Gender Differences in Financial Capability and the Implications for Retirement Adequacy in New Zealand

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Abstract

Empirical studies fail to extensively explore the relationship between gender and financial capability, particularly in relation to retirement adequacy. For this study, financial capability is defined as the behaviour, knowledge, attitude and ability to make decisions towards financial wellbeing; a financial theory that builds on the common concepts of financial inclusion and financial literacy. Literature exploring financial capability identifies a direct link with increased retirement planning. Ultimately, gender affects much of what is traditionally thought to impact financial capability; income, education, ethnicity and gendered social stigmas. This thesis seeks to explore the relationship between gender, financial capability and one's ability to achieve retirement adequacy.

The first hypothesis for this thesis is that a gender difference exists in financial capability and financial literacy levels of men and women. Lissington's (2018) study measured two variables of specific interest: financial literacy and financial capability scores. These variables were tested independently using a two-sample T-test to compare male and female mean scores. Results were not sufficient to reject the null hypothesis of no difference between gender means for financial literacy or financial capability. That is, this study does not support a significant gender difference in financial literacy and financial capability levels for 50-80-year olds in New Zealand.

The second purpose of this thesis is to identify whether the gender gap in financial capability found in empirical studies translates to a disparity in retirement adequacy. Using the online survey data from Lissington's (2018) study, a binary logistic regression model was applied to test the explanatory power of gender on retirement adequacy. Controlling for income, education and ethnicity, women were found to be less likely to achieve retirement adequacy for pre-retirees only.

The findings of this study enhance the understanding and progression of financial capability and retirement wellbeing, especially for New Zealand resident women. Its intended purpose is to contribute to the literature on gender and financial behaviour and guide policymakers to further explore and address gender disparities in financial capability and retirement adequacy.

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1.) Introduction:

1.1 Background

Empirical financial behaviour studies explore the definitions and interdependence of financial inclusion, financial education and financial literacy. Financial capability is a new, multi-faceted concept in financial behaviour studies which is more exhaustive in explaining the relationship between financial behaviour and wellbeing. As such, financial capability is considered a progressive concept which combines inclusion, knowledge and literacy to comprehensively describe one's ability to achieve financial and retirement adequacy.

Financial inclusion measures the degree to which adults have access to and ease of use of formal financial services (Demirguç-Kunt, Klapper, & Singer, 2017). Studies suggest financial services are key in providing financial education, as well as enabling smoother consumption, and efficient & safe transactions which reduce financial fragility and improve financial capability in the long run (Demirguç-Kunt et al., 2017). Restricted access to financial services is recognised as a barrier to the development of financial knowledge, and therefore financial literacy, especially for women, the poor and rural dwellers in developing countries. That is, for individuals to develop financial knowledge and build a base financial literacy level, they need access to formal financial services and exposure to the financial education this access can provide.

Financial literacy describes the level to which an individual is equipped with the information needed to make sound financial decisions concerning saving, investing, borrowing and general money management (Klapper, Lusardi, & van Oudheusden, 2014; O'Connell, 2009). As such, there is an inherent assumption that financial literacy relies on a foundation of financial education. Due to increasing financial inclusion across the globe and inclusion rates in developing counties, the growing importance of improving financial literacy levels has been highlighted. Studies identify that formal financial services are a large source of financial education and therefore financial inclusion can directly improve an individual's financial literacy ("2009 Financial Knowledge Survey," 2009). Consequently, financial literacy is facilitated by the ability to access formal financial services. The S&P Global Financial Literacy Survey outlines four indicators used to measure the level of financial literacy: knowledge of interest rates, interest compounding, inflation, and risk diversification (Klapper et al., 2014).

Approximately only 33% of adults globally are classified as financially literate; a low rate which translates to systemically poor financial capability worldwide (Hasler & Lusardi, 2017). Poor financial literacy tends to be concentrated in certain socio-demographic and economic groupings, particularly younger adults, individuals with lower education, lower income earners, ethnic minorities and women (Bajtelsmit & Bernasek, 1996; Falahati & Paim, 2011; Lusardi & Mitchell, 2011b; Zokaityte, 2016).

For this paper, the working definition for financial capability is the combination of knowledge, skills, motivation and behaviours enabling individuals to make informed decisions/actions with the goal of achieving financial wellbeing (McQuiad & Egdell, 2010; Moon, Ohk, & Choi, 2014; Taylor, Jenkins, & Sacker, 2009). Financial inclusion facilitates exposure to financial education through formal financial services and aids the development financial literacy. Financial capability expands the definition further by including a consideration of financial attitudes and the goal of financial and retirement wellbeing. That is, these concepts are interdependent; those who are financially excluded, have low knowledge and poor financial literacy, and are therefore likely to be financially incapable. Ultimately, an individual's ability to achieve financial capability is dependent on being financially included, to motivate and facilitate beneficial financial behaviour, and financial literacy to provide the foundational knowledge to guide financial decision making. Consequently, it is assumed that financial capability is also influenced by the same socio-demographic factors as financial literacy; age, education, income, ethnicity and occupation (Lin et al., 2016; Lusardi & Mitchell, 2011a; McQuiad & Egdell, 2010).

1.2 Objectives

Numerous financial capability studies reveal a gender differential which is in part explained by other socio-demographic and economic factors; a plethora of studies identify that women have lower average income levels, education levels, access to formal services and are constrained by socially defined gender roles and differing attitudes towards money and finances (Lin et al., 2016; Lusardi & Mitchell, 2011b; Taylor et al., 2009). It is also important to note that financial capability is the progression of financial literacy in that it involves attitudes towards long-term financial wellbeing.

Literature to date identifies financial capability as a key driver in financial planning and wealth accumulation (Falahati & Paim, 2011; Lusardi & Mitchell, 2011b). Consequently, those who

are more financially capable also tend to plan for retirement, make sound investment decisions, and accumulate more wealth on average (Gustman, Steinmeier, & Tabatabai, 2010). Recent studies identify that often women have lower incomes than men on average, restricting the residual income level available to contribute to retirement savings (Bajtelsmit & Bernasek, 1996; Zokaityte, 2016). Likewise, longitudinal studies show that the average life span of a female is longer than that of a male, provoking the belief that females may need a higher level of retirement savings to fund a longer retirement period (Bajtelsmit & Bernasek, 1996).

The **research question** for this thesis is two-tiered;

> Does a gender gap exist (in favour of males) in financial literacy and financial capability levels across varying age (pre-retiree and retiree), education, income, and ethnic groups among New Zealanders?
>
> Does a gender gap exist in the ability of adults in New Zealand to achieve retirement adequacy?

In the context of New Zealand, KiwiSaver is one of many superannuation schemes available to working adults and participation is used as a proxy for retirement planning. Responsibility for retirement planning and saving now falls on the individual rather than on the employer. In the past, defined benefit schemes were common whereby employers were contributing to the employee's superannuation fund. As such, many major decisions regarding the saving fund, investment rate, superannuation supplier and other financial matters were the responsibility of the employer. Currently, defined contribution plans are more common where individuals contribute individually to their own superannuation fund. Therefore, without the appropriate knowledge to make informed financial decisions regarding retirement planning, individuals are likely to be disadvantaged come retirement. Hence, the relationship between financial capability and retirement preparedness has been highlighted over recent years; a study in the United States found that financially knowledgeable people recognise improvement in financial capability levels, leading to an increased probability of achieving retirement wellbeing (Clark, Lusardi, & Mitchell, 2015).

The first research question is tested applying a two-sample T-test to the mean scores for men and women for financial capability and financial literacy data collected for Lissington's (2018)

study. The second research question is tested using a binary logistic regression model on retirement adequacy data from Robert Lissington's study (2018). That is, a retirement adequacy index was formed, inclusive of data on respondents KiwiSaver usage, taking the value of 1 if individuals were likely to achieve adequate consumption in retirement, and 0 if not. Therefore, a statistically significant gender coefficient in retirement adequacy analysis, would support hypothesis two.

1.3 Thesis Outline

This thesis is divided into five main sections. The first section is a brief introduction to current literature, the research question and the structure of the thesis. Section two is the literature review and is divided into further sub-sections exploring financial inclusion, financial literacy, financial capability and retirement adequacy. Section three outlines the proposed hypotheses and the intended method and source of data. The fourth section explores the findings drawn from the data and a discussion on their applicability and limitations. The final section articulates the conclusions drawn from the thesis as a whole.

2.) Literature Review:

Financial capability is a progressive concept, expanding on the ideas of financial inclusion and literacy. Financial capability is defined as having the knowledge, skills, attitudes and behaviours appropriate to achieve financial wellbeing (McQuiad & Egdell, 2010; Moon, Ohk, & Choi, 2014; Taylor, Jenkins, & Sacker, 2009). Consequently, empirical studies explore the dependence of financial capability on financial literacy and inclusion. Financial inclusion is a necessary requirement in achieving financial capability given it enables access to financial management tools, advice on financial decision making and exposure to financial education. Financial literacy is imperative in achieving financial capability given it is the foundation of knowledge which encourages beneficial decision making and financial behaviour. Each of the relevant concepts will be explored below.

2.1 Financial Inclusion:

This study will adopt the definition of Demirguç-Kunt et al. (2017) where financial inclusion is defined as having access to and ease of use of financial servces. Over recent decades there has been a significant improvement in the level of financial inclusion both in emerging and advanced economies. Worldwide, approximately 38% of adults remain 'unbanked' due to a plethora of barriers including geographical disparity, inadequate income levels or regulatory restrictions (Demirguç-Kunt et al., 2017). One measure of inclusion is bank account penetration through formal institutions. In advanced economies, 94% of adults hold a bank account at a formal institution compared to only 54% in developing nations, and as low as 14% in the Middle East (Demirguç-Kunt et al., 2017). The urban-rural divide is a large contributor to these statistics in developing countries due to the tendency for those living in rural areas to have lower incomes, education levels and informal jobs, as well as the geographical isolation of rural dwellers in relation to banks (Demirguç-Kunt & Klapper, 2012). In a study focussed on financial inclusion in Mexico, the introduction of numerous banks saw a significant improvement in access to formal services. Consequently, the improvement in financial inclusion was linked to an increase in income for lower income earners and also led to an increase in employment due to informal business being able to remain open (Demirguç-Kunt et al., 2017)

Many studies support the existence of a persistent gender divide in the level of access to financial services, an issue which significantly impacts female inclusion and absorption of knowledge through exposure to financial services (Delelchat, Newiak, Xu, Yang, & Aslan, 2018; Demirguç-Kunt & Klapper, 2012) This gender gap is most prominently recognised in South Asia, the Middle East and North Africa, however it holds across the majority of countries examined even after controlling for income, age, education and ethnicity. Although the level of financial inclusion in advanced economies is similar between males and females, a significant gender gap (an average of 9% in favour of males) exists in the level of access to formal financial services in developing countries (Demirguç-Kunt et al., 2017).

The OECD recognises that a significant barrier to the development of financial education for women is their limited access to formal financial services, particularly in developing countries. This is worsened by the restrictions for females regarding access to higher education levels, employment and entrepreneurship opportunities (OECD, 2013). Despite the positive financial attitudes and behaviours women maintain, women often report using an account that is not owned by them personally (often a partner, husband, father etc.), often resulting from gendered social stigmas regarding household finances and a lower level of confidence due to poor financial knowledge (Demirguç-Kunt & Klapper, 2012). A significant contributor to the gender gap in financial inclusion is the legal discrimination and constraints women face. A 2013 OECD publication reveals women have restricted access to formal credit including lower availability of bank loans and higher interest charges for female entrepreneurs (*Women and Financial Literacy: OECD/INFE evidence, survey and policy responses*, 2013).

Financial inclusion is believed to have far reaching benefits beyond access to a bank account for formal saving. Demirguç-Kunt et al. (2017) find that increasing access to financial services can build future investment, smooth current consumption and aid the reduction of financial fragility; this is particularly important given that one measure of financial capability is financial preparedness and resistance to emergency financial shocks. The International Monetary Fund document that financial inclusion can have macro-level impacts including economic growth, stability and equality (Demirguç-Kunt et al., 2017). They also find that financial inclusion can contribute to financial stability for the economy and provide a means and motivation for formal retirement saving. Finally, increased inclusion leads to improved financial knowledge levels; exposure to financial advice and products is a large source of financial education and

motivation to expand their knowledge further (Demirguç-Kunt et al., 2017). This is vital given financial knowledge is one of the three elements used to measure financial literacy and thus financial capability. Utilising the working definition, financial capability involves the ability to exercise decision making regarding financial management to achieve wellbeing. It is therefore an assumption that financially capable individuals have access to formal financial services and advice. From the above analysis of financial inclusion, it is clear that women have significantly lower levels of access to these formal channels which is likely to contribute to the poor level of financial capability among women when in compared to men.

