Identifying School Climate Variables Associated with Financial Literacy Outcomes in PISA 2018 Data

A Multilevel Structural Equation Modelling Approach

Tony C. A. Tan

Master of Science in Assessment, Measurement and Evaluation
30 credits

Centre for Educational Measurement
Faculty of Educational Sciences

Spring 2021

Acknowledgements

I am deeply indebted to my supervisors Prof Ronny Scherer and Dr Chia-Wen Chen. Both scholars afforded me their valuable time and infinite patience throughout the thesis production process. Ronny's occasional "wow" and "awesome" time and again saved me from deep insecurity and lent me the courage to continue this journey. It were Chia-Wen's clear and decisive instructions that helped me avoid the many pitfalls along the way. This thesis owes its very existence to both experts' input and reviews while any errors and omissions remain mine solely.

I often imagine what I would be doing today should former CEMO senior advisor Anne-Catherine Lehre not have encouraged me to extend my exchange semester into this Master program. I owe this degree to Anne-Catherine, Senior Executive Officer Siri Heslien, Academic Head of Program Prof Dr Johan Braeken and CEMO Director Prof Dr Sigrid Blömeke for their encouragement and guidance. My deep appreciation also goes to our new Administrative Leader Tara Sarin for providing me with a study space and her continuous support and protection throughout the pandemic period. May this thesis serve as a thank-you to everybody that assisted me each step of the way.

ILS scholars Dr Nani Teig and Prof Trude Nilsen's generosity of accepting me as their research assistant also introduced the fine details of conducting scientific research to my workflow. In fact, I learnt the school climate framework from Nani and Trude's project and I hope I presented this literature correctly in my writing.

Behind-the-scenes heroes are UV's IT expert Terje Thoresen and all the specialists empowering the Norwegian Research and Education Cloud. I can hardly imagine what my statistical analyses would look like without them lending me the university's powerful computation infrastructure. Terje also regularly stopped by and enquired about my progress—his insight into economics, politics, and life in general helped to contextualise my thesis topic into a broader social debate. I am also grateful for Terje's assistance in translating the abstract into Norwegian.

Certainly, my story with UiO would not come to be, had the University of Melbourne not facilitated my exchange semester in 2018. I would like to thank Global Learning Senior Education Abroad Adviser Mr Aaron DeBono for opening this world to me. I look forward to reporting back to the MGSE team when international travel resumes. I wish to sit down with

Aranka Dalgleish and Jeff Kinsman and highlight their thoughts and teachings that made into my thesis. The kind images of the Director of Initial Teacher Education Dr Daniela Acquaro, Student Experience Team Leader Clair Richards and Student Wellbeing Officer Ms Susie Reay, all remind me the many shoulders I stand on today and I wish to record my gratitude to you all into this permanent archive at the University of Oslo.

To mum and dad, you deserve the most special thank-you on its own page and I present this thesis to fulfil my promise to be good and study hard made at the airport 18 years ago to this day. I hope I made you proud.

Popular Abstract

Preparing youth for life-long success with numeracy, literacy and science capability has been the core mission for all schooling systems. The post-financial crises and post-COVID era, in addition, imposed increasing demand for financial literacy on school leavers. Although financial education programs were generally reported as effective in promoting learners' financial literacy outcome, paradoxical results of non-findings or even negative findings were not unheard of. Any claim that education efforts did not matter, or even harmful, for learners' development deserves immediate attention because if school were committing something wrong, school leaders and policy makers would want to know what, which and where the problems were so that harmful practices can be reverted into good pedagogy. Alternatively, it could instead be the instrument some researchers employed that led to such underwhelming results. A closer examination of how school effectiveness is measured would also promote methodology practices and the resultant policy advice. Using 2018 PISA financial literacy data, this study examined how students' financial literacy scores changed systematically as educational efforts, parental involvement, school safety as well as resource allocation varied. Analyses showed that all four aspects of school climate mattered greatly in explaining differences in students' financial literacy scores. Negative results reported by some papers were likely the results of certain design choices. School financial education should definitely not be withdrawn but more carefully designed with increase emphases on students' financial problem-solving skills in addition to knowledge and confidence training.

Abstract

Repeated financial crises and the current pandemic emergency all exposed the harsh consequences of financial illiteracy shared by large proportions of the general population. Although remedial plans were shown to be most effective if introduced early in life, the exact relationships among student-, family- and school-factors behind youth's financial literacy outcomes were not yet fully understood. Using the latest Programme for International Student Assessment (PISA) 2018 financial literacy data and the theoretical framework of school climate recently proposed by Wang & Degol (2016), this study examined the mechanism for individuals' financial literacy performance in the context of their school environment. A multilevel structural equation model (MSEM) revealed that 33.5% of the variation in students' financial literacy scores could be explained by student-level variables and 47.7% by school-level factors for the full PISA 2018 sample. The MSEM also highlighted key roles financial knowledge and financial confidence played in mediating students' financial literacy performance. Both financial education and financial socialisation were positively associated with financial knowledge and confidence, but their direct effects on financial literacy scores were negative once the mediation effects have been accounted for. Strong contextual effects suggested the important role of school environment for facilitating individual-level effects. This study took a person-ecological approach for reconciling two strands of research efforts that focused either on students or on schools. It also confirmed the importance of school education, parental involvement, safety and educational resources for bringing about greater financial knowledge and confidence and identified potential improvement opportunity for pedagogical practices for further advancing students' financial problem-solving capabilities.

Keywords: school climate, financial literacy, PISA, multilevel modelling, structural equation modelling, contextual effect

Abstrakt

Gjentatte finanskriser og den nåværende pandemisituasjonen avslørte de alvorlige konsekvensene av manglende økonomisk kunnskap i en betydelig andel av befolkningen. Selv om kompenserende tiltak har vist seg å være mest effektive ved introduksjon tidlig i livet, var de eksakte forholdene mellom student-, familie- og skolefaktorer vedrørende ungdoms økonomiske ferdigheter ikke helt forstått. Ved hjelp av det nyeste programmet for internasjonal studentvurdering (PISA) 2018—økonomiske ferdigheter og det teoretiske rammeverket for skoleklima, som nylig ble publisert av Wang og Degol (2016), undersøkte denne studien mekanismen for individers økonomiske ferdigheter i skolesammenheng. Strukturell flernivåmodellering (MSEM) avslørte at 33,5% av variasjonen i studentenes økonomiske ferdigheter kunne forklares med variabler på studentnivå og 47,7% av faktorer på skolenivå for hele PISA-utvalget. MSEM fremhevet også nøkkelroller som finansiell kunnskap og økonomisk tillit sin betydning i formidling av elevenes økonomiske ferdigheter. Både finansiell utdannelse og økonomisk sosialisering var positivt assosiert med økonomisk kunnskap og tillit, men deres direkte effekter på finansiell kompetanse var negative etter at meklingseffektene har blitt redegjort for. Sterke kontekstuelle effekter belyste skolemiljøets viktige rolle for å tilrettelegge effekter på individnivå. Denne studien tok en personøkologisk tilnærming med formål om å forene to forskningsfelt som fokuserte på enten studenter eller skoler. Den bekreftet også viktigheten av skoleundervisning, foreldrenes engasjement, sikkerhet og pedagogiske ressurser for å skape større økonomisk kunnskap og tillit, og identifiserte potensielle forbedringsmuligheter for pedagogisk praksis for å videreutvikle elevenes økonomiske problemløsningsferdigheter.

