 5.72$, $SD = 2.15$). There were also no differences between those with ($M = 5.05$, $SD = 1.75$) and without ($M = 5.51$, $SD = 2.48$) a Maths A-level in terms of skills preparedness ($U = 865$, $p = 0.45$).

We then coded each participant by those who have studied a core science A-level subject (i.e., either Biology, Chemistry or Physics, $N = 38$) and those who have not ($N = 58$). This again showed no differences between those who have studied science at pre-tertiary level ($M = 5.92$, $SD = 2.045$) and have not ($M = 5.48$, $SD = 2.281$) in terms of self-reported preparedness for content of a psychology degree ($U = 1004.5$, $p = 0.46$). Nor were there any differences in preparedness for skills in those with ($M = 5.11$, $SD = 2.264$) and without ($M = 5.69$, $SD = 2.34$) a science A-level ($U = 1262.00$, $p = 0.23$).

To explore this sense of preparedness for different skills further, we investigated whether studying a psychology A-level significantly impacts self-reported preparedness for various different key *skills* of an undergraduate degree. Table 3 shows the statistical comparisons between students who had and had not studied psychology at A-level by these core nine academic skills. Importantly, students who entered their degree with no pre-tertiary psychology qualification reported feeling more prepared for report writing, evaluating papers, and searching for literature than their counterparts with a psychology qualification. The only significant difference in favour of those with an A-level in Psychology was in reported preparedness for 'psychology content'.

[Table 3 here]

To support this, 89.6% of psychology A-level graduates agreed that studying A-level psychology improved their confidence with the content of the first year of their degree, by way of answering either 'agree' 'somewhat agree' or 'completely agree' to this item on the survey. However, only 52.7% agreed that the same was true for the necessary academic skills required at undergraduate level.

Learning opportunities

When asked about whether students felt they had sufficient opportunity to *practice* the core academic skills at pre-tertiary level before coming to university, there were also significant differences across those who have and have not studied psychology. Table 4 shows the comparisons in self-reported sufficiency of learning opportunities for these core skills. Those with a pre-tertiary qualification in psychology reported having significantly more opportunities to practice essay writing, independent thinking, evaluating papers, literature searching, and learning psychology-specific content. However, those without a

psychology A-level reported significantly more opportunity to practice academic report writing before coming to university.

[Table 4 here]

Student confidence

We then investigated whether, in retrospect, A-level subject affected how students felt with regards to 'opportunity to practice' skills during their A-levels before joining the undergraduate programme. Table 5 shows the breakdown of comparisons by students who had and had not studied psychology A-level. Overall, students with an A-level in psychology were significantly more likely than those who did not study an A-level in Psychology to respond that they would have felt more confident going into the psychology degree with more opportunity to practice all of the key skills except group discussion.

In the latter questions of the questionnaire, 78.9% of students agreed that studying an A-level in psychology reduced some of the anxiety they had about starting their degree, although only 41.6% thought that they would have struggled more if they had not studied a psychology A-level.

To support this, 76.2% of students without an A-level in psychology agreed that not studying A-level psychology meant that they felt anxious at the start of their degree; however, only 45.3% agreed that they felt this this put them at a disadvantage.

[Table 5 here]

General Discussion

In this paper, we investigated whether pre-tertiary study in a student's chosen degree subject confers an advantage in the first year of degree studied, in terms of academic

attainment and self-reported preparedness. Specifically, we investigated whether students who had studied A-level psychology felt more prepared and confident for their psychology degree than those students who completed different A-levels. We investigated this by looking at self-reported preparedness for both *skills* and subject-specific *content.* Study 1 demonstrated that studying science-based subjects, such as Biology and Mathematics, significantly predicted undergraduate student academic attainment in the first year of their degree, whereas studying psychology did not. However, pre-tertiary grades only accounted for a small (8%) of overall variance in first-year undergraduate attainment, Study 2 then contextualised these findings in the context of the lived student experience and found that studying psychology at A-level generally makes students feel more prepared for the *content* of their undergraduate psychology degree.

However, students who had studied psychology A-level felt less prepared and would have liked more opportunity to practice some key academic skills such as report writing and critical thinking, compared to students who had not studied psychology. Our findings here are largely in line with reports which suggest that congruent pre-tertiary and Higher Education subject-specific training does not provide a notable advantage to undergraduates, in terms of academic attainment (Study 1), but does provide students with greater confidence with the subject-specific content (Study 2), which is highly valued from a student perspective (Study 2). The notion of a 'trade off' between skills and content is also recognised throughout the pedagogic literature. For example, Fawcett et al. (2017) found that first-year psychology students had a general lack of confidence in their academic skills, such as the ability to perform well in structured assignments and group-based projects. Development of these skills facilitated positive transitions from pre-tertiary to undergraduate education.

