

**The Role of Undergraduate Personal Finance Education in  
Financial Literacy, Financial Attitudes and Financial Behaviours**

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## **Abstract**

Among the range of policy options available to improve personal financial decision making are personal finance financial education interventions. Notwithstanding calls to expand delivery of such courses at university level, there is relatively limited evidence of their effectiveness. We provide such evidence through assessment of objective and subjective financial literacy measures, financial behaviours and financial attitudes for a sample of students completing a course relative to a control group of their peers. We isolate a positive role for course delivery and estimate a better outcome for female students. We do not find that those enrolling in the elective course do so with higher levels of financial literacy, or with better financial attitudes and behaviours. Finally, evidence does not support the view that overconfidence, due to an illusion of knowledge, is associated with completion of the course.

## 1 Introduction

We report on the financial literacy of a sample of undergraduate students who completed a semester personal finance course as part of their undergraduate bachelor's degree course. We compare pre- and post-course assessments of a range of financial literacy measures, financial attitudes and financial behaviour intentions. This paper can be seen as a response to two challenges. The first is the call "... to add it [financial literacy] not only to high school curricula but also to colleges both across the nation and around the world" (Lusardi & Wallace, 2013). Second, is in response to the declaration that "We need much more causal research on financial education" (Hastings, Madrian, & Skimmyhorn, 2013).

Recent analysis (Fernandes, Lynch, & Netemeyer, 2014; Hastings et al., 2013; Lusardi & Mitchell, 2014; Miller, Reichenstein, Salas, & Zia, 2014) provides a comprehensive review of financial literacy, financial education, and financial outcomes. Fernandes et al. (2014) offer a useful breakdown of the types of studies that have been undertaken in the area which they use to explain the apparent conflicting evidence the studies provide. The first type/group of papers focuses on financial education interventions, both experimental and quasi-experimental, which they label as "manipulated" financial literacy. The second group focuses on assessments of financial literacy and subsequent or downstream financial behaviours, labelled as "measured" financial literacy. They attribute the apparent conflicting evidence to a conflation of the two.

Lusardi and Mitchell (2014) provide a review of both types. From the former they highlight a common theme: "low levels of financial literacy are evident around the world" given the inability to answer three basic questions on numeracy, inflation, and diversification. In the latter they conclude that research has "done much to confirm the causal impact of financial literacy on economic decision-making, and to separately identify this effect from other factors, including education" but conclude that in terms of interventions more is needed "to explore endogeneity and establish causality".

The meta-analyses of Miller et al. (2014) and Fernandes et al. (2014) are less compelling in the evidence of a positive role of financial literacy and financial education interventions. While Miller et al. (2014) find a majority of the 188 papers the review have positive outcomes for financial education, they note few are rigorous in method and suffer shortcomings, notably selection bias. Fernandes et al. (2014) review 201 financial literacy effect sizes, 90 for manipulated financial literacy and the remaining for measured financial literacy, with the former estimated to explain as little as 0.1% of the variance in financial behaviours. They provide evidence explaining the ability of measured financial literacy papers to find positive outcomes through the inclusion of appropriate controls for psychological traits and instruments for omitted variables.

Empirical assessments of financial literacy programmes targeting undergraduate students are surprisingly sparse. Of the 188 “rigorously studied” interventions Miller et al. (2014) review, only four percent are in university, and 18 percent either university and high school. Our primary contribution is therefore to provide an evaluation of a semester course in managing personal finances delivered to university students. We assess a range of measures of financial literacy, including objective and subjective measures and self-reported intentions and behaviours.

A concern for the ability of consumers to make the financial decisions required of them has increased as the responsibility for the types of decision they are expected to make has expanded (eg. retirement savings), and as the range and type of products available has expanded (eg. credit, defined contribution retirement savings funds). This is evidenced by the national strategies adopted and facilitated by many governments and agencies. For example, in Australia the national financial literacy strategy falls under the direction of the Australian Securities and Investments Commission (Australian Securities and Investments Commission, 2011, 2014). In the U.S. the Consumer Financial Protection Bureau has become the central federal agency with oversight of consumer financial protections originating with the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Consumer Financial Protection Bureau, 2014). In the new UK

national curriculum (Department for Education, 2013) personal finance is embedded in the English curriculum. The now defunct Financial Services Authority was influential in its development of a national strategy (Financial Services Authority, 2003) and impacted the approach of other regulators as did its development of measures (Financial Services Authority, 2005). The OECD has facilitated governments in the development of policy through a statement of principles of financial education (OECD/INFE, 2012), development of measurement instruments (OECD-INFE, 2011), and administration of benchmark surveys, for example the triennial assessment of high school students (OECD, 2014).

Financial literacy can be seen as part of a “policy arsenal” that aims to facilitate better consumer outcomes. Fernandes et al. (2014) classify financial education as an “information remedy” from a policy mix which includes: offering more choices; providing better information; and providing incentives for consumers to change behaviours. Fernandes et al. (2014) also suggest combinations of these options can also be considered such as blending information and incentives via “choice architecture” (Thaler & Sunstein, 2008).

Bernheim, Garrett, and Maki (2001) provide positive results for the role of financial education at high school level through higher savings rates. Mandell (2009) provides mixed results utilising a large sample of US undergraduates suggesting financial education at high school and university is not associated with improved financial literacy but is associated with improved financial behaviours. Lusardi and Mitchell (2014) highlight criticism of this work, however, in the lack of adequate control for factors such as content and teacher preparation.

Lusardi, Michaud, and Mitchell (2011) and Lusardi and Mitchell (2014) model financial literacy and wealth acquisition where financial literacy is treated as endogenous and explicitly allowed to depreciate. Fernandes et al. (2014) provide evidence of significant depreciation, or decay effects, in financial literacy where after as little as 20-months following an intervention, negligible effects remain. Mandell and Klein (2009) highlight such a decay for high-school students. We add to this

discussion by comparing the level of financial literacy among those with prior exposure to finance courses and examine its role in subsequent accumulation of those completing the personal finance course.

Willis (2008) (2011) (2013) presents a pessimistic review of the role of financial education suggesting “insurmountable barriers” exist including: the difficulty of behaviour change; the complexity and rate of change of product information; capacity constraints (too much knowledge required); trait based characteristics (eg. impulsiveness, self-control); and relative power differences where financial institutions have the means and motivation to “run circles around financial educators” (Willis, 2013, 130). Willis also argues that providing more information can lead to an exacerbation of overconfidence or the “illusion of knowledge” (Willis, 2013, 129). We investigate whether this is the case in a sample of undergraduates by examining measures of confidence pre- and post-course delivery.

An unanswered question in the delivery of financial education to undergraduates is what type of student will choose to enrol? Willis (2011, 430) contends that “Ironically, those who participate voluntarily already have more financial knowledge, better budgeting and planning skills, and lower financial discount rates conducive to good money management than those who decline”. We provide direct evidence which challenges this assumption.

The following section reviews literature relevant to the financial literacy and financial education interventions. Section three provides a description of the personal finance course delivered. Section four examines the characteristics of those enrolled in the course and outcomes associated with course completion. A summary and conclusion is presented in the final section.

## **2 Literature**

Finke and Huston (2014) highlight that financial literacy is a relatively new term and “confusion has surrounded what financial literacy is and how one may become financially literate” (Finke &

Huston, 2014, 65). Many labels including financial literacy, financial capacity and financial capability, with associated definitions, have been proposed (Australian Securities and Investments Commission, 2011; Financial Services Authority, 2006; Lusardi & Mitchell, 2014; OECD-INFE, 2011; Remund, 2010; Task Force on Financial Literacy: Office of the Canadian Minister of Finance, 2010). Remund (2010) classifies these definitions into five categories: knowledge of financial concepts; ability to communicate about financial concepts; aptitude to manage personal finances; skill in making financial decisions; and confidence to plan effectively for financial needs. In turn, Huston (2010) categorizes these definitions into two separable components: knowledge and application.

Financial literacy can be characterised as a component of human capital (Huston, 2010) which Lusardi and Mitchell (2014) emphasise is a choice and can thus be viewed endogenously with wealth with “some level of financial ignorance” a choice residual. Viewed as a component of human capital Finke and Huston (2014) argue that this precludes the inclusion of financial behaviours and financial outcomes within the definition as financial literacy is “a distinct and different construct from financial decision-making, financial behaviour, financial outcome/well-being, and financial education” (Finke & Huston, 2014, 67).

We agree that financial literacy should be conceptually distinguished from attitude and behaviour, but argue that knowledge of financial attitudes and financial behaviour is an important component of financial education. Finke and Huston (2014, 67) conceptualise the experience that flows from financial decisions and behaviours as a separable contributor, from education, in enhancing financial literacy. This leaves the inexperienced exposed if provided solely with knowledge and skills. This does not imply an overt advocacy role for specific attitudes or behaviours, rather an awareness of the linkages between financial attitudes, behaviours and outcomes.

## 2.1 Financial literacy and education university undergraduates

Shim, Barber, Card, Xiao, and Serido (2010) provide one of the broader conceptualisations of financial learning, attitudes and behaviour with a structural model linking anticipatory financial socialization with student's financial learning, which predicts financial attitudes, and finally health financial behaviours. Anticipatory financial socialization refers to the learning of financial knowledge, attitudes and behaviours, conscious and unconscious, through agents including parents, school and work. In this section we first review the level of financial literacy before focussing on specific interventions utilising university students.

### 2.1.1 Levels of financial literacy among university students

Chen and Volpe (1998) is an early study documenting “inadequate knowledge on personal finance” among U.S. undergraduates, finding business majors and those with work experience scoring higher on knowledge tests. Beal and Delpachitra (2003) is one of few Australian reviews focussed on university students, assessing students from a single university largely following the method of Chen and Volpe (1998). Beal and Delpachitra (2003) find males, income, workforce experience positively related to a global financial literacy measure with risk preference<sup>1</sup> negatively related. No difference is found for business majors. However, when components of financial literacy are assessed (concepts, markets, planning, decisions and insurance), business majors scored higher on concepts, planning and decisions. A gender effect (positive for males) was isolated to concepts and decisions with a negative relationship for males and planning. Cull and Whitton (2011) similarly survey a single Australian university though analysis is limited, restricted to bivariate comparisons of selected questions (student debt, compounding, taxation, and superannuation) which does not allow clear interpretation of associations. Wagland and Taylor (2009) survey a small sample from the same university as Cull and Whitton (2011), restricted to

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<sup>1</sup> The risk preference is not clearly articulated but is assumed here to be risk tolerance. The paper argues an expectation of a negative relationship on the basis that “People with high aggregate risk preference scores are likely to have less experience, knowledge and confidence in financial matters” (Beal & Delpachitra, 2003, 74). It is not clear on what basis this expectation is based but it is counter to prevailing empirical findings elsewhere.



business students, finding no gender or age correlations.<sup>2</sup> Worthington (2013) reviews the above Australian surveys and commercial surveys conducted by financial institutions (ANZ and Commonwealth Bank) noting some criticism of the latter in terms of their focus on financial products. Worthington (2006) utilises a commissioned national survey to predict financial literacy levels and find a positive association for those having completed university education relative to not completing year 10.

## 2.2 Financial literacy interventions with university students

Shim et al. (2010), discussed previously, identify indirect roles for workplace, school and parents (collectively socialisation agents) in the level of financial knowledge, and with financial attitudes and behaviours. While each agent plays a role in financial learning, the parent's role persisted into university and was more influential than work experience or financial education during high school.