2.2 Financial Literacy:

The S&P Global Financial Literacy Survey refers to financial literacy as being equipped with the information needed to make sound financial choices concerning saving, investing and borrowing (Klapper et al., 2014). The consensus of empirical research is that financial literacy is the combination of knowledge and skills needed to make informed financial decisions and thereby reduce financial risk (Le, 2013; Moon et al., 2014) . Following the proven success of the Big Three survey questions developed by Lusardi & Mitchell (2005), multiple studies have implemented surveys using these questions, including Lusardi's adaptation to test how women fare regarding financial literacy in the United States. Findings reveal that poor financial knowledge is pervasive across the United States with only 29% of participants answering all financial literacy questions correctly (Lusardi & Mitchell, 2008). Le (2013) identifies that adults in New Zealand achieve a reasonable level of financial literacy, particularly prompted by an increase in overall financial knowledge revealed in the results of the ANZ Financial Knowledge Survey. In a comparison study completed by the OECD in 2012, New Zealand had the highest level of financial knowledge on average out of all fourteen participants. However, the study also identified that New Zealand adults are less proficient in their understanding of time value of money; this is of particular concern for retirement planning given wealth accumulation is dependent on such financial knowledge (OECD, 2013).

2.2.1 Financial Literacy across the Globe

On a global scale, findings suggest that only one in three adults are considered financially literate. A study on the financial literacy of Chinese University students reported results in comparison to the OECD Financial literacy survey results where thirty member countries were found to have lower financial literacy levels (Moon et al., 2014). Moon et al (2014) also reveal

that, in comparison, China achieves a financial literacy score of 56.59 on average, much lower than all thirty OECD country members. Canada (70%) and Germany (68%) are the countries with the highest level of financial literacy (Klapper et al., 2014). Not surprisingly, all of the countries that were found to have the highest financial literacy levels were classified as advanced economies. In an Australian context, a Kiwisaver focused study found widespread financial illiteracy among adults, further explaining the noticeable absence of retirement planning in Australia (Le, 2013). An Australian study found 34% of Australian females were financially literate, compared with 52% of males (Agnew, Bateman, & Thorp, 2013). Findings from the OECD study of twelve-member countries found extensive levels of financial illiteracy; for example, of all Japanese adults surveyed, 50% indicated having no knowledge of financial products. The lowest recorded levels of financial literacy are found in South Asian countries and drop to 25% and below (Klapper et al., 2014). Mottola & Kieffer (2017) found that financial literacy levels in America were not only low, they were also declining. In 2009, the average financial capability score was 3/5 with 42% of respondents achieving a score of 4/5 (considered to have a high level of financial knowledge). In 2012, these same questions yielded an average score of 2.9 and only 39% achieving at least 4/5. Finally, in 2015, the average score had fallen to 2.8 and only 37% achieving at least 4/5 on the financial literacy questions (Mottola & Kieffer, 2017). This highlights the detrimental cycle of an aging population; when financial literacy levels are low in youth, as they age and reproduce, financial illiteracy will manifest in future generations, boosting illiteracy statistics as time progresses.

Cupak, Fessler, Schneebaum & Silgoner (2018) explore the results of a smaller OECD study examining the financial literacy levels of 12 countries. In the countries studied (with the exception of Croatia and Russia), a significant gender gap existed. The highest gender discrepancy of 20% was found in the Netherlands and the lowest within the Eastern European countries (Cupák, Fessler, Schneebaum, & Silgoner, 2018). In 2016, a survey was completed by the International Network of Financial Education (INFE) to assess the adult financial literacy competencies within 30 participating countries (including 17 OECD countries). Despite little evidence-based research on the financial literacy levels of adults in developing nations, due to the correlation between financial inclusion/education and literacy, countries including Malawi, Mozambique and Nigeria are expected to return low financial literacy levels related

to a lack of awareness and education. The INFE survey was comprised of 21 questions exploring financial behaviour, knowledge and attitude to form a financial literacy 'mark' out of 21 with an average score across all countries of 13.2 (Xu & Zia, 2012). High levels of budgeting, planning ahead, choosing products and using input advice are thought to improve their financial resilience and consequently their level of literacy/capability (Xu & Zia, 2012). Within the OECD study, the countries with the lowest financial resilience (due to poor financial behaviour) are Hungary (25%), Austria (31%) and Norway (33%) (Xu & Zia, 2012). A study completed in the Czech Republic is one of the only findings whereby a reverse gender gap exists, with females having a higher level of financial knowledge than males. The study found that of individuals classified as having high financial knowledge, 51% were female, 38% had secondary education and 47% were between 30-49 years. Likewise, of those with high financial behaviour, 47% were women and 40% were 30-49 years (Chmelíková, 2017). An American study exploring the impacts of financial inclusion and financial education on retirement preparedness found that individuals who were financially included performed better in all financial behaviour measures (financial management, saving and credit use) (Nam & Loibl, 2018). Although on average the financial literacy level is poor when compared to other countries (and the average score) in the OECD study, this is a one of few cases where gender differences in the level of financial literacy are not significant.

A study by Almenberg & Dreber (2012) found that the gender gap that governs financial literacy levels worldwide, largely explains the recognised gender gap in stock market participation. This perpetuates a lack of knowledge and therefore confidence to participate in investment stocks as well as a lower risk tolerance and a tendency to save privately. The study also found that females are more risk averse than males on average, yet this discrepancy reduces somewhat at advanced financial literacy levels (J. Almenberg & Dreber, 2012). This risk aversity is also identified in the OECD financial literacy study which finds gender differences in financial behaviour, with an emphasis on females taking less financial risk (OECD, 2016).

2.2.2 Financial Literacy and Demographics

Adults classified as having a low level of financial literacy tend to fall into at least one of the following demographics. Firstly, age is important, with participants in the low knowledge group tending to fall within 18-24years or 65 years plus ("2009 Financial Knowledge Survey,"

2009). On average, and across geographical boundaries, financial literacy follows a u-shape in regards to age. Explored by Lusardi & Mitchell (2011b), and based on their studies in America, younger and older individuals are less financially literate, and those between 30-50 years demonstrate a higher level of financial literacy. This finding is supported by a Dutch study where low financial literacy was concentrated in adults under 35 years and over 65 years (Bucher-Koenen, Alessie, Lusardi, & van Rooij, 2016). Likewise, in Sweden financial literacy is highest between the age 35-50 years, and lowest for adults 65 years and above (J. Almenberg & Säve-Söderbergh, 2011).

Lusardi (2015) explored the level of financial literacy of youth using the first international survey of this nature conducted in 2012; the Programme for International Student Assessment (PISA) across 18 different countries. With a score of 400 or below considered poor financial literacy, findings suggest that only Colombia achieved an average score below this threshold, revealing high levels of financial illiteracy. No country achieved financial proficiency (a score of 625 or above) indicating that only a basic level of financial literacy is achieved internationally (Lusardi, 2015). The study also found that, with the exception of Italy, the results of the PISA data did not support a significant gender difference between youth. This indicates that the gender gap evidenced by various other studies among adults, develops throughout one's working life, perhaps indicative of factors including the gender pay gap, differences in higher level education, the weaker attachment to the labour market amongst females and gendered roles within the household (Duberley, Carmichael, & Szmigin, 2014; Lusardi, 2015). It is however important to note that although financial knowledge is lowest amongst the youth and elderly, this trend will change over time due to aging populations.

Lissington (2018) explored the relationship between age and financial literacy, concluding that by retirement, the gender gap in financial literacy levels is expected to have narrowed given the plethora of financial decisions individuals have faced throughout their working life. Consequently, it is expected that the gender gap in financial literacy is most prominent during the age bracket 18-45 years, tapering off as adults approach retirement (Lissington, 2018).

Secondly, education also has a large influence on financial literacy with multiple studies revealing low education (high school or below only) as a strong contributor to low financial knowledge (Falahati & Paim, 2011; Lusardi & Mitchell, 2011b; Zokaityte, 2016). An American study found that all measures of financial literacy were improved for individuals who had

achieved higher education levels (Lusardi & Mitchell, 2007). Particularly for women, education is thought to have a direct positive impact on financial literacy. As per a study carried out exploring the financial literacy rates of varying education levels, individuals with education below university level had an average financial literacy rate of 25.5-32.3%, as compared with graduates with 41.5% and postgraduates with 61.8% (Potrich, Vieira, & Kirch, 2018). Consequently, individuals with poor financial literacy tend to be categorised as low income, semi-skilled or domestic workers and non-homeowners, a majority of whom tend to be females. In terms of occupation, unemployed individuals have lower financial literacy levels (28%) when compared with employed respondents (44%) (Agnew et al., 2013). Individuals in lower paying occupations and therefore with lower overall disposable incomes often have less motivation to actively 'manage' their finances and therefore tend to have lower levels of financial literacy. Individuals with higher incomes tend to have higher levels of financial literacy due to an increased motivation to manage their finances (Le, 2013; Zokaityte, 2016). In a study exploring women's retirement, females were found to have significantly lower incomes across all age groups, indicating a gender pay gap exists that holds as individuals age and enter retirement (Duberley et al., 2014). Therefore, the gender pay gap, which is pervasive across many countries around the world, is likely to contribute the gender disparity in financial literacy levels. A study by Fonseca et al. (2012) shows that the impacts of age, race and income on financial literacy are indifferent for men and women however, men reap the benefits of education more than women in regards to financial literacy levels (Fonseca, Mullen, Zamarro, & Zissimopoulos, 2012).

Surveys have shown that geographical factors also influence an individual's level of financial literacy. In developing countries more so, a significant disparity in financial literacy levels exists between urban and rural dwellers, largely due to the lower access to formal services in rural areas (Xu & Zia, 2012). In Ghana for example, 52% of the urban population is banked, as compared with only 21% of the rural dwellers. The natural side effect of this phenomenon is that urban based workers are much more likely to secure skilled and salaried jobs (resulting in exposure to financial education and services), as compared with those in rural areas with more labour-based jobs (Xu & Zia, 2012). Even within countries, various regions show disparities in the level of financial literacy; in Italy, the Central and Northern areas have a higher level of literacy. The same trend also exists in Malawi and in Germany, people in the

West of the country tend to have higher financial literacy than those living in the East (Xu & Zia, 2012). Ethnicity has been recognised in many countries as an indicator of financial literacy whereby ethnic minorities tend to lack financial literacy, often due to language, legal and economic barriers inhibiting financial inclusion (Zokaityte, 2016). The FinScope study revealed that within South Africa, 91% of whites were banked compared with only 57% of blacks (Xu & Zia, 2012). Lusardi and Mitchell found that in American surveys, African- Americans and Hispanics scored the lowest across all financial literacy questions (Lusardi & Mitchell, 2011a). In New Zealand, Europeans scored highest on the financial knowledge and behaviour questions, with Pacific Islanders and Maori scoring much lower (*Financial Knowledge and Behaviour survey 2013*, 2013). A study by Ooi (2018) explored the degree to which financial literacy gender gaps could be explained by national culture. The study found that 7%-22% of the gender gap could be explained by various cultural dimensions; the gender disparity narrowed considerably in countries with cultures that were masculine, long-term oriented, had a high level of uncertainty avoidance, indulgent or gender egalitarian (Ooi, 2018).

2.2.3 Financial Literacy and Gender

Financial literacy levels across the world illustrate a significant gender gap. This discrepancy is to some degree explained by factors including the gender pay gap, concentration of women in lower-paying caring jobs, female restriction from education programmes (particularly in developing countries) and social stigmas. A study was undertaken in 2009, by Bucher-Koenen, Lusardi, Alessie & van Rooji (2017), exploring the financial literacy levels of adults in America, Germany and the Netherlands. In America, they found that 38% of males correctly answered all three financial literacy questions as compared with 22% of women; this finding was statistically significant and held when identifying gender gaps on the three financial literacy questions independently (Bucher-Koenen, Lusardi, Alessie, & van Rooij, 2017). Similar results were found in the Netherlands with all results except the interest rate question yielding a gender disparity. Finally, in Germany, 60% of male respondents correctly answered all questions as compared with 48% of female respondents (Bucher-Koenen et al., 2017). Bajtelsmit & Bernasek (1996) attributes the prevalence of the gender pay gap to the concentration of women in 'caring' and/or part-time roles and the career gaps associated with child-rearing (Zokaityte, 2016). This is evidenced in the United Kingdom where women earn on average £161 compared to the male average of £303 (Zokaityte, 2016). A Dutch study

by Bucher-Koenen et al. (2014) explored whether low financial literacy among females was due to a lack of financial knowledge or a lack of confidence; this stemmed from a finding that financial literacy was also low among young females despite high levels of education and employment. The hypothesis of the study was tested by running two surveys, one in which respondents had the option of 'yes', 'no', and 'I don't know' as possible answers to financial questions, and the other with only 'yes' and 'no'. When the 'I don't know' option was deleted from the survey, the number of female (male) respondents who correctly answered all three questions rose from 29.4% (58.1%) to 60.1% (74.9%). The findings suggest that a significant portion of the gender differential in financial literacy is explained by lower confidence in females. However, once controlling for confidence, a gender difference of almost 15% still existed, indicating a disparity in financial knowledge levels (Bucher-Koenen et al., 2016). This provokes a question as to measuring true and subjective knowledge. Currently, it is assumed financial knowledge improves financial literacy and contributes to financial wellbeing. This study highlights the possibility that there should be a separation between 'true' and 'subjective' knowledge. 'Subjective' knowledge measures the perceived confidence an individual has in their level of financial knowledge. Particularly for women, subjective knowledge is a significant influencer on financial behaviour and financial wellbeing will only be achieved through the improvement of both 'true' and 'subjective' financial knowledge. A survey exploring the adult financial literacy in New Zealand was undertaken by the Programme for the International Assessment of Adult Competencies (PIAAC), measuring the literacy, numeracy and problem-solving abilities of 6177 New Zealanders between 16-65 years old. The study found that 63% of women calculated prices, costs and budgets at least once per week as compared with only 51% of males. This trend was found also in partnered adults with children and indicates that women tend to have stronger financial attitudes and behaviours. The study also revealed that despite females performing financial activities more regularly, they still maintained lower average financial knowledge rates, as previously captured by the OECD (Satherley, 2017).

