THE EXPRESSION, EXPERIENCE AND TRANSCENDENCE OF LOW SKILLS IN AOTEAROA NEW ZEALAND

READING ENGAGEMENT AND WELLBEING IN AOTEAROA NEW ZEALAND

ABOUT THIS RESEARCH PROGRAMME

Over half a million adult New Zealanders live with low literacy and/or numeracy (L+N) skills, with a strong over-representation of Māori and Pacific peoples. This has significant economic and social costs, including increased risk of unemployment and poverty, detrimental effects on physical and mental well-being, and decreased social and political attachment.

This programme applies a mixed-method approach to the following research aims: to build a detailed population-wide picture of those with low L+N skills; analyse their life-course pathways and effectiveness of interventions with respect to a range of economic and social outcomes; forecast future changes in population skill level; and develop an understanding of the barriers and enablers that build resilience to risk, along with pathway to transcend low skills.

For further information about our programme and other outputs, see http://workresearch.aut.ac.nz/low-skills

RESEARCH PARTNERS

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ABSTRACT

Education and literacy have long been associated with a range of economic and social outcomes in industrialized societies. Recent research based on large-scale national and international surveys has examined effects of education and literacy on individuals' social and economic outcomes. This paper takes a further step in understanding the importance of literacy for individuals' economic and social outcomes by disentangling the effects of two different aspects of literacy, literacy proficiency as measured by standardized tests and reading engagement as measured by self-reports of everyday reading activities. Using recent nationally representative survey data from New Zealand, multivariate regression models estimate the effects of reading engagement on earnings, health, social trust, political efficacy and civic engagement. Reading engagement has statistically significant and substantial positive effects on each of these outcomes with the effects of literacy proficiency, education and other important variables held constant. The results have important implications for policy and practice in adult education as well as for future research about the role of reading engagement in wellbeing more generally.

1 Introduction

This paper examines the role of literacy in individual wellbeing using data from New Zealand's 2014 PIAAC survey. Although there are many possible indicators of individual wellbeing, two variables measured in PIAAC – earnings and overall health status – are widely accepted wellbeing indicators and are core elements of the global Better Life Index (https://www.oecdbetterlifeindex.org/) as well as New Zealand's Living Standards Framework (New Zealand Treasury, 2018). This paper will look at these core outcomes as well as several additional social outcomes measured in PIAAC that are often considered as components of individual wellbeing: social trust, political efficacy, and civic engagement.

Literacy and Wellbeing

Education and literacy have long been believed to be central to our social and economic wellbeing (Desjardins, 2008; Martin, 2018). In addition to the education individuals attain in their first cycle of schooling, their continued education as adults is also associated with better life outcomes and wellbeing (Duckworth, 2012; Jenkins & Wiggins, 2015; Tuijnman, 1990; Vera-Toscano, Rodrigues & Costa., 2017). There is growing evidence from numerous international and national surveys that literacy skills are also associated with a range of economic and social outcomes.

Hanushek, Schwerdt, Wiederhold and Woessmann (2015) highlighted the economic returns to cognitive skills such as literacy and numeracy using Mincer-like wage equation models. A variety of social outcomes including health, social trust, political efficacy and civic engagement have been studied in surveys such as the Adult Literacy and Lifeskills (ALL) survey, the International Adult Literacy Survey (IALS) and most recently the Programme for the Assessment of Adult Competencies (PIAAC). Analyses of these survey data generally find that both education and literacy skills are associated with better social outcomes (Borgonovi & Burns, 2015; Dinis da Costa, Rodrigues, Vera-Toscano & Weber, 2014; Duckworth, 2012; OECD, 2013, 2016, 2019; Schnitzlein, 2018; van der Heide et al., 2013). In these studies, individuals with high levels of assessed literacy proficiency are more likely to have positive social outcomes, even after controlling for demographic and educational attainment variables. Dinis da Costa et al. (2014) analysed the four social outcomes of interest here for countries in the European Union and found literacy proficiency to be more important than education as determinants of these key social outcomes.

Previous research with New Zealand's PIAAC data has found that adults with higher levels of educational attainment and adults with higher literacy proficiency earn higher wages on average (Ministry of Education & Ministry of Business, Innovation and Employment, 2016). Scott (2018) examined social and wellbeing outcomes in New Zealand and similarly found that adults with more formal education and adults with higher levels of literacy proficiency tend to have higher levels of positive social outcomes. Jones and Satherly (2018) and Satherly (2018) extended these results to the Māori and Pasifika subpopulations, respectively.

The mechanisms and processes linking literacy proficiency to these social outcomes are complex and may well differ across outcome. Some possibilities are discussed in OECD (2013) and Desjardins (2008, 2003). There is widespread consensus among researchers that literacy and other information processing skills are linked to various forms of political participation (e.g., Tolbert & MacNeal, 2003). There is also a substantial research base in health literacy that connects information-processing skills with health, although there is far more research about how skills are used for accessing health information than for communicating with health-care providers or managing one's own health and care (e.g., Feinberg et al., 2016; Rudd, Kirsch & Yamamoto, 2004).

This paper attempts to take a further step in understanding the importance of literacy for earnings and social outcomes by disentangling the effects of two different aspects of literacy, literacy proficiency as measured by standardized tests and reading engagement as measured by self-reports of everyday reading activities. Using nationally representative PIAAC data from New Zealand, multivariate regression models are used to estimate the effects of reading engagement on earnings and social outcomes while holding literacy proficiency, education and other important variables constant.

Literacy Proficiency and Reading Engagement

Including standardised cognitive assessments in large-scale surveys has enabled analysts to better understand the joint effects of education and cognitive skills on economic and social outcomes. There is also need to consider the use of cognitive skills in everyday life and work as a determinant of social and economic outcomes. The impact of an individual's literacy proficiency, for example, may depend considerably on how much the individual uses reading and writing skills at work and outside of work.

Desjardins and Rubenson (2011) analysed ALL data to examine skill use in the workplace. Their analyses along with initial analyses of skill use in the PIAAC data (OECD, 2013) demonstrate how useful such data

can be in the context of large-scale assessments. Analyses of the skill use data in both surveys showed substantially increased earnings for workers at higher levels of skill use. Desjardins and Rubenson (2011) estimated for the ALL data that 32%, 20% and 10% increased earnings for high levels of reading, writing and maths skill use at work, respectively, compared to low levels of skill use after controlling for proficiencies, demographics, education, work experience, occupation and industry. With the more sophisticated measurement of skill use now available in the Survey of Adult Skills (PIAAC), more comprehensive understandings of the relationship between skill use, proficiency and a range of social and economic variables become possible.

Since skill use measures in PIAAC are positively correlated with both education and literacy proficiency (OECD, 2013), multivariate modelling is needed to tease apart the effects of education, proficiency and skill use (practice engagement) on social and economic outcomes. Grotlüschen, Mallows, Reder and Sabatini (2016), Reder (2017) and Jonas (2018) estimated multivariate regression models of various social and economic outcomes as dependent variables, using education, proficiency and skill use and other control variables as independent variables. For most of the Round 1 PIAAC countries, they found significant positive effects of skill use on outcomes when effects of the other variables were statistically controlled. New Zealand's Round 2 PIAAC data was not yet available for those analyses. In this article, I use New Zealand's PIAAC data to model earnings and social outcomes in relation to education, literacy proficiency, use of reading skills (herein termed reading engagement) and control variables.

Practice engagement theory (PET) provides a theoretical framework for these analyses. Practice engagement theory (Desjardins, 2019; Reder, 1994, 2009, 2019; Reder, Gauly, & Lechner, 2020; Sheehan-Holt & Smith, 2000) characterises how literacy proficiency, for example, develops during adulthood. PET describes how engagement in reading practices in everyday life (whether at work or outside of work contexts) influences literacy proficiency development over the adult lifespan. PET was initially developed in cross-cultural and cross-situational qualitative research about literacy practices and proficiencies, finding that literacy proficiency and engagement in literacy practices reciprocally influence each other's development over time. Quantitative modelling of PET became possible as large-scale national and international surveys measured both literacy proficiencies and the use of those skills in everyday activities (Sheehan-Holt & Smith, 2000; Smith, 1996, 2009). The initial cross-sectional analyses of relationships between literacy skills and practices were extended by Desjardins (2019), who examined synthetic cohorts of national populations synthetically aligned across repeated surveys, and found that engagement in literacy practices is associated with population-level growth of literacy proficiency over time.