Several U.S. studies identify positive outcomes involving interventions with undergraduate students though sample sizes are small and intervention length is short. For example, Gross (2005) reports significant improvements in knowledge and reported behaviours of a sample of law students completing a two-day, pass-fail credit course though no control group was examined. Borden, Lee, Serido, and Collins (2008) report improvements in financial knowledge and intentions to perform effective financial behaviours of a sample of college students attending a 90 minute seminar. Bowen and Jones (2006) report similar positive outcomes from students attending two lectures focussed on credit card use, though sample size was small (59) and involved no control.

Cross-sectional assessments not linked to specific interventions identify mixed results. Peng, Bartholomae, Fox, and Cravener (2007) find college level personal finance course completion positively associated with higher investment knowledge while no such relationship was found for

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<sup>2</sup> Though the analysis is somewhat limited.

completion within high school level classes. Xiao, Serido, and Shim (2012) report that while subjective assessment of financial knowledge is improved for those completing an undergraduate level personal finance course, objective knowledge was no different and risky credit behaviours were *higher* for those having completed a course.

Maurer and Lee (2011) compare informational sessions on basic elements of financial literacy (budgeting or credit) delivered via two options: within a semester long family economics unit, taken as a required or elective unit in equal proportions, where both the budgeting and credit sessions were embedded; or via peer financial counselling, delivered by students to their peers who elect to attend one session on either budgeting or credit. The peer-led sessions were of less than one-hour duration each whereas the unit provided more than double the time plus additional materials. Comparable improvements were made in both delivery mechanisms though significantly different sample selections and differences in time between pre-and post-test assessments are noted.

Mandell (2009) summarises the first national assessment of university students in the U.S. utilising the same instrument administered by Jump\$tart to high-school students. Financial literacy improved with formal education level and notably with each year at university, linked to the problem solving skills typically developed at university. Outside of participating in a stock market game, university students' financial literacy was not significantly higher if they had completed a personal finance course at high school. Those who had taken a university level, semester long course had lower financial literacy levels, although this does not account for the level of financial literacy for these students prior to the course. While those undertaking economics, accounting or finance degrees perform better than average, science majors performed best which is attributed to problem solving abilities, differentiated from content knowledge.

Blue, Grootenboer, and Brimble (in press) review financial literacy education as now included in the Australian primary and secondary education curriculum. Worthington (2013) provide a broader

review of the range of financial literacy programmes in Australia offered by: government (including consumer regulators (ASIC) and through school curriculum); industry (banks and associated foundations); community (community organisations often partnered with a financial institution); and workplace. Programmes for undergraduates are a notable absence and we can identify no Australian studies that assess financial literacy interventions at university level.

### **3 Course Description**

In 2013 a new *Managing your Personal Finances* unit was developed to meet the requirements as a “broadening unit” offered by the UWA Business School at the University of Western Australia. Students must complete four “broadening” units from “any discipline outside the knowledge area of your degree” within their twenty-four unit degree. The unit has no pre-requisites and is a level one or first-year course taught in the second semester. In the initial semester the unit had 11 weeks of classes plus exams and review weeks. A breakdown of topics covered is presented in Table 1. The delivery was shared between two experienced finance educators, who had also designed the course. Weekly lectures were 105 minutes plus a 45 minute tutorial, managed by three tutors. Two tutors were undergraduates who had completed their finance major and one was a PhD student.

<Insert Table 1>

The unit assessment included: tutorial participation (10%); weekly reflective journal (10%); group assignment (15%); and two exams (20% and 45%). Tutorial participation was based on discussions from weekly assigned readings and questions utilising a text, videos, websites and additional articles. A key objective of the unit was the development of a personal financial plan which requires collation of personal financial information. To ensure no contravention of financial services legislation covering provision of personal financial advice, it was emphasised that no personal advice was provided through the course and that it was not expected that personal financial data was shared. The personal financial plan was therefore a personal output, facilitated by a weekly reflective journal, but not submitted for assessment. For each topic, question(s) were

posed related to an aspect of developing a personal financial plan. For example, “What is your experience of price changes? How should inflation be included in your personal financial plan?” and “The text suggests that debt allows you to better smooth your life time consumption. Do you think it makes sense for an undergraduate student to borrow to finance their time at university?”. Students posted reflections on the questions in a graded online journal. The group assignment included two key tasks. The first was evaluating the financial position of a young couple utilising financial ratios introduced in the course. The second required application and analysis of time value of money principles using online calculators to solve savings and loan calculations. The two exams were a mixture of multiple choice and short answer questions.

The book “Your Money Milestones”, by Moshe Milevsky, was the required text for the unit. The book was chosen from the large range of available personal finance texts given its strong thematic approach set around key money milestones and incorporation of simple mathematic principles (addition, subtraction, division and multiplication) as a means of illustrating application of personal finance principles. The book also blends research from the personal finance literature which provides a strong evidence based approach to the topics. Finally, the text emphasised the pivotal role of human capital in consideration of personal financial decisions.

## **4 Data and Analysis**

A total of 384 students commenced the unit with 374 receiving a grade and the remaining 14 withdrawing before an academic penalty deadline.

### **4.1 Sample characteristics - administrative**

An analysis of those who enrolled in the unit relative to those that didn’t was first examined through administrative records.<sup>3</sup> The unit is targeted as a second semester unit for students in their first year of study, but can be taken at any time of study. The administration records indicate that

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<sup>3</sup> The access to university records and survey data, discussed later, for purposes of research analysis was submitted to, and approved by, the University Ethics committee.

52 percent of those enrolled had completed an equivalent of one semester of studies (four units) with 62 percent the equivalent of two semesters (eight units). A preliminary analysis focuses on this cohort of students, specifically those new to their course in 2013. Records were extracted for the cohort of students new to a course in 2013 within any undergraduate degree. This resulted in a sample of 4,162 students. Of this group (ie. the sub-sample who are in their first year), 163 enrolled in the unit in their first year. The “competition” for students in broadening units is large, or more collegially, the supply is broad. For example, a student enrolled in a Bachelor of Arts has 57 first year offerings across a range of disciplines across the university which can serve as a broadening unit. Some of these units are existing units within majors whereas the unit developed here is specifically developed as a standalone broadening unit.

A larger proportion of males (59 percent) enrolled in the unit than in the broader cohort (51 percent). Students can select one or two majors within most degrees which is summarised in Table 2. The profile of those enrolled in the unit is compared with two groups, arising from the unit being designed for non-commerce majors. The “excluding commerce” column in Table 2 calculates the proportion of majors of the non-enrolled cohort which enables a better comparison with the proportions in the enrolled unit. Using this column as a comparison indicates that the group that is over-represented in the enrolled group are those with first-majors in the Biomedical Science, Anatomy and Physiology group. The group under-represented is in the Arts and Humanities group. This is true when the second major is considered collectively. Students in Engineering, Maths and Computing Science majors are equally represented as are remaining groups of majors, largely.

<Insert Table 2>

To better examine and control for other student characteristics, a logistic regression was estimated for the likelihood of enrolling in the unit. Table 3 presents the odds-ratio estimates for a range of characteristics. The increased-likelihood of males enrolling is significant, but only at the 90%

confidence level when other characteristics are controlled for. The over and under-representation of students with specific first majors are significant relative to the Engineering, Maths and Computing major group.<sup>4</sup> No significant difference is observed for age. Domestic students were more likely to enrol in the unit. Acceptance into the overall course of study is primarily based on a tertiary entrance score, typically a secondary school performance score. Not all students will have a score available and where this was the case a zero was entered and a dummy variable of “No score” scored as one for that student. Neither was significant.

<Insert Table 3>

## **4.2 Survey Samples Characteristics and Bivariate Analysis**

To provide further insight into the profile of those enrolling in the course and to assist evaluation of the unit, a survey was administered in the week prior to the unit commencing and in the week of the final class. The survey had two main objectives. The first was to provide data to facilitate class discussion. For example, the profile of ownership of financial products among the student cohort, sources of financial information currently being used, and the financial experience of students were discussed in class. The survey collected demographic and socio-economic data, course related information, big-five personality assessments, financial behaviours, financial attitudes (including risk tolerance) and financial knowledge questions. Students enrolled in the course received a small course credit for survey completion but it was clear students could opt out of having their survey data, which was then de-identified, and used in the research project. Students who were not enrolled in the course were also sought as a control group and invited to complete the survey at the same times. The only difference was that the invitation to complete the survey for those enrolled in the course was received via the online learning management system (Moodle) whereas other students received a general email notice about the survey. Those who completed the surveys were able to enter a prize draw for one of five \$25 shopping vouchers. The

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<sup>4</sup> The decreased likelihood for Commerce is significant as expected. A commerce student can enrol, there is a not a prohibition, but to meet requirements they will generally complete the unit outside of their discipline.

survey closed once classes began and class material was released to students. This resulted in a short 10-day window for survey completion. Table 4 provides a summary of responses for both surveys for the two samples.

<Insert Table 4>

Of the 378 students that commenced the unit, 370 completed the pre-course survey and 308 (81 percent) completed the post-course survey. In the control group 665 responded to the notice and logged into the survey site of which 519 completed the pre-survey and 211 (42 percent) the post-survey, 13 weeks later. The differential response rates for the follow-up survey were expected. Given the first survey was designed with for a 25-30 minute completion time and the follow-up survey required 20 minutes, the 42 percent completion rate was an excellent result.

This survey was separate to the formal university unit evaluation conducted. An online survey is made available to students at the end of semester which canvasses six questions, summarised in Table 5. The 39 percent of students responding indicated, on average, that the unit was as successful as other units within the school in delivery.

<Insert Table 5>

#### 4.2.1 Course and control group demographics and trait comparisons at baseline

The “gold-standard” in analysis of interventions is randomised assignment to enrolment and non-enrolment. Such opportunities are not likely possible in terms of courses for university students. It is therefore important to examine differences in characteristics between those that choose to enrol and those that don’t. Here we attempt to do this by comparing the profile of those enrolled with those choosing to complete the survey and didn’t enrol, who serve as a “control” group, at the baseline or pre-test. Table 6 to Table 8 provide a comparison of the enrolled (course) and not-enrolled (control) with a further breakdown by whether they completed both the pre- and post-surveys (complete) or only the initial survey (incomplete) producing four groups. A one-way

ANOVA analysis of each characteristic by the four mutually exclusive groups is reported plus a comparison of each pairing of groups to isolate any differences.

<Insert Table 6 to Table 8>

Those in the course and who completed both surveys were younger than those in the control and also completed both surveys. The administrative records had indicated a higher proportion of males enrolled in the unit. As noted previously, more males enrolled in the course but there was no gender difference in survey completions (complete and incomplete) by gender. There were no significant differences in the proportion of international students, number of units completed, whether the student had previously studied in finance/business/economics/accounting or being currently enrolled in a Faculty of Science degree. Income, assets and debt were comparable and course enrolment was no more likely in any group.

In terms of personality, of the Big-Five traits (John, Donahue, & Kentle, 1991; John, Naumann, & Soto, 2008), openness was higher in the control and conscientiousness, unsurprisingly, was also significantly higher for those completing both surveys in the control relative to each of the other groups. No differences in risk tolerance or future time perspective (Jacobs-Lawson & Hershey, 2005) were found.

#### 4.2.2 Financial behaviours and attitudes at baseline

Reflecting the prevalence of part-time work among the group, approximately 60 percent of students had a superannuation account.<sup>5</sup> Those in the control who completed both surveys had a higher awareness of 10 financial products<sup>6</sup>, measured as whether they currently have the product or they have heard of the product<sup>7</sup>, compared with those who enrolled in the course. There was no significant difference in having tracked spending closely in the past-six months, but there was

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<sup>5</sup> In Australia those earning \$450 in a month receive a compulsory 9.5% of earnings in contributions to a retirement savings account which is defined contribution equivalent to a 401(k).