Nøkkelord: skoleklima, finansiell forståelse, PISA, flernivåmodell, strukturell lingningsmodell, kontekstuell effekte

Identifying School Climate Variables Associated with Financial Literacy Outcomes in PISA 2018 Data: A Multilevel Structural Equation Modelling Approach

An Atlas of Financial Illiteracy

Repeated economic crises in recent memory have exposed the harsh consequences of financial *illiteracy* shared by high proportions of the general population. Low financial literacy was directly linked with negative credit behaviours such as high amount of credit card debt (Norvilitis & MacLean, 2010), high costs of borrowing (Huston, 2012; Pak, 2018), poor mortgage choices (Cox et al., 2015) and subsequent delinquency and home foreclosure (Agarwal, Chomsisengphet, et al., 2015; Gerardi et al., 2010). Poor financial decisions made early in life can have profound long-term economic and societal impacts (Montoya & Scott, 2013) such as forgoing medical care (Lusardi et al., 2015), mental health crises (Stone et al., 2018) and geronto-poverty resultant from insufficient retirement provision (Lusardi & Mitchell, 2007, 2008). Borrowers' collective misjudgement on mortgage risks kicked start the subprime crises and in combination with Wall Street greed and laissez faire regulatory attitudes that eventually triggered the avalanche of 2008 financial crisis, the first domino of world-changing events whose impact continues reshaping global economics and geopolitics landscape.

Even more concerning is the pervasive global distribution of financial illiteracy. Deficiencies in financial capability had been observed not only in emerging economies (Karakurum-Ozdemir et al., 2019) such as Colombia (Cao-Alvira et al., 2020), Mexico (Arceo-Gómez & Villagómez, 2017; Böhm et al., 2021), India (Agarwal, Amromin, et al., 2015; Kiliyanni & Sivaraman, 2016; Utkarsh et al., 2020), Indonesia (Cole et al., 2009; Khoirunnisaa & Johan, 2020), Turkey (Akben-Selcuk & Altiok-Yilmaz, 2014), and Eastern European countries (Belás et al., 2016; Opletalová, 2015; Reiter & Beckmann, 2020) but also in advanced economies such as Australia (Ali et al., 2014; Taylor & Wagland, 2013; Thomson & De Bortoli, 2017), Canada (Boisclair et al., 2017), Germany (Bucher-Koenen et al., 2017; Erner et al., 2016), Austria (Silgoner et al., 2015), the UK (Barnard et al., 2021) and the USA (Breitbach & Walstad, 2016; Gale et al., 2012; Lusardi et al., 2010). International comparisons also reported low financial literacy in many Asian countries (Yoshino et al., 2015) and member states of the Organisation for Economic Co-operation and Development (OECD) (Cupak et al., 2018; Lusardi, 2015), particularly amongst the young (De Beckker et al., 2019), females, lower educated (Klapper & Lusardi, 2019) and somewhat surprising, inhabitants of countries

with more generous social security systems (Jappelli, 2010).

Financial Literacy as a Necessity

One major reason behind the escalating interests in citizens' financial literacy can be attributed to the policy adjustment taking place in the past two decades. The neo-liberal ideology of reducing government involvement in the economy had crowded out societal care such as pension, health and education from the collective via the state to the individuals (Gilbert, 2002). In a post-financialisation world (Krippner, 2005), the primary goal of political economy has shifted from the redistribution of wealth to the incorporation of individuals within the mainstream financial architecture (Regan & Paxton, 2003). The succession of the asset-based welfare system to the income-based model (Finlayson, 2009), however, was by no means unique to the Anglosphere. The Hartz reforms of 2003/04, according to Seeleib-Kaiser (2016), had significantly altered Germany's post-war social welfare arrangement, leading Ferragina et al. (2015) to re-classify Germany from a conservative welfare into a liberal welfare state comparable to the United Kingdom. Although a detailed account of the history, politics and moral philosophy of social welfare reforms is beyond the scope of this project, this background information does confirm financial literacy as a social necessity independent of one's believes or preference.

Strengthening citizen's financial literacy also generates substantial social returns. The latest U.S. Department of Justice statistics showed a total loss of near 3.25 billion dollars to financial fraud in 2017 (Morgan, 2021) while similar figure was estimated to be 190 billion pounds for the UK, more than the public spending on health and defence *combined* (Gee, 2018). A financially informed and alert individual is less likely to fall victim to fraud and scams (Gamble et al., 2015; Lusardi, 2012) although this effect was thought to be moderated by one's ability to recognise and resist manipulative tactics (Drew & Cross, 2016). In addition to the monetary benefit, some scholars see financial education as a service to civics and democracy since a financially literate population is more resilient to political opportunists. Teaching citizens—as well as the young who will be future voters—about taxation, tariff, outsourcing, labour market transition and career choices protects not only individuals' financial security and dignity but also informs and empowers voting behaviours through which governments are scrutinised and democracy is upheld (Davies, 2015) and even modified (Arthur, 2016). After all, financial literacy can be seen as an investment in human capital

(Lusardi & Mitchell, 2014). Today's young people are growing up in a society in which the financial landscape is complex and the financial responsibilities of citizens are substantial.

Profiles of Successful Learners

As the cellular constituent of the broad economy, personal finance success has long attracted interests from policy makers and educators. Numerous research efforts have been devoted into identifying the common traits shared by individuals displaying knowledge, confidence and behaviour conducive to high financial literacy performance. Potrich, Vieira, and Kirch (2015) found well-educated individuals from wealthy families and earning good income themselves had the highest propensity to demonstrate substantial financial literacy. The positive correlations between socioeconomic status and financial literacy performance was observed not only in adult samples but also in late year school students. Using school enrolment data from the State of Victoria, Australia, Ali et al. (2016) found socio-economic variables such as urban-rural locations, non-English speaking at home as well as parental education and occupations accounted for very high proportion of the variations in students' financial literacy test scores. Negative correlations, on the other hand, had been observed between cross-border relocation experience and financial literacy performance. Using 2012 PISA data, Gramaţki (2017) applied a propensity score matching technique to 15-year-old migrant students and concluded that, everything else being equal, second generation migrants underperformed their native peers by 0.15 standard deviations (SD) and this penalty increased to 0.30 SD for first generation migrants.

