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# The Causal Effects of the Peer Assisted Study Sessions (PASS) on Educational Outcomes

Final Report

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## Executive Summary

This report summarises the results of a HEPPP-funded research project on the effects of the Peer Assisted Study Sessions (PASS) on educational outcomes. The study used a randomised encouragement design (RED), which avoids the potential problem of selection bias that pervades non-experimental evaluations. Globally, this is the first large-scale experiment on the effectiveness of PASS or related Supplemental Instruction programmes.

The study population consists of 6 954 student-subject observations from 14 first-year courses at the University of Wollongong in Australia in 2014 and 2015. Following the RED approach, a randomly selected sub-group was offered a large, near-cash incentive to participate in PASS.

Whilst PASS participation is voluntary and unrestricted, participation was 0.47 sessions (19 percent) greater for the incentivised group compared to the non-incentivised group. This inducement effect is larger for students from low-SES areas (0.89 sessions). But the overall inducement effect is smaller than anticipated, which limits the statistical power of the main analysis, especially for subgroups. We also varied the size of the incentive greatly between semesters, but this did not meaningfully change the size of the inducement effect. The design of effective incentives for student populations warrants further research.

The experiment suggests that one hour of PASS improved grades by 0.065 standard deviations (1.26 marks on a raw 100-point scale), which is consistent with the non-experimental literature. However, this estimate is not statistically significant, reflecting limited statistical power.

The estimated effect is largest and statistically significant for students in their first semester at university (0.153 standard deviations or almost 3 marks per hour of PASS). This particular sub-group analysis was not in our pre-analysis plan, and so it should be treated as a suggestive – rather than a confirmatory – result. Nevertheless, it remains plausible given issues around transitioning into a university environment, including the more independent, self-directed study skills and time management required in tertiary study, as well as the need for structure and social support.

We had intended to study heterogeneity of effects for a number of other subgroups (by socioeconomic status, rural and indigenous backgrounds, age, sex, domestic/international status, and high school grades), but this was not feasible because of limited statistical power.

## **Introduction**

A research team at the University of Wollongong was allocated AUD 62 500 from the 2013 and 2014 rounds of the Australian Government's Higher Education Participation and Partnership Programme (HEPPP) to study the effects of the Peer Assisted Study Sessions (PASS) on educational outcomes. The study utilised an experimental evaluation technique known as the randomised encouragement design (RED), which avoids the potential problem of selection bias that pervades non-experimental or observational evaluations. Globally, this project is the first large-scale experiment on the effectiveness of PASS or related Supplemental Instruction programmes.

This brief summary report should be read alongside the academic paper. At the time of writing, the academic paper is under peer review, and is available online as a discussion paper at the following URL: <http://ftp.iza.org/dp9696.pdf>.

## **Supplemental Instruction or Peer Assisted Study Sessions**

A number of non-experimental studies suggest that peer learning and student leadership programmes at university contribute to student learning outcomes, participation, and retention rates. There are many variations of such programmes and roles. One of the more widely known and international peer learning programmes is Supplemental Instruction (SI), which is usually called PASS (Peer Assisted Study Sessions) in Australasia.

PASS is a free – in the sense that students do not pay an upfront or direct cost to attend other than their time cost – and voluntary supplementary academic assistance programme that utilises peer-led group study to assist students enrolled in targeted subjects or courses. The programme is specific to each subject, and it consists of informal but regularly scheduled sessions. These sessions are facilitated by current high achieving students – so-called “PASS Leaders” – who have recently completed the subject.

PASS at UOW is a highly awarded programme. Its accolades include an Australian Learning and Teaching Council Programme Award and Most Outstanding PASS Program in the World Award from the University of Missouri–Kansas City (UMKC), both in 2010. It was also the recipient of two commendations (2006 and 2011) from the former Australian Universities Quality Agency, and was awarded institutionally in 2007 for Outstanding Contribution to Student Learning. Since 2005, PASS at UOW has been accredited by UMKC as the National Center for PASS/SI in the Australasia region, providing training for other PASS programmes at some 70 institutions in this part of the world. In this capacity, the National Center at UOW has led the second wave of implementation of the programme in

this region after earlier attempts by other Australian universities faltered in the 1990s. Thirty-seven of the 39 Australian universities now have staff trained by UOW in implementing PASS.

PASS at UOW annually delivers up to 40 000 contact hours to over 4 000 individual students. While the majority of subjects supported are at the first-year level, PASS also supports some second-year and post-graduate subjects that have students transitioning into their first semester at UOW. The programme consists of one-hour, weekly sessions for 12 of the 13 weeks in a full semester at UOW.

## **Randomised Encouragement Design Avoids Selection Bias**

Selection bias is a pervasive challenge for evaluating the impact of any intervention where there is self-selection into participation. Participants and non-participants are likely to differ on observed and unobservable characteristics, and these differences can also influence the outcome being measured. The dominant view is that randomised controlled trials (RCTs) constitute the “gold standard” for impact evaluation because the random assignment of the policy or treatment eliminates selection bias. Nevertheless, the prevalence of RCTs in evaluating social programmes is limited for a variety of reasons. Major barriers to their implementation include programme cost, ethical and practical considerations, and political and social acceptance. Treatment randomisation may not be feasible when a programme already exists, participation is voluntary, and programme proponents – for ethical or political reasons – refuse to deny treatment to eligible participants.

The RED is an alternative impact evaluation strategy which can be used to evaluate existing voluntary programmes that have partial take-up. In a RED evaluation, a randomly selected sub-group is offered an incentive or encouragement to participate in a given programme. While participation is voluntary, one can expect that it is higher in the incentivised group. RED is akin to RCTs with partial or imperfect compliance. Estimates of treatment effects can be recovered using standard instrumental-variable regression techniques. The intuition of the technique is to compare average outcomes between the entire incentivised group and the non-incentivised group. If the programme works, and participation is higher in the incentivised group, then average outcomes should also be higher. The random assignment into groups assures that differences in outcomes are not driven by other factors.