<sup>6</sup> Based on the measure of OECD-INFE (2011).

<sup>7</sup> Superannuation, managed fund, mortgage, secured and unsecured loan, credit card, cheque account, savings account, shares and bonds.



in terms of the success of doing this between those enrolled in the course (lower) and those in the control group who completed both surveys. Similarly, no significant differences were evident in having established financial goals over the past six-months but those in the control and having completed both surveys were more successful than their equivalent in the course group. No differences were found between groups for having developed a budget or spending plan over the previous six months. There were also no differences in reported intentions to perform any of the three previous behaviours in the future. Those in the control had more often set aside money for an emergency and been successful at it than the course group, though again there were no differences in intention to do so in the future.

Five positive financial behaviours from (OECD-INFE, 2011) were assessed in terms of how often they were performed on a five point scale (never 1 to always 5) as well as the rating of their importance also on a five point scale (not at all important 1 to extremely important 5). The five behaviours were: Before buying something I carefully consider whether I can afford it; I pay my bills on time; I keep a close personal watch on my financial affairs; I set financial goals and strive to achieve them; Before committing to a financial decision I consult independent sources of information/advice. How often these were performed was rated on a five-point scale (never 1, 2, sometimes 3, 4, always 5) and the importance was rated on a five-point scale (not at all important 1, 2, neither important nor unimportant 3, 4, extremely important 5). Those in the control who completed both surveys scored significantly higher on how often they had performed the behaviours compared with the course groups, with a difference in importance being only true for one pairing of control and course. Differences in the rating of importance of a range of information sources, modified from the list proposed by (OECD-INFE, 2011) and scored on a five point scale (not at all important 1 to extremely important 5), were only significant for advertisements and authority (government, MoneySmart) sources.

#### 4.2.3 Financial literacy at baseline: Course and control group comparison

Financial literacy was assessed with three sets of questions to construct a basic, advanced and applied measure as summarised in Appendix 1. Four questions comprise the basic measure covering: the impact of compounding (compounding); inflation (inflation); time value of money (tvm); and an inflation/money illusion (money illusion) based on Lusardi and Mitchell (2009) as utilised in the Rand American Life Panel and also used in Bateman et al. (2012). The set of questions comprising the advanced measure are also from the same sources and include: the relative risk between shares and bonds (risky assets); returns over the long term (returns assets); volatility over the long term (volatility); the result of diversification (diversification). A third applied measure comprised four questions which each required: a ranking of long term expected returns (shares, government bonds, company bonds); risks (shares, government bonds, company bonds); cost of car financing (credit card, secured loan, unsecured loan); and household goods financing (credit card, store credit, unsecured loan).

Before comparing the different groups, it is interesting to compare the sample here with that used in Lusardi and Mitchell (2009) and Bateman et al. (2012), both of which are older and more diverse in terms of education and work experience. The comparison does not provide a consistent pattern as some questions have poorer performance by the student sample (inflation, risky assets, returns assets, diversification), some questions have performance in between the other two samples (TVM, volatility), and some questions are largely the same in aggregate (money illusion, compounding). These differences can likely be taken, at least in part, as a reflection of the different socialisation exposures to financial learning as suggested by Shim et al. (2010).

In terms of differences between the course and control groups, and those completing the first or both surveys, those who enrolled in the course and did not complete the second survey had significantly lower scores for two questions and the overall basic literacy score. A similar pattern was evident for the advanced set of questions but only for two of the questions, and not for the

aggregate score. Of the applied questions only the car financing ranking had a significant score difference, between the control who completed both surveys and those who only completed the first survey.

Individuals also provided a self-rating of their: maths ability; overall financial decision making ability; investing knowledge; and superannuation knowledge on a seven-point scale (extremely poor 1, to extremely good 7). No differences were found in self-rated maths ability and investing knowledge. Those enrolling in the course had lower self-rated financial decision making ability, though this was only significant for the control relative to the course group not completing the second survey. Self-rated knowledge of superannuation was lower for the course group that completed both surveys compared with the control group. A final comparison examined “How satisfied are you with your ability to manage your personal finances” scored on a seven-point scale (very dissatisfied 1 ...very satisfied 7). Those who enrolled in the course had significantly lower satisfaction ratings than the control group.

In summary, the preliminary assessment of the baseline results comparing those enrolled in the course and the control group do not appear to support the contention of Willis (2011, 430) that those who enrol in a financial education course have better knowledge and have better attitudes. The preliminary evidence is the opposite – those enrolling in the course had lower knowledge scores, did not display positive behaviours as often, were less aware of financial products, and with some evidence of less success in financial behaviours. Those enrolling in the course reported significantly lower satisfaction with managing their personal finances which suggests an underlying motivation for enrolment though surprisingly, there was no difference in intentions to perform a number of financial behaviours which would be expected to increase satisfaction. It is not clear whether this is because of a lack of awareness of what to do impacting those intentions.

#### 4.2.4 Financial literacy at baseline: Demographic breakdown

A comparison of baseline performance on financial literacy questions by respondents characteristics, broken down by course and control group, is presented in Table 9. Males performed better across each of the basic literacy measures and on the majority of advanced questions, consistent with a wealth of empirical international evidence. Where an age difference is significant, it is older respondents who perform better. Those with higher income and assets performed better across both course and control groups. Differences by ethnicity groups are not significantly different across basic and advanced questions with one exception. Having superannuation was not generally associated with different scores, though those who did not know whether they did or not have superannuation scored poorer on every question, suggesting it may be a good single diagnostic question.

<Insert Table 9>

In terms of study area (first major), commerce and engineering students in the control group had the highest average basic score with psychology and arts and humanities lowest, though a significant difference was only evident across study area in the compounding and inflation questions. This pattern was largely similar in the course group. In the advanced questions in the control group, commerce students clearly performed better followed by students from engineering, maths and computing science. The ranking in the set of basic questions highlights the role of numeracy in explaining basic financial literacy. The clear outperformance of commerce students in the advanced questions however highlights that this does not necessarily extend to advanced financial concepts.

Those who had studied business/accounting/economics subjects at high-school performed better on the inflation question for both groups compared with those with no previous study whereas those who had studied subjects but only since school had no differences. There were no other significant differences in the other three basic questions. A clearer difference was evident in the

advanced questions where those who had studied, whether at high school or in studies since, scored significantly better. Post-hoc comparisons, not tabulated, do not identify consistency in whether this is for those who studied at high school only or at high school and since. These results can be, tentatively, contrasted with the findings of significant decay in the effectiveness of financial education interventions documented by Fernandes et al. (2014), though the question asked here was broad in terms of subjects studied rather than related to specific interventions. A better contrast is with the findings of Mandell and Klein (2009), focussed on high school students.

A final bivariate breakdown examines differences by whether respondents considered that financial decisions had discussed or explained within the family when they were growing up. There were generally no significant differences in the basic financial literacy questions for both groups. For the advanced questions, however, those answering “sometimes” or “most of the time” scored significantly higher than the “never, rarely” group.

In summary, the baseline comparison finds cross-sectional variation in financial literacy consistent with patterns identified in previous empirical literature. Respondents who were older, males, those with more resources (income and assets), those with prior business/finance/economics study had higher financial literacy scores.

### **4.3 Regression analysis**

To better explore cross-sectional variation controlling for respondent characteristics and to assess the role of the course a regression for each of the financial literacy measures was estimated. Two issues required consideration in this estimation. The first was the differences of those selecting into the course and the second was the differential dropout rates in completion of the second survey. Administrative records support a marginally higher proportion of males, an over-representation of biomedical, anatomy and physiology students and under-representation of those in arts and humanities. The bivariate analysis of the control and course groups identified an over-representation in the control group of female students who were marginally older but with no

differences by financial characteristics. Those who did not complete the second survey, in both the control and course, tended to have lower scores in the financial literacy scores at baseline.

Satisfaction with managing personal finances was lower for course participants. To control for both issues a linear mixed model regression with individual random effects was estimated by maximum likelihood. Vittinghoff, Glidden, Shiboski, and McCulloch (2010, p.390) suggest that where “dropout is dependent on previous, observed values ... mixed model methods, based on maximum likelihood, are less affected”.

Estimations for objective measures of financial literacy (basic, advanced and applied) and self-assessments (day to day financial decisions, investing, superannuation, and satisfaction with managing finances) are presented in the first three columns of Table 10. To capture the impact of course completion a dummy variable was included for those who enrolled in the course and for the second (post-course) survey completion. The interaction of these two variables isolates the impact of course completion. A three-way interaction sought to identify any differential role of gender in course completion. Controls are included for demographics (age, ethnicity, financial resources, study area), psychosocial factors (big-five personality traits, risk tolerance) and socialisation factors (prior study, family member worker in a finance related industry, discussion of finances at home).

<Insert Table 10>

#### 4.3.1 Objective financial literacy assessments and course completion

Focussing first on the objective financial literacy measures (first three columns Table 10), a negative relationship was found for females though not in an interaction of female and course. That is, female students scored significantly lower on each of the measures but there was no difference between females in the control and enrolling in the course. A positive relationship for assets on each of the three measures, and a positive relationship for age, but only for basic and advanced measures, were estimated. Inconsistent results by ethnicity differences were estimated.

Relative to commerce students, negative estimates were found most consistently for advanced financial literacy though a negative estimate was found for basic and applied measures for a number of other study areas. Of the psychosocial measures, positive relationships were estimated for risk tolerance on each measure, and conscientiousness for advanced and applied financial literacy. A negative relationship was estimated for extraversion and neuroticism for basic financial literacy. Of the socialisation variables, having studied in a finance related subject previously was positively associated with the advanced and applied measures though was not significant if it has only been since leaving school. This result is interesting and generally in contrast with the available U.S. evidence, most notably Mandell and Klein (2009). Having a parent working in a related industry was curiously negative for basic financial literacy but positive for advanced. Having discussed finance issues in the family when growing up was positively associated with advanced financial literacy.

Turning to the association of course completion, the interaction for the second survey and those enrolled in the course was positive and significant for each of the three financial literacy measures. However, the three way interaction suggests that there is a differential impact by gender where female students improved more from the course for the basic and advanced measures. This is captured clearly in Figure 1. In summary, having controlled for an extensive set of demographic, psychological, and social factors a significant positive course effect is estimated.

<Insert Figure 1>

#### 4.3.2 Subjective financial literacy assessments and course completion

The next four columns of Table 10 present estimations for subjective assessments of dimensions of financial literacy plus an estimation for satisfaction of managing personal finances. As with objective measures, a negative relationship was estimated for females but only for investing and superannuation knowledge. Assets were again positive and significant whereas age was not as strong. The negative and significant female estimate when viewed with the three-way interaction

for the objective financial literacy assessments provides support for the suggestion of Lusardi and Mitchell (2014) that “awareness of their own lack of knowledge may make women ideal targets for financial education programs”. Again, inconsistent results were estimated for ethnicity. No differences were found between engineering, maths and computer science students relative to commerce majors though a negative relationship was estimated for each other study area for investing knowledge, superannuation knowledge, and satisfaction managing personal finances though significance varies. Of the psychosocial variables, risk tolerance was again positive but only significant for investing and superannuation, with conscientiousness positively related to each of the four measures. The socialisation variables had generally the same positive relationship as observed with the objective financial literacy measures, if more consistent. Having studied previously or having a parent in the finance or associated industry were positively related to the four subjective measures, though significance varied by item. Having discussed finances at home was more robustly positively associated with each of the measures.

