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**Factors Associated with
Financial Literacy among High School Students**

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Abstract

Understanding the financial literacy of young people is an essential prerequisite for developing effective education programmes designed to improve young people's understanding of personal finance. In this paper, we present results from a survey of high school students which included a financial literacy component, a financial risk tolerance assessment, and basic demographic details. Overall, we find that financial literacy is lowest among financially poorer students, those with less English ability, and those with less academic ability. However, relative poverty and lower English ability were not related to the ability to apply financial knowledge. Thus, while financial education targeted to immigrant groups and the poor may improve overall financial literacy, a broader approach remains necessary. A general form of financial literacy education, beginning at the high school level, may be the key to improving financial literacy in the population in the long term.

Keywords

financial literacy
financial education
risk tolerance
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JEL Classification

A21, D14

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1. Introduction

Financial literacy can be considered ‘a combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial wellbeing’ (Atkinson and Messy 2012, p.14). Having an effective degree of financial literacy is important, given the increasing range and accessibility of financial products and services available (see, for example, Beckett *et al.* 2000, Marcolin and Abraham 2006). Young people in particular are having to make more financial choices earlier and are increasingly confronted with opportunities to borrow money and apply for credit (see, for example, Roberts and Jones 2001, Lusardi *et al.* 2010).

Despite there being no commonly accepted, standard definition of financial literacy (Huston 2010), it is apparent from many prior studies that the level of financial literacy (however measured) amongst young people is poor (Mandell 2008a, 2008b; Borodich *et al.* 2010, Cameron *et al.* 2013). On reviewing the need for financial education in the U.S., the Office of Investor Education and Assistance, Securities and Exchange Commission (1999 p.2) declared the country to be facing ‘a financial literacy crisis’, and was ‘alarmed’ at how few high school students could pass a basic financial literacy test. Mandell (2008a) noted that financial literacy levels appear to be worsening with time. The results of the initial Jump\$start survey of 1997 were considered appalling, returning an average score of 57.3%. However the following four biennial test means were between 50.2% and 52.4% (Mandell 2008a), and by 2008 average score had fallen to 48.3%, meaning the test averages have never made the 60% designated as acceptable (Mandell 2008b).

2. Background

Many factors have been shown to be associated with financial literacy among teenagers. In terms of demographic characteristics, males have been found to outperform females (Mandell 2008a, Lusardi *et al.* 2010), although gender differences appear to not be stable over time, as females outperformed males in the most recent Jump\$start survey (Mandell 2008b).

Studies have shown that overall academic ability of students is strongly positively related with financial literacy (Mandell 2008b), as are students’ educational and career aspirations (Mandell 2008b, Lusardi *et al.* 2010). However, students who have completed an economics, personal finance or money management course have been shown to not have higher financial literacy (Mandell 2008b). Still, Mandell (2008b) found that students who had completed a stock market game in class did perform better. He noted that ‘playing such an interactive game stimulates interest in (at least) the investment-related aspects of personal finance’ (Mandell 2008b, p.17).

Several studies cite the dominance of parents in informal financial education (see, for example, Lusardi *et al.* 2010). It is, therefore, not surprising that Bowen (2002), Mandell

(2008a) and Lusardi *et al.* (2010) all find that higher financial education among parents is correlated with a higher financial literacy, while other studies have found that financial literacy is positively associated with parental income (Mandell 2008a, Lusardi *et al.* 2010). The characteristics of students' peers are also important (Lusardi *et al.* 2010), but these variables probably proxy the students' own characteristics to some extent.

Students' experience with managing their own finances is an important factor associated with financial literacy. Mandell (2008b) showed that high school students who use an ATM card for purchases and cash withdrawals have higher financial literacy than those who use a card only for cash withdrawals, or those who do not use an ATM card. In contrast, students who use a credit card have significantly lower financial literacy than those who do not. Students with bank accounts tend to be more financially literate, as do those who have worked in the paid workforce (Mandell 2008b). Finally, time preference has been shown to be significant, with impatience associated with lower financial literacy (Lusardi *et al.* 2010).