Internationally, 35% of men are financially literate as compared with 30% of women (Hasler & Lusardi, 2017). This gap is approximately 5% across the BRICS (Brazil, Russian Federation, India, Chile & South Africa) and 8% across the G7 countries (Canada, France, Germany, Italy, Japan, UK, US). It is however important to note that in G7 countries, 55% of adults in the study

answered three out of four basic literacy questions correctly (achieving a financial literacy passing score) compared to only 28% in the BRICS (Hasler & Lusardi, 2017). Fonseca et al. (2012) also document that financial illiteracy often manifests amongst women, which is likely to have detrimental effects on financial wellbeing throughout their working years and in to retirement. This financial illiteracy can be attributed to significantly lower levels of financial knowledge when compared to males (Fonseca et al., 2012). They support these claims (using a normally distributed financial literacy index), identifying that the index for women is about 0.7 standard deviations lower than for men (to the 1% significance level) (Fonseca et al., 2012). The consensus of empirical research is that a significant gender difference exists in both financial literacy and financial capability levels internationally. Likewise, studies attribute such differences to varying income levels, concentration of women in lower paying/caring roles, restrictions on access to credit and education for females in some countries as well as other socio-demographic factors.

Table 1: Female Financial Literacy in Brazil (Potrich et al., 2018)

Table 1 focuses on the financial literacy levels of Brazilian females. The chi-square distribution identifies household income, education, personal income and marital status as the significant explanatory variables. That is, females with low personal/household income levels, single relationship status and low levels of education are susceptible to low financial literacy. Arguably the most significant piece of work contributing to financial literacy data was completed by the OECD in conjunction with the International Network for Financial Education measuring financial knowledge, behaviour and attitude to form a financial literacy index.

Country	Percentage scoring 5, 6, or 7	
	Female	Male
Albania	44%	42%
Austria	62%	71%
Belarus	39%	36%
Belgium	52%	68%
Brazil	44%	52%
British Virgin Islands	33%	39%
Canada	50%	72%
Croatia	46%	46%
Czech Republic	50%	54%
Estonia	73%	74%
Finland	65%	75%
France	54%	66%
Georgia	51%	60%
Hong Kong, China	80%	89%
Hungary	58%	61%
Jordan	34%	57%
Korea	72%	81%
Latvia	67%	68%
Lithuania	53%	68%
Malaysia	32%	35%
Netherlands	51%	76%
New Zealand	52%	74%
Norway	56%	84%
Poland	53%	56%
Portugal	54%	67%
Russian Federation	44%	47%
South Africa	28%	34%
Thailand	40%	42%
Turkey	51%	64%
United Kingdom	37%	58%
Average, all countries	**51%**	**61%**
Average, OECD countries	**56%**	**69%**

Table 2: Financial Knowledge Scores- OECD

Table 2 records the financial knowledge scores separated by gender for the 2016 study. Across all 30 countries, 51% of females achieved a high financial knowledge score compared with 61% of males. When looking at OECD countries only, the gap was wider, at 56% and 69% for females and males respectively (OECD, 2016). In 19 of the 30 countries tested by the OECD in 2016, there is a statistically significant gender difference (tested by regression analysis)

between the male and female average level of financial knowledge minimum pass scores. In particular, larger gender disparities exist in Canada (72% males and 50% females), Norway (84% vs 56%), New Zealand (74% vs 52%), Netherlands (76% vs 51%) (Xu & Zia, 2012). This is indicative of the consensus drawn from national and international empirical studies measuring financial literacy. For example, the ANZ financial knowledge survey found that only 40% of women were classified as having high knowledge, while 46% of males achieved this (Brunton 2009). Although gender differences in financial knowledge levels are significant, they are not pervasive in every country. The Czech Republic is an example of a country whereby the gender difference is reversed. Of those achieving high financial literacy, 51% were female, indicating that the level of financial knowledge does not seem to be impacted by gender. A study exploring financial literacy in America found that financially knowledgeable households achieve consistently better financially, highlighting the interdependence of financial knowledge and financial behaviour in achieving financial literacy (Seay, Kim, & Heckman, 2016).

Country	**Percentage achieving minimum target scores**		
	All	Female	Male
Albania	45%	45%	44%
Austria	68%	72%	65%
Belarus	44%	47%	40%
Belgium	70%	70%	71%
Brazil	36%	33%	40%
British Virgin Islands	72%	70%	75%
Canada	68%	68%	67%
Croatia	40%	41%	38%
Czech Republic	42%	44%	41%
Estonia	38%	40%	36%
Finland	71%	72%	70%
France	85%	85%	85%
Georgia	36%	35%	38%
Hong Kong, China	63%	65%	60%
Hungary	25%	26%	23%
Jordan	59%	53%	64%
Korea	57%	60%	55%
Latvia	48%	52%	44%
Lithuania	51%	49%	53%
Malaysia	57%	58%	55%
Netherlands	45%	44%	46%
New Zealand	59%	64%	53%
Norway	58%	59%	57%
Poland	31%	31%	30%
Portugal	66%	66%	66%
Russian Federation	44%	45%	44%
South Africa			No score
Thailand	61%	62%	60%
Turkey	38%	34%	42%
United Kingdom	54%	53%	55%
Average, all countries	**51%**	**53%**	**52%**
Average, OECD countries	**53%**	**55%**	**53%**

Table 3: Financial Behaviour Scores- OECD

Table 3 illustrates the OECD results regarding financial behaviour. In this study, financial behaviour is measured as the ability to budget, make ends meet, actively save, be financially aware, financially plan long-term, and choose financial products effectively. Across all countries surveyed, 53% of women achieve the minimum pass score for financial behaviour as compared with 52% of males. In OECD countries only, these increase to 55% and 53% respectively. Consequently, only a slight gender gap exists in favour of women. A more significant gap exists for financial behaviour in Jordan (53% for women and 64% for males) and New Zealand (64% for women and 53% for males)(OECD, 2016). Ooi (2018) found that culture significantly impacted individual's level of financial literacy and their consequent behaviour, including investment in insurance products and the tendency to invest in commodities rather than equities. Further, Ooi (2018) identifies the demand to invest in financial literacy is a self-made decision influenced by various cultural considerations including time, motivation, money and access to financial services (Ooi, 2018).

Country	Percentage achieving minimum target score (more than 3)		
	All	Female	Male
Albania	61%	66%	56%
Austria	58%	63%	53%
Belarus	39%	41%	35%
Belgium	56%	60%	52%
Brazil	50%	52%	49%
British Virgin Islands	55%	59%	51%
Canada	64%	68%	60%
Croatia	40%	40%	40%
Czech Republic	46%	47%	44%
Estonia	53%	55%	51%
Finland	59%	60%	58%
France	52%	56%	48%
Georgia	35%	44%	24%
Hong Kong, China	28%	30%	24%
Hungary	63%	66%	59%
Jordan	25%	21%	29%
Korea	51%	53%	48%
Latvia	39%	41%	38%
Lithuania	56%	57%	54%
Malaysia	39%	41%	37%
Netherlands	57%	64%	49%
New Zealand	75%	75%	74%
Norway	73%	81%	65%
Poland	30%	31%	28%
Portugal	63%	64%	62%
Russian Federation	40%	42%	38%
South Africa	48%	49%	48%
Thailand	47%	48%	46%
Turkey	48%	50%	47%
United Kingdom	57%	58%	56%
Average all countries	**50%**	**53%**	**47%**
Average, OECD countries	**55%**	**58%**	**52%**

Table 4: Financial Attitude scores- OECD

Table 4 illustrates the results for financial attitudes in the OECD study. The financial attitude questions were focussed on identifying whether an individual had an attitude towards long-term security. Across all 30 countries, 53% of females achieve a high financial attitude score as opposed to only 47% of males. These scores increase to 58% and 52% for averages in OECD countries only. Large gender differences exist in the Netherlands (64% for women and 49% for males) and Norway (81% for women and 65% for males) (OECD, 2016). That is, females generally tend to be more aware of the importance of saving and financial planning, attitudes which are especially prominent in Canada, Albania, Austria, Brazil, France and Georgia (OECD, 2016). A study by Almenberg & Dreber (2012) found that the gender gap that governs financial literacy levels worldwide, largely explains the recognised gender gap in stock market participation. This perpetuates from a lack of knowledge and therefore confidence to participate in investment stocks as well as a lower risk tolerance and a tendency to save privately (J. Almenberg & Dreber, 2012). A study exploring financial literacy and gender in Ghana conveyed similar findings, acknowledging women's lack of financial confidence and feelings of negativity regarding money (Adam, Boadu, & Frimpong, 2018). Adam et al. (2018) find that regarding personal finance, women have less enthusiasm and willingness to improve their knowledge. Consequently, literature indicates that female's low financial literacy levels are largely attributed to poor financial knowledge which inhibits financial literacy and restricts financial behaviour.

An American study found a gender difference existed in the level of financial literacy measured and yet, a significant proportion of all Americans (both men and women) were ill-equipped to achieve financial wellbeing particularly in retirement (Woodyard & Robb, 2012). The life cycle and marriage status of women has a significant impact on their financial literacy levels. In particular, married women are thought to be more likely to be financially literate as compared with those who are unmarried (Fonseca et al., 2012). Bucher-Koenen et al. (2017) find that married women yield much lower rates of financial literacy when compared to married men. A study looking at Dutch households found that single adults (without children) were found to have a high level of financial literacy compared to single parents (particularly women) who were found to have low levels (Bucher-Koenen et al., 2016). A study looking into financial literacy levels in Brazil confirms that marital status is an important influencer on financial literacy levels; 42% of single women had high financial literacy as opposed to 52.8%

of married women (Potrich et al., 2018). A concern presented by the OECD is that females, who often hold lower financial literacy levels when compared to their male-counterparts, generally hold the primary child-rearing responsibilities; if females themselves have a low level of financial literacy, future generations are going to reflect these lower levels (OECD, 2013). Woodyard & Robb also highlighted this idea in their 2012 study finding that 26% of households were headed independently by women and, given the gender gap in financial literacy, this promoted a long-term financial knowledge issue.

Literature now promotes the idea that financial literacy itself is not sufficient. To progress towards independent financial wellbeing, financial capability must first be achieved. As such, the focus of government groups in particular has turned to assessing financial capability levels and associated wellbeing in order to better construct policies to address the financial shortfalls. Given the relationship between financial literacy and financial capability, it is vital to understand the level of financial literacy and its relative determinants, to form the foundation of understanding about the financial capability landscape. Although attention has turned to evaluating and improving financial capability levels, an important issue is the lack of financial literacy among adults across the globe, particularly women. A study by Zokaityte (2016) reported the findings of the OECD studies that women's irrationality is related to their poor financial literacy and lack of exposure to formal services. Studies that reveal a gender gap persisting in the level of financial literacy imply that this gender gap carries over to financial capability. Ultimately, the gender divide which is evident in financial literacy levels, contributed to the construction of this thesis hypotheses in that, if men are more financially literate than women, it is likely men will achieve higher levels of financial capability.

2.3 Financial Capability:

2.3.1 Financial capability definition

As a relatively new concept in the financial behavioural sphere, financial capability has a plethora of working definitions. Following the Her Majesty's Treasury working definition, financial capability is defined as the combination of knowledge, skills, motivation and behaviours enabling individuals to make informed decisions/actions with the goal of financial wellbeing (McQuiad & Egdell, 2010; Moon et al., 2014; Taylor et al., 2009). Various researchers have expanded on this concept, including additional considerations they feel fit to best quantify financial capability. Taylor (2010) in particular, includes a focus on the ability

to balance income generation with the skills to manage expenditures to measure capability (Taylor, 2010; Taylor et al., 2009). Literature to date has identified a common practice for measuring financial capability using the following four indicators; making ends meet, planning ahead, investment/financial products, and financial knowledge (Lin et al., 2016; Lusardi & Mitchell, 2011a; Taylor et al., 2009).

2.3.2 Financial capability and demographics

Not surprisingly, the economic and socio-demographic influencers of financial literacy (education, membership of a minority group and gender), tend to have a similar impact on financial capability levels (Lusardi & Mitchell, 2007). Higher income levels and full-time employment are again significant drivers of financial capability; in a British study, a large proportion of adults earning less than £10,000 per year, as well as unemployed adults, were struggling to make ends meet and plan financially (McQuiad & Egdell, 2010). Lusardi and Mitchell (2011a) find that less financially capable adults tend to be women, have low education and/or fall into ethnic minority groups (African-Americans and Hispanics). These results are confirmed in an American study which finds that in addition to gender, education and ethnicity, financial capability is often influenced by age with young respondents being recognised as having low financial capability levels (Lin et al., 2016). A British study suggests higher levels of education effectively improve one's level of financial capability (and reduce the number of financial problems an adult faces). Within America, individuals with high school as their highest education achievement were considered disadvantaged in terms of developing financial capability (Lin et al., 2016; Taylor et al., 2009).