In terms of the role of the course, the interaction term between course enrolment and the second survey is positive and significant for each of the four subjective assessments. That is, those who completed the course had a significant increase in the assessment of their ability to make day to day decisions, knowledge of investing in financial assets, knowledge of superannuation and satisfaction with their ability to manage their personal finances. The magnitude is large for the investing in financial assets and superannuation knowledge than day-to-day decisions. No significant three-way interaction was found, which suggests no difference in the role of enrolment by gender, in contrast to that suggested in some of the objective financial literacy assessments.

#### 4.3.3 Overconfidence impact of course enrolment

Thus far, estimates suggest a clear positive impact for completion of the course. A final estimation examines the contention that such courses present a risk of “exacerbating participant’s overconfidence” (Willis, 2013, 130). After each of the set of basic and advanced financial literacy



questions, respondents were asked how many they believed they answered correctly. The number actually correct was deducted from this to determine a “confidence” measure. A positive (negative) result can be interpreted as over (under)confidence, that is the respondent thought they had more (less) correct than they actually did and a zero result would indicate a calibrated result. The final two columns of Table 10 present the estimates where the same set of explanatory variables have been used as the objective and subjective financial literacy estimates. The interaction of second survey and course enrolment is not significant, and neither is the three-way interaction with gender. This does not support the “over-confidence” contention of Willis (2013, 130).

#### 4.3.4 Behaviour performance, importance, and course enrolment

The final set of estimations focussed on behaviours, intentions and ratings of importance of financial information sources. Performance of five positive behaviours (OECD-INFE, 2011), as discussed in section 4.2.2, is examined in the first two columns of Table 11. Female students had a positive relationship with the importance of the behaviours as did older students for both performance and importance. No significant differences were found for other demographics. Of the psychosocial variables, conscientiousness and future time perspective were positively associated with performance and importance of the five positive behaviours. Of the socialisation variables prior studies in a related subject was not associated with either performance or importance. Having a parent in a finance related industry and having discussed finances in the family home were both positively associated with performance and importance of the positive behaviours, though the parent role was not significant for importance.

<Insert Table 11>

Turning to the interaction term, the completion of the course was significantly positively associated with the performance but not the importance of the behaviours. The three-way interaction did not identify a gender difference related to course completion.

The next three columns examine the intention to perform three basic financial behaviours: track expenditures; establish a budget and establish an emergency fund. Here, course completion was positively associated with budgeting and establishing an emergency fund. Notably the socialisation variable, having discussed finances at home, was again positive and significant for each of the three behaviours.

The final three columns examine the importance attached to three types of information sources as discussed in section 4.2.2. A factor analysis of the 18 information sources identified three major groups of information sources labelled as Authority (MoneySmart, personal recommendation from a finance professional), Family/Friends (advice of friends/relatives, advice from immediate family (parents, sister, brother), and employer's advice), and Unsolicited (sales staff, information collected from branch, office). The Authority information sources can be identified as positive or recommended sources whereas the Unsolicited as negative. Family/Friends could not clearly be classified as positive or negative.

Those enrolled in the course were positively associated with the authority sources. Of the demographics a positive association for family and friends was estimated for females and age. A positive association was found for Asian students for family/friends, and unsolicited information sources. Of psychosocial variables, agreeableness was positively associated with all three sources of information and extraversion positively associated with family/friends and unsolicited information sources. Of the socialisation factors, those who completed study in a related subject area, but only since school, was negatively associated with assessment of family/friends and unsolicited. Those who had discussed finances at home were positively associated with the authority information sources.

Completion of the course was positively associated with rating of the importance of authority information sources, but no related to either of the other two. No significant interaction with gender could be identified.

## 5 Conclusion

We provide evidence in an area under-explored in the financial literacy literature, namely, the impact of financial interventions for undergraduate students. While the ideal of a randomised control trial is not possible, or likely in this context, we provide a quasi-experimental approach where we include both an appropriate control group and account for a collection of demographics, psychosocial variables and socialisation variables that have been identified in the literature. We design and evaluate a semester-long elective course in managing personal finances for undergraduate students. We find that those enrolling in the course have lower objective financial literacy and lower self-assessed financial literacy, seemingly against the prevailing wisdom of who is attracted to such courses (Willis, 2011, 430).

We identify significant outcome effects for those completing the course. This is in terms of basic, advanced and applied measures of financial literacy having controlled for maths ability, psychosocial variables, including personality traits, risk tolerance and future time perspective, socialisation variables including prior education in a related subject, and discussion in the family home of finances. A gender interaction was also identified suggesting that female students may be a better target of financial education programs (Lusardi & Mitchell, 2014). Similar positive effects are found for self-assessed financial literacy and satisfaction with managing personal finances. No evidence is found to suggest over-confidence as a consequence of course completion.

Performance of positive financial behaviours and intentions to perform positive behaviours were also positively related to course completion though no evidence was found for intentions to perform basic financial behaviours of tracking expenditure and establishing a budget. Finally, positive effects were found for rating of the importance of authority information sources, such as the regulator's MoneySmart website and professional personal advice.

Limitations remain in the analysis undertaken. While the number of students is large, the generalisability may be limited to the format of delivery, those delivering the material, and the

student cohort. Also, the cost of delivery is significant, not least of which in the development of materials, and no comparison is made with an alternative delivery mechanism given the control group is no course. Further, effects are over a relatively short-period of time namely a semester and the challenge is to track financial behaviours and outcomes in the medium to longer term. However, with the success of the unit in terms of enrolment, student completion and student evaluation we hope to address some of these limitations in future delivery.

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## Appendix

### Basic Financial Literacy

1. Suppose you had \$100 in a savings account and the interest rate is 20 per cent per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total?

Ans: More than \$200; Exactly \$200; Less than \$200; Do not know

2. Imagine that the interest rate on your savings account was 1 percent per year and inflation was 2 percent per year. After 1 year, how much would you be able to buy with the money in this account?

Ans: More than today; Exactly the same; Less than today; Do not know

3. Assume a friend inherits \$10,000 today and his sibling inherits \$10,000 3 years from now. Who is richer because of the inheritance?

Ans: My friend; His sibling; They are equally rich; Do not know

4. Suppose that in the year 2020, your income has doubled and prices of all goods have doubled too. In 2020, how much will you be able to buy with your income?

Ans: More than today; Exactly the same; Less than today; Do not know

### Advanced Financial Literacy

1. Is the following statement true or false? Shares are normally riskier than bonds.

Ans: True; False; Do not know

2. Considering a long time period (e.g. 10 or 20 years), which asset normally gives the highest return?

Ans: Savings account; Shares; Bonds; Do not know

3. Considering a long time period (e.g. 10 or 20 years), which asset normally displays the highest fluctuations?

Ans: Savings account; Shares; Bonds; Do not know

4. When an investor spreads his/her money among different assets, does the risk of losing money:

Ans: Increase; Decrease; Stay the same; Don't know

### Applied Financial Literacy

1. Drag and drop the investment options below so they are ranked by the return you would expect from them over the long term (>10 years) where 1 at the top is the HIGHEST expected return and 5 at the bottom is the LOWEST expected return: Company Shares; Bank Term Deposit; Commonwealth Government Bonds; Residential Investment Property; Company Bonds.

2. Drag and drop the investment options below so they are ranked by the risk you would expect from them over the long term (>10 years) where 1 at the top is the HIGHEST expected risk and 5 at the bottom is the LOWEST expected risk. For this question we define risk as the variation in the investments value (and returns) over time: Company Shares; Bank Account Term Deposit; Commonwealth Government Bonds; Residential Investment Property; Company Bonds.

3. You are looking to borrow \$10,000 to buy a second hand car from a car yard. Your expectation is that you will repay the money over five years. Drag and drop the borrowing options below so they are ranked by total borrowing costs where 1 at the top is the HIGHEST cost and 3 at the bottom is the LOWEST cost: Credit card, An unsecured personal loan arranged through the car dealer; A secured car loan through a bank.

4. You are looking to borrow \$4,000 to purchase a new TV, sofa, fridge and washing machine for your new apartment from a major national retailer. Your expectation is that you will repay the money over three years. Drag and drop (move) the borrowing options below so they are ranked by total borrowing costs where 1 at the top is the HIGHEST cost and 3 at the bottom is the LOWEST cost: An unsecured personal loan from a bank; Credit card; Store approved finance with six-months interest free period



**Table 1 Course Topics**

Topic	Description
One	"What's it all about" - The Personal Financial Planning Process
Two	"Am I saving the right amount?" - Saving money forever
Three	"Do I need to borrow more money?" - Too Much Debt
Four	"Please sir, may I pay some more tax?" - Overview of personal taxation issues
Five	"Should I rent or buy" - Home Ownership
Six	"Do you want insurance with that?" - Protecting ourselves.
Seven	"Owning your first..." - Dimensions of Personal Finance
Eight	"What is Behavioural Finance?"
Nine	"Where can I put my money?" - Available assets, portfolios and diversification
Ten	Really Long-Term - "Retirement? Kids? Marriage?"

**Table 2 Unit Enrolment Comparison for New Student Cohort**

This table provides a breakdown of enrolments using university administrative records for those enrolled and not enrolled in the unit. To better enable a comparison the analysis is restricted to the cohort of new students to the university in 2013, the first year the unit was offered. Because the unit is targeted to non-Commerce students, and hence enrolment in the unit is very low for these students, a breakdown is provided from the general student cohort excluding commerce students.

	First Major				Second Major				Either_Major		
	Not Enrolled	Excluding Commerce	Enrolled	Total	Not Enrolled	Excluding Commerce	Enrolled	Total	Not Enrolled	Excluding Commerce	Enrolled
Engineering, Maths, Computer Science	772 19%	772 25%	43 26%	815 20%	160 4%	160 5%	4 2%	164 4%	932 23%	932 30%	47 29%
Biomedical Science, Anatomy, Physiology	664 17%	664 21%	55 34%	719 17%	354 9%	354 11%	28 17%	382 9%	1018 25%	1018 33%	83 51%
Chemistry, Pharmacology, Geology, Other	508 13%	508 16%	28 17%	536 13%	300 8%	300 9%	17 10%	317 8%	808 20%	808 26%	45 28%
Psychology	283 7%	283 9%	7 4%	290 7%	257 6%	257 8%	7 4%	264 6%	540 14%	540 17%	14 9%
Commerce	888 22%		9 6%	897 22%	820 21%		11 7%	831 20%	1708 43%		20 12%
Arts and Humanities	588 15%	588 19%	13 8%	601 14%	541 14%	541 17%	10 6%	551 13%	1129 28%	1129 36%	23 14%
Architecture, Design	176 4%	176 6%	4 2%	180 4%	146 4%	146 5%	4 2%	150 4%	322 8%	322 10%	8 5%
None	17 0%	17 1%	0 0%	17 0%	1,421 36%	1421 45%	82 50%	1,503 36%	1438 36%	1438 46%	82 50%
Mature Age Access	103 3%	103 3%	4 2%	107 3%					103 3%	103 3%	4 2%
Total	3,999 100%	3111 100%	163 100%	4,162 100%	3,999 100%	3,179 100%	163 100%	4,162 100%	3,999 100%	3,111 100%	163 100%

**Table 3 Odds Ratios for Likelihood of Enrolment Among New Cohort of Students**

This table presents odds ratios from a logistic regression for the likelihood enrolling in the personal finance unit. The sample is restricted to those new to their course in 2013. Where the entrance score is not available, zero is entered and a dummy variable (No score) is included for the student. Entrance score is

	Odds Ratio
Age	-0.00317 (0.0254)
Male	0.306* (0.176)
Major (first) – (Base, Engineering, Maths, Computer Science) Biomedical Science, Anatomy, Physiology	0.510** (0.224)
Chemistry, Pharmacology, Geology, Other	0.0654 (0.259)
Psychology	-0.640 (0.426)
Commerce	-1.569*** (0.374)
Arts and Humanities	-0.796** (0.334)
Architecture, Design	-0.747 (0.536)
Born in Australia	0.314* (0.185)
Entrance score	0.00696 (0.0122)
No score	0.0417 (1.118)
Constant	-3.838*** (1.288)
Observations	4,145
Likelihood Ratio (12)	79.318
Nagelkerke R <sup>2</sup>	0.067

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 4 Survey Sample Breakdown**

	Baseline Survey		Second Survey	
Overall				
Course	370	42%	308	59%
Control	501	58%	211	41%
Total Overall	871	100%	519	100%
Course				
Female	173	47%	140	45%
Male	197	53%	168	55%
Sub-Total	370	100%	308	100%
Control				
Female	333	66%	138	65%
Male	168	34%	73	35%
Sub-Total	501	100%	211	100%

**Table 5 Unit Evaluation**

Results of end of unit student evaluations. Surveys are administered online and of the 378 enrolled, 146 responses were received, a 39 percent response rate. Questions scored on a four-point scale.