PET has been more rigorously tested in longitudinal panel studies of individual literacy development. The Longitudinal Study of Adult Learning followed a random sample of adults with a low level of education in a metropolitan area in the United States over eight years with repeated measurements of both literacy proficiency and engagement in reading and writing practices (Reder, 2009, 2019). Adult literacy development was also examined in the German National Educational Panel Study (Wicht, Rammstedt & Lechner, 2020). A third panel study in this line of inquiry was PIAAC-L, a longitudinal extension of the PIAAC survey in Germany (Reder et al., 2020). Analyses of each panel study found that engagement in reading practices predicted growth of individuals' literacy proficiency over time, even though the three panel studies involved different measures of literacy proficiency and different measures of engagement in reading practices. Despite these differences in measures, the three studies found positive effects of individuals' reading engagement on their literacy proficiency growth over time.

In this paper, I further explore the relationship of individuals' reading engagement to their social and economic outcomes. Using cross-sectional analyses of New Zealand's PIAAC data, I will estimate effects of reading engagement on individual's earnings, health, social trust, political efficacy and civic engagement, holding literacy proficiency, education, and other variables constant. I hypothesize that reading engagement is positively associated with each of the five outcome variables with the other variables controlled. Although direct causality cannot be inferred through such cross-sectional modelling, the models can be an important step in increasing our understanding of reading engagement. The models can illustrate how reading engagement may foster not only the growth of literacy proficiency but also of individuals' social and economic outcomes. In New Zealand, these questions are important for the adult population in general and especially for the Māori and Pasifika populations who experience disparities in education, literacy and a range of social and economic outcomes (Furness, Hedges, & Piercy-Cameron, 2021).

2 Data

In the first cycle of PIAAC, 38 countries including New Zealand participated in one of three rounds of data collection between 2012 and 2017. In each country, a household survey was conducted, nationally representative of its adult population aged 16-65. The survey included an extensive background questionnaire (BQ) covering a wide range of topics, including demographics, education, employment, health, and the use of skills at work and in everyday life. The survey also assessed respondents' literacy, numeracy and problem-solving skills. General descriptions of the survey methods and results are available in OECD (2013, 2016, 2019).

The data used here are from the New Zealand PIAAC survey, collected in 2014 as part of the second round. Conducted in English, it was administered to a nationally representative sample of 6,177 adults, age 16-65. Further information about New Zealand's survey is available in Ministry of Education and Ministry of Business, Innovation & Employment (2016). All variables used in analyses except literacy proficiency are based on responses to BQ items, with the four binary outcome variables recoded from 5-point Likert response scales:

Outcome variables

- Monthly earnings (continuous, 2014 NZD)
- High general health status (binary)
- High social trust (binary)
- High political efficacy (binary)
- High civic engagement (binary)

Literacy variables

- Literacy proficiency (continuous 0-500 point scale) - see below for more details
- Reading engagement index (continuous scale score with mean 0 and standard deviation 1) – RW index used in earnings models, RE used in social outcomes models. See below for more details

Covariates

- Education (continuous, years)
- Age (continuous, years) -- used in social outcomes but not in earnings models
- Work experience (continuous, years) – used in earnings but not in social outcomes models
- Currently employed (binary flag) – used in social outcomes but not in earnings models
- Female (binary)
- New Zealand born (binary)
- Native English speaker (binary)
- Māori identity (binary)
- Pasifika identity (binary)
- NZ European identity (binary)
- Asian identity (binary)

Reading Engagement

The BQ included self-reported frequencies of performing eight specific reading activities:

How often do you read…

- directions or instructions
- letters, memos or mail
- newspapers or magazines
- professional journals or publications
- books
- manuals or reference materials
- financial statements
- diagrams or schematics

Respondents indicated, on a Likert scale, how often they performed each activity:

- Never
- Less than once a month
- Less than once a week but at least once a month
- At least once a week but not every day
- Every day

All respondents were asked how often they did each reading activity outside of work, and, if they were currently working, how often they did each reading activity at work. I derived two reading engagement indices based on the reported frequencies for work and outside-of-work contexts. For those who were currently employed, I estimated a reading engagement at work (RW) index from the frequencies of reading activities reported for work. The RW index is similar to the READWORK index that OECD derived for its PIAAC data set. I made a separate RW index for two reasons: (1) it is scaled from New Zealand's data only rather than from the extensive cross-national PIAAC data; (2) the READWORK index was not calculated (and set to missing) for workers who responded "Never" to all eight reading items (i.e., did not read at all in the workplace). The RW index includes those workers in its scaling and so that they can be included in the analyses reported here. Among individuals with both RW and READWORK measures defined, the two are correlated very highly (r = 0.973).

I also estimated a life-wide reading engagement index (RE) that has no counterpart in the OECD skill use measures. I scaled RE from the cross-context activity frequencies reported for the work and outside-of-work contexts. The cross-context task frequency is defined as the greater of the at-work and outside-of-work frequencies reported for the given task. For example, if an individual reported reading newspapers or magazines "every day" at work and "once a week" outside of work, then the cross-context frequency would be "every day". For individuals who were not employed at the time of the interview, the cross-context frequency was simply the outside-of-work frequency.

Responses were merged across contexts in this way for several reasons. First, the overall cross-context level of practice engagement is of theoretical interest within PET. Second, there are indications that individuals who are working tend to substitute some reading behaviours between non-work and work contexts. Finally, the merged context measures enable analysis of the entire adult population rather than just the currently employed subpopulation. I have used similar cross-context measures of practice engagement in earlier PIAAC publications (Reder, 2020; Reder et al., 2020).

I applied the generalised partial credit model (GPCM) of Item Response Theory (Hamel et al., 2016; Masters, 1982) to scale the cross-context task frequencies into the RE index and, for respondents who were currently employed, the at-work frequencies into the RW index. The partial credit model of item response theory estimates values of an underlying variable (e.g., overall reading engagement) from ordered responses (e.g., Never; Less than once a month; Less than once a week but at least once a month; At least once a week but not every day; Every day) to a set of individual items (e.g., how often individuals perform each of the queried reading tasks). These index variables were scaled to have means of 0 and standard deviations of 1.

Literacy Proficiency

After completing the BQ, respondents took standardised assessments of literacy, numeracy and problem-solving skills. Of interest here is the literacy assessment, conceptualised within a framework developed by the PIAAC Expert Literacy Group (2009). This framework considers literacy as the ability to understand, evaluate, use and engage with written texts to get everyday things done. The assessment involves only reading, no writing was involved.

The assessment was based on respondents' answers to sets of cognitive items of varying difficulties. From these responses, ten plausible values were imputed for each respondent's literacy proficiency, on a 0-500 point scale. By estimating the analytical models with each of these 10 plausible values, measurement error present in the literacy assessment can be accounted for. Further information about the literacy assessment framework, scaling methodology and sample items used in PIAAC are available in OECD (2013) and PIAAC Literacy Expert Group (2009).

3 Methods

Analytical Methods

I estimate a series of multivariate regression models for each outcome variable. I use linear regression models for the continuous outcome (earnings) and logit regressions for the binary social outcomes (high levels of health, social trust, political efficacy and civic engagement). For each outcome, I estimate four models: a baseline model that uses a set of covariates as independent variables; a literacy model that adds literacy proficiency as an independent variable to the baseline model; a reading model that adds reading engagement as an independent variable to the baseline model (RW added to the earnings models, RE to the social outcomes models); and the full model that adds both literacy proficiency and reading engagement to the baseline model.