In addition to social factors, there appeared to be a persistent and sizeable sex difference in financial literacy performance with greater awareness of monetary matters amongst males (Atkinson & Messy, 2011; Lusardi et al., 2010) regardless of test question sophistication (Agnew & Cameron-Agnew, 2015; Agnew & Harrison, 2015) and across countries (Bucher-Koenen et al., 2017). Correlational studies largely discounted macroeconomic variables behind male advantages in financial literacy performance (Chambers & Asarta, 2018) in favour of factors at the family level (Chambers et al., 2019), corroborating the observation that females appeared to start falling behind too early in life (Driva et al., 2016) to allow market force to take effect (Preston & Wright, 2019). Culture did seem to play a partial role in explaining sex difference (Grohmann, 2016) with gender gaps appearing significantly smaller in countries with more egalitarian financial arrangement for custody and

marriage (Hospido et al., 2021). Additional proposals were also put forward ranging from historic forces (Bottazzi & Lusardi, 2020), risk aversion (Chen & Garand, 2018), lacks of confidence (Bucher-Koenen et al., 2021; Danes & Haberman, 2007) or problem-solving attitudes (Longobardi et al., 2018), to imbalanced household decision-making (Fonseca et al., 2012). Consensus remains strong amongst existing literature advocating more inclusion of women in promoting population's financial literacy and well-being.

Measuring Financial Literacy

All intervention programs aiming for financial literacy advancement must be constructed based on sound evidence. Amongst competing inventories, OECD's Programme for International Student Assessment (PISA) stands out as a comprehensive and reliable source of data for measuring 15-year-olds' financial literacy outcomes thanks to OECD's careful sampling procedure and attention to construct validity of measurement. Four technical features of PISA are crucial for the architecture of this study. First, following statistical theory, PISA designers acknowledged the hierarchical nature of education research data such that students are nested in schools, and schools are further nested in countries. Second, one student weight is assigned to each observation in order to account for the fact that not all schools in a country are equally likely to be sampled by the PISA organiser; and given a particular school that has been chosen, not every student in this school is equally likely to be asked to participate in the test (Rust, 2014). A third complication arises from the "planned missingness" in students' responses because each participant is only given a small number of questions relative to the entire test bank in order to ensure their responses are not undermined by tiredness (von Davier, 2014), leading to the outcome variables being represented by multiple plausible values. Fourthly, PISA consulted and synthesised multiple schools of thoughts (OECD, 2019a) in constructing their financial literacy framework. As a result, 2018 PISA data set (OECD, 2020a) provides not only variables measuring behavioural competency outcomes but also cognitive and affective factors such as familiarity with concepts of finance and confidence about financial matters, enabling a nuanced study design involving decomposing the total effect of financial literacy performance into its knowledge, affect, and application components.

Program Effectiveness for Advancing Financial Literacy

Since youths partition their time between schools and families, research efforts aimed at promoting young people's financial literacy over the years evolved into two strands: on the design and evaluation of school financial education programs, and on the influence of home environment through the process of financial socialisation—the intentional or involuntary transmission of financial concepts which are required to functioning successfully in society (Bowen, 2002). A recent meta-analysis conducted by Kaiser and Menkhoff (2020) found that while school financial education programs had sizeable impacts on *financial knowledge* (+0.33 SD) similar to education interventions in other domains, their effect on students' *financial behaviour* is quite small (+0.07 SD). This conclusion added to a list of weak or non-findings regarding the long-term behavioural effect brought about by school financial education programs. Brown et al. (2016), for instance, reported mixed outcome in students' long-term financial well-being depending on the programs received; whereas Cole et al. (2016) observed that traditional personal finance courses lacked any explanatory power in accounting for graduates' financial outcome once the additional mathematics training in which finance topics were packaged has been controlled for. Despite careful controls and thoughtful study designs, correlating classroom interventions and young people's financial literacy outcomes has repeatedly yielded paradoxical results of non-significant or even negative relationship; some positive findings remained small in magnitudes and/or were sensitive to robust analyses.

Literature along the financial socialisation line of enquiry delivered more consistent findings. Building on the acknowledgement that families serve as information filters from the outside world (Danes & Haberman, 2007) as well as the foundation for youth's continued financial concept formation, Gudmunson and Danes (2011) put forward a family financial socialisation theory to accommodate both the process and the outcome for variations in young people's financial capabilities. Using structural equation modelling, Jorgensen and Savla (2010) was able to show that perceived parental influence had a direct and moderately significant influence on financial attitude, did *not* have an effect on *financial knowledge*, and had an indirect and moderately significant influence on financial behaviour, mediated through financial attitude. This attitude(A)–behaviour(B)–cognition(C) conceptualisation of financial literacy (Potrich, Vieira, Coronel, et al., 2015) continues to influence subsequent research effort. More recently, Moreno-Herrero et al. (2018) continued this line of enquiry by applying

multilevel regression analyses to the 2015 PISA data and reported that students' financial literacy was associated mainly with understanding the value of saving and discussing money matters with parents. In addition, exposure and use of financial products, in particular holding a bank account, improved students' financial knowledge as well.

Research Questions

The current study wishes to incorporate both the school intervention and family socialisation arms of existing literature under a uniform framework recently proposed by Wang and Degol (2016) named "school climate". Besides the classroom activities (ACADEMIC) and parental involvement (COMMUNITY) aspects reviewed earlier, the school climate framework also acknowledges the importance of school safety (SAFETY) and adequate resources (INSTITUTIONAL ENVIRONMENT) for cultivating a healthy and thriving young generation. By taking advantage of the latest wave of 2018 PISA financial literacy results, this project aims to answer these two research questions:

RQ1. To what extent can the variation in students' financial literacy outcomes be accounted for by each of the school climate variables?

RQ2. How does the school-level climate impact on individual learners' financial literacy acquisition process?

Thesis Overview

This thesis is structured as following: Key concepts such as school climate and financial literacy are explained in detail in the Conceptual Framework section along with the hypothesised relationship between each construct. The Methods section will explain the 2018 PISA financial literacy data including sample characteristics and variable formation. A multilevel structural equation model will be proposed in this chapter as well as related technical considerations such as weights, estimators and the model evaluation procedure. Subsequently, analysis results will be presented in the Results section including both descriptive and inferencial statistics. Coefficients from student- and school-levels will be presented separately first, then linked together by the contextual effects. Finally, the Discussion section will discuss the pedagogical and policy implications of these findings, pointing out the limitation on causal inference as well as directions for future research effort.