Financial capability has been found by multiple studies to underpin sound financial wellbeing, particularly in relation to retirement planning and wealth accumulation. Failure to achieve capability can, on a personal level, result in a difficulty in make ends meet, high debt levels, retirement implications (lack of planning and insufficient wealth accumulation upon retirement), and stress/anxiety related to one's financial situation. In a wider sense, the economy is negatively affected, with misuse of financial services, high indebtedness and general inefficiency (Taylor et al., 2009). As such, Taylor has consequently identified that improvement in financial capability can have a favourable impact on debt levels at the personal, household and economy wide levels, as well as on retirement planning and overall financial wellbeing (Taylor et al., 2009).

2.4 Gender and Financial Capability

Multiple studies conclude that females tend to have lower levels of financial literacy and therefore will have lower financial capability. For example, a study in the United Kingdom identified that a gender gap exists, with less females achieving financial capability than males surveyed, however this gender difference was explained by income differentials (Taylor et al., 2009).

2.4.1 Gender and Financial Inclusion

Regarding Financial Inclusion, the OECD recognises that a significant barrier to the development of women's financial education is their limited access to formal financial services, particularly in developing countries (OECD, 2013). Within a Brazilian microfinance institution, findings evidenced discrimination against female entrepreneurs when granting loans; a trend more prevalent in developing countries (*Women and Financial Literacy: OECD/INFE evidence, survey and policy responses*, 2013). In Ghana, female entrepreneurs are often restricted from formal financial services and have to rely on social capital to fund the business; in turn, this leads to limited exposure to financial services, inhibiting further education and learning (*Women and Financial Literacy: OECD/INFE evidence, survey and policy responses*, 2013). This is worsened by the notable restrictions for females regarding access to higher education levels, employment and entrepreneurship opportunities (OECD, 2013). Interestingly, Demirguç-Kunt et al. (2017) find that when females have more control over money within the household, improvements are recognised in health, housing and nutrition areas (Demirguç-Kunt et al., 2017).

2.4.2 Gender and Financial Knowledge

On average, women have lower levels of financial knowledge, as evidenced by findings from studies in both developing and developed countries, which will directly affect their financial wellbeing by inhibiting the development of financial capability. The OECD confirmed that no country surveyed resulted in a measure of females being more financially knowledgeable than males completing the same survey. This finding is also consistent across age groups with a study finding that teenage women tend to hold a lower level of financial knowledge (Danes & Haberman, 2007). Mottola (2018) completed a study exploring financial knowledge and financial literacy levels of both American males and females across various generational groups. The study measured financial knowledge levels in 2009, 2012 and 2015; The aim was

to identify whether the gender disparity in financial literacy varied over time, as shown in Figure 1.

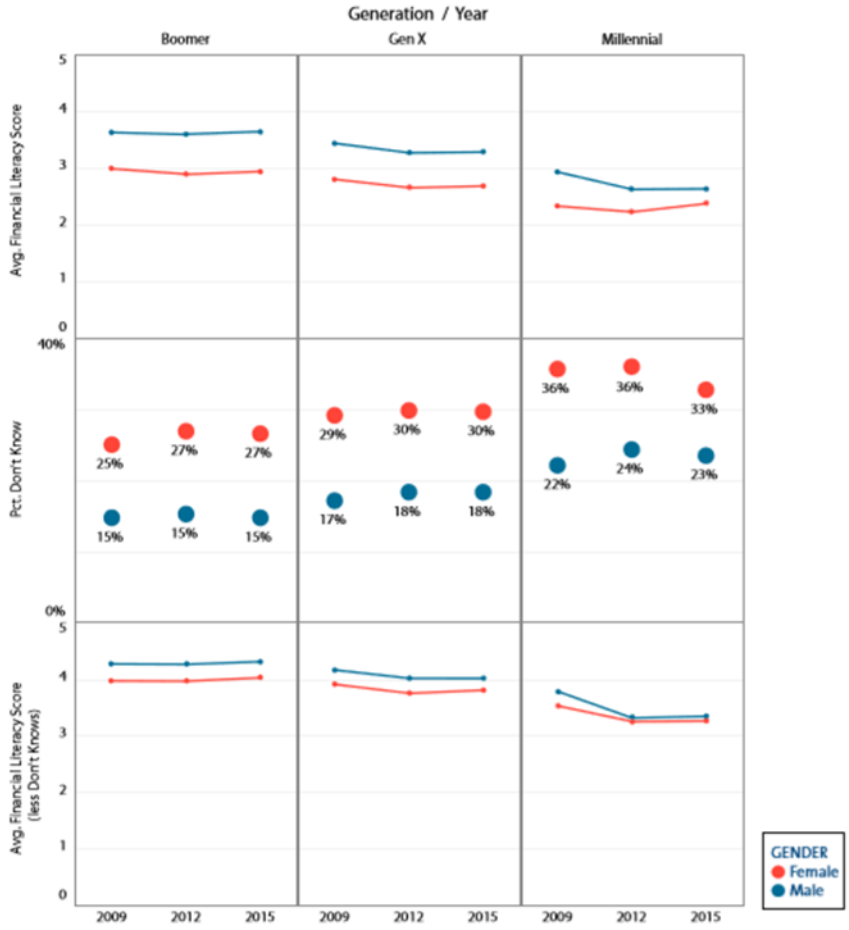

Figure 1: Financial Literacy by year

As presented in Figure 1 above, the gender gap for the millennial age group narrowed between 2009 and 2015, with the financial literacy score for males beginning at 0.6 higher than females and dropping to only 0.26 higher in 2015. Despite this improvement, at all points in time, fewer females were achieving a high level of financial literacy. By 2015, the gender gap between Millennials had reduced to 10% (in favour of males), as compared with 18% for Generation X respondents and 19% for Boomers (Mottola, 2018).

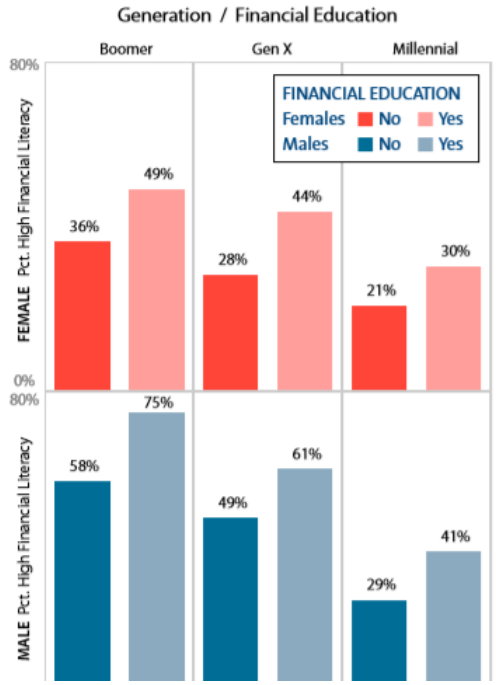

Figure 2: Financial Knowledge across generations

Figure 2 presented above from Mottola's study identifies that, across all generations measured (Millennials, Generation X and Boomer), women had lower levels of financial knowledge. The lowest level of financial knowledge was found in Millennial females with no financial education where only 21% achieved a high level of financial knowledge. This confirms the consensus of empirical studies in that women, younger individuals and those with less education tend to show lower levels of financial knowledge (Mottola, 2018).

A global study measuring financial literacy identified that a significant number of countries examined maintained a gender gap. Of particular note were the large discrepancies in favour of males in Germany, Brazil, Indonesia, Italy, Australia and Canada. This finding is somewhat surprising given the advanced nature of their economies. The lowest gaps were identified in Japan, UK, South Africa and China whereby, financial literacy levels for males and females were comparable (Hasler & Lusardi, 2017). Likewise, Delelchat (2018) explains this occurrence as inequalities stemming from the existence of gendered roles in finance and discriminatory restrictions on economic opportunities. A study on gender disparity in financial literacy undertaken in Ghana found that women tend to be less financially literate due to the male managing finances within a household (Adam et al., 2018). In the 2016 OECD/INFE study of financial literacy, across all thirty countries, 61% of males achieve the minimum passing score for financial knowledge (5/7 questions) on average, as compared with only 51% for

females. Within OECD countries only, on average 69% of males achieved this score but only 56% of females (Xu & Zia, 2012). In 19 of the 30 countries tested by the OECD in 2016, there is a statistically significant gender difference (tested by regression analysis) between the male and female average level of financial knowledge minimum scores. In particular, larger gender disparities exist in Canada (72% males and 50% females), Norway (84% vs 56%), New Zealand (74% vs 52%), and the Netherlands (76% vs 51%) (Xu & Zia, 2012).

2.4.3 Gender and Financial Literacy

Perhaps the most important contributing factor to gender disparities in the level of financial capability, and the consequent impacts on retirement wellbeing, is the recognised and proven gender differences in financial literacy. Worldwide, 35% of males are considered financially literate, in comparison to 30% of females (Klapper et al., 2014). This is evidence of a prominent gender gap that is pervasive across various ages, relevant to different education levels, ethnicities, and various income levels (Le, 2013; Lusardi & Mitchell, 2008). In another US study, despite improvements in making ends meet, planning ahead, managing financial products and financial knowledge measures, the overall financial literacy level of American adults has fallen; a concerning result given the proven link between financial literacy and financial behaviour, in particular, planning for retirement (Falahati & Paim, 2011; Lin et al., 2016; Lusardi & Mitchell, 2011b).

Furthermore, a global study identified that a comparable gender gap exists across both low-income and high-income economies, proving gender disparity in financial literacy is a global and persistent issue (Hasler & Lusardi, 2017). In surveys testing financial literacy levels, women have lower literacy in almost all countries. The FinScope study on financial literacy levels reveals that in Africa, this is largely due to differences in access to formal financial services. In Malawi, 17% of women are banked as opposed to 21% of males (with similar differences found in Mozambique, South Africa and Zambia) (Xu & Zia, 2012). In the ANZ Financial Knowledge Survey for New Zealand, only 40% of females were measured as having a high level of financial knowledge (thought to lead to a higher level of financial literacy) compared to males at 46% ("2009 Financial Knowledge Survey," 2009). A Mastercard survey completed in 2011 which focuses on the financial literacy level of females in twenty-four countries (including people from Asia, the Middle East, North Africa, and Sub-Saharan Africa) identified that women are at higher risk of poverty and insufficient funds to support

retirement given their lower level of financial literacy (particularly in older females when compared to the wider population) coupled with longer lifetimes (on average) and short/broken working lifespan (Xu & Zia, 2012). The Flat World initiative exploring financial literacy found that women's knowledge levels vary greatly by country, but in almost every case, no level of female literacy exceeds that of their male equivalents. The gender disparity varies greatly across various demographics but particularly across countries; in New Zealand, males and females have a similar level of knowledge regarding time value of money and yet in Sweden the differential is 18% in favour of males, and in the US, 12% in favour of males (Women and Financial Literacy: OECD/INFE evidence, survey and policy responses, 2013). The OECD/INFE pilot study furthered these findings identifying gender differentials (favouring males) of 26%, 22% and 20% in UK, Germany and Norway respectively (Women and Financial Literacy: OECD/INFE evidence, survey and policy responses, 2013).

2.4.4 Gender, Financial Capability and Demographics

Gender differences in financial capability also extend to various subgroups who tend to maintain a lower level of knowledge and literacy on average relative to the general female group and entire population. The Health and Retirement Surveys completed in 2004 and 2008 in the United States convey that older women may have lower financial literacy levels when compared to other age groups; these findings are supported by similar results in the financial knowledge ANZ survey undertaken in New Zealand (Women and Financial Literacy: OECD/INFE evidence, survey and policy responses, 2013). The British Household Panel Survey identifies that female savings and debt levels are more sensitive to changes in life events compared to males, and consequently their financial recovery from these events can be delayed. For example, in the case of divorce/death of a spouse, although both sexes are affected, females are often impacted financially to a greater extent (Women and Financial Literacy: OECD/INFE evidence, survey and policy responses, 2013). As is the case with ethnic minorities in general, female minorities also demonstrated lower levels of financial capability, particularly female immigrants, asylum seekers and indigenous women (Women and Financial Literacy: OECD/INFE evidence, survey and policy responses, 2013).

Current literature identifies that women have lower financial knowledge and confidence in their knowledge which translate to significantly lower financial capability on average. A study by the OECD/INFE in 2013 identifies the most significant barriers to improvement in female

financial literacy as differences in socio-economic conditions and in general, limited access to education, employment and formal services some barriers that are restricting the financial literacy of women (*Women and Financial Literacy: OECD/INFE evidence, survey and policy responses*, 2013). Regarding education, women face limited opportunities (many often don't even complete secondary school and are thrust in to motherhood, especially in developing countries), employment (biases towards men in certain roles) and entrepreneurship. These gender differences have been evidenced to some degree, which Zokaityte (2016) indicates has prompted financial education schemes targeting female financial education. The OECD/INFE study in 2016 also identified gender factors in financial attitudes which directly contribute to the gender disparities in financial capability. On average, men are less likely to have positive attitudes about the long-term (e.g. savings, retirement planning etc.). In Albania, Austria, Belgium, France, Hong Kong and Malaysia, these attitude differences are particularly exaggerated; the opposite case is found in Jordan (Xu & Zia, 2012). Especially in developing countries, a significant barrier to female knowledge improvement is the lack of girls' access to schooling; in the OECD-PISA survey, 55 countries showed a relationship between schooling and the development of economic literacy (Women and Financial Literacy: OECD/INFE evidence, survey and policy responses, 2013). Punjabi women report significant discrimination related to access to college training and specific government education programmes (Women and Financial Literacy: OECD/INFE evidence, survey and policy responses, 2013).