Given the potentially severe consequences of low financial literacy (Lusardi and Mitchell 2007, Lusardi *et al.* 2010, Gerardi *et al.* 2010), it is incumbent on policy makers and education providers to understand how best to improve financial literacy, especially among young people. Understanding the factors associated with financial literacy under current educational programme settings is an important first step in appropriate development of educational materials.

In this study, we investigate the factors that are associated with financial literacy in a sample of high school students in an urban area of New Zealand. Specifically, we test the relationship between five groups of variables and financial literacy, namely,

- **Demographic Characteristics of Students**
Gender, Age.
- **Student Ability and Student Characteristics**
English ability, mathematics ability, past study in economics or business studies.
- **Consumer Socialisation and Financial Experience**
Banking, Employment and Consumer Spending History.
- **Parental Wealth**, and
- **Financial Risk Tolerance.**

We hypothesise that age will have an increasing effect on financial literacy, because as young people mature they become more engaged in the financial and consumer worlds. We also expect this effect to be non-linear, i.e. that the size of the incremental effect of age will diminish with age. We have no a priori hypothesis on the effect of gender on financial literacy, although multiple choice tests tend to favour boys over girls (Mazzeo *et al.* 1993). We hypothesise that financial literacy increases with English ability (because the survey instrument is administered in English), mathematical ability (which may also be a proxy for

students' overall academic ability), and past study in economics or business studies (which we expect would introduce students to many concepts related to personal finance). We hypothesise that greater consumer socialisation and financial experience (proxied by longer periods of holding a bank account or being employed; and by paying some of their own mobile phone expenses) will be associated with higher financial literacy. Parental wealth is hypothesised to have a positive relationship with financial literacy, as those whose parents have more financial resources are more likely to pass on financial experience and knowledge to their children. Finally, we have no prior hypothesis about the relationship between financial literacy and financial risk tolerance, but were interested in whether any relationship would be observed.

3. Data and Methods

We surveyed high school students in schools in and around Hamilton, an inland city in the central North Island of New Zealand, in September and October 2012. Eleven high schools were approached, and five agreed to participate in the research project. The schools ranged from decile 4 to decile 10,¹ with an average decile of 7.8, and were geographically dispersed throughout the Hamilton sub-region.

The sampling frame comprised students in NCEA Level 1 mathematics classes. Mathematics was selected because NCEA Level 1 mathematics is compulsory for all students. Almost all students in NCEA Level 1 will be in Year 11, that is, 15 years old, which matches the ages of the comparator samples from Japan and the United States. Students were given 50 minutes to complete the financial literacy test, a short demographic questionnaire, and a survey instrument designed to measure financial risk tolerance. The combined test and survey instrument was pre-tested for suitability and length among first-year university economics students before data collection began. Student participation in the research was incentivised through a random draw for prizes undertaken after all students had participated. The research was given ethical approval by the Waikato Management School Ethics Committee.

The students' financial literacy was evaluated using the Financial Fitness for Life – High Schools (FFFL-HS) test (Walstad and Rebeck 2005). The FFFL-HS Test was designed by the National Council on Economic Education (NCEE) to provide an up-to-date assessment tool that 'measure(s) understanding of personal finance among high school students', as part of their endeavour to provide the best possible economic and financial education to high school students. The test has been used widely (see, for example, Borodich *et al.* (2010), Harter and Harter (2007) or Butt *et al.* (2008)). The FFFL-HS test comprises ten multiple choice questions on each of five themes:

¹ New Zealand schools are rated to indicate the extent to which they draw students from low socio-economic communities, with decile 1 representing the 'poorest' 10 percent of schools, while decile 10 represents the 'richest' 10 percent of schools.

- **The Economic Way of Thinking**
Economic reasoning and the way decision-making affects incomes and standard of living.
- **Earning Income**
Aspects of finding work and own job creation and reasons why incomes vary between various jobs.
- **Saving**
Costs and benefits of saving and various aspects of investment.
- **Spending and Using Credit**
The use of credit and the nature of interest payments, and
- **Money Management**
Budgeting, banking and insurance.