Importantly, the skills/content trade-off also aligns well with Chester et al.'s (2013) model of 'five senses of student success'. In their model, the authors propose that the ability

to understand discipline-specific knowledge, or to 'master content', is one of five elements of student success during the transition to university, which falls under the category of 'capability'. Other 'senses' of student success include 'resourcefulness' (i.e., the ability to navigate university systems and develop study skills) and 'culture' (i.e., the ability to understand the principles and culture of HE). Here, our results suggest that studying a pre-tertiary psychology qualification may help psychology undergraduate students to feel prepared for the 'capability' element of success during this transition, but may not, perhaps unsurprisingly, enable students to develop their 'resourcefulness' skills, which are more specific to a HE, rather than pre-tertiary, learning context. This has implications for the wider landscape of HE.

These findings provide important context to understanding successful student transitions. Here, we found that pre-tertiary education in specific A-level subjects, but not necessarily the same as the undergraduate programme, can improve academic attainment in the first year of a psychology degree. Specifically, in our sample, studying Mathematics and Biology at A-level conveyed an advantage during the first year of a psychology degree, whilst no such advantage was observed for studying A-level Psychology. The advantage that studying mathematics confers is broadly in line with the notion that students often report feeling unprepared for the mathematical and statistical aspects of a psychology degree (Onwuegbuzie & Wilson, 2003). Previous work has shown that, due to this, 'statistics anxiety' amongst psychology undergraduates is the strongest predictor of their academic performance (Macher et al., 2012) and thus lack of mathematics skills and knowledge can contribute to feelings of under preparedness (Faulkner et al., 2014). However, Harvey (2009) found that an ad-hoc GCSE-based mathematics test did not predict successful performance in a statistics modules of an undergraduate psychology degree, calling into question the value of mathematics as a qualification suitable to prepare undergraduates. These findings echo that of

Sibulkin and Butler (2008), who found similar results for college algebra in psychology undergraduates. Taken together, this suggests that only students who had studied an advanced level of mathematics outperform other students in a psychology programme.

The apparent lack of undergraduate degree performance advantage afforded by studying psychology A-level may be due to the sample used in Study 1. Whilst studying psychology at A-level is typically not a pre-requisite for degree level study, many students who undertake a psychology undergraduate degree, have previously studied psychology at a pre-tertiary level. This is reflected in our Study 1 sample in which over 90% of the students included in our model had previously studied A-level psychology. Therefore, it may be that our model is unable to determine whether there is an advantage of studying psychology A-level.

Implications for Higher Education

This work demonstrates the pervasive concern that undergraduates have for the subject-specific *content* of their degree, specifically in the first year of their studies. In many ways, students' anxiety around feeling familiar and comfortable with the content of their degree outweighed investment in some of the key academic skills (Study 2). This may be due, in part, to the way that pre-tertiary teaching shapes students' approach to their learning. It may be that the degree-level skills included in Study 2 do not reflect the academic skills that are most valued by students; Ahonen and Kinnunen (2015) investigated high school students' attitudes towards academic skills and found that social skills and collaboration were valued highest.

In addition, these results could also corroborate Maragakis et al.'s (2020) concern that the discipline-specific skills that students develop throughout psychology undergraduate training in the US are not well articulated in programme design, which leads to a lack of unique 'value added' skills (see also Landrum & McCarthy, 2018). Similarly, Harris et al. (2021) have

reported that while students in the UK value psychological literacy skills, they do not necessarily recognise the terms "Psychological literacy".

These findings suggest a tension between content and skills, which must be navigated sensitively to encourage smooth transition from pre-tertiary to Higher Education-level learning (Lowe & Cook, 2003). Looking at the 'big picture' of HE, these findings may prompt a consideration of whether undergraduate programmes should ultimately either aim to *build upon* or *consolidate* the content of pre-tertiary curriculum in the same subject. This question was asked of Familari et al. (2013) in the context of Australian secondary education curriculum in biology. The authors weighed up an 'aspirational skill set' of a biology programme with a 'generalised skill set' and concluded that biology subjects are well placed to build upon academic skills that should, in theory, be practiced in pre-tertiary level. They warn, however, that curriculum developers at both pre-tertiary and undergraduate level should be aware of the skills and content covered at each respective level. A stronger sense of constructive alignment (Biggs, 1996) between pre-tertiary and undergraduate-level content and skills may alleviate some of the tensions that arise due to mismatched expectations of lecturers and first-year undergraduate (Hassel & Ridout, 2018; Smith & Wertlieb, 2005)

Future directions

Although pre-tertiary experiences may only account for a small proportion of variance in this sample (8%, Study 1), some key issues related to successful academic transition have been highlighted here. The relationship between pre-tertiary and undergraduate success is, of course, not linear, and there are many factors beyond the scope of this dataset that must also be taken into account in future work (e.g. Bowles et al., 2014). For example, demographic variants including socio-economic status, gender, and age, have been found to affect student's transition to undergraduate-level learning from pre-tertiary education (e,g Rummey, Clemons, & Spagnoli, 2019). Beyond these demographic factors, there are also a number of

factors, such as self-esteem, social support, and stress (Friedlander et al., 2007), students' reading ability (Collins & Onwuegbuzie, 2007), and university attendance (Dobkin et al., 2010), which all also affect transition to university (Christie et al., 2008). There are other important pre-tertiary factors, such as high school type (Birch & Miller, 2007a), and undertaking a pre-university gap year (Bich & Miller, 2007b) that should also be fully scrutinised.