Conceptual Framework

School Climate

A positive school climate is easier to recognise but difficult to define (OECD, 2019b). When organising school attributes into frameworks, early studies loosely clustered themselves into two camps along the concrete–abstract spectrum. When researching on students' behavioural problems and emotional distress, for example, Kuperminc et al. (1997) recognised the insufficiency of using observable characteristics of a school as the metric for its managerial success but adopted a utilisation and perception approach based on social-ecological and developmental theories. Such emphasis on school users' *perception* continued into Esposito (1999)'s study of students' social disadvantages on their academic outcomes, with exploratory factor analysis results suggesting a five-factor model including student academic orientation, parent-school relationships, security, administration and teacher-student relationships. Freiberg and Stein (1999), on the other hand, took a more idealised view of school climate as "the heart and soul of a school"—the very "essence of a school that leads a child, a teacher, an administrator, a staff member to love the school and to look forward to being there each school day" (p. 11). However broad or narrow the definition, both ends of the spectrum signalled that the ultimate utility of any school climate framework should facilitate our understanding of student development.

With this goal in mind, Wang and Degol (2016) surveyed six theories for the purpose of building a multidimensional school climate framework. Since schooling is an interaction between individuals and every environment immersing them (the bio-ecological theory), students inevitably develop protective and/or maladaptive behaviours (risk and resilience perspective) in addition to all existing bonds they formed with parents (attachment theory). Thanks to students' ever-growing capabilities, schools may then encourage learners to connect, invest, participate and believe in their learning environment (social control theory), by bridging their motivation towards success criteria (social cognitive theory) and by removing barriers (stage- environmental fit theory) to growth. These theories jointly guided a literature review and coding exercise that led to a four-domain, 13-dimension structure of school climate framework (see Figure 1, Wang & Degol, 2016, p. 318). This current project approached Wang and Degol's (2016) ontology from the domain-level and referred the ACADEMIC climate as the overall quantity and quality of the teaching-learning activities; COMMUNITY as the

engagement and interpersonal ties schools maintain with stakeholders such as and in particular parents; SAFETY as the degree of physical and emotional security afforded by schools; and INSTITUTIONAL ENVIRONMENT as the organisational and structural features of schools in particular their educational resource availability. All four branches of the school climate framework serve as platforms upon which students' financial literacy can be constructed.

School Financial Education Programs (FEdu)

Amongst the many redress schemes aimed at promoting citizens' financial capability, the return on investment was the highest when direct classroom interventions were applied to the young. Lusardi and Mitchell (2014) have shown that providing financial knowledge to high schoolers before they enter the labour market increased their well-being by approximately 82% of their initial wealth, while the rate of return was around 56% for college graduates. In order to test the causal effects between classroom interventions and students' financial understanding Amagir et al. (2018) reviewed 24 studies evaluating the effectiveness of secondary school financial education programs using either random control trails or quasi-experimental research designs, and found all but two reported positive effects between school interventions and students' financial knowledge. The effect sizes, however, appeared to be dependent on the length of the delivery periods, with one long and intensive program yielding $d = 0.981$ for basic economic knowledge and 1.020 for personal finance but only $d = 0.221$ to 0.267 from a short series. The review paper also found general positive correlations between school programs and students' attitudes towards finance-related matters (FA) such as confidence. Kaiser and Menkhoff (2020) recently updated the literature using publications employing (quasi-)experiment designs and reported an average treatment effect of 0.331 for the 31 pooled samples and 0.369 for the 12 high school sub-samples on financial knowledge (FC) gains. Based on existing literature, the current project therefore hypothesises that

H1: There exists a positive association between FEdu and FC.

H2: There exists a positive association between FEdu and FA.

The relationships between school financial education programs and students' subsequent financial *behaviours* (FB), on the other hand, were more mixed. Early studies by Bernheim et al. (2001) examined the impact of the progressive introduction of financial curriculum mandates in many US states between 1957 and 1985 on recipients' saving behaviour and net worth at the end of 1995. Analyses showed that (a) systematic differences

in saving rates across states did not appear until after mandates were imposed, (b) saving rates only started to raise many years after the mandate, and (c) net worth was higher by roughly one-year's worth of earnings for an average individual having been exposed to the mandate. This 20-year time horizon study led the authors to the conclusion that school financial education efforts *did* have meaningful impact on recipients' life-long financial well-being albeit with significant implementation lags. Most recently, a German study showed causal evidence that teaching financial literacy to 16-year-olds had significant short- and longer-term effects on risk and time preferences (Sutter et al., 2020). This result lent weight to an earlier randomised controlled trial with 3,000 Grade 9 students in Spain (Bover et al., 2018) where students showed more patience in hypothetical saving choices both immediately after the treatment and three months later. Frugality, delayed gratification, faster debt clearance and decreased reliance on credit financing were all documented by Carlin and Robinson (2012) in the US after a finance-related theme park training. Other publications, however, showed weak or even non-findings for financial behaviour improvement. A short financial education program on German high schoolers, for example, showed reduction in impulse purchases but no significant increase in savings (Lührmann et al., 2015). A review article by Fernandes et al. (2014) found school programs explained only 0.1% of the variance in financial behaviours and decaying to negligible levels 20 months later. Since the current literature is yet to reach consensus about the strength of the relationship between school interventions and students' financial behaviour, it is prudent to hypothesise:

H3: The relationship between FEdu and FB is non-negative.

Parental Influence and Financial Socialisation (FSoc)

Although financial capability is an important integral of adulthood, the process of acquiring the financial knowledge and skills begins in early childhood. Parents provide a context in which children learn what money is, for instance, and how it is used and saved (Birbili & Kontopoulou, 2015). Whether intentionally or informally, financial intuition is passed around the household through frequent interactions, conversations, and lessons. Consequently, the financial knowledge and skills acquired while growing up at home form the foundation for the financial attitudes and behaviours carried into adulthood (Serido & Deenanath, 2016). Using a panel data set from the Dutch DNB Household Survey between 2000 and 2012, Bucciol and Veronesi (2014) reported that parental teaching about savings

increased the likelihood of adult saving by 16% and the saving amount by approximately 30%. Similar intergenerational effect was observed from longitudinal studies in the US, linking adolescents' observation of parents' responsible financial behaviour to their own good decisions and actions later in life (Tang, 2017). Moreno-Herrero et al. (2018) further examined the relationship between students' financial socialisation experience and their financial literacy outcome using PISA 2012 data. By operationalising financial socialisation as the frequency of money-related discussions with parents, saving habits and bank account ownership, the authors reported positive associations between financial socialisation and PISA financial literacy scores. These studies suggested that

H4: The relationship between FSoc and FC is non-negative.