	Strongly Disagree	Disagree	Agree	Strongly Agree	Unit Score	School Average
Q1. It was clear what I was expected to learn in this unit	1%	9%	57%	33%	3.2	3.1
Q2. The assessment requirements were clearly stated	1%	9%	52%	38%	3.3	3.1
Q3. The assessment tasks were closely linked to the unit objectives	1%	3%	53%	43%	3.4	3.2
Q4. The unit was well organised	2%	10%	48%	40%	3.3	3.1
Q5. The learning resources (handouts, text, web resources, etc) were adequate for my study in the unit	2%	12%	48%	38%	3.2	3.0
Q6. Overall, this unit was a good educational experience	2%	5%	53%	40%	3.3	3.1

**Table 6 Comparison of Course & Control – Baseline Demographics Data**

	Control Complete (A)	Control Incomplete (B)	Course Complete (C)	Course Incomplete (D)	N	F-test	p-value	Bonferroni Comparisons ( 95%** 90%*)
Age	20.81	21.07	19.68	19.56	20.41	4.4	0.0044	AC**
Male	35.50%	32.23%	51.42%	59.09%	41.91%	12.5	0.0000	AC**,AD**, BC**,BD**
International Student	6.00%	9.30%	8.51%	9.09%	8.27%	0.63	0.5985	
Units Completed	9.38	8.43	9.00	9.08	8.90	0.91	0.4368	
Previously Studied	51.50%	50.50%	44.33%	46.59%	48.34%	1.1	0.3503	
Live at home	71.00%	72.43%	71.28%	70.45%	71.53%	0.07	0.9769	
Fulltime Study	35.00%	33.89%	33.69%	30.68%	33.75%	0.17	0.9164	
Science Degree	59.00%	52.49%	80.50%	64.77%	64.29%	18.71	0.0000	
Income (1: < \$10,000; 2: \$10,000-\$24,999; 3: ≥ \$25,000)	1.42	1.40	1.39	1.43	1.41	0.14	0.9348	
Assets (1: \$0; 2:< \$5,000; 3: \$5,000-\$19,999; 4: ≥ \$20,000)	2.30	2.22	2.37	2.19	2.28	1.27	0.2828	
Debt (1: \$0; 2: < \$5,000; 3: \$5,000-\$19,999; 4: ≥ \$20,000)	1.46	1.44	1.41	1.39	1.43	0.17	0.9137	
<i>BFI (1 low ... 5 high)</i>								
Extraversion	3.06	3.18	3.14	3.18	3.14	1.22	0.3001	
Agreeableness	3.76	3.75	3.77	3.76	3.76	0.10	0.9608	
Conscientiousness	3.72	3.53	3.59	3.46	3.59	5.25	0.0014	AB**,AC*,AD**
Neuroticism	2.94	2.90	2.78	2.87	2.87	2.49	0.0587	AC*
Openness	3.60	3.60	3.37	3.36	3.50	13.15	0.0000	AC**,AD**,BC**,BD**
Future Time Perspective (1 low ... 7 high)	2.38	2.46	2.46	2.57	2.45	0.45	0.7203	
Risk Tolerance – SCF (1 low ... 5 high)	2.38	2.46	2.46	2.57	2.45	0.66	0.5784	
Satisfaction Managing Finances	4.96	4.76	4.11	4.06	4.53	21.07	0.0000	AC**,AD**,BC**,BD**
Superannuation Account (Yes)	65.50%	62.13%	60.64%	61.36%	62.34%	0.41	0.7444	
Awareness of Financial Products (0-10)	9.28	8.99	8.67	8.78	8.93	4.81	0.0025	AC**
<i>Track spending closely (six-months):</i>								
In Past? (Never 1, Once 2, Monthly 3, Weekly 4)	3.17	3.23	3.09	2.98	3.15	2.07	0.1030	
Success? (Not very successful 1..Extremely Successful 5)	3.68	3.50	3.38	3.19	3.47	4.80	0.0025	AC**, AD**
Intend to? (yes)	88.50%	89.37%	89.72%	88.64%	89.21%	0.07	0.9748	
<i>Establish a financial goal(s) (six-months)</i>								
In Past? (Never 1, Once 2, Monthly 3, Weekly 4)	2.39	2.38	2.23	2.49	2.34	2.40	0.0661	
Success? (Not very successful 1Extremely Successful 5)	3.13	2.95	2.79	2.93	2.94	3.00	0.0297	AC**
Intend to (yes)	69.00%	73.42%	76.95%	80.68%	74.28%	2.00	0.1130	
	200	301	282	88	871			

**Table 7 Comparison of Course & Control – Financial Literacy: Attitudes & Behaviour at Baseline**

	Control Complete (A)	Control Incomplete (B)	Course Complete (C)	Course Incomplete (D)	N	F-test	p-value	Bonferroni Comparisons (95%** 90%*)
<i>Develop a budget or spending plan (six-months)</i>								
In Past? (Never 1, Once 2, Monthly 3, Weekly 4)	2.455	2.40	2.23	2.32	2.35	2.20	0.0865	
Success? (Not very successful 1..Extremely Successful 5)	2.955	2.85	2.68	2.69	2.80	2.13	0.0946	
Intend to? (yes)	74.00%	74.42%	75.53%	79.55%	75.20%	0.39	0.7634	
<i>Set aside money for an emergency</i>								
In Past? (Never 1, Once 2, Monthly 3, Weekly 4)	2.67	2.61	2.35	2.51	2.53	4.26	0.0053	AC**, BC**
Success? (Not very successful 1..Extremely Successful 5)	3.47	3.16	3.01	3.07	3.17	4.39	0.0045	AB**, AC**
Intend to (yes)	79.00%	78.74%	72.70%	77.27%	76.69%	1.28	0.2803	
Positive Behaviours (1 to 5 more often)	3.96	3.89	3.80	3.69	3.86	4.28	0.0052	AC*, AD**
Positive Behaviours Importance (1 to 5 more important)	4.47	4.39	4.44	4.29	4.41	2.76	0.0411	AD**
<i>Information Source</i>								
(Not at all Important 1, ... Extremely Important 5)								
Advertisements	2.6775	2.783223	2.676418	2.923296	2.738519	3.59	0.0134	AD**, CD**
Authority	3.83125	3.739203	3.875887	3.818182	3.812572	3.27	0.0206	BC**
Online	3.475	3.456811	3.414007	3.423296	3.443743	0.55	0.6483	
Family/Friends	4.82	4.774086	4.72695	4.712121	4.763108	0.91	0.4379	
Unsolicited	3.21	3.199336	3.187943	3.19697	3.197857	0.05	0.9852	
	200	301	282	88	871			

**Table 8 Comparison of Course & Control – Financial Literacy: Knowledge and Self Assessments**

	Control Complete (A)	Control Incomplete (B)	Course Complete (C)	Course Incomplete (D)	N	F-test	p-value	Bonferroni Comparisons (95%** 90%*)
Financial Literacy Basic								
1. Compounding Correct	73.50%	71.10%	70.92%	61.36%	70.61%	1.49	0.2149	
2. Inflation Correct	72.50%	65.12%	68.44%	53.41%	66.70%	3.61	0.0130	AD**
3. Time Value Correct	65.50%	62.79%	67.73%	53.41%	64.06%	2.13	0.0947	
4. Money Illusion Correct	91.00%	88.04%	87.94%	79.55%	87.83%	2.53	0.0563	AD**
All Four Financial Literacy Basic Correct	42.00%	33.55%	37.59%	15.91%	35.02%	6.62	0.0002	AD**, BD**, CD**
Mean Financial Literacy Basic (/4)	3.03	2.87	2.95	2.48	2.89	6.18	0.0004	AD**, BD**, CD**
Confidence Basic (Predicted Correct – Actual Correct)	-0.11	-0.11628	-0.14184	0.056818	-0.10563	0.91	0.4359	
Financial Literacy Advanced								
1. Risky Assets	57.00%	57.14%	59.22%	53.41%	57.41%	0.32	0.8078	
2. Long Term Returns	35.00%	34.55%	37.23%	32.95%	35.36%	0.25	0.8612	
3. Long Term Volatility	81.50%	76.41%	74.47%	67.05%	76.00%	2.54	0.0555	AD**
4. Diversification	72.50%	68.44%	71.99%	57.95%	69.46%	2.46	0.0613	AD*, CD*
All Four Financial Literacy Advanced Correct	17.00%	21.93%	20.92%	18.18%	20.09%	0.71	0.5444	
Mean Financial Literacy Advanced (/4)	2.46	2.37	2.43	2.11	2.38	1.78	0.1494	
Confidence Advanced (Predicted– Actual Correct)	-0.315	-0.42	-0.43	-0.20	-0.38	1.43	0.2317	
Financial Literacy Applied - Rankings								
Returns Ranking (0 correct ... 3 correct)	1.70	1.71	1.75	1.74	1.72	0.2	0.8974	
Risk Ranking (0 correct ... 3 correct)	1.92	1.83	1.91	1.88	1.88	1.38	0.2490	
Car Loan Ranking (0 correct ... 3 correct)	2.28	2.04	2.08	1.95	2.10	3.44	0.0165	AB**, AD**
TV Loan Ranking (0 correct ... 3 correct)	1.52	1.65	1.59	1.69	1.61	1.32	0.2673	
Mean Financial Literacy Applied	1.86	1.81	1.83	1.82	.55	.6477		
Self-Assessment (Extremely Poor 1 ... Extremely Good 7)								
Maths Ability	5.80	5.64	5.81	5.72	5.74	1.22	0.3001	
Financial Decisions Ability	5.46	5.39	5.13	5.13	5.29	3.72	0.0112	AD**, BD**
Investing Knowledge	3.39	3.35	3.05	3.34	3.26	2.22	0.0847	
Superannuation Knowledge	3.23	3.07	2.69	2.91	2.97	5.49	0.0010	AC**, BC*
Satisfaction Managing Personal Finances	4.96	4.76	4.11	4.06	4.52	21.07	0.0000	AC**, AD**, BC**, BD**
n	200	301	282	88	871			