The questions in the test are also classified into three cognitive levels: Knowledge, Comprehension, and Application. There are 14 questions pertaining to Knowledge, which emphasise the ability to recognize and recall facts. The 25 Comprehension questions require some understanding of information and the skill of explaining it in various ways. The other 11 questions (Application) involve the use of information in different scenarios. The questions from the U.S. version of the FFFL-HS test were adapted for the New Zealand context by the New Zealand-based authors. This involved minor alterations to individual questions to account for differences in local financial and tax laws. The final version of the New Zealand test is included in Cameron *et al.* (2013).

The demographic questionnaire first asked for students' age (to the nearest month), gender, first language, and whether they had ever studied economics or business studies before. It then asked for students' self-perceived mathematics ability (top third/middle third/bottom third), and self-perceived parental wealth (top third/middle third/bottom third). Students were also asked to note the road intersection closest to their home. This question was asked in order to obtain a geographically-based estimate of parental wealth. Since it can be assumed that most students live at home with their parents, and geographic measures of local social deprivation are available for small areas, we can use this data to as an indicator of parental wealth in the absence of perfect data on this variable. To construct this variable, we used the average social deprivation (NZDep2006) score for all meshblocks surrounding the specified road intersection. Meshblocks are the smallest geographic unit for which statistical data are collected by Statistics New Zealand. They are approximately the size of a city block, with an average population of around 100 people. NZDep2006 is the most commonly used measure of local area social deprivation in New Zealand (Salmond *et al.* 2007), and was constructed from 2006 Census data, with lower deprivation scores representing areas of higher socio-economic status.

The demographic section asked whether the students had a bank account (and for how long), whether they had a part-time job (and for how long), and whether they paid their own

mobile phone expenses. These final three questions were included in order to measure students' degree of 'consumer socialisation' (Ward 1974) or financial experience; that is, how engaged they already are in market and finance activities.

Finally, students' degree of financial risk tolerance was assessed using the assessment instrument introduced by Grable and Lytton (1999). This instrument has been widely used (see for example, Grable (2000), Grable and Lytton (2003), Chatzoglou (2010), or Gilliam and Chatterjee (2011)). The instrument itself consists of 20 multiple-choice questions. Each possible answer is designated a score of between one and four points (although not all questions offer all four values), and all points are summed together to give an index value between 20 and 69, with a higher value representing higher degree of financial risk tolerance (lower risk aversion).

In all, 352 students participated in the research. We omitted from the analysis 17 students who scored less than 25 percent in the test (we assume these students were answering test questions randomly), or who failed to attempt five or more of the questions. Thus, the analysis in this paper is based on the test results from the remaining 335 students. Of these, 293 students completed all three sections of the survey (financial literacy test, demographic questionnaire, and financial risk tolerance instrument).

To examine the association between the various groups of variables and financial literacy, we employed ordinary least squares regression, with school-level fixed effects to control for unobserved differences in the test administration and any other unobserved factors between schools. We used a stepwise forward selection procedure to add groups of variables to the regression model with overall financial literacy score (as a mark out of 50) as the dependent variable. All steps are reported in the following section. Sample sizes decrease with each step, as some students did not answer all of the demographic questions. Once the final model was constructed, we ran similar regressions with Knowledge, Comprehension, and Application scores as dependent variables.

4. Results and Discussion

Table 1 presents the summary statistics for key dependent and explanatory variables used in the analysis. The sample size is different for different variables, because some students did not answer all of the demographic questions. On average, financial literacy was poor, with an average score amongst this sample of 23.1 correct answers out of 50. This poor level of financial literacy is similar to that observed in other countries (see, for example, Cameron *et al.* (2013) for a comparison of scores from this sample with scores in the United States and Japan). Students do poorly at all cognitive levels, with all three means at 50 percent correct or below. Again, this is in line with international comparisons (Cameron *et al.* 2013).