H5: FSoc is positively related to FA.

H6: FSoc is positively related to FB.

School Safety (Safety)

School safety is the prerequisite for any learning and growth. As a social construction, the definition of school safety can be subjective and coloured by one's social location, cultural experiences and school context (Cornell & Mayer, 2010). Since its initial definition as an absence of weapons and/or homicides in school settings (Skiba et al., 2006), the understanding of school safety has evolved substantially to emphasise the prevention of overt and covert violence such as bullying behaviours (physical safety, Jimerson et al., 2012), caring and supportive staff as well as the availability of mental health services (emotional safety, Kuperminc et al., 1997), and delinquent acts committed by students against their peers and teachers (school order and discipline, Gottfredson et al., 2005). Although studies specifically examining the relationship between adverse school experiences such as being bullied and financial literacy performance were yet to emerge, Kutsyuruba et al.'s (2015) review article on the associations between school safety and students' general academic attainment may serve as a general guide suggesting

H7: There is a positive association between Safety and FC.

H8: There is a positive association between Safety and FA.

H9: There is a positive association between Safety and FB.

Institutional environment (Resource shortage)

Both the physical and social infrastructure of schools greatly influence users' experience and functioning. An optimal learning environment requires appropriate heating and cooling, ample supply of lighting, necessary acoustic control and regular maintenance (environmental adequacy, Uline & Tschannen-Moran, 2008). Secondly, structural organisation such as class size was also linked to students' education outcomes (Finn & Achilles, 1999). Lastly, although the core of classroom instruction involves the interaction between teachers and students, the quality of such interaction is frequently facilitated by the equipment, materials, and supplies. Optimising resource utilisation has been attributed to improved student attainment particularly for schools in impoverished communities (Miles & Darling-Hammond, 1998). Based on the observed impact school resource had on learner outcomes, this study hypothesises that

H10: Resource shortage is negatively associated with students' average FB.

H11: Class size is negatively associated with students' average FB.

Financial Literacy

In its official publication *PISA 2018 Assessment and Analytical Framework* (OECD, 2019a), the OECD provided an explicit definition of "financial literacy" as

> the knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding in order to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life (p. 128)

with emphases on both the thinking and behaviour that characterise such construct and the purposes for developing this particular literacy. Of particular relevance to the current project are the knowledge, confidence and application aspects of financial literacy.

Knowledge Aspect of Financial Literacy (FC)

Since poor financial behaviours have been associated with a lack of financial knowledge (Hastings et al., 2013; Lusardi & Mitchell, 2014), one major goal of financial literacy interventions is to ensure students receive the information and support they need to make responsible and appropriate financial decisions confidently, both in their school years and in adult lives (OECD, 2020b).

Confidence Aspect of Financial Literacy (FA)

The positive association between students' confidence and their academic attainment has also been well documented. By synthesising one decade of large-scale international assessment data, Lee and Stankov (2018) found self-beliefs (labelled "self-efficacy" in PISA and "confidence" in TIMSS) to be the strongest non-cognitive predictor for students' mathematics achievement. Similar relationships had also been observed in the realm of financial literacy such as Arellano et al.'s (2014) study using the Spanish portion of the PISA 2012 financial literacy data, and Borges Ramalho and Forte's (2019) results based on the Brazilian sub-sample of the 2016 OECD/INFE International Survey of Adult Financial Literacy Competencies.

Application Aspect of Financial Literacy (FB)

Although financial knowledge and confidence forms the very foundation upon which financial capability can be developed, it is individuals' willingness and ability to *apply* such capability through financial decision-making that counts as the ultimate outcome of their financial literacy (Huston, 2010). Operationalise financial behaviour as one's ability to solve real-world financial problems also make it feasible to capture financial behaviours within a one-hour test, with the result reflecting one's understanding, affinity and application of their financial capability. The OECD paid particular attention to upholding financial literacy as an independent construct. Such consideration was important because one's financial capability was known to covary with both numeracy (Geiger et al., 2020; Ozkale & Erdogan, 2020a, 2020b; Sole, 2014) and literacy (Bay et al., 2014) skills. Empirical studies using diverse samples from the Philippines (Indefenso & Yazon, 2020) to Sweden (Skagerlund et al., 2018) reported correlations between numeracy and financial knowledge/literacy to be between approximately .61 and .52. In order to minimise the impact of low arithmetic skills (Huston, 2010), financial formulæ were never required in any problem solving tasks and students may use the on-screen calculator at any time of the test. Furthermore, stimulus material and task statements were generally designed to be as clear, simple and brief as possible to minimise the impact of low reading ability on financial literacy scores.

Both financial knowledge and confidence are hypothesised to contribute to students' performance in finance-related problem solving:

H12: FC is positively related to FB.

H13: FA is positively related to FB.

Summary of Relationships between Constructs

As discussed in **??**, learners' demographic attributes such as socio-economic status, immigration history and sex were used as control variables, leading to the following diagram summarises all hypothesised relationship between concepts introduced in this chapter:

References

Agarwal, S., Amromin, G., Ben-David, I., Chomsisengphet, S., & Evanoff, D. D. (2015). Financial literacy and financial planning: Evidence from India. *Journal of Housing Economics*, *27*, 4–21. https://doi.org/10.1016/j.jhe.2015.02.003

Agarwal, S., Chomsisengphet, S., & Zhang, Y. (2015). How does financial literacy affect mortgage default? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2601025

Agnew, S., & Cameron-Agnew, T. (2015). The influence of consumer socialisation in the home on gender differences in financial literacy. *International Journal of Consumer Studies*, *39*(6), 630–638. https://doi.org/10.1111/ijcs.12179

Agnew, S., & Harrison, N. (2015). Financial literacy and student attitudes to debt: A cross national study examining the influence of gender on personal finance concepts. *Journal of Retailing and Consumer Services*, *25*, 122–129. https://doi.org/10.1016/j.jretconser.2015.04.006

Akben-Selcuk, E., & Altiok-Yilmaz, A. (2014). Financial literacy among Turkish college students: The role of formal education, learning approaches, and parental teaching. *Psychological Reports*, *115*(2), 351–371. https://doi.org/10.2466/31.11.pr0.115c18z3

Ali, P., Anderson, M., McRae, C., & Ramsay, I. (2016). The financial literacy of young people: Socio-economic status, language background, and the rural-urban chasm. *Australian & International Journal of Rural Education*, *26*(1), 53–65. http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=2&sid=f7900e91-7c14-4983-9c5e-41979ed77f10@sdc-v-sessmgr03