Earnings Models

The dependent variable is the natural logarithm of self-reported total monthly earnings (gross wages and bonuses). The dependent variable is trimmed at the 1st and 99th percentile to minimise any undue influence of outliers. The earnings models are based on Mincer-style wage equations, with the baseline model including covariates of education, gender, work experience, nativity and ethnicity. Robust linear regression is used to estimate these models for the population of prime age (25-54) workers working full-time (30 or more hours per week). Part-time and self-employed workers are excluded.

Social Outcome Models

For each social outcome, I estimate logit regressions models for the population of adults age 25-65. Dependent variables in these models are derived from responses to a single BQ question having a five-point Likert response scale, recoding binary indicators of a high level of the given outcome. The dependent variable in the health models is derived from the respondent's self-reported general health status: "Excellent, Very Good, Good, Fair, Poor." This self-reported health variable has been widely used in other surveys and health research, and has been validated against a range of objective health measures (Fosse & Haas 2009; Gallagher et al., 2016; Idler & Benyamini, 1997; Meng, Xie & Zhang, 2014). I recoded the five-point Likert response scale into a binary indicator of high health status: "Excellent" or "Very Good" = 1; "Good", "Fair" or "Poor" = 0.

In the social trust models, the dependent variable is derived from the extent to which the respondent believes "You can trust only a few people". I recoded the five-point Likert response scale into

a binary indicator of high social trust: “Strongly Disagree” or “Disagree” = 1; “Neither Agree nor Disagree”, “Agree” or “Strongly Agree” = 0.

In the political efficacy models, the dependent variable is derived from the response given to “You have no influence on the government”. I recoded the five-point Likert response scale into a binary indicator of high political efficacy: “Strongly Disagree” or “Disagree” = 1; “Neither Agree nor Disagree”, “Agree” or “Strongly Agree” = 0.

In the civic engagement models, the dependent variable is derived from the response to “How often do voluntary work for nonprofit organisations?”. I recoded the five-point Likert response scale into a binary indicator of high civic engagement: “Every Day” or “At Least Once a Week but Not Every Day” = 1; “At Least Once a Month but Less Than Once a Week”, “Less than Once a Month” or “Never” = 0).

The continuous independent variables in all earnings and social outcomes models (literacy proficiency, reading engagement, education, age, work experience) are standardised to facilitate comparison of the magnitude of their effects on the dependent variables. All descriptive statistics and model parameters are estimated using Stata 16 and its REPEST procedure (Avvisata & Keslair, 2014) taking into account both the complex sample design of the PIAAC survey and the measurement error in literacy proficiency.

4 Results

This section presents results for the earnings and social outcomes. For both the earnings and social outcomes, an initial table presents the means and standard errors of the dependent and independent variables estimated for the subpopulation being modelled. A second table displays the regression results for the baseline, literacy, reading and full models described in the preceding section. Although the regression tables include estimates of all the independent variables used in the models, the results focus primarily on the significance and magnitude of the effects of literacy proficiency and reading engagement, particularly on the reading engagement variables used in the full models.

To further illustrate and explore these key modelling results, a figure for each outcome displays variation of the outcome across levels of reading engagement. Each figures displays two plots of the given outcome across the five quintiles of reading engagement. One plot shows the mean values of the outcome for quintiles of reading engagement and a second plot shows the regression-predicted mean values of the outcome over quintiles of reading engagement after adjusting for the effects of literacy proficiency, education and other covariates. The plots of the regression-adjusted outcome values help visualize the importance of reading engagement in the economic and social outcomes.

Earnings

Monthly earnings are modelled for the subpopulation of fulltime workers (i.e., those working 30 or more hours per week, excluding self-employed) age 25-54 in New Zealand. The subsample of 1,747 represents a subpopulation of size 854,090. The dependent and independent variables are listed in Table 1, showing subpopulation means and standard errors. Workers report a median income of $4,833. About 42% of the workers were female. Workers averaged 14.3 years of education and 19.4 years of work experience. About two in three workers (66%) were born in New Zealand and 4 in 5 (80%) were native English speakers. Slightly more than 1 in 8 workers (12.9%) identified as Māori, 6.5 % as Pasifika, 72.6 % as NZ European and 15.1 % as Asian.[1] Workers' mean literacy proficiency was 289 and their reading engagement (RW) averaged 0.271.

[1] Individuals could mention any number of ethnicities so these percentages do not add to 100%.

Table 1. Descriptives for Models of Monthly Earnings

Variable	Type	Mean
Monthly Earnings	Continuous	4833*
		(54.3)
Literacy Proficiency	Continuous	289.000
		(1.1900)
Reading Engagement at Work (RW)	Continuous	0.271
		(0.0228)
Female	Binary	0.421
		(0.0094)
Work Experience (years)	Continuous	19.400
		(0.2070)
Education (years)	Continuous	14.300
		(0.0759)
Native English Speaker	Binary	0.800
		(0.0095)
NZ Born	Binary	0.660
		(0.0122)
Māori	Binary	0.129
		(0.0068)
Pasifika	Binary	0.065
		(0.0052)
NZ European	Binary	0.726
		(0.0117)
Asian	Binary	0.151
		(0.0080)
N		1,747

Notes: New Zealand PIAAC 2014, population estimates for fulltime workers, age 25-54, excluding self-employed. Robust standard errors in parentheses. * indicates median rather than mean value shown.

Table 2 displays the regression results for log(earnings). Robust regression estimates are shown in the four columns for the baseline, literacy, reading and full models. The independent variables are shown in the first column. Continuous variables – literacy proficiency, reading engagement at work, work experience and education -- are standardised to facilitate comparison and interpretation of model coefficients. All other independent variables are binary. The four models have the same independent variables except for the combination of literacy proficiency and reading engagement in each model.

Table 2. Linear Regression Models of log Earnings

Variable	Baseline	Literacy	Reading	Full
Literacy Proficiency		0.096***		0.081***
		(0.0128)		(0.0118)
Reading Engagement at Work			0.132***	0.122***
			(0.0130)	(0.0129)
Work Experience	0.381***	0.361***	0.325***	0.312***
	(0.0715)	(0.0716)	(0.0694)	(0.0691)
Work Exp. Squared	0.000***	0.000**	0.000**	0.000**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Female	-0.253***	-0.253***	-0.261***	-0.260***
	(0.0196)	(0.0197)	(0.0177)	(0.0179)
Education	0.197***	0.153***	0.155***	0.122***
	(0.0107)	(0.0119)	(0.0128)	(0.0136)
Native English Speaker	0.061	0.044	0.036	0.024
	(0.0375)	(0.0385)	(0.0350)	(0.0354)
New Zealand Born	-0.003	-0.013	0.004	-0.005
	(0.0296)	(0.0293)	(0.0282)	(0.0278)
Māori	-0.050	-0.050	-0.053	-0.053
	(0.0322)	(0.0317)	(0.0294)	(0.0292)
Pasifika	0.047	0.084*	0.041	0.073*
	(0.0415)	(0.0392)	(0.0379)	(0.0353)
NZ European	0.095**	0.052	0.102***	0.066*
	(0.0327)	(0.0346)	(0.0300)	(0.0317)
Asian	-0.110*	-0.089	-0.113*	-0.094*
	(0.0479)	(0.0466)	(0.0443)	(0.0433)
Constant	8.704***	8.720***	8.650***	8.667***
	(0.0767)	(0.0764)	(0.0683)	(0.0689)
N	1747	1747	1747	1747
r^2	0.325	0.360	0.388	0.413

Notes: Robust standard errors in parentheses. Fulltime workers, age 25-54, excluding self-employed. Literacy Proficiency, Reading Engagement at Work, Work Experience, Education standardized. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