Table 1: Summary Statistics for Key Variables

Variable	Sample Size	Mean	Maximum	Minimum	Standard Deviation
<i>Dependent variables</i>					
Financial Literacy score (out of 50)	292	23.1	43.0	7.0	6.6
Knowledge score (out of 14)	292	5.4	12.0	0.0	2.4
Comprehension Score (out of 25)	292	12.5	24.0	2.0	3.9
Application score (out of 11)	292	5.2	9.0	0.0	1.7
<i>Explanatory variables</i>					
Gender (Male = 1)	289	0.60	NA	NA	NA
Age	292	15.9	18.8	13.0	0.5
English as a first language (Yes = 1)	288	0.82	NA	NA	NA
Economics or business studies (Yes = 1)	290	0.43	NA	NA	NA
High mathematics ability (Yes = 1)	292	0.34	NA	NA	NA
Low mathematics ability (Yes = 1)	292	0.13	NA	NA	NA
Bank account (years)	292	5.1	16.0	0.0	4.7
Employment (years)	292	0.5	8.0	0.0	1.2
Pays mobile phone (Yes = 1)	291	0.45	NA	NA	NA
Social deprivation score	213	973.0	1219.5	853.5	71.3
Financial risk tolerance score	292	39.1	65.0	25.0	5.8

Sixty percent of the sample was male, and the average age was 15.9 years. Most students (82 percent) spoke English as their first language and nearly half (43 percent) had previously taken a course in economics or business studies. This is surprisingly high, considering that economics and business studies are not compulsory school subjects, and students have many subject choices available. About one third of students rated themselves in the top one third in terms of mathematics ability, but only 13 percent rated themselves in the bottom one third. On average, students had held a bank account for 5.1 years, and been in paid employment for 0.5 years. Nearly half of students (45 percent) reported that they paid their own mobile phone expenses.

Table 2 presents the regression results with overall financial literacy as the dependent variable, with robust standard errors in parentheses below the coefficients. Gender is initially significant (with boys having higher financial literacy than girls), but this effect disappears when student characteristics are included. Age and age-squared are both statistically significant in all models, which implies that financial literacy increases with age, but at a

decreasing rate. The coefficients in Model (5) suggest that financial literacy peaks at an age of 16.4 years; thus financial literacy increases with age only through the early years of high school but that by senior high school this effect is limited. This is consistent with young teenagers developing their financial knowledge as they mature and become more acculturated into making their own financial decisions.

Student ability and characteristics are generally significant in the models. English as a first language is highly significant and associated with more than two additional correct answers in the 50-question test. This is consistent with students who have English as a second language finding it more difficult to understand multiple choice questions in their second language. Students who have previously completed an economics or business studies course have significantly higher financial literacy. This contrasts with previous studies (see Mandell 2008b) where no significant relationship has been found. Economics and business studies courses typically introduce high school students to many personal finance terms. However, there may also be a selection effect, in that students who are more interested in economics or business studies are also students who take a keener interest in personal finance. So, we cannot use this result to conclude that high school economics or business studies courses themselves improve financial literacy.

Self-reported high mathematics ability is associated with an over 6.5 percentage point better performance in the financial literacy test. Self-reported low mathematics ability is related to lower financial literacy, but this result becomes statistically insignificant once we control for parental wealth. Clearly, more able students are likely to be better at understanding and interpreting multiple choice questions of any type, including financial literacy questions. We cannot conclude that mathematical ability is associated with financial literacy per se, because we cannot separate the effect of mathematical ability from the overall effect of student aptitude. However, these results provide guidance on the types of students to which financial literacy education might be targeted for greatest effect.

Of the variables that indicate consumer socialisation or financial experience, only the length of time students have held a bank account was statistically significant. Length of paid employment, and paying some or all of their mobile phone expenses were not significant. The size of the effect of bank accounts is relatively small. Given that on average these students had held a bank account for five years, the mean effect of bank accounts is an additional one correct question (out of 50).

Parental wealth (proxied by social deprivation) is highly statistically significant, and has a negative coefficient. This suggests that students who live in an area that has higher social deprivation have significantly lower financial literacy. The size of this effect is substantial, despite the small coefficient and having controlled for student background and ability. The highest deprivation score in our sample is 1220, and the lowest is 854. *Ceteris paribus*, the difference between a student with a deprivation score of 1220 and one of 854, is nearly 10

percentage points in financial literacy. Finally, financial risk tolerance is not associated with financial literacy. Students with higher financial literacy are no more or less likely to prefer risky investment than students with lower financial literacy.