Ali, P., Anderson, M. E., McRae, C. H., & Ramsay, I. (2014). The financial literacy of young Australians: An empirical study and implications for consumer protection and ASIC's National Financial Literacy Strategy. *Company and Securities Law Journal*, *32*(5), 334–352. https://ssrn.com/abstract=2490154

Amagir, A., Groot, W., van den Brink, H. M., & Wilschut, A. (2018). A review of financial-literacy education programs for children and adolescents. *Citizenship, Social and Economics Education*, *17*(1), 56–80. https://doi.org/10.1177/2047173417719555

Arceo-Gómez, E. O., & Villagómez, F. A. (2017). Financial literacy among Mexican high school teenagers. *International Review of Economics Education*, *24*, 1–17. https://doi.org/10.1016/j.iree.2016.10.001

Arellano, A., Cámara, N., & Tuesta, D. (2014). *The effect of self-confidence on financial literacy* (Working Paper No. 14/28). BBVA Research. https://www.bbvaresearch.com/wp-content/uploads/2014/10/WP14-28The-effect-of-self-confidence-on-financial-literacy1.pdf

Arthur, C. (2016). Financial literacy education as a public pedagogy: Consumerizing economic insecurity, ethics and democracy. In C. Aprea, E. Wuttke, K. Breuer, N. K. Koh, P. Davies, B. Greimel-Fuhrmann, & J. S. Lopus (Eds.), *International handbook of financial literacy* (pp. 113–125). Springer. https://doi.org/10.1007/978-981-10-0360-8_9

Atkinson, A., & Messy, F.-A. (2011). Assessing financial literacy in 12 countries: An OECD/INFE international pilot exercise. *Journal of Pension Economics and Finance*, *10*(4), 657–665. https://doi.org/10.1017/s1474747211000539

Barnard, C. R., Billing, J., Brotherston, D., Jeffery, T., Mansell, P., & Wright, J. (2021). Money, knowledge and power. *British Actuarial Journal*, *26*(e4), 1–26. https://doi.org/10.1017/s1357321721000039

Bay, C., Catasús, B., & Johed, G. (2014). Situating financial literacy. *Critical Perspectives on Accounting*, *25*(1), 36–45. https://doi.org/10.1016/j.cpa.2012.11.011

De Beckker, K., De Witte, K., & Van Campenhout, G. (2019). Identifying financially illiterate groups: An international comparison. *International Journal of Consumer Studies*, *43*(5), 490–501. https://doi.org/10.1111/ijcs.12534

Belás, J., Nguyen, A., Smrčka, L., Kolembus, J., & Cipovová, E. (2016). Financial literacy of secondary school students. Case study from the Czech Republic and Slovakia. *Economics & Sociology*, *9*(4), 191–206. https://doi.org/10.14254/2071-789x.2016/9-4/12

Bernheim, B., Garrett, D. M., & Maki, D. M. (2001). Education and saving: The long-term effects of high school financial curriculum mandates. *Journal of Public Economics*, *80*(3), 435–465. https://doi.org/10.1016/s0047-2727(00)00120-1

Birbili, M., & Kontopoulou, M. (2015). Financial education for preschoolers: Preparing young children for the 21st Century. *Childhood Education*, *91*(1), 46–53. https://doi.org/10.1080/00094056.2015.1001670

Böhm, P., Böhmová, G., Šimková, V., & Gazdíková, J. (2021). The impact of secondary education on the level of financial literacy: The case of Slovakia. *Problems of Education in the 21st Century*, *79*(1), 13–33. https://doi.org/10.33225/pec/21.79.13

Boisclair, D., Lusardi, A., & Michaud, P.-C. (2017). Financial literacy and retirement planning in Canada. *Journal of Pension Economics and Finance*, *16*(3), 277–296. https://doi.org/10.1017/s1474747215000311

Borges Ramalho, T., & Forte, D. (2019). Financial literacy in Brazil—Do knowledge and self-confidence relate with behavior? *RAUSP Management Journal*, *54*(1), 77–95. https://doi.org/10.1108/RAUSP-04-2018-0008

Bottazzi, L., & Lusardi, A. (2020). *Stereotypes in financial literacy: Evidence from PISA* (NBER Working Paper No. 28065). National Bureau of Economic Research. https://www.nber.org/system/files/working_papers/w28065/w28065.pdf

Bover, O., Hospido, L., & Villanueva, E. (2018). *The impact of high school financial education on financial knowledge and saving choices: Evidence from a randomized trial in Spain* (Working paper No. 1801). Banco de España. https://doi.org/10.2139/ssrn.3116054

Bowen, C. F. (2002). Financial knowledge of teens and their parents. *Journal of Financial Counseling and Planning*, *13*(2), 93–102. https://afcpe.buckeyedev.com/wp-content/uploads/2018/10/vol1328.pdf

Breitbach, E., & Walstad, W. B. (2016). Financial literacy and financial behavior among young adults in the United States. In E. Wuttke, J. Seifried, & S. Schumann (Eds.), *Economic competence and financial literacy of young adults* (pp. 81–98). Verlag Barbara Budrich. https://doi.org/10.2307/j.ctvbkk29d.7

Brown, M., Grigsby, J., van der Klaauw, W., Wen, J., & Zafar, B. (2016). Financial education and the debt behavior of the young. *Review of Financial Studies*, *29*(9), 2490–2522. https://doi.org/10.1093/rfs/hhw006

Bucciol, A., & Veronesi, M. (2014). Teaching children to save: What is the best strategy for lifetime savings? *Journal of Economic Psychology*, *45*, 1–17. https://doi.org/10.1016/j.joep.2014.07.003

Bucher-Koenen, T., Alessie, R., Lusardi, A., & van Rooij, M. (2021). *Fearless girl: Woman's financial literacy an stock market participation* (Discussion Paper No. 21-015). Leibniz

Centre for European Economic Research.
http://ftp.zew.de/pub/zew-docs/dp/dp21015.pdf

Bucher-Koenen, T., Lusardi, A., Alessie, R., & van Rooij, M. (2017). How financially literate are women? An overview and new insights. *Journal of Consumer Affairs*, *51*(2), 255–283. https://doi.org/10.1111/joca.12121

Cao-Alvira, J. J., Novoa-Hoyos, A., & Núñez-Torres, A. (2020). On the financial literacy, indebtedness, and wealth of Colombian households. *Review of Development Economics*, 1–16. https://doi.org/10.1111/rode.12739

Carlin, B. I., & Robinson, D. T. (2012). What does financial literacy training teach us? *Journal of Economic Education*, *43*(3), 235–247. https://doi.org/10.1080/00220485.2012.686385