Females tend to have lower financial knowledge (and skills), contributing to financial inefficiency among approximately half of the population and detrimentally impacting a woman's role in intergenerational education, particularly regarding household and general literacy (*Women and Financial Literacy: OECD/INFE evidence, survey and policy responses*, 2013). Likewise, individuals (especially women) with low financial capability are less likely to invest in the stock market, borrow efficiently, plan for retirement and practice diversification of risk (Hasler & Lusardi, 2017). Secondly, there is a trend towards long-term wealth management focused around retirement planning, given the shift of responsibility to the individual for retirement saving. Relatively, women are faced with shorter career spans and occupation options constrained by social norms, childrearing, gender pay gap and other barriers to retirement saving, before considering their lower level (on average) of financial

literacy (*Women and Financial Literacy: OECD/INFE evidence, survey and policy responses*, 2013).

2.5 Retirement:

2.5.1 Financial Capability and Retirement

Financial capability has been proven to directly influence the retirement landscape of individuals as well as the propensity they have to plan for retirement. Ultimately, the ability of an individual to commit to a retirement plan stems from their level of financial knowledge and capability; consequently, financial capability improves retirement planning and contributes to retirement confidence (Joo & Pauwels, 2002; Lusardi & Mitchell, 2007). Mottola & Kieffer found only 37% of American adults surveyed could answer 4/5 financial literacy questions correctly. This study concluded that poor financial literacy manifests as poor financial behaviours and negative financial outcomes, particularly on retirement (G. Mottola & Kieffer, 2017). Lack of financial literacy is generally associated with poor retirement planning and is believed to contribute to a lower confidence in retirement (Joo & Pauwels, 2002; Lusardi & Mitchell, 2011b). In Lusardi and Mitchell's (2011b) study, this one-way relationship was statistically significant, indicating improvement in financial literacy can improve retirement planning. Gustman, Steinmeier & Tabatabai (2010) also conveys this idea, identifying a link between financial literacy and pension/retirement knowledge, particularly recognising an increase in savings and household wellbeing (Falahati & Paim, 2011). A study in the United States found that financially literate individuals with high financial knowledge held 18% more stock as compared with investors with lower financial literacy. Likewise, they held stocks with 40% higher portfolio volatility and yet less idiosyncratic risk, illustrating diversified investment and knowledge regarding effective financial management (Clark et al., 2015).

Building on the gender difference in financial literacy found internationally, Adam, Boadu & Frimpong (2018) explored whether a similar disparity exists in Ghana after retirement. They found that males scored stronger in seven out of ten financial literacy questions with women scoring higher in only three (Adam et al., 2018). Likewise, Adam et al. (2018) conveyed that the gender gap in financial literacy contributes to the gender differential in retirement preparedness between males and females (Adam et al., 2018).

Financial capability and retirement planning studies have become increasingly prevalent due to a shift in the retirement landscape from benefit plans to defined contribution schemes. That is, responsibility for retirement savings, superannuation contributions and wealth accumulation now fall on the individual, rather than employers; a trend which highlights the lack of financial capability adults maintain, and the relative implications this will have on retirement wellbeing (Agnew et al., 2013; Bajtelsmit & Bernasek, 1996; Falahati & Paim, 2011; Le, 2013). Bucher-Koenen et al. (2017) emphasise the relationship between labour market status and retirement wealth; a link that would likely widen the gender disparity that exists in financial literacy. Mahdzan, Mohd-Any & Chan (2017) explore the relationship between financial literacy, risk aversion and retirement planning. They identify that the global trend towards defined contribution plans has emphasised the need for individuals to have sufficient knowledge to manage their own financial decisions. The importance of this knowledge is amplified further given the complexity of the financial products offered in modern financial markets (Mahdzan, Mohd-Any, & Chan, 2017). A good example of this in New Zealand is KiwiSaver, a superannuation scheme whereby individuals contribute a proportion of their income to invest in a fund (with a risk profile of their choice) to save for retirement. Individuals are responsible for decisions regarding their contribution rate, the riskiness of their fund and other related issues. In the past these decisions were made by the employer on behalf of the employee as stipulated in the employment contract. Now that the individual makes these decisions independently, the importance of financial knowledge and the current level of financial illiteracy has been highlighted.

Many previous studies have identified a significant link between financial capability and retirement and yet a quarter of retirees in New Zealand do not have enough money to do what they want in retirement (Lin et al., 2016; Lusardi & Mitchell, 2005; *New Zealanders aged 50 years plus*, 2015). This is a result of widespread financial illiteracy in New Zealand and reinforces the link between financial capability and the ability to prepare effectively for retirement as identified by Lusardi and Mitchell (2011b) and numerous other studies. Bucher-Koenen, Lusardi, Alessie & van Rooji (2017) contend that individuals lacking financial capability have a poor understanding of saving and investment concepts and are susceptible to issues regarding accumulation of retirement savings. Agnew et al. (2013) also explore the idea that lack of financial wellbeing at retirement is due to inappropriate use/investment in

financial schemes; of concern is the tendency for individuals to choose default schemes which tend to be conservative, low risk and low return portfolios. Due to the age factor affecting financial literacy levels, defaulting young (usually less financially capable) adults to conservative schemes is likely to generate wealth accumulation shortfalls by retirement (Le, 2013).

2.5.2 Retirement planning around the Globe

Worldwide, retirement planning is considered poor. A study in 1998 was an early exploration of the negative impact that poor financial literacy can have on retirement planning (Bernheim, 1998). In the United States, only 46% of 30-44 year olds have attempted planning for retirement, this proportion only increasing to 51% for 45-59 year olds (Lusardi & Mitchell, 2011a). A study completed in America in 2012 found that 54% of working Americans had insufficient funds to enable adequate consumption during retirement (Woodyard & Robb, 2012). Once again, poor retirement planning is thought to be a result of financial illiteracy, reflected in Lusardi and Mitchell's findings that within adults over 50years surveyed, only 34% were considered financially literate and only 31% had done some planning for retirement (Lusardi & Mitchell, 2011b). A study in the United States identified that more highly educated households tend to hold more stock, related to higher financial literacy levels and a positive impact on retirement adequacy (Clark et al., 2015). In Lusardi & Mitchell's (2008) study on women, financial literacy and retirement planning, more than two thirds had no retirement planning (coinciding with a high level of financial illiteracy), and of the small proportion of planners, only 58.5% of those planners were successful in following the plan. In 2014, the Financial Consumer Agency in Canada undertook an analysis of the link between financial literacy and retirement wellbeing, based on the Canadian Financial Capability Survey. The study was prompted by the trend towards self-directed retirement planning/management and an aging population, not dissimilar to the current scenario in New Zealand (Simhon & Trites, 2017). As such, due to a lack of financial capability, individuals are often defaulted to conservative schemes and at risk of insufficient wealth accumulation (Falahati & Paim, 2011). The Canadian study identified that a significant relationship exists between financial literacy/capability and retirement wellbeing; in particular, the most important components of financial literacy were improving financial confidence, financial knowledge and an ability to develop and stick to a budget (Simhon & Trites, 2017). Mahdzan et al. (2017) found that

90% of individuals living in rural areas and 86% of urban dwellers had no savings, indicating many Malaysians will have to continue to work into their retirement years.

2.5.3 Retirement: New Zealand & Australia

In the context of New Zealand, an ANZ survey reveals an increase in the number of respondents recognising lifestyle as an important consideration for retirement planning (83%). However, there has been a drop in the number of respondents recognising the need to consider the likely length of retirement (*Financial Knowledge and Behaviour survey 2013*, 2013). In a study of New Zealanders over 50 years of age, 46% of those close to retirement did not have a financial plan in place (New Zealanders aged 50 years plus, 2015). Only 11% of those surveyed believed they had enough to live the lifestyle they desired after retiring (New Zealanders aged 50 years plus, 2015). Within Australia, only 32% of non-retired adults have attempted to work out the requirements for retirement saving (Agnew et al., 2013). In a retirement study on Australian and New Zealand residents, 42% and 37% of 18-24-year olds in New Zealand and Australia respectively have thought a lot about retirement. In contrast, these numbers are 68% and 60% for 55-64-year olds in New Zealand and Australia (*Retirement Survey AU/NZ*, 2017). In terms of calculating the required savings to fund retirement, only 19% of New Zealand respondents had thought about it 'a great deal', while in Australia, it was 20% (*Retirement Survey AU/NZ*, 2017). Further, based on the weekly New Zealand superannuation rate of $600 for a couple, only 48% of respondents would be able to get by, 16% being comfortable and 31% unable to get by. These figures worsen for the weekly single person superannuation rate of $360 whereby qualifying respondent answers revealed 24% get by, only 8% are comfortable financially, and 55% are unable to get by (*Retirement Survey AU/NZ*, 2017). In Australia, the fortnightly couple's superannuation rate is $1348 per fortnight; only 41% could get by, 12% could do so comfortably and 38% could not get by. For the single rate of $894 per fortnight, these figures fall to 35%, 12% and 47% respectively (*Retirement Survey AU/NZ*, 2017). With such a high level of individuals unlikely to be able to afford basic living in retirement, and without the appropriate planning, New Zealand and Australia are at risk of an increase in the numbers of retirees who fall below the poverty line.

The above results could stem from the partly-compulsory nature of the Australian Superannuation system. In Australia, employers have a compulsory contribution rate for each of their employees and additionally, adults are incentivised by tax benefits to contribute

further. In contrast, employers have little impact on retirement planning and superannuation schemes for employees in New Zealand. Hence, participation in Kiwisaver and other superannuation schemes are driven by the motivation and knowledge of the employee themselves to prepare for retirement.

Of individuals over 50 years that are yet to retire, a New Zealand study shows that only 42% have planned for retirement including calculating the likely expenses they will incur. More than half of the respondents have done no planning, meaning they are susceptible to financial hardship in retirement. Of the non-planners, the study revealed they were most likely in their early 50s with low income (below $30,000) and single. In contrast, the majority of thorough planners were over 60 years, with high income levels ($100,000 and above), living in Auckland or Wellington areas and in some cases, owned their own businesses (New Zealanders aged 50 years plus, 2015). Studies have shown that women are less likely to plan ahead and consequently plan for retirement, putting women at high risk of poverty at retirement due to inadequate finances (Hasler & Lusardi, 2017).

2.5.4 Retirement and gender

Reflecting the gender gap in financial capability, males tend to plan more for retirement than females despite the fact that females have a greater financial need at retirement. However, empirical retirement studies have assumed a traditional career duration, whereby retirement marks the end of the working years. In reality, the working life of a female differs greatly from the male as they are more likely to undertake flexible working arrangements, take career breaks and perform unpaid work resulting in a weaker attachment to the labour market (Duberley et al., 2014). Duberly et al. (2014) find that an individual's retirement adequacy is often defined by factors beyond financial preparedness, including the "historical, cultural and social context of life experiences". Bucher-Koenen et al. (2017) find that women are not only less financially literate, but also have difficulty obtaining high quality financial advice, rendering them vulnerable to failing to plan for retirement and making detrimental financial decisions. This finding holds across both G20 & BRICS countries; a 15% gender gap (in favour of males) exists in the United Kingdom regarding retirement savings (Hasler & Lusardi, 2017). Studies have identified that for a number of reasons, females have a greater need for retirement savings and yet often face strong barriers. Lusardi and Mitchell (2008) and other researchers have identified that males are more likely to invest in risky portfolios, often

resulting in higher returns and a greater level of wealth accumulation at retirement (Joo & Pauwels, 2002). A gender preference study undertaken in America also identified that women are less averse to both risk and competition (Croson & Gneezy, 2009). Women tend to be concentrated in low paying jobs, as well as spending a greater proportion of their working life on 'caring' work (child-rearing), causing lower attachment to the labour market and resulting in less disposable income available for investment/saving (Bajtelsmit & Bernasek, 1996; Bucher-Koenen et al., 2017; Joo & Pauwels, 2002; Zokaityte, 2016). Duberly et al. (2014) attribute female retirement issues to the tendency for them to adopt primary responsibility for family care and thus a more fragmented working life. Consequently, due to the weaker attachment to the labour market for a majority of females, often the income they earn over their career is insufficient to maintain their current consumption level in retirement, leading to many women working beyond the traditional retirement age (Duberley et al., 2014). Studies also highlight that women on average have a higher life expectancy, indicating a need to accumulate more funds to sustain spending requirements throughout the length of retirement (Bajtelsmit & Bernasek, 1996; Bucher-Koenen et al., 2017; Lusardi & Mitchell, 2008). Beyond these factors, given the relationship between financial capability and one's ability/propensity to save for retirement, combined with the gender differentials in financial capability levels, it is predicted that a gender gap also exists in achieving retirement wellbeing.