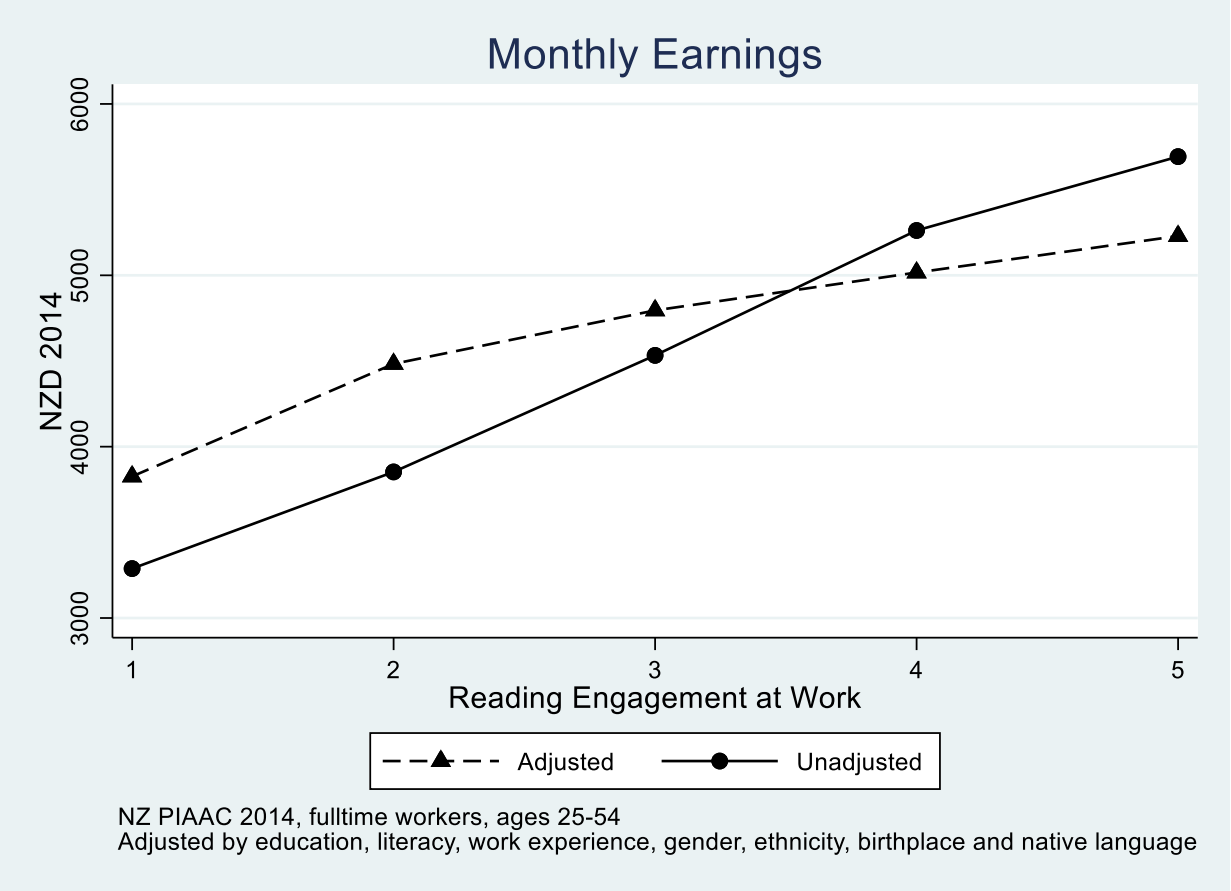
As expected from previous research with Mincer-like earnings models, education and work experience have positive effects on wages in the baseline and other models. The significant negative coefficient of work experience squared reflects the gradually declining returns to additional work experience among highly experienced workers. In all models, females receive significantly lower earnings (consistently about 23% lower) than men with other variables controlled. Native speaker and nativity status are not significantly associated with any of the earnings models. In the full model, both Asian and NZ European ethnicities are statistically significant, with Asian having negative and NZ European having positive effects on earnings.

Literacy proficiency and reading engagement at work have statistically significant positive effects on earnings with the effects of education and other covariates controlled. Adding literacy proficiency to the baseline model produces a significantly better fitting model of earnings: $F(1, 1746) = 63.88$, $p=0.0000$. Adding reading engagement to the literacy proficiency-enhanced model again produces a significantly better fitting earnings model: $F(1, 1746) = 114.50$, $p=0.0000$.

The magnitude of the coefficients for literacy proficiency, reading engagement, work experience and education can be compared as effect sizes in the full model since these four variables are standardised. The effect sizes of education, work experience, literacy proficiency and reading engagement are similar, with education being the most potent predictor in the model. Nevertheless, the standardised coefficient for reading engagement of 0.103 corresponds to a substantial 10.3% increase in earnings for each standard deviation increase in reading engagement with other variables controlled. I will argue below that, for many adults, reading engagement may be more malleable across the lifespan than either education or literacy proficiency.

Figure 1 illustrates the effects of reading engagement at work on earnings. Two curves of mean earnings are shown as a function of increasing levels of reading engagement. Reading engagement scores are grouped into five quintiles for this figure. The solid line displays unadjusted mean earnings as a function of reading engagement level. The dashed line shows the model-based estimate of mean earnings after adjusting for effects of literacy proficiency, education work experience and other covariates in the literacy model.

Figure 1. The effects of reading engagement at work on earnings



Notes: Mean monthly earnings for fulltime workers, age 25-55 (excluding self-employed) as a function of quintile of reading engagement at work. Solid line displays earnings unadjusted by individual characteristics. Dashed line displays earnings adjusted by effects of literacy proficiency, work experience, gender, education, native language, birthplace and ethnicity.

The two curves each show systematic increases in monthly earnings as levels of reading engagement increase. The slope of the adjusted curve is smaller than that of the unadjusted curve, reflecting the positive correlation of reading engagement with other variables positively associated with earnings. Even so, the slope of the adjusted earnings curve is substantial, showing about a 40% marginal increase in earnings across the range of reading engagement levels after correcting for effects of literacy proficiency, education and other variables.

To explore the robustness of the effect of reading engagement at work on earnings, the full model was estimated separately for various occupational groups and firm sizes. Regression results for skilled, semi-skilled white collar, semi-skilled blue collar, and elementary occupational groups are presented in Appendix Table A1. For each occupational group, the reading engagement variable has a statistically significant positive effect on (log) earnings. It is the only statistically significant variable associated with

earnings across all occupational groups. Appendix Table A2 displays the regression results for five firm sizes: 1-10, 11-50, 51-250, 251-1000 and 1000+ employees. Reading engagement at work has statistically significant positive effects on workers' (log) earnings in all sizes of firms after controlling for effects of literacy proficiency, work experience, education and other variables. Work experience and education also have statistically significant, positive effects in these models. Literacy proficiency is not statistically significant except in the smaller firm sizes.

Social Outcomes

The binary social outcomes of high levels of health, social trust, political efficacy and civic engagement are modelled for the subpopulation of adults age 25-65. This is a subsample of 4,768 representing a subpopulation of 2,160,818. The dependent and independent variables are listed in Table 1, showing subpopulation means and robust standard errors. Nearly 60% of the adults reported a high health status, more than 25% a high level of social trust, 45% a high level of political efficacy, and 17% a high level of civic engagement (volunteerism). The subpopulation is slightly more than half female, has an average age of 45 years and completed an average of 14 years of schooling. Approximately 70% were born in New Zealand and about 83% are native English speakers. About 81% were employed at the time of their interview. About 1 in 8 (12.9%) reported a Māori identity, 5.6% a Pasifika identity, 75.2% a NZ European identity and 11.9% an Asian identity. The subpopulation's mean literacy proficiency score was 282 and its mean life-wide reading engagement (RE) index was 0.078.