Table 2: Regression Results for Financial Literacy Score

Variable	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
Gender (Male = 1)	1.855*** (0.898)	1.016 (0.798)	0.976 (0.797)	1.175 (0.952)	1.210 (0.948)
Age	19.140*** (7.015)	17.375** (8.370)	21.704*** (6.915)	25.527* (12.291)	29.418** (13.582)
Age ²	-0.627*** (0.218)	-0.551** (0.262)	-0.684*** (0.216)	-0.078* (0.403)	-0.899** (0.441)
English as a first language (Yes = 1)		2.670*** (0.866)	2.288*** (0.874)	2.138* (1.153)	2.191* (1.148)
Economics or business studies (Yes = 1)		3.232*** (0.728)	3.129*** (0.727)	3.013*** (0.888)	3.073*** (0.891)
High mathematics ability (Yes = 1)		3.741*** (0.805)	3.318*** (0.822)	3.379*** (0.942)	3.486*** (0.966)
Low mathematics ability (Yes = 1)		-1.808* (1.064)	-1.971* (1.058)	-0.133 (1.291)	-0.050 (1.307)
Bank account (years)			0.221*** (0.082)	0.231*** (0.095)	0.232*** (0.094)
Employment (years)			-0.545 (0.375)	-0.486 (0.456)	-0.467 (0.472)
Pays mobile phone (Yes = 1)			0.019 (0.695)	-0.360 (0.815)	-0.438 (0.818)
Social deprivation score				-0.013** (0.005)	-0.013** (0.005)
Financial risk tolerance score					-0.072 (0.080)
<i>n</i>	289	285	285	207	207
R ²	0.040	0.208	0.229	0.215	0.215

* p<0.1; ** p<0.05; *** p<0.01

Table 3 presents a more fine-grained analysis, with the results of separate regressions for questions at each cognitive level; that is, regressions with Knowledge score (out of 14), Comprehension score (out of 25), and Application score (out of 11) as dependent variables. Only the final regression results (that is, the equivalent of Model (5) from Table 2) are reported.

The effect of English ability on financial literacy appears to be limited to limited to the comprehension cognitive level. Thus, students with English as a second language are no less likely to recognise or recall basic financial terms, nor are they less likely to do well in financial application questions. Mathematical ability is related to all three cognitive levels, consistent with students of greater academic ability being generally able to answer multiple

choice questions better. Having a bank account for longer is also associated with greater financial literacy at all three cognitive levels. Thus bank accounts probably signify students who are not only more exposed to financial terms, but also students who are better able to make sound financial decisions.

Table 3: Regression Results for Financial Literacy Score
by Cognitive Level

Variable	Knowledge Score	Comprehension Score	Application Score
Gender (Male = 1)	0.551 (0.388)	0.690 (0.549)	-0.031 (0.267)
Age	8.102* (4.366)	15.474* (8.750)	5.843 (3.808)
Age ²	-0.249* (0.140)	-0.473* (0.286)	-0.178 (0.124)
English as a first language (Yes = 1)	0.177 (0.409)	1.492** (0.725)	0.522 (0.328)
Economics or business studies (Yes = 1)	0.804** (0.340)	1.980*** (0.537)	0.289 (0.256)
High mathematics ability (Yes = 1)	0.929** (0.373)	1.704*** (0.547)	0.853*** (0.273)
Low mathematics ability (Yes = 1)	0.265 (0.600)	-0.518 (0.799)	0.203 (0.370)
Bank account (years)	0.074** (0.036)	0.097* (0.053)	0.061** (0.026)
Employment (years)	-0.141 (0.151)	-0.364 (0.261)	0.038 (0.135)
Pays mobile phone (Yes = 1)	-0.164 (0.329)	-0.232 (0.487)	-0.043 (0.233)
Social deprivation score	-0.005** (0.002)	-0.008** (0.003)	<0.001 (0.002)
Financial risk tolerance score	0.007 (0.032)	-0.046 (0.043)	-0.032* (0.019)
<i>n</i>	207	207	207
R ²	0.137	0.182	0.096

* p<0.1; ** p<0.05; *** p<0.01

Interestingly, after controlling for other variables, parental wealth (proxied by social deprivation) is only associated with knowledge and comprehension, but not application scores. This implies that students from wealthy families are better able to recognise and understand personal finance terms, but that this higher recognition and understanding does not necessarily translate into greater ability to make financial decisions.