Due to the responsibility of retirement planning/saving falling increasingly on the individual, research has highlighted the prevalence of poor adult financial capability levels, and the impact this capability level has on retirement wellbeing. Considering growth in financial knowledge generally translates to an improvement in financial capability, an indicator of capability is one's ability to understand and effectively make sound financial decisions, including those towards retirement wellbeing. Due to poor financial literacy amongst women, it is expected they are less financially capable and thus, less likely to plan for retirement. Research to date fails to identify the extent to which varying retirement adequacy levels (linked to financial capability measures) are an independent gender issue which consequently puts women at higher risk of insufficient retirement wealth, poverty, homelessness and financial instability.

3.) Data and methods

3.1 Hypotheses

Following the working definition for this study, financial capability is achieved through using a combination of financial knowledge, literacy, behaviours and motivations to make informed decisions towards financial wellbeing. The consensus drawn from the literature is that improvements in financial knowledge, inclusion and literacy levels can all contribute to the progression of financial capability and thus lead to improved financial wellbeing for individuals as well as economic growth for society. Shortfalls in financial capability levels are attributed by many researchers to certain socio-demographic factors previously recognised in studies measuring financial inclusion, knowledge and literacy. That is, low levels of financial capability are most often found amongst young adults, those with low education, low-income earners and in ethnic minorities. However, although identifying gender as an influencing factor, studies have failed to comprehensively analyse whether the gender disparity in financial capability levels is pervasive across cultures, life-stages, countries, and contexts.

Hypothesis 1: A gender gap exists in financial capability and financial literacy levels measured across varying age (pre-retirees and retirees), income, education, and ethnic demographics.

Due to the changing retirement perspective and shift in responsibility, the focus of recent studies has turned to identifying the determinants of sound retirement planning. The general findings of relevant studies on financial behaviour tend to indicate a significant positive relationship between the level of financial capability and retirement adequacy. Low financial capability is widespread internationally, with members of advanced economies significantly lacking in the appropriate skills, knowledge and motivation to achieve financial wellbeing. This relationship provokes the question as to whether the gender divide identified in the level of financial capability of adults translates to inadequate retirement wellbeing for females in particular.

Hypothesis 2:

a.) Females are less financially prepared for retirement, resulting in a lower level of New Zealand women achieving retirement adequacy
b.) Retirement adequacy is independently influenced by gender

3.2 Data sources:

The first section of the study relates to hypothesis 1 and investigates whether a significant gender difference exists in financial capability levels. This investigation will use online survey data collected for original use in the Thesis of Robert Lissington (2018) titled 'How prepared are New Zealanders to achieve adequate consumption in retirement?'; in September 2015, 1044 respondents between 50-80 years completed questions regarding financial health, behaviour and attitudes as well as general demographic questions.

The second section of this thesis explores whether the above gender issue (if identified) in financial capability translates to a similar gender gap in retirement adequacy levels in New Zealand. The analysis will utilise retirement adequacy scores and socio-demographic data from Lissington's (2018) study to determine whether the gender gap in financial capability identified in empirical literature translates to a sustained gender gap in retirement adequacy for individuals between 50-80 years. Ultimately, retirement adequacy will be modelled as a multi-factor regression relationship, using education, income and gender and ethnicity as explanatory variables.

3.3 Data Model:

A two-sample T-test is used to test for a significant gender difference in financial literacy and financial capability. This is the most appropriate model given that we can split the data for the finliteracy (lit) and fincapability (cap) variables into two samples; males and females. Table 15 provides a breakdown of the questions used to determine the fincapability and finliteracy scores. For each variable, the statistical significance of the difference between gender means is examined to identify the explanatory power.

Method
μ_1: mean of Males cap
μ_2: mean of Females cap
Difference: $\mu_1 - \mu_2$
Equal variances are not assumed for this analysis.

Table 5:Two-sample T-test financial capability

Method
μ_1: mean of Males lit
μ_2: mean of Females lit
Difference: $\mu_1 - \mu_2$
Equal variances are not assumed for this analysis.

Table 6: Two-sample T-test financial capability

The second part of this research relates to Hypothesis 2 and seeks to identify whether a significant statistical relationship exists between retirement adequacy and gender. That is, whether there is a gender gap in retirement adequacy in favour of males which is not explained by variations in other socio-demographic factors. For Lissington's (2018) study, a Consumption Replacement method was used to calculate a retirement adequacy binary variable; a respondent was deemed to achieve retirement adequacy if, the difference between the Net Present Value (NPV) of household resources and the NPV of total household consumption requirements was zero or above.

A binary logistic regression model is the most appropriate analysis to identify the explanatory power of gender on retirement adequacy. Empirical studies identify that income, education and ethnicity influence one's likelihood to achieve retirement adequacy. Table 15 (in the appendix) provides an outline of the questions used to determine the data for each of the independent variables and the empirical research that supports their relevance in this analysis. This study seeks to identify whether gender has explanatory power on retirement adequacy when considered independently of these variables. Equation 1 below allows retirement adequacy and gender to be analysed while controlling for the explanatory power of income, education and ethnicity. The following logistic regression model has been constructed to test the hypothesis that retirement adequacy is independently influenced by gender, based on categorical data;

$$Y' = \alpha + \beta_1 (\text{income}) + \beta_2 (\text{education}) + \beta_3 (\text{gender}) + \beta_4 (\text{ethnicity})$$

Where: Y' = Retirement Adequacy

β_1 = Income coefficient

β_2 = Education coefficient

β_3 = Gender coefficient

β_4 = Ethnicity coefficient

Equation 1: Retirement Adequacy regression equation

The data has been split into pre-retirees (individuals who are still employed to some degree) and retirees. Both data sets were regressed using Equation 1 to identify whether gender is a statistically significant predictor of retirement adequacy. The data set was split to account for the impact of the income variable; pre-retirement, the income stream will be based on

salaries/wages earned. Post-retirement, income streams are largely superannuation payments and income from other investments. As income contributes significantly to one's ability to plan and save for retirement, it is important to distinguish between life stages whereby this income stream is likely to be different to identify true results. The explanatory variables included in both equations largely reflect consensuses drawn from the relevant literature. That is, financial capability and retirement wellbeing are believed, and in many cases proven, to be directly influenced by income, education and ethnicity. The inclusion of the gender variable is directly associated with the investigation of Hypothesis two.

4.) Results and Discussion

4.1 Gender issue in financial capability

Lissington's (2018) study developed a finliteracy index based on questions on time value of money, interest rates, inflation, depreciation and diversification. For each correct answer, respondents were given 1 point, forming a finliteracy score from 1-7. A similar approach was taken to forming the fincapability variable; survey questions focused on the development of financial plans especially for retirement, budgeting, money management, financial knowledge (including about the economy) and debt levels, yielding a score of 1-5 (Lissington, 2018). The questions used to test both financial capability and financial literacy are recorded in Table 15 in the appendix.

The two-sample T-test was used to test the significance of gender on the mean level of the finliteracy and fincapability variables. The test then ran the null hypothesis that the difference between the mean finliteracy level for males and females was equal to zero. By default, the alternative hypothesis is that the difference between means (male less female mean) was different to zero in either direction. This same test was run to measure whether a gender difference existed for the fincapability variable.

Two-Sample T-Test and CI: Males lit, Females lit

Method

μ_1: mean of Males lit
μ_2: mean of Females lit
Difference: $\mu_1 - \mu_2$

Equal variances are not assumed for this analysis.

Descriptive Statistics

Sample	N	Mean	StDev	SE Mean
Males lit	528	4.60	1.74	0.076
Females lit	35	4.66	1.63	0.27

Estimation for Difference

Difference	95% CI for Difference
-0.057	(-0.633, 0.520)

Test

Null hypothesis $H_0: \mu_1 - \mu_2 = 0$
Alternative hypothesis $H_1: \mu_1 - \mu_2 \neq 0$

T-Value	DF	P-Value
-0.20	39	0.843

Table 7: Two sample T-Test- Finliteracy

The null hypothesis for the deviance test for each of the variables is that the coefficient is equal to zero. A p-value less than 0.05 conveys that the null can be rejected and the variable coefficient is statistically different from zero. As shown in Table Five above, the two-sample T-test for finliteracy tested the male mean less the female mean to identify whether a significant difference exists. The test returned a mean finliteracy level of 4.600 for males and 4.66 for females. That is, the estimated difference based on the sample data is -0.057 with a corresponding 95% confidence interval of -0.633, 0.520. The t-value of -0.2 and the p-value of 0.843 indicate that there is no statistically significant difference in the finliteracy levels for males and females.

Two-Sample T-Test and CI: Males cap, Females cap

Method

μ_1: mean of Males cap
μ_2: mean of Females cap
Difference: $\mu_1 - \mu_2$

Equal variances are not assumed for this analysis.

Descriptive Statistics

Sample	N	Mean	StDev	SE Mean
Males cap	451	3.136	0.527	0.025
Females cap	258	3.181	0.503	0.031

Estimation for Difference

Difference	95% CI for Difference
-0.0450	(-0.1235, 0.0335)

Test

Null hypothesis $H_0: \mu_1 - \mu_2 = 0$
Alternative hypothesis $H_1: \mu_1 - \mu_2 \neq 0$

T-Value	DF	P-Value
-1.13	555	0.261

Table 8: Two-sample T-test- Fincapability

Secondly, the same test model was run using the fincapability data for both males and females, with the results presented in Table 8 above. The model yielded a mean fincapability level of 3.136 for males and 3.181 for females. The estimated difference between the male and female averages is -0.045 with a 95% confidence interval of -0.1235, 0.0333. This corresponds to a t-value of -1.13 and a p-value of 0.261, indicating the null hypothesis cannot be rejected and therefore we assume no statistically significant gender difference between fincapability levels based on this sample.

These results indicate it cannot be concluded that there is a difference in the financial literacy and/or financial capability levels between men and women. These findings therefore do not validate the Hypothesis 1. However, it is important to note the conditions under which the financial literacy and financial capability variables were identified. In empirical studies, financial literacy and capability were often tested on the foundation of questions termed the 'Big Three'. That is, Lusardi & Mitchell formed three basic questions covering diversification, time value of money and inflation. These have since been identified as the precedent to measure financial literacy levels, with some studies using these as the crux of the study and adding additional questions to achieve a more comprehensive finding.

In contrast, the finliteracy and fincapability indexes measured in Robert Lissington's (2018) study include a wider scope of financial components. Firstly, beyond the 'Big Three' questions, the finliteracy measure in this study also includes measures for understanding investments and compounding interest. Secondly, the testing of fincapability for Lissington's study differed from previous studies in that it also included measurements for indebtedness, financial awareness and a pre-retiree financial plan. Consequently, although these studies found there was no significant gender difference in financial literacy and capability levels, these results cannot validify that Hypothesis 1 is completely inaccurate. That is, based on the measurement practice in this study, no statistically significant difference was found; however, in other studies with different components for measuring, and/or different geographical areas, these results may vary.

4.2 Gender issue in retirement adequacy

Due to the age range of respondents between 50-80 years, it is likely the income level in retired individuals (pension funds) will differ greatly from respondents who still receive a wage or salary. For this reason, the data has been split into retired and employed individuals and analysed separately.

Deviance Table

Source	DF	Adj Dev	Adj Mean	Chi-Square	P-Value
Regression	8	12.205	1.5257	12.21	0.142
Income	2	1.287	0.6435	1.29	0.525
Education	4	2.556	0.6391	2.56	0.635
Gender	1	7.228	7.2282	7.23	0.007
Ethnicity	1	2.399	2.3993	2.40	0.121
Error	368	472.215	1.2832		
Total	376	484.421			

Table 9: Deviance Table- employed

Deviance Table

Source	DF	Adj Dev	Adj Mean	Chi-Square	P-Value
Regression	8	40.091	5.0114	40.09	0.000
Income	2	37.118	18.5590	37.12	0.000
Education	4	3.481	0.8701	3.48	0.481
Gender	1	0.072	0.0719	0.07	0.789
Ethnicity	1	0.593	0.5929	0.59	0.441
Error	597	626.801	1.0499		
Total	605	666.893			

Table 10: Deviance Table- retired

In both cases, the binary logistic regression model has been tested. When running Equation 1 for employed individuals, despite all variables tested returning significance, the deviance R-squared value is only 2.52%, indicating retirement adequacy is a complex multi-faceted measure that may be influenced by a wider range of variables not included in this study. Similarly, when testing the gender difference in retirement adequacy for retirees, Equation 1 returned a deviance R-squared of 6.01%, again suggesting the model does not comprehensively explain variation in the adequacy for retirees.

Table 9 reveals the p-values for testing the model variables for employed respondents and Table 10 for retirees. The null hypothesis for the regression variable in both equations is that for all variables, the coefficients equal zero. The p-value for the regression for employed respondents is 0.142 which indicates the null hypothesis cannot be rejected and thus at least one of variables has a coefficient of zero. For retired respondents the regression p-value is 0.000 indicating the coefficients of the same four variables are not equal to zero.