Table 3. Descriptives of Variables in Models of Social Outcomes

Variable	Type	Mean
High Health	Binary	0.598
		(0.0081)
High Social Trust	Binary	0.257
		(0.0069)
High Political Efficacy	Binary	0.452
		(0.0074)
High Civic Engagement	Binary	0.171
		(0.0067)
Literacy Proficiency	Continuous	282
		(0.9390)
Reading Engagement (RE)	Continuous	0.079
		(0.0131)
Female	Binary	0.524
		(0.0019)
Age	Continuous	44.700
		(0.0694)
Education	Continuous	14.000
		(0.0508)
Native English Speaker	Binary	0.826
		(0.0047)
NZ Born	Binary	0.705
		(0.0064)
Employed	Binary	0.809
		(0.0066)
Māori	Binary	0.129
		(0.0012)
Pasifika	Binary	0.056
		(0.0022)
NZ European	Binary	0.752
		(0.0043)
Asian	Binary	0.119
		(0.0029)
N		4,768

Notes: Zealand PIAAC 2014, population estimates for individuals aged 25-65.

Table 4 displays results for the logit regression models of high levels of the social outcomes. The table displays the full models for each of the four social outcomes. Complete results - the baseline, literacy, reading and full models - are shown in Appendix Tables A3-A6 for health, social trust, political efficacy and civic engagement, respectively. The independent variables used in these models are shown in the first column. Continuous variables – literacy proficiency, life-wide reading engagement, age and education --

are standardised to facilitate comparison and interpretation of model coefficients. All other independent variables are binary.

Literacy proficiency and life-wide reading engagement have statistically significant positive effects on earnings with the effects of education and other covariates controlled. Adding literacy proficiency to the baseline model produces a significantly better fitting model for health ($F(1, 4767) = 23.98$, $p=0.0000$), for social trust ($F(1,4767) = 41.65$, $p=0.0000$), for political efficacy ($F(1,4767) = 77.52$, $p=0.0000$), and for civic engagement ($F(1,4767) = 11.95$, $p=0.0006$). Adding reading engagement to the literacy proficiency-enhanced models again produces significantly better fitting models for health ($F(1, 4767) = 6.48$, $p=0.0109$), for social trust ($F(1,4767) = 5.35$, $p=0.0207$), for political efficacy ($F(1, 4767) = 22.49$, $p=0.0000$), and for civic engagement ($F(1,4767) = 9.25$, $p=0.0024$).

Table 4. Logit regression models for full models of social outcomes: High levels of health, social trust, political efficacy and civic engagement (volunteerism).

Variable	Health	Trust	Political	Civic
Literacy Proficiency	0.170***	0.313***	0.313***	0.169*
	(0.0458)	(0.0570)	(0.0570)	(0.0670)
Life-Wide Reading Engagement	0.102**	0.104*	0.104*	0.154**
	(0.0391)	(0.0456)	(0.0456)	(0.0499)
Age	-0.0458	0.0998*	0.0998*	0.323***
	(0.0336)	(0.0442)	(0.0442)	(0.0503)
Age-squared	-0.0209	-0.0732	-0.0732	-0.0677
	(0.0388)	(0.0464)	(0.0464)	(0.0438)
Female	0.197**	0.210*	0.210*	0.312***
	(0.0746)	(0.0874)	(0.0874)	(0.0783)
Education	0.172***	0.181***	0.181***	0.181**
	(0.0461)	(0.0469)	(0.0469)	(0.0576)
Native English Speaker	-0.000979	-0.0625	-0.0625	-0.112
	(0.142)	(0.162)	(0.162)	(0.153)
NZ Born	0.0479	0.159	0.159	-0.0695
	(0.108)	(0.0997)	(0.0997)	(0.131)
Employed	0.602***	0.277**	0.277**	-0.359**
	(0.0800)	(0.0969)	(0.0969)	(0.113)
Māori	-0.490***	-0.142	-0.142	0.253
	(0.116)	(0.145)	(0.145)	(0.164)
Pasifika	-0.249	-0.159	-0.159	0.470*
	(0.153)	(0.232)	(0.232)	(0.229)
NZ European	0.0933	0.303	0.303	-0.538**
	(0.108)	(0.168)	(0.168)	(0.186)
Asian	0.0569	-0.0554	-0.0554	-0.661***
	(0.174)	(0.188)	(0.188)	(0.194)
Constant	-0.189	-1.660***	-1.660***	-0.907***
	(0.164)	(0.176)	(0.176)	(0.234)
N	4768	4768	4768	4768

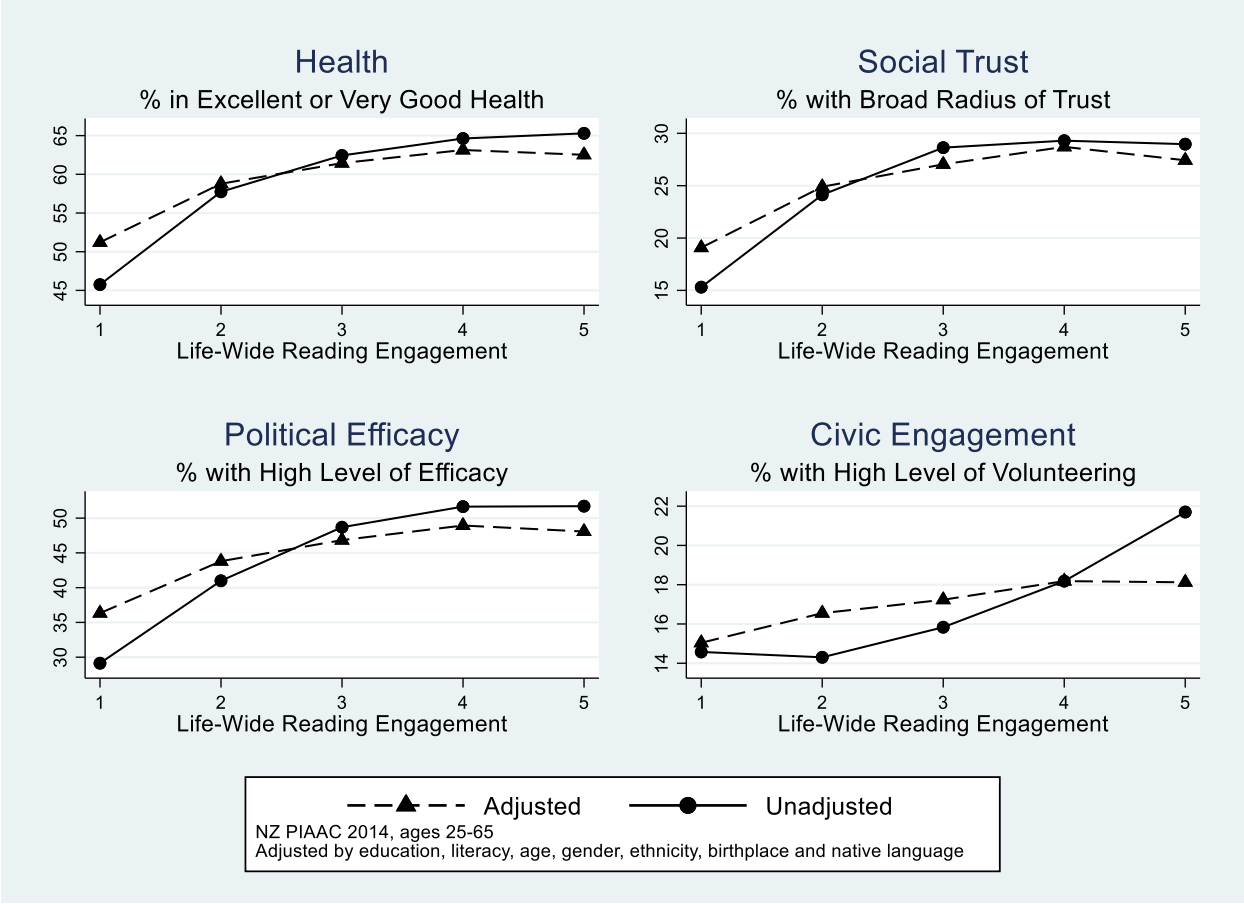
Robust standard errors in parentheses. Individuals aged 25-65. Literacy Proficiency, Life-Wide Reading Engagement, Age, Education standardized. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

There is a consistent pattern of effects across the four outcomes. Both literacy proficiency and life-wide reading engagement have statistically significant positive effects on each social outcome with the effects of education and other covariates statistically controlled. Years of education has a statistically significant positive effect on each outcome while native language and nativity status are not significant predictors of any of the social outcomes. The effects of the other covariates are not consistent across the four social outcomes. Gender and age each have significant effects for 3 of the 4 social outcomes. Age has statistically significant, positive effects on social trust, political efficacy and civic engagement but no significant effect on health status. Being female has statistically significant, positive effects on health, social trust and civic engagement outcomes but no significant effect on political efficacy. Being currently employed has statistically significant, positive effects on health and social trust, a significant negative effect on civic engagement and no significant effect on political efficacy.