In this paper, we have identified how pre-tertiary education in isolation may account for variance in student's experiences of their first year of undergraduate learning. It must also be noted that these results are constrained to the context of psychology undergraduate learning, which, as our data supports, is a subject whereby the majority of undergraduate students have received preliminary pre-tertiary training. It may therefore be pertinent to extend these inquiries to other subjects which do not have a clearly corresponding pre-tertiary qualification. Finally, future work should also aim to apply and update these research questions as the core academic skills required to succeed in Higher Education, and beyond into the graduate labour market, continue to adapt and change, for example, by responding to technological advances (van Laar et al., 2017) and ongoing reforms to A-level and undergraduate curriculum.

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Tables

Table 1. Descriptive Statistics showing the mean score achieved during the first year of the undergraduate programme, mean A-level points, and the number of students who had studied different A-level subjects

	Mean	SD	Count
First year score	65.1	10.7	N/A
A level points total	349.9	25.45	N/A
Psychology			651
Biology			239
English Language			137
English Literature			121
Sociology			118
Maths			99

Table 2. Predictors (A-level points, A-level subject studied) of first-year psychology degree performance

Predictor	**Estimate**	**Standard Error**	**t**	**P**
Intercept	6.13	0.16	37.27	< 2e-16 ***
Biology	0.53	0.09	6.09	1.90e-09 ***
A-level points	0.18	0.04	4.51	7.61e-06 ***
Maths	0.28	0.12	2.38	0.018*
Psych	0.16	0.15	1.02	0.307
English Lang	0.13	0.11	1.23	0.219
English Lit	-0.05	0.11	-0.47	0.639
Sociology	-0.04	0.11	-0.40	0.690

Table 3. Comparisons of students with and without a psychology A-level for the nine core skills on the item "*Having studied [Psychology/my] A-level[s], at the start of my degree I felt prepared for…*"

Self-reported preparedness	Psychology A-level		No Psychology A-level			
	M	SD	M	SD	U	p
Essay writing	4.42	1.71	3.81	1.65	991.5	0.097
Report writing	3.19	1.84	4.67	1.69	1744.00	< 0.001*
Critical thinking	4.81	1.29	5.07	1.35	1368.00	0.303
Group discussion	5.02	1.36	5.26	1.42	1371.00	0.292
Independent thought	4.74	1.64	3.98	1.93	952.00	0.052
Psychology content	6.05	0.99	3.72	1.94	424.5	< 0.001*
Reading papers	3.11	1.78	3.42	1.78	1361.00	0.329
Evaluating papers	2.84	1.67	4.44	1.76	1825.00	< 0.001*
Literature searching	2.82	1.68	5.21	2.04	1982.5	< 0.001*

* significant at the $p < 0.01$ level.

Table 4. Comparisons of students with and without a psychology A-level for the nine core skills on the item "*During my [Psychology] A-level[s], I had sufficient opportunity to…*"

I have sufficient opportunity to practice	Psychology A-level		No psychology A-level			
	M	SD	M	SD	U	p
Essay writing	5.51	1.44	3.84	1.66	556.5	< 0.001*
Report writing	2.95	1.73	4.67	1.82	1837.00	< 0.001*
Critical thinking	4.86	1.36	4.98	1.61	1332.00	0.443
Group discussion	5.39	1.25	5.07	1.64	1109.00	0.399
Independent thought	4.86	1.37	3.35	1.81	640.5	< 0.001*
Psychology content	6.32	1.06	3.64	1.87	286.00	< 0.001*
Reading papers	2.84	1.54	3.28	1.79	1402.5	0.206
Evaluating papers	2.65	1.69	4.21	1.82	1788.00	< 0.001*
Literature searching	2.54	1.62	3.71	1.67	1680.00	< 0.001*

* significant at the $p < 0.01$ level.

Table 5. Comparisons of students with and without a psychology A-level for the nine core skills on the item "*I would felt more confident during my degree if I had had greater opportunity to practice…"*

	Psychology A-level		No psychology A-level			
	M	SD	M	SD	U	p
Essay writing	5.67	1.31	4.62	1.87	794.00	0.003*
Report writing	6.39	0.77	5.5	1.53	795.00	0.002*
Critical thinking	5.67	1.35	4.86	1.52	817.00	0.005*
Group discussion	4.79	1.45	4.31	1.44	1027.00	0.214
Independent thought	5.37	1.22	4.24	1.67	703.00	< 0.001*
Psychology content	-	-	5.21	1.73	-	-
Reading papers	6.44	0.96	5.38	1.46	697.00	< 0.001*
Evaluating papers	6.56	0.93	5.57	1.4	699.00	< 0.001*
Literature searching	6.14	1.29	5.14	1.46	713.5	0.001*

* significant at the $p < 0.01$ level.