Odds Ratios for Categorical Predictors

Level A	Level B	Odds Ratio	95% CI
Income			
1	0	0.8657	(0.5462, 1.3723)
2	0	1.5754	(0.4732, 5.2454)
2	1	1.8198	(0.5602, 5.9112)
Education			
2	1	1.5160	(0.7716, 2.9785)
3	1	1.5322	(0.7721, 3.0405)
4	1	1.6647	(0.7092, 3.9072)
5	1	1.9201	(0.7904, 4.6639)
3	2	1.0107	(0.5813, 1.7572)
4	2	1.0981	(0.5205, 2.3167)
5	2	1.2665	(0.5768, 2.7807)
4	3	1.0865	(0.5097, 2.3159)
5	3	1.2532	(0.5688, 2.7610)
5	4	1.1534	(0.4607, 2.8876)
Gender			
2	1	0.5478	(0.3517, 0.8533)
Ethnicity			
1	0	1.6079	(0.8858, 2.9188)

Odds ratio for level A relative to level B

Table 13: Binary Logistic Regression Odds Ratio- Employed

Odds Ratios for Categorical Predictors

Level A	Level B	Odds Ratio	95% CI
Income			
1	0	0.1688	(0.0948, 0.3005)
2	0	0.1969	(0.0997, 0.3892)
2	1	1.1665	(0.7129, 1.9088)
Education			
2	1	0.9992	(0.4683, 2.1319)
3	1	0.8041	(0.3767, 1.7164)
4	1	1.2633	(0.5664, 2.8178)
5	1	1.3178	(0.5893, 2.9470)
3	2	0.8048	(0.4720, 1.3724)
4	2	1.2644	(0.6988, 2.2878)
5	2	1.3189	(0.7266, 2.3940)
4	3	1.5710	(0.8668, 2.8474)
5	3	1.6388	(0.9031, 2.9739)
5	4	1.0432	(0.5538, 1.9651)
Gender			
2	1	1.0553	(0.7121, 1.5639)
Ethnicity			
1	0	1.1929	(0.7589, 1.8752)

Odds ratio for level A relative to level B

Table 14: Binary Logistic Regression Odds Ratio- Retired

Coefficients

Term	Coef	SE Coef	VIF
Constant	0.261	0.427	
Income			
1	-0.144	0.235	1.10
2	0.455	0.614	1.08
Education			
2	0.416	0.345	2.15
3	0.427	0.350	2.09
4	0.510	0.435	1.63
5	0.652	0.453	1.60
Gender			
2	-0.602	0.226	1.02
Ethnicity			
1	0.475	0.304	1.06

Table 12: Binary Logistic Regression coefficients- employed

Coefficients

Term	Coef	SE Coef	VIF
Constant	0.169	0.426	
Income			
1	-1.779	0.294	2.04
2	-1.625	0.348	2.10
Education			
2	-0.001	0.387	3.01
3	-0.218	0.387	2.95
4	0.234	0.409	2.59
5	0.276	0.411	2.67
Gender			
2	0.054	0.201	1.02
Ethnicity			
1	0.176	0.231	1.06

Table 11: Binary Logistic Regression coefficients- retired

Particularly important when using binary logistic regression is to analyse the odds ratio. This ratio compares the impact on the response variable of an explanatory variable occurring at two different levels. Only odds ratios that have a confidence level that doesn't include 1.0 are considered to yield statistically significant results.

4.2.1 Ethnicity

Firstly, when measuring the ethnicity variable, the value 1 was given to all Europeans and 0 to all other ethnicities and individuals who answered 'I don't know' or 'prefer not to say' (representative of ethnic minorities in New Zealand), as documented in Table 15. For employed respondents, ethnicity yields a deviance p-value of 0.121, indicating the variable coefficient of 0.475 is not statistically significant, as shown in Table 7. For retired respondents shown in Table 11, the coefficient of 0.176 for ethnicity is not statistically different from zero based on the p-value of 0.441. Testing ethnicity as 1 against 0, yielded an odds ratio of 1.6079, as presented in Table 12 for employed respondents, however the result was not statistically significant. Table 14 shows that the same calculation revealed an odds ratio of 1.1929, which was not significant when testing retired respondents.

4.2.2 Income

For simplicity, income data was allocated a 2 if within the high income brackets, 1 if medium and 0 if low; the specific allocation of the income data is broken down in Table 15. Income is significant at the 1% level with a p-value of 0.000 for retirees yet not significant for employed adults with a p-value of 0.525 as shown in Tables 9 and 10. Table 11 reveals that for employed respondents, income returned a coefficient of -0.144 for medium income earners and -0.455 for high earners. Table 13 presents comparable results for retired individuals, with the respective coefficients of -1.779 and -1.625 being significant at the 1% level based on the p-value of 0.000. This negative relationship is interesting given that empirical literature indicates that individuals with higher incomes tend to maintain high financial literacy levels as well as have a higher proportion of residual disposable income to save for retirement. One explanation for this low income-high adequacy trend is the New Zealand government-based superannuation schemes providing adequate financial support for low income passive investors. Tables 12 and 14 provide an analysis of odds ratios relative to the relationships between varying income levels for employed and retired respondents respectively. Testing the 2 vs 1 income levels did not return a significant result for employed or retired individuals.

1 vs 0 yielded a significant ratio of 0.1688 for retired only, illustrating that medium income retirees 0.1688 times more likely to achieve retirement adequacy than low income retirees. Similarly, testing 2 vs 0 returns a significant ratio of 0.1969 for retired respondents, indicating that high income retirees are 0.1969 more likely than low income retirees to achieve retirement adequacy.

4.2.3 Education

As shown in Table 15 in the appendix, education was segmented into: no formal education (1), school qualification only (2), trade certificate or diploma (3), Bachelors degree (4), Postgraduate degree (5). For employed respondents (displayed in Table 9), education has a p-value of 0.635 which is indicative that the coefficients of 0.416 (high school), 0.427 (diploma/certificate), 0.510 (Bachelors) and 0.652 (Postgraduate) are not statistically significant. Table 10 shows results for retirees and reveals a p-value of 0.481 which indicates the education coefficients of -0.001 (high school), -0.218 (diploma/certificate), 0.234 (Bachelors) and 0.276 (Postgraduate) are not statistically significant. Tables 12 and 14 show that for employed and retired respondents respectively, none of the odds ratios are statistically significant indicating that there is insufficient evidence that education has an impact on retirement adequacy.

4.2.4 Gender

As shown in Table 9 the deviance p-value for employed respondents is 0.007 indicating the coefficient for gender of -0.602 is significant at the 1% level. For retired respondents (Table 10), the coefficient of 0.054 returns a p-value of 0.789 indicating it is not statistically different from zero.

One of the main purposes of this thesis is to identify whether a gender gap exists in retirement adequacy and therefore whether one's ability to achieve retirement adequacy is largely influenced by gender. When collecting data, a binomial measure was used with females being allocated a score of 2 and males a score of 1. Consequently, in the binary logistic regression model, the odds ratio test used males as the reference level and compared the probability of being categorised as adequate for retirement if a respondent was female. Table 12 reveals the ratio testing yielded 0.5478 for the employed respondent data, indicating that females are approximately half as likely to achieve retirement adequacy when compared with males. As shown in Table 14, the ratio returned for retirees was 0.054 yet, the confidence interval

includes 1.0 and conveys that this ratio is not conclusive of a significant difference in retirement adequacy levels between males and females.

The binary logistic regression is the most appropriate model to assess whether hypothesis two is valid as retirement adequacy was measured binomially, with those achieving financial adequacy allocated 1 and those who didn't a 0. The above results reveal that gender largely influences a respondent's ability to achieve retirement adequacy for those who are still employed. That is, males are more than twice as likely to achieve adequacy based on the respondent data collected. However, it cannot be concluded that this is the case when the binary logistic model is used to test the data for retirees as the odds ratio confidence individual indicates the coefficient is not significant. Hence, the above analysis validates Hypothesis 2 only for employed individuals and does not hold for retired respondents.

4.3 Discussion

Hasler & Lusardi (2017) highlight that poor financial literacy is largely influenced by gender and it is not simply a coincidental relationship. The paper also indicates that policy should be introduced to reduce the pervasive gender gap in financial literacy, perhaps by targeting women in financial education schemes and empowering them to take financial responsibility. The gender issue is evident in various other influencing factors and should be directly addressed. Policies should aim to improve the inequalities related to the gender pay gap, gendered education differentials and treatment of ethnic minorities, in particular women.

Hasler and Lusardi (2017) also identify that targeted education programmes for women and men could be efficient at improving overall financial literacy levels. As such, these education programmes can be tailored to the appropriate audience; research demonstrates that targeted education programs for women regarding financial knowledge and awareness are generally beneficial given that women are often aware of their lacking financial abilities (Hasler & Lusardi, 2017). This concept is supported by findings in a 2007 study in America, concluding that a "one-size-fits-all" education approach will fail to improve financial behaviour due to the level of diversity in people's financial understanding (Lusardi & Mitchell, 2007). Programmes targeting males should focus on improving general financial knowledge and attitudes to saving and investment. Financial education, especially personal finance should target school children, given that there is a gender gap in financial knowledge at high

school ages and that an understanding of money should be instilled from an early age (Hasler & Lusardi, 2017).

Arguably the most important finding of this study is that a significant gender difference exists in retirement adequacy for adults prior to retirement that is not explained by other variables. That is, males are more than twice as likely to achieve adequacy within the pre-retiree age bracket. This is particularly concerning given the long-life expectancy of women on average. Given the gender gap that persists in countries worldwide, coupled with the gender disparity in financial capability levels, women are often disadvantaged in terms of retirement saving and preparedness and consequently, more at risk of poverty later in life. Due to the aging nature of the world's population, policymakers should target both males and females at a young age (as young as high school) with financial education programmes to instil a foundation of financial literacy and boost awareness about retirement planning.

An interesting finding in the above analysis is that income is statistically significant in determining retirement adequacy and yet the relationship is negative; a finding contradictory to the empirical literature. Based on the relationships and correlations established by recent studies, it is believed that higher incomes usually translate to higher financial capability levels and therefore improve one's ability to achieve retirement wellbeing. Not only do those with higher incomes have a greater level of disposable income available for saving, they also have an increased motivation to use formal financial services and upskill in order to better manage their personal funds. Many people who are on low wages, work casually or are unemployed, have little means to acquire formal financial services (money management, investing, loans, etc.) and therefore are less likely to achieve financial wellbeing during their working life and adequacy come retirement. Although unlikely to have caused the actual relationship to differ from the expected positive relationship, it is important to mention that the above analysis separated respondents into high, medium and low income. Low income households were $0-$35,000, medium income households were $35,001-$150,000 and high-income households were above $150,001. Consequently, the division between high, medium and low may be different from other studies and therefore influence the income variable coefficient.

An explanation for the occurrence of the negative relationship is that the retirement adequacy index included a consideration for the level of consumption the respondents expected to have in retirement. Those with lower incomes have lower expectations for

consumption requirements and it is possible their estimated requirements are covered by the New Zealand superannuation payments they receive. In contrast, respondents with high income, will likely have higher requirements to be able to maintain their level of consumption during retirement. Consequently, New Zealand Superannuation payments would be insufficient and the deficit would need to be covered by personal savings and other investments. Also, despite measuring retirement adequacy for an individual, the original data utilised household income. Individual retirement adequacy may be over-estimated in some cases. For example, in a household where a male predominantly provides financially for the family, a female respondent may report high household income and yet low personal income, each of which would have largely varying impacts on the retirement adequacy index measured.

The findings by Bucher-Koenen et al (2016) suggest that a significant portion of the gender differential in financial literacy is explained by lower confidence in females. However, once controlling for confidence, a gender difference of almost 15% still existed, indicating a disparity in financial knowledge levels (Bucher-Koenen et al., 2016). It is possible that the lack of confidence females have in their own financial knowledge and financial independency could contribute to the gender difference in retirement adequacy for pre-retirees. Further, this would be increasingly relevant if the male of the household took control (either currently or in the past) of financial matters including superannuation investment. In such cases, females lack the knowledge and the confidence to proactively prepare for retirement and manage their own superannuation plans. This above analysis of gender differences in retirement adequacy could be enhanced by including a variable controlling for an individual's confidence in their personal financial knowledge and ability to manage their retirement plan effectively.

Overall, both of the models have very low R-squared values, indicating that their explanatory power is weak. They conclude that although the variables included look to be related based on empirical studies and the coefficients calculated, only gender has statistical significance for the employed model. Future studies should attempt to tailor the above models to improve the explanatory power. In particular, the explanatory power of the chosen independent variables may be low due to the way the dependent variable was defined. In the index, retirement adequacy was determined largely by measuring individual's attitudes to key

retirement considerations. However, the index fails to capture measures of financial knowledge and behaviour, both of which largely contribute to retirement wellbeing and are proven by empirical studies to be influenced by socio-demographic factors. For simplicity, only four relevant variables were used to test retirement adequacy; it is therefore possible other variables could be included to explain more of the variation in retirement adequacy. For example, the literature above shows that efficient investment in stocks, and other assets, can improve retirement savings significantly. Likewise, the risk profile of respondents could significantly impact the level of funds superannuation schemes accumulates from person to person. Literature reveals that women tend to be less financially confident and more risk averse than men. This could result in women selecting lower contribution rates and lower risk investments and therefore generating less savings for retirement during their commitment in the superannuation fund. Although not included in the above models tested, a simple index of financial literacy (measured using the 'Big Three' questions) could enhance the explanatory power. Empirical literature identifies a significant relationship between financial literacy, financial capability and retirement wellbeing in that adults who are financially literate, tend to behave, plan and save in a way the is focussed towards long-term wellbeing.