The effects of ethnicity on the social outcomes exhibit a mixed picture. With other variables controlled, Māori identity has no significant effect on any of the social outcomes except health status, for which it has a statistically significant negative effect. Pasifika identity has statistically significant positive effects on political efficacy and civic engagement, but no significant effect on health status or social trust. New Zealand Euro identity has a significant positive effect on social trust and negative effect on civic engagement, whereas Asian identity has a significant negative effect on civic engagement.

The key finding here is that life-wide reading engagement has a statistically significant positive effect on all four social outcomes with the effects of literacy proficiency and other covariates statistically controlled. Figure 2 illustrates the magnitude of these reading engagement effects on the various social outcomes. Each panel of the figure displays the effects of reading engagement on a particular social outcome: health is shown in the top left panel, social trust in the top right, political efficacy in the lower left, and civic engagement in the lower right panel. In each panel, two curves show the percentage of individuals reporting a high level of the outcome as a function of increasing levels of life-wide reading engagement, with reading engagement levels grouped into five quintiles. The solid lines display the (unadjusted) percentage of individuals reporting a high level of the social outcome across the five levels of reading engagement. The dashed lines show the percentages after adjusting for effects of literacy, proficiency, education and other covariates.

Figure 2. Mean percentage of individuals reporting a high level of social outcomes as a function of quintile of life-wide reading engagement



Notes: Individuals aged 25-65. Top left: General health status. Top right: Social trust. Bottom left: Political efficacy. Bottom right: Civic engagement. Solid lines display percentages unadjusted by individual characteristics. Dashed lines display percentages adjusted by effects of literacy proficiency, age, gender, education, native language, birthplace, employment status and ethnicity.

Both unadjusted and adjusted curves show systematic increases in the outcomes as levels of reading engagement increase. Increases in the adjusted curves – whose statistical significance is confirmed by the regression results in Table 4 -- are relatively small: the high outcome levels for health increase from 51% to 62%, for social trust from 20% to 27%, for political efficacy from 36% to 45%, and for civic engagement from 15% to 18%. Figure 2 shows that for each social outcome, almost all of the increase attributable to reading engagement occurs from the 1st to 3rd quintile of reading engagement. The social outcome curves appear relatively flat at still higher levels of reading engagement. This flattening is not seen in the earnings curves shown in Figure 1. The flattening of the adjusted social outcomes curves may be of considerable practical importance, as it suggests that interventions designed to increase reading engagement may have beneficial effects on social outcomes for interventions aiming to moderately increase lower levels of reading engagement.

5 Discussion

Summary

The effects of reading engagement on selected economic and social outcomes were estimated in multivariate regression environments. Monthly earnings of fulltime prime-age workers, age 25-54, were modelled with an index of reading engagement in work settings. Four social outcomes -- general health status, social trust, political efficacy and civic engagement -- were modelled for adults age 25-65, using a life-wide reading engagement index constructed across both work and non-work settings. The regression results are consistent with a broadened PET framework in which reading engagement is associated with not only the growth of adults' literacy proficiencies but also with a range of better economic and social outcomes while controlling for the effects of literacy proficiency, education and other covariates. The central finding of this paper is that two aspects of literacy contribute to individuals' economic and social outcomes, literacy proficiency and reading engagement.

Reading engagement at work has a statistically significant and substantial positive effect on monthly earnings among fulltime workers with the effects of literacy proficiency, education, work experience and other variables controlled. This is a robust finding for fulltime workers as a whole as well as for those working in numerous occupational categories and firm sizes examined. In the full Mincer-like log earnings model, the standardised coefficient of reading engagement is 0.103, corresponding to a 10.3% increase in earnings for each standard deviation increase of reading engagement. Across the range of reading engagement levels, regression-adjusted mean earnings increase from about $3800 per month among adults in the lowest quintile of reading engagement to $5200 per month in the highest quintile.

Life-wide reading engagement has a statistically significant positive effect on health status after controlling for the effects of literacy proficiency, education and other variables. Previous research (e.g., Ghiara & Russo, 2019; Lunze & Paasche-Orlow, 2014; Marcus, 2006) has made it clear that literacy is a social determinant of health. The findings reported here help extend previous research to New Zealand and elaborate on how individuals' engagement in reading practices may underlie observed relationships between literacy and health. Life-wide reading engagement also has statistically significant positive effects on the other social outcomes examined after controlling for the effects of literacy proficiency, education, and other variables. This holds for the outcomes of social trust, political efficacy and civic engagement. After adjusting for the effects of the other variables in the model, the percentage of adults reporting a high level of each social outcome increases with the level of their life-wide reading engagement.

Although the increases over levels of reading engagement are statistically significant for both the earnings and social outcomes, they are relatively modest for the social outcomes. The regression-adjusted percentage of adults reporting a high health status increases from 51% among adults in the lowest quintile of life-wide reading engagement up to 62% among those in the highest quintile; the corresponding increases for social trust are from 20% to 27%; for political efficacy from 36% to 45%; and for civic engagement from 15% to 18%. For each of these social outcomes, the increases seen across levels of life-wide reading engagement are evident across only the lower quintiles of the reading engagement scale, in contrast with the substantial earnings gains evident across the entire scale of reading engagement at work.

Limitations

The significant effects of reading engagement found in the cross-sectional models of earnings and social outcomes do not, of course, imply causal relationships between reading engagement and those outcomes. Additional research utilizing stronger causal methods is needed to identify causal mechanisms that may underlie the relationships observed here, particularly with longitudinal measurement of the outcomes.

A second important limitation is encountered in trying to interpret the robust and substantial effects of reading engagement at work on monthly earnings. As measured in PIAAC, reading engagement at work is an attribute of the job as well as of the individual who performs the job. In contrast with literacy proficiency, which is conceptualized as an attribute of the individual that moves from job to job (context to context), reading engagement at work may be shaped by the design, requirements and affordances of the job and workplace. Research is needed that compares the earnings of workers holding given jobs who use different levels of reading engagement in performing their work.

Implications

Subject to these limitations, the findings in this paper have some important implications for programmes, policy and future research. The findings suggest that effective adult literacy programmes may not only improve adults' literacy abilities, they may help improve the economic and social dimensions of their lives as well. Using strong quasi-experimental controls, I previously found that participation in such programmes leads to substantial gains in long-term earnings (and other outcome variables) of high school dropouts in the United States (Reder, 2014). The Canadian UPSKILL project, in a random control trial, found

substantial impacts of basic skills instruction for incumbent hospitality workers on several outcomes: proficiency, skill use on the job, job performance and employer profits (Gyarmati, Leckie, Dowie, Palameta et al., 2014).

Interventions to increase reading engagement at work should be systematically explored and evaluated to see how they affect workers' earnings over time. These interventions could be instructional or non-instructional. Non-instructional interventions might include re-designing workplaces and jobs to foster increased reading engagement at work (Felstead, Gallie, Green & Henseke, 2019; Green, 2015). Practice-centred instruction – designed to increase reading engagement rather than literacy proficiency -- is already considered an effective approach to adult literacy education in numerous countries including New Zealand (Reder, 2020). The present findings suggest it may also be an effective means for improving individuals' earnings, health and other dimensions of wellbeing. Contextualising instruction with health information and materials, for example, may strengthen reading engagement in ways that improve both health status and literacy over time. Non-instructional interventions such as the development of medical practices and reading materials (e.g., for managing a chronic condition) that are easier to engage with should also be explored.