## **Experiment Details**

The study has two experimental arms: an incentivised group consisting of students who were offered an incentive to participate in PASS and a non-incentivised group. Members of both groups were allowed to attend PASS. The study sample was drawn from students enrolled in any of 14 first-year courses at the main campus of UOW in Australia over three semesters: Autumn 2014, Spring 2014, and Autumn

2015.<sup>1</sup> Assignment into the incentivised and non-incentivised groups was random and communicated to students by e-mail and short-message service (SMS).

Members of the incentivised group were encouraged to attend the PASS programme with a chance to win a near-cash incentive. The incentive was substantially larger in the 2014 semesters. Across nine subjects in 2014, the prizes consisted of 50 gift certificates worth AUD 1 000 valid at a number of retail outlets, for a total prize value of AUD 50 000. In Autumn 2015, only five such gift certificates were offered across five subjects for a total value of AUD 5 000. Students in the incentivised group who attended PASS at least five times over five separate weeks were eligible for the prize draw; those who attended at least eight times over eight separate weeks were allocated two entries in the prize draw, thereby doubling their chances of winning.

The full study population consists of 6 954 student-subject observations. Of these, 969 (14 percent) do not have a final grade assigned for the relevant subject, leaving 5 985 student-subject observations in the estimation sample, from 4 397 separate students. The attrition is explained by students having the option to withdraw from a given subject without academic penalty up to approximately two-thirds through each semester's teaching period. Attrition rates do not differ significantly between the incentivised and non-incentivised groups.

## **The Effect of the Incentive on PASS Attendance**

Students in the incentivised group attended 0.47 more PASS sessions than students in the comparison group on average. This is an increase of 19 percent or 1 428 additional sessions of PASS attended by students in that group. This inducement effect is smaller than anticipated which limits the statistical power of the main analysis, especially for sub-groups.

The inducement effect for students from low-SES areas is 0.89 sessions, more than twice as large as for the remainder of the sample (0.42). While the difference is not statistically significant ( $p = 0.134$ ), it is reasonable that students from low-SES areas may respond more to such incentives.

The estimated inducements effects are quite similar for the Autumn 2014 and Autumn 2015 sessions (0.459 versus 0.439). This is despite considerably larger (approximately five times larger) incentives

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<sup>1</sup> The five subjects in Autumn 2014 are Accounting Fundamentals in Society (ACCY111), Statistics for Business (COMM121), Engineering Materials (ENGG153), General Mathematics 1A (MATH151), and Introduction to Anatomy and Physiology I (SHS 111). The four subjects in Spring 2014 are Statistics for Business (COMM121), Macroeconomic Essentials for Business (ECON101), Theory Design and Statistics in Psychology (PSYC123) and Molecules, Cells, and Organisms (BIOL103). In Autumn 2015, the included subjects were Accounting Fundamentals in Society (ACCY111), Statistics for Business (COMM121), Foundations of Engineering Mathematics (MATH141), General Mathematics 1A (MATH151), and Introduction to Anatomy and Physiology I (MEDI111/EDPS101).

being offered in 2014 and otherwise similar design. This suggests that the size of the incentive (and hence the total cost of RED experiments) does not seem to be a major factor in the design of effective RED experiments. Similar future studies could be designed in ways that increase statistical power through methods that do not necessarily involve greater cost. The design of effective incentives for a student population warrants further research.

## **Main Results**

One hour of PASS is estimated to improve grades by 0.065 standard deviations, equivalent to around 1.26 marks on a raw 100-point scale. This is similar to the results we obtain from non-experimental techniques, and is consistent with the broader non-experimental literature.

This overall estimate is not statistically significant ( $p = 0.167$ ); but it is subject to a large standard error due to limited statistical power.

The results suggest that the effect of PASS may be considerably larger and is statistically significant for students enrolled in their first-ever semester (0.153 standard deviations or almost 3 marks per hour of PASS). The comparison between new students and others was not included in our pre-analysis plan, and so it should be treated as an exploratory result rather than a confirmatory result. Nevertheless, this seems plausible, given the issues around transitioning into a university environment, including the more independent and self-directed study skills and time management required in tertiary study. Many students also leave home to attend university, thereby losing the structured and supportive environment which some parents can provide. Students at university are also faced with making new social connections and friends within much larger cohorts than they have previously encountered. Programmes such as PASS aim to address many of these issues. The systematic review conducted by Dawson et al. [2014] suggests that PASS assisted in the areas of students developing effective study skills and exam preparation techniques, understanding course expectations, feeling more supported, enhancing social relationships and personal well-being, and reducing anxiety.

We had intended to study heterogeneity of effects for numerous other sub-groups (by socioeconomic status, rural and indigenous backgrounds, age, sex, domestic/international status, and high school grades), but this was not feasible because of limited statistical power due to the relatively weak inducement effect of the incentive.

## **Conclusion**

Our experiment suggests that one hour of PASS improved grades by 0.065 standard deviations (1.26 marks on a raw 100-point scale) which is consistent with the non-experimental literature. However,

this estimate is not statistically significant, reflecting limited statistical power. The estimated effect – nearly 3 marks per hour of PASS – is largest, and is statistically significant, for students in their first semester at university.

## **Reference**

Dawson, P., van der Meer, J., Skalicky, J., & Cowley, K. [2014]. “On the Effectiveness of Supplemental Instruction: A Systematic Review of Supplemental Instruction and Peer-Assisted Study Sessions Literature Between 2001 and 2010” . *Review of Educational Research* 84(4):609-639.