**Table 9 Financial Literacy Score Baseline Breakdown**

This table reports a breakdown of financial literacy scores at baseline by demographics within the group that completed the course and the sample of those otherwise able to enrol in the course but didn't. In this table no distinction is made between whether the respondent completed the second survey. The proportion within each grouping who answered each question correctly is reported as well as the mean score for basic and advanced financial literacy measures where the maximum score possible in each is four.

		n	Basic Financial Literacy					Advanced Financial Literacy				
			Inflation	TVM	Money	Comp.	Total	Risk	Returns	Volatility	Divers.	Total
Overall	Control	501	68.1%	63.9%	89.2%	72.1%	2.93	57.1%	34.7%	78.4%	70.1%	2.40
	Course	370	64.9%	64.3%	85.9%	68.6%	2.84	57.8%	36.2%	72.7%	68.6%	2.35
	t-test		0.99	0.14	1.46	1.09	1.32	0.22	0.45	1.96*	0.45	0.57
Gender – Control	Female	333	61.3%	58.3%	89.2%	66.4%	2.75	52.9%	26.4%	75.7%	68.2%	2.23
	Male	168	81.5%	75.0%	89.3%	83.3%	3.29	65.5%	51.2%	83.9%	73.8%	2.74
	t-test		4.69***	3.73***	0.03	4.05***	5.70***	2.71***	5.66***	2.13**	1.30	4.52***
Gender – Course	Female	173	54.3%	59.0%	88.4%	56.6%	2.58	53.2%	32.4%	67.6%	62.4%	2.16
	Male	197	74.1%	69.0%	83.8%	79.2%	3.06	61.9%	39.6%	77.2%	74.1%	2.53
	t-test		4.05***	2.02***	1.29	4.79***	4.46***	1.71*	1.44	2.05**	2.43**	2.81***
Age – Control	18 years or less	176	64.2%	63.1%	88.1%	69.3%	2.85	60.2%	29.5%	77.3%	68.2%	2.35
	19 years	142	63.4%	64.1%	90.1%	78.2%	2.96	53.5%	31.7%	81.0%	71.8%	2.38
	20 years	62	64.5%	51.6%	91.9%	69.4%	2.77	56.5%	35.5%	75.8%	72.6%	2.40
	21 years or more	121	81.0%	71.1%	88.4%	70.2%	3.11	57.0%	45.5%	78.5%	69.4%	2.50
	F-test		4.17***	2.28*	0.31	1.24	2.09	0.48	2.97**	0.31	0.24	0.39
Age – Course	18 years or less	133	56.4%	54.9%	88.0%	69.2%	2.68	51.9%	31.6%	66.9%	65.4%	2.16
	19 years	135	68.1%	63.7%	90.4%	64.4%	2.87	57.8%	33.3%	77.0%	68.9%	2.37
	20 years	32	62.5%	71.9%	90.6%	65.6%	2.91	59.4%	40.6%	75.0%	62.5%	2.38
	21 years or more	70	75.7%	80.0%	71.4%	77.1%	3.04	68.6%	48.6%	74.3%	77.1%	2.69
	F-test		2.88**	4.61***	5.31***	1.20	1.93	1.76	2.22**	1.23	1.18	2.64**
Income - Control	< \$10,000	344	62.8%	59.6%	88.7%	70.6%	2.82	56.1%	29.9%	78.2%	68.0%	2.32
	\$10,000 -24,999	109	78.0%	73.4%	89.0%	78.0%	3.18	60.6%	40.4%	79.8%	75.2%	2.56
	>= \$25,000	48	83.3%	72.9%	93.8%	68.8%	3.19	56.3%	56.3%	77.1%	72.9%	2.63
	F-test		7.41***	4.41**	0.57	1.25	7.00***	0.34	7.59***	0.09	1.13	2.46*
Income - Course	< \$10,000	246	62.6%	63.4%	87.0%	66.3%	2.79	58.1%	32.9%	72.4%	65.9%	2.29
	\$10,000 -24,999	100	65.0%	63.0%	86.0%	73.0%	2.87	55.0%	42.0%	72.0%	71.0%	2.40
	>= \$25,000	24	87.5%	79.2%	75.0%	75.0%	3.17	66.7%	45.8%	79.2%	87.5%	2.79
	F-test		3.00*	1.23	1.30	0.99	1.45	0.55	1.78	0.27	2.57*	1.75

		n	Inflation	TVM	Money	Comp.	Total	Risk	Returns	Volatility	Divers.	Total
Assets - Control	Personal Effects Only	160	58.8%	56.3%	81.9%	66.9%	2.64	52.5%	25.6%	73.8%	61.2%	2.13
	< \$5,000	121	67.8%	60.3%	93.4%	71.1%	2.93	52.1%	25.6%	76.0%	75.2%	2.29
	\$5,000-\$19,999	154	73.4%	68.8%	91.6%	75.3%	3.09	62.3%	39.0%	80.5%	72.1%	2.54
	>=\$20,000	66	78.8%	77.3%	93.9%	78.8%	3.29	65.2%	63.6%	89.4%	77.3%	2.95
	F-test			4.02***	3.88**	4.61***	1.50	8.53***	2.04	12.76***	2.54*	3.16**
Assets - Course	Personal Effects Only	89	46.1%	53.9%	87.6%	52.8%	2.40	51.7%	25.8%	69.7%	56.2%	2.03
	< \$5,000	114	65.8%	61.4%	91.2%	75.4%	2.94	52.6%	33.3%	70.2%	69.3%	2.25
	\$5,000-\$19,999	124	71.8%	68.5%	81.5%	71.0%	2.93	60.5%	39.5%	75.0%	68.5%	2.44
	>=\$20,000	43	81.4%	81.4%	81.4%	76.7%	3.21	76.7%	55.8%	79.1%	93.0%	3.05
	F-test			7.56***	3.75**	1.89	4.95***	7.89***	3.15**	4.19***	0.66	6.36***
Ethnicity-Control	Other	50	76.0%	62.0%	88.0%	84.0%	3.10	58.0%	38.0%	76.0%	68.0%	2.40
	Asian	118	64.4%	61.9%	81.4%	73.7%	2.81	55.9%	28.8%	74.6%	65.3%	2.25
	British	33	75.8%	78.8%	90.9%	78.8%	3.24	57.6%	36.4%	84.8%	87.9%	2.67
	European	24	75.0%	58.3%	79.2%	62.5%	2.75	62.5%	37.5%	70.8%	75.0%	2.46
	Aust/NZ	276	66.7%	63.8%	93.5%	69.2%	2.93	56.9%	36.2%	80.4%	69.9%	2.43
F-test			0.96	0.94	3.96***	1.67	1.66	0.09	0.61	0.87	1.67	0.94
Ethnicity-Course	Other	36	66.7%	61.1%	83.3%	61.1%	2.72	36.1%	30.6%	50.0%	0.67	1.83
	Asian	65	63.1%	61.5%	78.5%	66.2%	2.69	67.7%	35.4%	75.4%	0.69	2.48
	British	16	62.5%	81.3%	93.8%	75.0%	3.13	68.8%	31.3%	87.5%	0.69	2.56
	European	9	88.9%	100.0%	100.0%	55.6%	3.44	33.3%	22.2%	66.7%	0.56	1.78
	Aust/NZ	244	64.3%	63.1%	87.3%	70.5%	2.85	58.6%	38.1%	74.6%	0.69	2.40
F-test			0.62	1.89	1.47	0.63	1.49	3.22**	0.45	3.05	0.21	2.33*
Have Super – Control	No	119	73.9%	63.0%	87.4%	73.9%	2.98	63.0%	34.4%	81.5%	76.5%	2.55
	Yes	318	69.5%	67.6%	90.6%	73.0%	3.01	59.4%	39.6%	80.2%	70.8%	2.50
	Don't Know	64	50.0%	46.9%	85.9%	64.1%	2.47	34.4%	10.9%	64.1%	54.7%	1.64
	F-test			6.01***	5.06***	0.86	1.18	7.60***	8.16***	10.00***	4.59**	4.87***
Have Super – Course	No	88	65.9%	61.4%	84.1%	65.9%	2.77	67.05%	31.82%	75.0%	65.9%	2.40
	Yes	225	67.1%	67.1%	86.2%	72.0%	2.92	58.22%	37.78%	74.2%	70.2%	2.40
	Don't Know	57	54.4%	57.9%	87.7%	59.6%	2.60	42.11%	36.84%	63.2%	66.7%	2.09
	F-test			1.64	1.06	0.21	1.82	2.45*	4.50**	0.49	1.56	0.33
Maths Ability - Control	Neither Good/Bad & Below	73	65.7%	53.4%	83.6%	58.9%	2.62	50.7%	19.2%	74.0%	61.6%	2.05
	Somewhat Good	94	54.2%	50.0%	85.1%	62.8%	2.52	51.1%	38.3%	72.3%	64.9%	2.26
	Good	187	72.7%	68.4%	88.8%	71.6%	3.02	52.9%	33.1%	79.7%	72.7%	2.38
	Extremely Good	147	72.1%	72.1%	95.2%	85.0%	3.24	69.4%	42.2%	82.9%	74.1%	2.68
	F-test			3.86***	5.93***	3.26**	7.83***	13.0***	4.41***	4.11***	1.64	1.83
Maths Ability - Course	Neither Good/Bad & Below	36	47.2%	52.8%	72.2%	50.0%	2.22	55.6%	36.1%	63.9%	50.0%	2.05
	Somewhat Good/Good	69	57.9%	55.1%	84.0%	62.3%	2.59	52.2%	36.2%	72.5%	63.7%	2.24
	Good	180	67.2%	66.1%	86.7%	71.1%	2.91	59.4%	38.3%	74.4%	69.4%	2.41
	Extremely Good	85	72.9%	72.9%	91.8%	76.4%	3.14	60.0%	31.8%	72.9%	78.8%	2.43
	F-test			3.12**	2.58*	2.79**	3.40**	8.48***	0.44	0.36	0.56	3.64**