Chambers, R. G., & Asarta, C. J. (2018). Gender, country-level variables, and financial knowledge. *Empirische Pädagogik*, *32*(3/4), 310–328. https://bit.ly/2Pw1HFs

Chambers, R. G., Asarta, C. J., & Farley-Ripple, E. N. (2019). Gender, parental characteristics, and financial knowledge of high school students: Evidence from multicountry data. *Journal of Financial Counseling and Planning*, *30*(1), 91–109. https://files.eric.ed.gov/fulltext/EJ1241100.pdf

Chen, Z., & Garand, J. C. (2018). On the gender gap in financial knowledge: Decomposing the effects of don't know and incorrect responses. *Social Science Quarterly*, *99*(5), 1551–1571. https://doi.org/10.1111/ssqu.12520

Cole, S., Paulson, A., & Shastry, G. K. (2016). High school curriculum and financial outcomes: The impact of mandated personal finance and mathematics courses. *Journal of Human Resources*, *51*(3), 656–698. https://doi.org/10.3368/jhr.51.3.0113-5410r1

Cole, S., Sampson, T., & Zia, B. (2009). *Financial literacy, financial decisions, and the demand for financial services: Evidence from India and Indonesia* (Working Paper 09-117). Harvard Business School. http://www1.worldbank.org/prem/poverty/ie/dime_papers/1107.pdf

Cornell, D. G., & Mayer, M. J. (2010). Why do school order and safety matter? *Educational Researcher*, *39*(1), 7–15. https://doi.org/10.3102/0013189x09357616

Cox, R., Brounen, D., & Neuteboom, P. (2015). Financial literacy, risk aversion and choice of mortgage type by households. *Journal of Real Estate Finance and Economics*, *50*, 74–112. https://doi.org/10.1007/s11146-013-9453-9

Cupak, A., Fessler, P., Silgoner, M., & Ulbrich, E. (2018). *Exploring differences in financial literacy across countries: The role of individual characteristics and institutions* (Working Paper 220). Oesterreichische Nationalbank. https://www.oenb.at/dam/jcr:c6506da3-61d3-4be8-abee-cf19468c13fa/WP220.pdf

Danes, S. M., & Haberman, H. R. (2007). Teen financial knowledge, self-efficacy, and behavior: A gendered view. *Journal of Financial Counseling and Planning*, *18*(2), 48–60. https://files.eric.ed.gov/fulltext/EJ1104367.pdf

von Davier, M. (2014). Imputing proficiency data under planned missingness in population models. In L. Rutkowski, M. von Davier, & D. Rutkowski (Eds.), *Handbook of international large-scale assessment: Background, technical issues, and methods of data analysis* (pp. 175–201). CRC Press. https://doi.org/10.1201/b16061-13

Davies, P. (2015). Towards a framework for financial literacy in the context of democracy. *Journal of Curriculum Studies*, *47*(2), 300–316. https://doi.org/10.1080/00220272.2014.934717

Drew, J. M., & Cross, C. (2016). Fraud and its PREY: Conceptualising social engineering tactics and its impact on financial literacy outcomes. In T. Harrison (Ed.), *Financial literacy and the limits of financial decision-making* (pp. 325–340). Springer. https://doi.org/10.1007/978-3-319-30886-9_16

Driva, A., Lührmann, M., & Winter, J. (2016). Gender differences and stereotypes in financial literacy: Off to an early start. *Economics Letters*, *146*, 143–146. https://doi.org/10.1016/j.econlet.2016.07.029

Erner, C., Goedde-Menke, M., & Oberste, M. (2016). Financial literacy of high school students: Evidence from Germany. *Journal of Economic Education*, *47*(2), 95–105. https://doi.org/10.1080/00220485.2016.1146102

Esposito, C. (1999). Learning in urban blight: School climate and its effect on the school performance of urban, minority, low-income children. *School Psychology Review*, *28*(3), 365–377. https://doi.org/10.1080/02796015.1999.12085971

Fernandes, D., Lynch, J. G., & Netemeyer, R. G. (2014). Financial literacy, financial education, and downstream financial behaviors. *Management Science*, *60*(8), 1861–1883. https://doi.org/10.1287/mnsc.2013.1849

Ferragina, E., Seeleib-Kaiser, M., & Spreckelsen, T. (2015). The four worlds of 'welfare reality'—Social risks and outcomes in Europe. *Social Policy and Society*, *14*(2), 287–307. https://doi.org/10.1017/s1474746414000530

Finlayson, A. (2009). Financialisation, financial literacy and asset-based welfare. *The British Journal of Politics and International Relations*, *11*(3), 400–421. https://doi.org/10.1111/j.1467-856x.2009.00378.x

Finn, J. D., & Achilles, C. M. (1999). Tennessee's class size study: Findings, implications, misconceptions. *Educational Evaluation and Policy Analysis*, *21*(2), 97–109. https://doi.org/10.3102/01623737021002097

Fonseca, R., Mullen, K. J., Zamarro, G., & Zissimopoulos, J. (2012). What explains the gender gap in financial literacy? The role of household decision making. *Journal of Consumer Affairs*, *46*(1), 90–106. https://doi.org/10.1111/j.1745-6606.2011.01221.x

Freiberg, H. J., & Stein, T. A. (1999). Measuring, improving and sustaining healthy learning environments. In H. J. Freiberg (Ed.), *School climate: Measuring, improving and sustaining healthy learning environments* (pp. 11–29). RoutledgeFalmer.

Gale, W. G., Harris, B. H., & Levine, R. (2012). Raising household saving: Does financial education work? *Social Security Bulletin*, *72*(2), 39–48. https://www.ssa.gov/policy/docs/ssb/v72n2/v72n2p39.pdf

Gamble, K. J., Boyle, P. A., Yu, L., & Bennett, D. A. (2015). Aging and financial decision making. *Management Science*, *61*(11), 2603–2610. https://doi.org/10.1287/mnsc.2014.2010

Gee, J. (2018). *Annual fraud indicator 2017: Identifying the cost of fraud to the UK economy.* Growe UK. https://www.crowe.com/uk/croweuk/-/media/Crowe/Firms/Europe/uk/CroweUK/PDF-publications/Annual-Fraud-Indicator-report-2017

Geiger, V., Yasukawa, K., Bennison, A., Wells, J. F., & Sawatzki, C. (2020). Facets of numeracy: Teaching, learning and practices. In J. Way, C. Attard, J. Anderson, J. Bobis, H. McMaster, & K. Cartwright (Eds.), *Research in mathematics education in*

Australasia 2016–2019 (pp. 59–89). Springer. https://doi.org/10.1007/978-981-15-4269-5_4

Gerardi, K., Goette, L., & Meier, S. (2010). Financial literacy and subprime mortgage delinquency: Evidence from a survey matched to administrative data [Working paper 2010-10]. *Federal Reserve Bank of Atlanta Working Paper Series*. https://www.atlantafed.org/-/media/documents/research/publications/wp/2010/wp1010.pdf

Gilbert, N. (2002). *Transformation of the welfare state: The silent surrender of public responsibility*. Oxford University Press.