4.4 Limitations

These results are significant and especially contribute to the growing literature on retirement wellbeing in New Zealand. One limitation of this data is that it is concentrated on New Zealand data, and although models and trends are likely to be applicable internationally, we cannot conclude that the gender gap identified in retirement adequacy for pre-retirees holds in every country. For example, financial literacy levels are very low in some developing countries, especially in South Asia, implying poor retirement wellbeing for both men and women. It is therefore inappropriate to assume running a similar model with data from adults in these areas would generate similar results. Likewise, as the data used for retirement adequacy was collected for analysis of retirement wellbeing and the variables that are related, data was only collected for people in the age group 50-80 years. Therefore, it cannot be concluded that the gender difference is pervasive over all age groups. Instead, our findings show that a gender gap exists in adults over the age of 50 but before retirement and living in New Zealand.

Not unrelated to the above limitations is that the survey data is self-reported and therefore assumes individuals understand the purpose of the question and answer correctly. Likewise,

responses can often be biased; individuals who feel they may have particularly poor answers to certain questions may not submit the survey. There is a tendency for respondent data to be positively skewed and therefore the results should be interpreted in conjunction with findings from empirical studies.

Lastly, it should be recognised that the results above were dependent on the retirement adequacy index formed by Robert Lissington (2018) to assess one's ability to achieve adequate consumption in retirement. This was based on a Consumption Replacement method; a respondent was deemed to achieve retirement adequacy if the difference between the Net Present Value (NPV) of household resources and the NPV of total household consumption requirements was zero or above. As such, this index excluded relevant considerations such as the presence of a long-term financial plan and participation in a superannuation scheme. Consequently, the above should be interpreted as an indication that a gender gap exists in the ability of pre-retirees to achieve adequate consumption come retirement. It is also provides scope for further research to understand if this trend holds in different sample pools, across country boundaries, and with other related measures of retirement adequacy.

5.) Conclusions

5.1 Introduction

Gender inequality is a prominent issue that affects many industries and facets of community living. Although progress has been made in many areas, a gender disparity persists in financial behaviour, particularly financial capability. Despite a number of financial behaviour studies acknowledging the influence of gender, very few have examined the extent to which gender impacts on financial behaviour and whether, in fact, gender explains variation in financial wellbeing levels. The core issue of this study is the explanatory power of gender on variations in financial literacy, capability and retirement adequacy levels. It explores whether gender exists as a stand-alone issue when controlling for other influences including age, education, income and ethnicity. For this study, Financial Capability is defined as the behaviour, knowledge, attitude and ability to make decisions towards financial wellbeing.

5.2 Gender and financial capability

Hypothesis 1 was formed based on the pervasive gender gap in financial literacy identified by numerous empirical studies. This was measured by collating OECD surveys, the Flat World Initiative results, ANZ Financial behaviour surveys and the results of other relevant studies. The Flat World initiative exploring financial knowledge/behaviour found that worldwide, in no countries did the level of female literacy exceed that of their male equivalents. The degree of gender disparity varies greatly across various demographics but particularly across countries; in New Zealand, males and females have a similar level of knowledge regarding time value of money and yet in Sweden the differential is 18% in favour of males (*Women and Financial Literacy: OECD/INFE evidence, survey and policy responses*, 2013). The OECD/INFE pilot study furthered these findings identifying gender differentials (favouring males) of 26%, 22% and 20% in UK, Germany and Norway respectively (*Women and Financial Literacy: OECD/INFE evidence, survey and policy responses*, 2013).

Hypothesis one was tested by running a two-sample T-test using the financial literacy and financial capability variable data from Lissington's study (Lissington, 2018) . The results of the tests for difference between the gender means for financial capability and financial literacy were insufficient to support the claim that a significant gender difference exists in both variables. This could arise due to the data being collected from adults aged 50-80 years. Adults

are assumed to have developed a wider financial knowledge base due to their exposure to financial services and decisions throughout their adult life. Consequently, it is expected that gender differences in financial literacy and capability levels are likely to be more prominent in adults between 18-45 years.

5.3 Gender and retirement adequacy

The testing of Hypothesis 2 investigates whether females are less financially prepared for retirement and are therefore less likely to achieve retirement wellbeing than males. Studies have found that males tend to plan more for retirement than females despite the fact that females have a greater financial need come retirement. In both G20 and BRICS countries, a gender difference in planning for retirement is found; in the United Kingdom, the number of males planning and saving for retirement is 15% higher than the number of females (Hasler & Lusardi, 2017). Females have a greater need for retirement savings due to their long average life expectancy and yet often face stronger barriers than males. Lusardi and Mitchell identify that males are more likely to invest in risky portfolios, often resulting in a higher returns and a greater level of wealth accumulation come retirement (Joo & Pauwels, 2002; Lusardi & Mitchell, 2008). Additionally, women often take career breaks due to child-rearing and in many cases are more highly concentrated in lower paying care work and part-time roles. The risk aversity of women combined with the gender pay gap also significantly contribute to the gender disparity in retirement saving.

To test hypothesis two, a binary logistic regression model was applied to test retirement adequacy as a function of income, ethnicity, education and gender. The findings validate hypothesis two in regards to adults over 50 years still in employment, indicating a significant gender difference exists in retirement adequacy. For this age bracket, females are less than half as likely to achieve retirement adequacy than males. However, results are inconclusive for those who have already retired.

5.4 Further Research

Duberly et al. (2014) investigated women's retirement planning and decisions. They explore the idea that a women's retirement trajectory varies greatly from their male counterparts given the weaker attachment to the labour market, career breaks and regularity of unpaid, care work. The study suggests exploring women's retirement preparedness as a multi-factor model inclusive of personal health, family & caring responsibilities, financial issues,

employment policies and discrimination, and institutional factors (Duberley et al., 2014). Not discounting the importance of financial literacy in achieving retirement adequacy, preparedness for retirement is likely influenced by factors beyond financial knowledge, inclusion, attitudes and risk aversion. The retirement adequacy index formed for Lissington's (2018) study and used for the above analysis, assumes retirement adequacy is predominantly based on financial attitudes. Thus, it ignores the importance of cultural factors, personal health, institutional factors as well as gender and racial discrimination.

Similarly, just as there is no conventional working life trajectory for a female, there is no one pattern of life beyond retirement. Often females work beyond the standard retirement age, in both part-time and unpaid care work. Duberly et al. (2014) propose that women's retirement should be assessed independently of males due to the additional factors influencing female work life including a weaker labour market attachment, career breaks, lower income levels and domestic household attitudes. The gender differences in male and female retirement patterns highlighted in the study, have direct implications on the results of this thesis. Although it is likely there are significant gender differences in the financial preparedness of men and women due to disparities in financial literacy levels and the gender pay gap, it may be more appropriate to take a holistic approach when assessing retirement adequacy.

On further analysis, the retirement adequacy formed by Lissington (2018) focuses largely on financial attitudes, measuring the degree to which respondents agreed with statements regarding New Zealand Superannuation, KiwiSaver, spending of income, being well-prepared for retirement and having a well-developed financial plan. Despite the importance of a positive financial attitude in driving behaviour, financial knowledge and the consequent financial behaviour are arguably more important when measuring one's likelihood of achieving adequate consumption in retirement. Duberly et al. (2014) identify significant differences in the retirement landscape between men and women. Women tend to have a weaker attachment to the labour force, take on a greater role in child-rearing, become concentrated in lower paying roles contributing to the pervasive gender gap, and rarely take on the financial management role within the conventional household. Consequently, a female's transition to retirement is strongly impacted by additional factors beyond those that impact the conventional male work to retirement transition. Future studies could identify the

factors that specifically influence male and female retirement patterns independently, form two respective indices based on these and explore retirement adequacy through comparison of the two.

For future studies both within New Zealand and internationally, retirement adequacy should be defined as the ability to achieve adequate consumption in retirement beyond simply making ends meet. In theory, many financial knowledge and behavioural factors influence one's likelihood of achieving retirement adequacy and therefore should be combined to form a proxy for retirement adequacy. These include one's predicted age of retirement from both full-time and part time work, the formation of a formal financial plan (involving the calculation of the retirement saving needed and the predicted weekly income required to fund adequate consumption), other expected income sources additional to New Zealand Superannuation, net worth, current financial position and ability to make ends meet, and propensity to save.

5.5 Concluding remarks

From the above analysis, it is evident that a significant gender difference exists in financial capability levels that is pervasive in the majority of countries studied. In particular, the OECD financial knowledge survey identified gender differences in financial knowledge and financial behaviour levels across all 30 countries studied. However, utilising the financial capability and financial literacy data from Lissington's (2018) study, no significant gender differences could be identified. Further study is required to identify whether gender impacts on financial capability in New Zealand and internationally.

The internationally recognised gender differences in financial literacy, are believed to have a significant impact on retirement planning. The binary logistic regression analysis undertaken for this study resulted in a statistically significant gender difference in retirement adequacy levels for pre-retirees in New Zealand, with males almost twice as likely to achieve retirement adequacy than females. Further analysis is required to determine whether this trend holds in younger adults and individuals who have already retired. Further, it is proposed that future research should form a new proxy for retirement adequacy that utilises measures of financial knowledge and financial behaviour, including an individual's current financial position, propensity to save, other sources of income in retirement, formulation and adherence to a formal financial plan and calculations of retirement income requirements.

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7.) Appendix

Variable	Measurement	Questions	Relevance
Finliteracy	Financial literacy scores 1-7	*In order for people to take full advantage of the financial markets it is important that people understand financial terms and concepts. Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow? *Suppose you had $100 in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, how much would you have in this account in total? *Suppose in the year 2016, your income has doubled and prices of all goods have doubled. In 2016, how much will you be able to buy with your income? *Assume Sarah inherits $10,000 today and James inherits $10,000 in 3 years from now. Who is the richer because of the inheritance? *Considering a long period of time (for example 10 or 20 years), which asset normally gives the highest return? *When an investor spreads his money amongst different assets, does the investment risk of losing money...? - increase, decrease, stay same, don't know *Which is the best example of 'diversification'?	Lusardi & Mitchell's (2011b) 'Big Three' financial literacy questions: *Suppose you had $100 in a savings account and the interest rate was 2% per year. After 5 years, how much do you think you would have in the account if you left the money to grow: more than $102, exactly $102, less than $102? *Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy more than, exactly the same as, or less than today with the money in this account? *Do you think that the following statement is true or false? "Buying a single company stock usually provides a safer return than a stock mutual fund."
Fincapability	Financial capability scores 1-5	*How well developed or undeveloped would you say your financial plans for retirement currently are? *I am organised with regards to managing money- agree/disagree	

		*I know enough about financial products (loans, investments, etc) to choose ones that meet my needs- agree/disagree *Over the past five years, my personal loans and credit card debt has increased- agree/disagree *I often follow financial matters in the news, on-line and/or in the media- agree/disagree *I have a weekly or monthly budget that I follow- agree/disagree *Pre-retirement: I did not have a financial retirement plan: My financial retirement plans were well developed (1)- 1-7 scale	
Income	(1) $10,000 or less (2) $10,001 - $25,000 (3) $25,001 - $35,000 (4) $35,000 - $60,000 (5) $60,001 - $100,000 (6) $100,001 - $150,000 (7) $150,001 - $200,000 (8) More than $200,000 (9) Don't know	Which of the following best describes your household's total yearly income from all sources before tax (including government allowances and NZ Superannuation)? For simplicity in this study, categories 1,2,3 were allocated a score of 0, categories 4,5,6 were allocated a score of 1 and 7,8 were allocated a score of 2. The 'don't know' category was excluded from this analysis	McQuiad & Egdell (2010) explore the relationship between income and financial capability, finding that low financial capability was concentrated in adults with lower incomes; this is likely to have an adverse impact on one's ability to prepare adequately for retirement
Education	(1) No formal qualification (2) School Qualification only (3) Trade Certificate or Diploma (4) Bachelor's Degree (5) Postgraduate Qualification	Which best describes your highest formal educational qualification?	Lusardi & Mitchell (2011a) identify a distinct link between education and financial capability; this indicates that a likely relationship exists between higher education and achieving retirement adequacy
Gender	(1) Male (2) Female	Are you male or female?	The main objective of this study is to model gender as an explanatory factor of retirement adequacy given empirical literature, including Lusardi & Mitchell' 2011 study in America, attributes gender as a factor of poor financial capability
Ethnicity	(1) New Zealand European	Which of these groups do you fit into? You can be in more than	Lusardi & Mitchell (2011a) find that in America, ethnic minorities (Hispanics and African Americans)

	(2) New Zealand Maori, Samoan, Cook Island Maori, Tongan, Niuean, Another Pacific Island group (please tell us), Chinese, Indian, Another Asian group (please tell us), Another European group (please tell us), Another ethnic group (please tell us), Don't know, Prefer not to say	one - for simplicity in this study, a binary variable was formed	often have lower levels of financial capability. In New Zealand, the financial knowledge survey (Brunton 2013) explores a similar relationship with Maori and Pacific Islanders living in New Zealand. Due to the link between financial capability and retirement preparedness, it is likely ethnicity will directly influence retirement adequacy

Table 15: Variables