		n	Inflation	TVM	Money	Comp.	Total	Risk	Returns	Volatility	Divers.	Total
Study Area – Control	Engineering, Maths, Comp. Science	76	75.0%	71.1%	88.2%	88.2%	3.22	60.5%	42.1%	80.3%	72.4%	2.55
	Bio Science, Anatomy, Physiology	91	62.6%	64.8%	85.7%	76.9%	2.90	52.7%	30.8%	75.8%	61.5%	2.21
	Chemistry, Pharmacology, Geology	86	60.4%	61.6%	89.5%	67.4%	2.79	47.7%	18.6%	70.9%	68.6%	2.06
	Psychology	36	63.9%	52.8%	86.1%	63.9%	2.67	41.7%	16.7%	72.2%	58.3%	1.89
	Commerce	97	78.4%	71.1%	89.7%	79.4%	3.19	82.5%	60.8%	87.6%	85.6%	3.16
	Arts and Humanities	96	66.0%	59.4%	93.8%	56.2%	2.76	49.0%	30.2%	82.2%	67.7%	2.30
	Architecture, Design	19	63.2%	47.4%	89.5%	63.2%	2.63	47.4%	21.1%	63.2%	63.2%	1.95
	F-test		1.76*	1.53	0.61	4.91***	3.47***	6.47***	8.94***	2.11*	3.00***	10.83***
Study Area – Course	Engineering, Maths, Comp. Science	82	78.0%	72.0%	86.6%	79.3%	3.16	65.9%	34.1%	73.2%	72.0%	2.45
	Bio Science, Anatomy, Physiology	120	55.0%	61.7%	86.7%	64.2%	2.68	46.7%	32.5%	72.5%	62.5%	2.14
	Chemistry, Pharmacology, Geology	74	59.4%	67.2%	82.8%	70.3%	2.80	56.2%	37.5%	75.0%	70.3%	2.39
	Psychology	23	65.2%	43.5%	95.7%	56.5%	2.61	56.5%	26.1%	78.3%	69.6%	2.30
	Commerce	38	76.3%	65.8%	76.3%	71.1%	2.89	73.7%	50.0%	76.3%	78.9%	2.79
	Arts and Humanities	33	63.6%	63.6%	90.9%	63.6%	2.82	63.6%	48.5%	63.6%	66.7%	2.42
	Architecture, Design	10	70.0%	60.0%	90.0%	60.0%	2.80	60.0%	20.0%	60.0%	70.0%	2.10
	F-test		2.48**	1.19	1.02	1.32	2.00*	2.16**	1.40	0.49	0.75	1.47
Prior study - Control	No	246	60.6%	63.0%	89.0%	69.1%	2.82	47.2%	29.3%	72.4%	65.9%	2.15
	Yes, at high school	101	74.3%	63.4%	88.1%	68.3%	2.94	65.3%	41.6%	80.2%	67.3%	2.54
	Yes, at high school and since	78	83.3%	67.9%	88.5%	78.2%	3.18	75.6%	44.9%	87.2%	80.8%	2.88
	Yes, only after high-school	76	68.4%	63.2%	92.1%	80.3%	3.04	59.2%	32.9%	86.8%	76.3%	2.55
	F-test		5.65***	0.22	0.28	1.93	2.81**	8.27***	3.02**	4.16***	2.73**	8.94***
Prior study – Course	No	204	57.4%	62.7%	88.7%	69.1%	2.78	51.5%	31.9%	67.6%	64.7%	2.16
	Yes, at high school	50	80.0%	66.0%	80.0%	66.0%	2.92	60.0%	44.0%	76.0%	84.0%	2.64
	Yes, at high school and since	55	78.2%	67.3%	80.0%	63.6%	2.89	80.0%	49.1%	83.6%	76.4%	2.89
	Yes, only after high-school	61	65.6%	65.6%	86.9%	73.8%	2.92	57.4%	32.8%	77.0%	62.3%	2.30
	F-test		4.93***	0.18	1.48	0.52	0.47	5.00***	2.44*	2.28*	3.25**	5.92***
Discussed – Control	Never, Rarely	187	65.2%	66.8%	87.7%	71.1%	2.91	49.2%	28.9%	71.1%	64.7%	2.14
	Sometimes	200	69.0%	60.5%	90.5%	73.0%	2.93	59.5%	33.5%	83.5%	69.0%	2.46
	Most of the Time, Always	114	71.1%	64.9%	89.5%	71.9%	2.97	65.8%	46.5%	81.6%	80.7%	2.75
	F-test		0.62	0.88	0.40	0.08	0.14	4.43**	5.03***	4.87***	4.46**	9.38***
Discussed - Course	Never, Rarely	151	60.9%	65.6%	83.4%	64.9%	2.75	51.7%	32.5%	71.5%	61.6%	2.17
	Sometimes	157	67.5%	67.5%	90.4%	70.7%	2.96	59.2%	37.6%	70.7%	72.0%	2.39
	Most of the Time, Always	62	67.7%	53.2%	80.6%	72.6%	2.74	69.4%	41.9%	80.6%	77.4%	2.69
	F-test		0.87	2.07	2.44*	0.87	1.90	2.96*	0.96	1.19	3.29**	3.83**
Bateman et al. (2012)			78.4%	54.9%	86.7%	71.8%		64.1%	54.9%	76.7%	73.3%	
Lusardi and Mitchell (2009)			87.1%	73.8%	78.4%	69.0%		80.2%	62.3%	88.3%	74.9%	

**Table 10 Financial Literacy, Over-Confidence, Self-Assessment Regression Estimates**

This table presents maximum likelihood estimates from linear mixed model regressions with individual random effects. The first three columns contain results where the dependant variable is an objective measure of financial literacy. The fourth and fifth column report results where the dependant measure is the self-assessed correct number of answers and the actual number correct for the basic and advanced measure of financial literacy. The final four columns provide estimates where the dependant variable is one of four self-assessments: including ability to make day-to-day financial decisions; knowledge of investing in financial assets; knowledge of superannuation; and satisfaction with ability to manage personal finances respectively. Standard errors are clustered by individual. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

	Basic Literacy	Advanced Literacy	Applied Literacy	Day to Day Decisions	Investing Knowledge	Super Knowledge	Satisfaction Manage Finances	Confidence Basic	Confidence Advanced
Second Survey x Course	0.2695**	0.5210***	0.1797***	0.2310*	1.4886***	1.4667***	0.9470***	0.1807	0.1815
	0.112	0.1541	0.0677	0.1365	0.1791	0.1827	0.1488	0.1281	0.1449
Second Survey x Course x Female	0.3663**	0.4361**	0.1227	0.1423	0.1564	0.3276	0.1696	-0.2157	-0.1331
	0.1647	0.209	0.0983	0.1845	0.2547	0.248	0.2081	0.1817	0.2015
Female	-0.2871***	-0.2635**	-0.1054**	-0.1141	-0.5075***	-0.2367*	-0.1332	-0.1192	-0.2959***
	0.0934	0.1071	0.0457	0.1145	0.1431	0.1334	0.1157	0.085	0.0905
Course (Base: Control)	-0.1690*	-0.0783	0.0065	-0.2186*	-0.3177**	-0.3430**	-0.6725***	-0.0692	-0.0042
	0.0988	0.1209	0.0475	0.1208	0.1554	0.1493	0.1379	0.0929	0.1019
Second Survey (Base: First)	0.1307	0.3363***	0.0371	0.0364	0.0056	0.2743**	0.2142*	-0.0651	-0.062
	0.0865	-0.1203	0.0431	0.1121	0.132	0.1247	0.1128	0.0959	0.1157
Second Survey x Female	0.0594	0.2169	0.073	0.0102	-0.0847	-0.1908	-0.1624	0.0728	0.1465
	0.1152	0.1466	0.0683	0.1366	0.1688	0.166	0.1466	0.1299	0.1454
Course*Female	0.0217	0.0272	0.0645	-0.1931	0.0247	-0.099	-0.1704	0.1057	0.0439
	0.1349	0.1602	0.069	0.1586	0.1937	0.1908	0.1775	0.137	0.1379
Age	0.0148***	0.0233***	0.0023	0.0046	0.0157*	0.0264***	0.005	-0.0154**	0.0042
	0.0046	0.0056	0.0029	0.0061	0.0087	0.0083	0.0076	0.0071	0.0056
Ethnicity (Base: Australian)									
Other	0.077	-0.3013**	-0.0575	0.0988	-0.0419	-0.1797	0.0654	-0.1703*	0.0254
	0.0949	0.1243	0.0533	0.1088	0.1435	0.1381	0.1261	0.1035	0.0892
Asian	-0.1383	-0.2853***	-0.0481	-0.2348***	-0.0712	-0.2676**	-0.3011***	-0.0809	0.0216
	0.0849	0.0883	0.0383	0.0885	0.1137	0.1127	0.099	0.0844	0.0835
British	0.1942*	-0.0132	0.0158	0.1265	-0.203	-0.4758***	-0.0588	-0.0433	-0.0493
	0.1089	0.1371	0.0524	0.1252	0.1696	0.1806	0.1714	0.108	0.1047
European	-0.0261	-0.1806	0.0369	0.0303	0.084	0.086	0.092	-0.0672	0.4542***
	0.1305	0.1862	0.0594	0.1415	0.2064	0.2071	0.1841	0.1221	0.1577
Income	0.0289	-0.002	-0.0244	0.0974*	0.0476	0.3542***	0.0317	0.0053	-0.0743
	0.0469	0.0522	0.0214	0.0557	0.0733	0.0736	0.0655	0.0511	0.0488
Assets	0.0981***	0.0771**	0.0477***	0.1179***	0.1734***	0.1098**	0.1145***	0.0383	0.0198
	0.0313	0.0362	0.0145	0.0374	0.0444	0.0459	0.0415	0.0319	0.0306
Study Area (Base: Commerce)									
Engineering, Maths, Comp. Science	-0.0301	-0.4015***	-0.0156	-0.2080*	-0.1058	-0.2194	-0.2286	0.0233	-0.1318
	0.1003	0.1159	0.0486	0.1122	0.1468	0.1548	0.1405	0.0934	0.0975
Bio Science, Anatomy, Physiology	-0.1223	-0.4783***	-0.0524	-0.0187	-0.2009	-0.3775**	-0.2368*	-0.0643	-0.1709*
	0.102	0.1089	0.0475	0.1074	0.147	0.1477	0.1294	0.0976	0.0984