Finally, financial risk tolerance is moderately negatively associated with application scores. This suggests that, within this sample, students who are more risk averse (lower

financial risk tolerance) have greater ability to apply their financial literacy knowledge to decision-making. This is an interesting result since it also implies that, holding other factors constant, students with poorer performance in terms of financial decision-making are also those that would be willing to make riskier investment choices.

5. Conclusions

The results presented in this paper have a number of important implications for policy makers and education providers. To the extent that financial literacy is associated with financial decision making, these results suggest that teenagers are poorly prepared for making potentially life-changing financial decisions. This result is not limited to our sample of New Zealand high school students – our results are merely one of many studies that find extremely low levels of financial literacy among teenagers (see for example, Cameron *et al.* (2013) or Mandell (2008b)). Financial literacy is described as an education priority in various National Strategies for Financial Literacy (New Zealand Network for Financial Literacy, 2010; Financial Literacy and Education Commission, 2011). Thus, a general programme of financial literacy improvement is warranted, and there is a strong case for it to be rolled out as part of the compulsory curriculum in high schools.

Barring a general or compulsory programme of financial literacy education, there are a number of general results in our paper that could justify a more targeted approach. Financial literacy was lowest among poorer students, those with less English ability, and those with less academic ability. This suggests that financial literacy programmes may be able to generate the greatest gains in financial literacy by targeting students from poorer communities, recent immigrants, and/or schools in poorer areas. However, we also found that English ability and social deprivation of students were not related to financial literacy at the application cognitive level. This is the cognitive level at which respondents are asked to apply their financial literacy knowledge, potentially the most important level since it is the closest to actual financial decision making behaviour. This suggests that, while this targeted approach may improve financial literacy amongst the more vulnerable sections of the community, there are still significant gains to be had by extending financial literacy education to all high school students.

Besides the overall poor results, one particular aspect should be especially concerning. Lower scores at the application cognitive level of financial literacy are associated with higher levels of financial risk tolerance. In other words, high school students who are less risk averse are also less able to apply their knowledge to personal financial situations. This result provides some support for the contention that poor financial literacy was one of the causes of the recent Global Financial Crisis (Gerardi *et al.* 2010), and if that is true then a general form of financial literacy education at high school level should be adopted with some urgency. This also raises the question of whether there is some causal mechanism between financial literacy at the application cognitive level and financial risk tolerance – does the ability to

apply personal financial knowledge lead high school students to become more risk averse? While we are not necessarily advocating for greater risk aversion in the general population, a greater degree of prudence with regard to investment opportunities may be warranted.

This research also raises other questions that should be explored in future research. Some of these questions have already been identified in a recent report by the Financial Literacy and Education Commission Research and Evaluation Working Group (2011). First, while we have looked at financial literacy at three different cognitive levels, we are unable to establish the extent to which financial literacy is associated with actual financial decision making. We can infer that the application cognitive level is related to decision making behaviour, but we cannot definitively say this. This is particularly true in light of the weak links between financial education and financial behaviour among mature adults that have been established in the existing literature (Lusardi 2008, Roa Garcia 2013). Longitudinal or experimental studies among high school students will be necessary in order to investigate whether financial literacy education among the young improves their financial decision making behaviour, both immediately and as they grow older (see also Bernheim *et al.* (2001)).

Secondly, we have, in this paper, identified the factors associated with financial literacy, but have been unable to establish causal factors. In particular, we believe it is worth investigating further whether business studies and economics courses in junior high school have an effect on financial literacy in senior high school. Answering this question would help to tailor appropriate financial literacy education programmes. Finally, once appropriate programmes of financial literacy education are in place, evaluation of their effectiveness (including their effectiveness in changing financial decision making behaviour as well as their effectiveness in increasing financial literacy) should be undertaken.

Financial literacy is a key component of knowledge for consumers in modern society. People who lack adequate financial literacy are more likely to make financial decisions with adverse consequences for themselves or others. A general form of financial literacy education, beginning at the high school level, may be the key to improving the situation.

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