The findings also suggest that initiatives and programmes that connect reading engagement and political efficacy and civic participation may increase both reading engagement and these social outcomes. Contextualising reading engagement within programmes fostering political efficacy and civic engagement – a cornerstone of Freire-inspired pedagogies -- has a long tradition in adult education around the world. Figure 2, that graphically illustrates the marginal returns to increasing reading engagement on social outcomes, is of interest in this regard. Recall that the increases in social outcomes are apparent only across the lower portion of the reading engagement scale. This suggests that interventions targeting minimally engaged readers may foster a wide range of improvements in wellbeing. This approach may be particularly effective with adults having literacy challenges, conceptualized here in terms of their level of reading engagement rather than their literacy proficiency (test scores).

The findings also have implications for education, training and wellbeing policy in New Zealand. The goals and designs of adult literacy programmes and interventions should be formulated in terms of both literacy proficiency and reading engagement. Given the increasing evidence for PET, programme evaluations should measure shorter-term impacts on reading engagement and longer-term impacts on literacy proficiency. This may help policymakers recognize the complex nature of skill formation processes in developing their wellbeing frameworks and funding priorities, as called for by Cochrane et al. (2020). With growing evidence of its broad impact on social and economic outcomes, reading engagement could

be usefully incorporated into the emerging collective impact framework for wellbeing (New Zealand Treasury, 2018).

Further research is needed to better understand and address the ubiquitous effects of gender across these economic and social outcomes. As widely found in previous research, fulltime female workers experience substantial earnings penalties in the current study even with controls for work experience, education, literacy and other variables. At the same time, women enjoy better social outcomes than men with these variables controlled.

In addition to exploring interventions that foster reading engagement, several lines of additional research will enhance our understanding about how practice engagement is related to social and economic outcomes. Linkages available between New Zealand's PIAAC data and the national administrative database, the Integrated Data Infrastructure (IDI) may provide an opportunity to identify causal relationships between reading engagement and longitudinal earnings and health data (Erwin, Meehan, Pacheco & Turco, 2020). Intervention and experimental research will help clarify the nature of the mechanisms underlying relationships between reading engagement and the various outcomes.

The PIAAC data include information about engagement in writing, maths and ICT practices as well as reading engagement. Engagement in these additional types of practices may also have important effects on social and economic outcomes. Examining the effects of these practice engagement measures on wellbeing outcomes will be useful, both in cross-sectional analyses and in potential longitudinal studies with IDI data.

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Appendix: Supplementary Tables

Table A1. Linear Regression Models of log Earnings for ISCO Occupational Groups

Variable	Skilled	Semi-Skilled White Collar	Semi-Skilled Blue Collar & Elementary
Literacy Proficiency	0.0798***	0.0760**	0.0323
	(0.0173)	(0.0290)	(0.0217)
Reading Engagement at Work	0.0807***	0.0974***	0.0689***
	(0.0183)	(0.0234)	(0.0171)
Work Experience	0.0995***	0.0932***	0.0274
	(0.0117)	(0.0200)	(0.0308)
Work Exp. Squared	-0.0361***	-0.0146	-0.0061
	(0.0109)	(0.0185)	(0.0280)
Female	-0.2400***	-0.1890***	-0.2770***
	(0.0240)	(0.0412)	(0.0449)
Education	0.1080***	0.0440	0.0244
	(0.0178)	(0.0347)	(0.0238)
Native English Speaker	0.0247	0.0233	-0.0437
	(0.0451)	(0.0872)	(0.0739)
New Zealand Born	-0.0120	-0.0239	0.0333
	(0.0337)	(0.0764)	(0.0470)
Māori	-0.0946*	-0.0108	-0.0266
	(0.0395)	(0.0657)	(0.0638)
Pasifika	0.0907	-0.00464	-0.0379
	(0.0520)	(0.104)	(0.0704)
NZ European	0.1400**	-0.1460	0.0239
	(0.0467)	(0.0980)	(0.0600)
Asian	-0.0407	-0.2010	-0.117
	(0.0572)	(0.131)	(0.103)
Constant	8.6100***	8.4810***	8.4730***
	(0.0621)	(0.149)	(0.0744)
N	1012	351	376
r^2	0.334	0.302	0.225

Notes: Standard errors in parentheses Fulltime workers, age 25-54, not self-employed. Literacy Proficiency, Reading Engagement, Work Experience, Education standardized. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A2. Linear Regression Models of log Earnings for Five Firm Sizes

Variables	1-10 Employees	11-50 Employees	51-250 Employees	251-1000 Employees	>1000 Employees
Literacy Proficiency	0.0853***	0.1030***	0.0272	0.0763	0.0298
	(0.0220)	(0.0216)	(0.0221)	(0.0500)	(0.0670)
Reading Engagement at Work	0.0920***	0.1180***	0.0734***	0.1080**	0.1670**
	(0.0172)	(0.0189)	(0.0177)	(0.0335)	(0.0599)
Work Experience	0.0700***	0.0700**	0.1280***	0.0772**	0.1030*
	(0.0207)	(0.0232)	(0.0160)	(0.0277)	(0.0417)
Work Exp. Squared	-0.0352	-0.00209	-0.0356*	-0.0961**	-0.0187
	(0.0192)	(0.0203)	(0.0147)	(0.0325)	(0.0397)
Female	-0.2980***	-0.2820***	-0.2890***	-0.1330*	-0.1640
	(0.0348)	(0.0356)	(0.0319)	(0.0606)	(0.0940)
Education	0.0892***	0.07490***	0.1800***	0.0786*	0.1690*
	(0.0271)	(0.0201)	(0.0264)	(0.0356)	(0.0697)
Native English Speaker	0.0471	0.0538	0.0240	0.0123	-0.0288
	(0.0566)	(0.0583)	(0.0636)	(0.119)	(0.126)
New Zealand Born	0.00601	-0.0345	0.0414	-0.0340	-0.0596
	(0.0433)	(0.0545)	(0.0522)	(0.0940)	(0.120)
Māori	-0.144**	-0.0429	-0.0522	-0.0160	-0.0251
	(0.0556)	(0.0606)	(0.0617)	(0.0867)	(0.127)
Pasifika	-0.0245	0.1080	0.0820	-0.0226	0.1030
	(0.0884)	(0.0688)	(0.0566)	(0.111)	(0.162)
NZ European	-0.0550	0.0250	0.0875	0.2590*	0.2010
	(0.0791)	(0.0639)	(0.0667)	(0.103)	(0.165)
Asian	-0.2080*	-0.0799	-0.0342	-0.0158	-0.1320
	(0.0991)	(0.109)	(0.0650)	(0.125)	(0.159)
Constant	8.590***	8.575***	8.572***	8.608***	8.634***
	(0.0863)	(0.0843)	(0.0711)	(0.128)	(0.185)
N	450	537	431	200	126
r^2	0.395	0.380	0.478	0.358	0.349

Notes: Standard errors in parentheses. Fulltime workers, age 25-54, not self-employed. Literacy Proficiency, Reading Engagement, Work Experience, Education standardized. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A3. Logit Models of High Health Status