Chemistry, Pharmacology, Geology	-0.1675	-0.5246***	-0.0586	-0.1092	-0.3387**	-0.3900**	-0.2122	0.0489	-0.1906*
	0.104	0.1167	0.0499	0.1086	0.1534	0.1584	0.1298	0.0941	0.0975
Psychology	-0.1741	-0.6015***	-0.2017***	-0.0379	-0.3856**	-0.4880**	-0.128	0.0164	-0.0931
	0.1372	0.1476	0.0609	0.1462	0.1888	0.1976	0.1688	0.1242	0.1207
Arts and Humanities	-0.2103*	-0.4551***	-0.0738	-0.1438	-0.2328	-0.3667**	-0.1041	0.0453	-0.0591
	0.1103	0.1178	0.0559	0.1209	0.1584	0.1623	0.1409	0.1213	0.1102
Architecture, Design	-0.3271*	-0.6719***	-0.2549***	-0.1245	-0.0657	-0.1232	-0.3398	0.2886	0.3173
	0.1915	0.2234	0.0888	0.2266	0.2698	0.2427	0.2773	0.1957	0.2289
Maths Ability	0.1197***	0.0567*	0.0054	0.2985***	0.1618***	0.1297***	0.1573***	-0.0093	0.0449*
	0.0253	0.0308	0.0119	0.0342	0.0369	0.0359	0.0356	0.0277	0.0259
Big five personality scores									
Extraversion	-0.1150***	-0.0713	-0.0166	0.0103	-0.05	0.0076	-0.0739	0.0224	-0.008
	0.039	0.0449	0.0194	0.0484	0.0591	0.0588	0.0564	0.0423	0.0388
Agreeableness	-0.0915	-0.0335	0.0579*	0.002	-0.1108	-0.0724	0.0009	0.0353	-0.059
	0.0645	0.0735	0.0309	0.0699	0.0906	0.0957	0.0837	0.0631	0.0625
Conscientiousness	0.033	0.1589***	0.0362	0.2904***	0.2143***	0.2464***	0.3775***	0.008	-0.0829*
	0.0477	0.0548	0.0246	0.0608	0.0713	0.0699	0.0676	0.0465	0.0451
Neuroticism	-0.1040**	-0.0113	-0.0144	-0.0237	-0.1443**	-0.036	-0.1619***	-0.0472	-0.0279
	0.0448	0.0523	0.0211	0.0538	0.0636	0.0659	0.0581	0.0466	0.0429
Openness	0.0214	-0.1041	-0.0341	0.0264	-0.0123	-0.0194	-0.075	-0.0109	0.1407***
	0.0561	0.0647	0.0256	0.0698	0.0791	0.0865	0.0765	0.0586	0.0521
Risk Tolerance	0.0823***	0.2269***	0.0377***	0.0364	0.2441***	0.1447***	0.0543	-0.0062	-0.0257
	0.027	0.0331	0.0138	0.0324	0.0403	0.0421	0.0347	0.0287	0.028
Future Time Perspective	-0.0118	0.0860***	0.0199*	0.1549***	0.1525***	0.1463***	0.1226***	0.037	-0.0191
	0.0238	0.0274	0.0121	0.0306	0.0363	0.039	0.0355	0.0254	0.0242
Previous studies (Base: No)									
Yes, at high school	0.064	0.2054**	0.0212	0.0864	0.5631***	0.2610**	0.1762	0.0842	0.0664
	0.0807	0.0957	0.0407	0.0897	0.115	0.1179	0.1099	0.0863	0.0855
Yes, at high school and since	-0.0125	0.1858*	0.0714*	0.2489***	0.8701***	0.1591	0.2264*	0.2634***	0.1142
	0.0855	0.0971	0.04	0.0905	0.1304	0.1305	0.1175	0.0878	0.0843
Yes, completed since high school	0.0264	0.0809	0.015	0.1285	0.3614***	0.1682	0.086	0.0442	0.0874
	0.0787	0.0847	0.0378	0.0835	0.1135	0.1153	0.1037	0.0751	0.0732
Parent in finance/accounting	-0.1226**	0.1296*	0.0469	-0.0105	0.2817***	0.2552***	0.1602**	0.0301	-0.1156*
	0.0625	0.0697	0.0295	0.0728	0.0943	0.0901	0.0813	0.0617	0.0595
Discussed family finances	0.0337	0.1386***	-0.0096	0.1075***	0.2256***	0.1254***	0.2071***	0.0018	0.0208
	0.029	0.0325	0.0135	0.0361	0.0444	0.0442	0.0375	0.0278	0.0281
Constant	2.5981***	0.7766	2.1590***	1.0376**	0.0769	-0.4626	1.9795***	-0.0405	-0.1882
	0.4551	0.5214	0.2148	0.5175	0.6322	0.6281	0.56	0.4915	0.4724
Observations	1,353	1,353	1,353	1,353	1,353	1,353	1,353	1,353	1,353
Number of groups	871	871	871	871	871	871	871	871	871
Log Likelihood	-1740	-1957	-871.5	-1890	-2266	-2255	-2073	-1803	-1838
Wald $\chi^2$ (df. 30)	444.5	693.2	175.6	420	1189	983.2	668.9	45.81	97.63

**Table 11 Financial Behaviours, Intentions, Information Sources**

This table presents maximum likelihood estimates from linear mixed model regressions with individual random effects. The first two columns contain results where the dependant variable is the performance and importance of five positive financial behaviours. The next three columns examine the intention to perform three basic financial behaviours (Track Expenditure, Establish Budget, Establish Emergency Fund) and the final three columns provide ratings of the importance of three groups of financial information sources. Standard errors are clustered by individual.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

	Performed	Importance	Expenditures	Budget	Emergency	Authority	Family/Friends	Unsolicited
Second Survey x Course	0.1651**	0.0605	0.0728	0.1179*	0.1460**	0.1382*	-0.1119	-0.0549
	0.0789	0.066	0.0551	0.0647	0.0632	0.0743	0.0775	0.0744
Second Survey x Course x Female	-0.0066	0.0747	-0.0512	-0.0817	-0.0515	0.0402	0.1489	-0.0313
	0.0993	0.0814	0.0671	0.0807	0.0822	0.0984	0.0988	0.1035
Female	-0.0064	0.1090**	0.0296	0.1127***	0.0633	0.071	0.1969***	0.0647
	0.0554	0.0487	0.0303	0.0433	0.0405	0.0535	0.0478	0.0557
Course (Base: Control)	-0.0645	0.0841	0.0041	0.1030**	-0.0416	0.1244**	0.0811	-0.0388
	0.0608	0.0566	0.0352	0.0491	0.0482	0.0558	0.0557	0.0651
Second Survey (Base: First)	-0.0715	-0.0241	-0.003	-0.0173	0.0439	-0.0036	-0.0451	-0.1106**
	0.055	0.0456	0.0463	0.049	0.0505	0.0563	0.0631	0.0551
Second Survey x Female	0.0854	0.0193	-0.0125	0.059	-0.0657	-0.0245	-0.0546	0.0615
	0.0703	0.0565	0.0539	0.0609	0.063	0.0725	0.0777	0.0749
Course*Female	-0.0531	-0.089	0.0397	-0.0737	0.0585	-0.0136	-0.2260***	-0.002
	0.0789	0.0681	0.0425	0.0613	0.0602	0.0737	0.0697	0.0861
Age	0.0087**	0.0078***	-0.0006	0.0012	0.0000	-0.0029	-0.0082**	-0.0190***
	0.0036	0.0029	0.002	0.0023	0.0023	0.0036	0.0042	0.0045
Ethnicity (Base: Australian)								
Other	0.046	-0.0019	-0.0034	-0.0477	0.0242	-0.0707	0.0126	0.0731
	0.0588	0.0507	0.0317	0.0427	0.0403	0.0571	0.0577	0.059
Asian	-0.0111	-0.0563	-0.0011	-0.0508	0.0996***	0.0102	0.1828***	0.0974*
	0.0498	0.041	0.0244	0.034	0.0297	0.0436	0.0439	0.0501
British	-0.0596	-0.0381	0.0242	-0.0723	-0.0012	-0.1256*	0.0549	-0.0879
	0.0723	0.0573	0.0338	0.0603	0.0555	0.0737	0.0602	0.0742
European	0.0166	0.0315	0.0449	-0.026	-0.022	0.0034	-0.0166	-0.0679
	0.0874	0.0678	0.0316	0.0623	0.0701	0.0733	0.0803	0.1016
Income	-0.0183	0.032	0.0184	0.0355*	0.0462**	0.0453	0.0676**	0.0076
	0.0322	0.0245	0.0144	0.0204	0.0191	0.0293	0.0263	0.0326
Assets	0.0088	-0.0226	-0.001	-0.0106	-0.0083	-0.0189	0.0028	-0.0538***
	0.0201	0.016	0.0092	0.0134	0.012	0.0178	0.0179	0.0189
Study Area (Base: Commerce)								
Engineering, Maths, Comp. Science	-0.0479	-0.0764	-0.0191	-0.0274	-0.0221	-0.0343	0.1232**	-0.0372
	0.0661	0.0536	0.029	0.0476	0.0434	0.0554	0.0587	0.0679
Bio Science, Anatomy, Physiology	-0.0945	-0.1058*	-0.0338	-0.0329	-0.0017	-0.0969*	0.0607	0.0358
	0.0648	0.0567	0.0278	0.0438	0.0404	0.0585	0.0553	0.0662
Chemistry, Pharmacology, Geology	-0.1536**	-0.016	-0.0052	-0.0579	-0.0662	-0.044	0.0191	-0.0256
	0.0654	0.0511	0.0298	0.0455	0.0444	0.0585	0.0588	0.0655

Psychology	-0.0243	0.0307	0.0389	-0.0213	0.0046	-0.0362	0.062	-0.0271
	0.0913	0.0594	0.0309	0.0566	0.049	0.0723	0.0666	0.0884
Arts and Humanities	-0.0521	-0.0831	0.0012	-0.0153	-0.0063	0.0104	0.033	0.0366
	0.0712	0.0584	0.0328	0.0475	0.0473	0.0625	0.0627	0.0714
Architecture, Design	-0.118	-0.1955**	0.0504	0.0954*	-0.0028	-0.1168	0.0716	0.0454
	0.1183	0.0898	0.045	0.0512	0.0701	0.1199	0.0904	0.1055
Maths Ability	0.0055	-0.0091	0.0153*	0.005	-0.0077	0.001	-0.0019	0.0261
	0.0181	0.0131	0.0083	0.0113	0.0103	0.015	0.0141	0.018
Big five personality scores								
Extraversion	-0.0517*	-0.0525**	0.0105	-0.0128	-0.008	-0.0156	0.0687***	0.0587**
	0.0266	0.0214	0.0132	0.0179	0.0176	0.0222	0.0229	0.0256
Agreeableness	0.0348	0.0711**	0.0557***	0.0730**	0.0028	0.0865**	0.1288***	0.1673***
	0.0421	0.0317	0.0205	0.03	0.0265	0.0392	0.0372	0.0429
Conscientiousness	0.2491***	0.1042***	0.0142	0.0144	0.0703***	0.0275	-0.0551**	0.0296
	0.033	0.0246	0.0143	0.0222	0.0222	0.0312	0.0265	0.0325
Neuroticism	-0.0146	0.022	0.0115	-0.0009	0.0217	0.0006	0.0185	0.0301
	0.0287	0.0224	0.0135	0.0187	0.0188	0.0244	0.0252	0.0291
Openness	0.0469	0.0408	0.0125	0.0903***	0.0513**	-0.0095	0.003	-0.0734**
	0.037	0.0291	0.0183	0.0256	0.0245	0.0325	0.0311	0.0342
Risk Tolerance	0.0302	0.0173	0.0221**	0.0119	0.0270**	0.01	0.012	0.0163
	0.02	0.0149	0.009	0.0116	0.0111	0.0153	0.015	0.0161
Future Time Perspective	0.1505***	0.1067***	0.0094	0.0185	0.0124	0.0803***	0.0505***	0.0417***
	0.0169	0.0157	0.0084	0.0114	0.0107	0.0168	0.015	0.0161
Previous studies (Base: No)								
Yes, at high school	-0.0351	-0.0218	0.0079	-0.026	-0.0532	0.0498	-0.0243	-0.034
	0.0527	0.0408	0.0243	0.0342	0.0338	0.0431	0.0425	0.0515
Yes, at high school and since	-0.0459	-0.0917*	0.0286	0.0029	0.0017	-0.0024	0.0414	-0.0442
	0.0563	0.0527	0.0221	0.0389	0.0387	0.0546	0.0516	0.057
Yes, completed since high school	-0.0082	-0.0199	-0.0255	-0.038	-0.0125	0.0212	-0.0828*	-0.0906*
	0.0477	0.0403	0.0261	0.0366	0.0332	0.043	0.0476	0.0495
Parent in finance/accounting	0.0813**	0.0415	0.011	0.0244	0.015	-0.0371	0.0127	0.0043
	0.0404	0.0333	0.0175	0.026	0.0255	0.033	0.0343	0.0403
Discussed family finances	0.0868***	0.0538***	0.0161*	0.0228*	0.0223**	0.0380**	0.0212	-0.0273
	0.0206	0.0174	0.0086	0.0117	0.0109	0.0165	0.0159	0.0199
Constant	1.6825***	2.8896***	0.2504*	-0.1614	0.0655	2.9196***	2.5434***	2.6024***
	0.293	0.2254	0.1402	0.1884	0.1798	0.2515	0.2426	0.3112
Observations	1,353	1,353	1,353	1,353	1,353	1,353	1,353	1,353
Number of groups	871	871	871	871	871	871	871	871
Log Likelihood	-1080	-821.4	-232.3	-660.8	-626.8	-977.3	-928	-1116
Wald $\chi^2$ (df. 30)	343.4	196.1	72.74	120.7	114	131.2	144.3	159.2

Figure 1 Three-way Interaction Effect for Basic and Advanced Financial Literacy