Variables	Baseline	Literacy	Reading	Full
Literacy Proficiency		0.188***		0.170***
		(0.0436)		(0.0458)
Life-Wide Reading Engagement			0.126***	0.102**
			(0.0371)	(0.0391)
Age	-0.0688*	-0.0413	-0.0711*	-0.0458
	(0.0335)	(0.0333)	(0.0337)	(0.0336)
Age-squared	-0.0350	-0.0224	-0.0316	-0.0209
	(0.0385)	(0.0388)	(0.0385)	(0.0388)
Female	0.1880*	0.1900*	0.1960**	0.1970**
	(0.0751)	(0.0744)	(0.0752)	(0.0746)
Education	0.2780***	0.1980***	0.2360***	0.1720***
	(0.0419)	(0.0453)	(0.0442)	(0.0461)
Native English Speaker	0.0507	0.0076	0.0359	-0.0010
	(0.141)	(0.144)	(0.139)	(0.142)
NZ Born	0.0578	0.0439	0.0608	0.0479
	(0.107)	(0.108)	(0.106)	(0.108)
Employed	0.6770***	0.6440***	0.6210***	0.6020***
	(0.0793)	(0.0796)	(0.0802)	(0.0800)
Māori	-0.5050***	-0.4900***	-0.5040***	-0.4900***
	(0.117)	(0.116)	(0.117)	(0.116)
Pasifika	-0.2990*	-0.2330	-0.3120*	-0.2490
	(0.151)	(0.152)	(0.152)	(0.153)
NZ European	0.1510	0.0844	0.1540	0.0933
	(0.106)	(0.108)	(0.106)	(0.108)
Asian	0.0150	0.0614	0.0150	0.0569
	(0.172)	(0.175)	(0.171)	(0.174)
Constant	-0.315	-0.216	-0.269	-0.189
	(0.167)	(0.165)	(0.165)	(0.164)
N	4768	4768	4768	4768

Notes: Standard errors in parentheses. Individuals age 25-65. Literacy Proficiency, Life-Wide Reading Engagement, Age, Education standardized. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A4. Logit Models of High Social Trust

Variable	Baseline	Literacy	Reading	Full
Literacy Proficiency		0.325***		0.313***
		(0.0556)		(0.0570)
Life-Wide Reading Engagement			0.135**	0.104*
			(0.0424)	(0.0456)
Age	0.0541	0.105*	0.0501	0.0998*
	(0.0443)	(0.0448)	(0.0436)	(0.0442)
Age-squared	-0.0964*	-0.0735	-0.0948*	-0.0732
	(0.0463)	(0.0466)	(0.0460)	(0.0464)
Female	0.193*	0.202*	0.203*	0.210*
	(0.0872)	(0.0874)	(0.0874)	(0.0874)
Education	0.336***	0.205***	0.296***	0.181***
	(0.0395)	(0.0464)	(0.0414)	(0.0469)
Native English Speaker	0.0121	-0.0573	0.000566	-0.0625
	(0.157)	(0.163)	(0.157)	(0.162)
NZ Born	0.179	0.155	0.183	0.159
	(0.0999)	(0.100)	(0.0993)	(0.0997)
Employed	0.373***	0.317***	0.315**	0.277**
	(0.0933)	(0.0931)	(0.0978)	(0.0969)
Māori	-0.181	-0.144	-0.178	-0.142
	(0.145)	(0.145)	(0.145)	(0.145)
Pasifika	-0.249	-0.142	-0.267	-0.159
	(0.236)	(0.230)	(0.238)	(0.232)
NZ European	0.401*	0.291	0.411*	0.303
	(0.169)	(0.168)	(0.169)	(0.168)
Asian	-0.132	-0.0553	-0.130	-0.0554
	(0.192)	(0.189)	(0.192)	(0.188)
Constant	-1.812***	-1.677***	-1.779***	-1.660***
	(0.175)	(0.176)	(0.176)	(0.176)
N	4768	4768	4768	4768

Notes: Standard errors in parentheses. Individuals age 25-65. Literacy Proficiency, Life-Wide Reading Engagement, Age, Education standardized. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A5. Logit Models of High Political Efficacy

Variables	Baseline	Literacy	Reading	Full
Literacy Proficiency		0.3970***		0.3130***
		(0.0417)		(0.0570)
Life-Wide Reading Engagement			0.2270***	0.1040*
			(0.0417)	(0.0456)
Age	0.1180***	0.1800***	0.1150***	0.0998*
	(0.0336)	(0.0352)	(0.0338)	(0.0442)
Age-squared	-0.0791*	-0.0533	-0.0741*	-0.0732
	(0.0340)	(0.0344)	(0.0341)	(0.0464)
Female	0.0733	0.0812	0.0901	0.2100*
	(0.0751)	(0.0754)	(0.0752)	(0.0874)
Education	0.3560***	0.1950***	0.2850***	0.1810***
	(0.0323)	(0.0377)	(0.0351)	(0.0469)
Native English Speaker	0.181	0.0965	0.160	-0.0625
	(0.143)	(0.145)	(0.145)	(0.162)
NZ Born	-0.0822	-0.116	-0.0784	0.1590
	(0.0918)	(0.0922)	(0.0929)	(0.0997)
Employed	0.00104	-0.0741	-0.104	0.2770**
	(0.0854)	(0.0865)	(0.0893)	(0.0969)
Māori	-0.0499	-0.0127	-0.0457	-0.1420
	(0.0981)	(0.105)	(0.0972)	(0.145)
Pasifika	0.234	0.381*	0.218	-0.1590
	(0.156)	(0.163)	(0.157)	(0.232)
NZ European	-0.0138	-0.1570	-0.0077	0.3030
	(0.132)	(0.131)	(0.133)	(0.168)
Asian	-0.1990	-0.1100	-0.2010	-0.0554
	(0.195)	(0.190)	(0.201)	(0.188)
Constant	-0.2240	-0.0234	-0.1450	-1.6600***
	(0.166)	(0.167)	(0.173)	(0.176)
N	4768	4768	4768	4768

Notes: Standard errors in parentheses. Individuals age 25-65. Literacy Proficiency, Life-Wide Reading Engagement, Age, Education standardized. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A6. Logit Models of High Civic Engagement (Volunteerism)

Variable	Baseline	Literacy	Reading	Full
Literacy Proficiency		0.1900**		0.1690*
		(0.0664)		(0.0670)
Life-Wide Reading Engagement			0.1720***	0.1540**
			(0.0493)	(0.0499)
Age	0.2980***	0.3280***	0.2970***	0.323*0**
	(0.0497)	(0.0497)	(0.0505)	(0.0503)
Age-squared	-0.0836	-0.0699	-0.0794	-0.0677
	(0.0447)	(0.0439)	(0.0447)	(0.0438)
Female	0.2980***	0.3020***	0.3100***	0.3120***
	(0.0766)	(0.0765)	(0.0784)	(0.0783)
Education	0.2990***	0.2220***	0.2440***	0.1810**
	(0.0516)	(0.0576)	(0.0517)	(0.0576)
Native English Speaker	-0.0534	-0.0994	-0.0741	-0.1120
	(0.153)	(0.156)	(0.151)	(0.153)
NZ Born	-0.0494	-0.0688	-0.0530	-0.0695
	(0.132)	(0.131)	(0.132)	(0.131)
Employed	-0.2600*	-0.2960**	-0.3370**	-0.3590**
	(0.106)	(0.110)	(0.109)	(0.113)
Māori	0.2210	0.2440	0.2330	0.2530
	(0.164)	(0.166)	(0.162)	(0.164)
Pasifika	0.4180	0.4900*	0.4040	0.4700*
	(0.233)	(0.233)	(0.228)	(0.229)
NZ European	-0.4890**	-0.5530**	-0.4800*	-0.5380**
	(0.188)	(0.187)	(0.187)	(0.186)
Asian	-0.6970***	-0.6550***	-0.6990***	-0.6610***
	(0.197)	(0.197)	(0.195)	(0.194)
Constant	-1.038***	-0.944***	-0.981***	-0.907***
	(0.236)	(0.237)	(0.232)	(0.234)
N	4768	4768	4768	4768

Notes: Standard errors in parentheses. Individuals age 25-65. Literacy Proficiency, Life-Wide Reading Engagement, Age, Education standardized. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

THE EXPRESSION, EXPERIENCE AND TRANSCENDENCE OF LOW SKILLS IN AOTEAROA NEW ZEALAND

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