Gottfredson, G. D., Gottfredson, D. C., Payne, A. A., & Gottfredson, N. C. (2005). School climate predictors of school disorder: Results from a national study of delinquency prevention in schools. *Journal of Research in Crime and Delinquency*, *42*(4), 412–444. https://doi.org/10.1177/0022427804271931

Gramaţki, I. (2017). A comparison of financial literacy between native and immigrant school students. *Education Economics*, *25*(3), 304–322. https://doi.org/10.1080/09645292.2016.1266301

Grohmann, A. (2016). The gender gap in financial literacy: Income, education, and experience offer only partial explanations. *DIW Economic Bulletin*, *6*(46/47), 531–537. https://www.econstor.eu/bitstream/10419/148080/1/872886581.pdf

Gudmunson, C. G., & Danes, S. M. (2011). Family financial socialization: Theory and critical review. *Journal of Family and Economic Issues*, *32*(4), 644–667. https://doi.org/10.1007/s10834-011-9275-y

Hastings, J. S., Madrian, B. C., & Skimmyhorn, W. L. (2013). Financial literacy, financial education, and economic outcomes. *Annual Review of Economics*, *5*(1), 347–373. https://doi.org/10.1146/annurev-economics-082312-125807

Hospido, L., Izquierdo, S., & Machelett, M. (2021). *The gender gap in financial competences* (Economic Bulletin 1/2021). Banco de España. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/InformesBoletinesRevistas/ArticulosAnaliticos/21/T1/descargar/Files/be2101-art05e.pdf

Huston, S. J. (2010). Measuring financial literacy. *Journal of Consumer Affairs*, *44*(2), 296–316. https://doi.org/10.1111/j.1745-6606.2010.01170.x

Huston, S. J. (2012). Financial literacy and the cost of borrowing. *International Journal of Consumer Studies*, *36*(5), 566–572. https://doi.org/10.1111/j.1470-6431.2012.01122.x

Indefenso, E. E., & Yazon, A. D. (2020). Numeracy level, mathematics problem skills, and financial literacy. *Universal Journal of Educational Research*, *8*(10), 4393–4399. https://doi.org/10.13189/ujer.2020.081005

Jappelli, T. (2010). Economic literacy: An international comparison. *The Economic Journal*, *120*(548), F429–F451. https://doi.org/10.1111/j.1468-0297.2010.02397.x

Jimerson, S. R., Hart, S. R., & Renshaw, T. L. (2012). Conceptual foundations for understanding youth engaged in antisocial and aggressive behaviors. In S. Jimerson, A. Nickerson, M. J. Mayer, & M. J. Furlong (Eds.), *Handbook of school violence and school safety* (2nd ed., pp. 3–14). Routledge. https://doi.org/10.4324/9780203841372

Jorgensen, B. L., & Savla, J. (2010). Financial literacy of young adults: The importance of parental socialization. *Family Relations*, *59*(4), 465–478. https://doi.org/10.1111/j.1741-3729.2010.00616.x

Kaiser, T., & Menkhoff, L. (2020). Financial education in schools: A meta-analysis of experimental studies. *Economics of Education Review*, *78*, 1–15. https://doi.org/10.1016/j.econedurev.2019.101930

Karakurum-Ozdemir, K., Kokkizil, M., & Uysal, G. (2019). Financial literacy in developing countries. *Social Indicators Research*, *143*(1), 325–353. https://doi.org/10.1007/s11205-018-1952-x

Khoirunnisaa, J., & Johan, I. R. (2020). The effects of financial literacy and self-control towards financial behavior among high school students in Bogor. *Journal of Consumer Sciences*, *5*(2), 73–86. https://doi.org/10.29244/jcs.5.2.73-86

Kiliyanni, A. L., & Sivaraman, S. (2016). The perception-reality gap in financial literacy: Evidence from the most literate state in India. *International Review of Economics Education*, *23*, 47–64. https://doi.org/10.1016/j.iree.2016.07.001

Klapper, L., & Lusardi, A. (2019). Financial literacy and financial resilience: Evidence from around the world. *Financial Management*, 1–26. https://doi.org/10.1111/fima.12283

Krippner, G. R. (2005). The financialization of the American economy. *Socio-Economic Review*, *3*(2), 173–208. https://doi.org/10.1093/ser/mwi008

Kuperminc, G. P., Leadbeater, B. J., Emmons, C., & Blatt, S. J. (1997). Perceived school climate and difficulties in the social adjustment of middle school students. *Applied Developmental Science*, *1*(2), 76–88. https://doi.org/10.1207/s1532480xads0102_2

Kutsyuruba, B., Klinger, D. A., & Hussain, A. (2015). Relationships among school climate, school safety, and student achievement and well-being: A review of the literature. *Review of Education*, *3*(2), 103–135. https://doi.org/10.1002/rev3.3043

Lee, J., & Stankov, L. (2018). Non-cognitive predictors of academic achievement: Evidence from TIMSS and PISA. *Learning and Individual Differences*, *65*, 50–64. https://doi.org/10.1016/j.lindif.2018.05.009

Longobardi, S., Pagliuca, M. M., & Regoli, A. (2018). Can problem-solving attitudes explain the gender gap in financial literacy? Evidence from Italian students' data. *Quality & Quantity*, *52*(4), 1677–1705. https://doi.org/10.1007/s11135-017-0545-0

Lührmann, M., Serra-Garcia, M., & Winter, J. (2015). Teaching teenagers in finance: Does it work? *Journal of Banking & Finance*, *54*, 160–174. https://doi.org/10.1016/j.jbankfin.2014.11.009

Lusardi, A. (2012). Financial literacy and financial decision-making in older adults. *Generations*, *36*(2), 25–32. https://www.jstor.org/stable/26555907

Lusardi, A. (2015). Financial literacy skills for the 21st Century: Evidence from PISA. *Journal of Consumer Affairs*, *49*(3), 639–659. https://doi.org/10.1111/joca.12099

Lusardi, A., & Mitchell, O. S. (2007). Baby Boomer retirement security: The roles of planning, financial literacy, and housing wealth. *Journal of Monetary Economics*, *54*(1), 205–224. https://doi.org/10.1016/j.jmoneco.2006.12.001

Lusardi, A., & Mitchell, O. S. (2008). Planning and financial literacy: How do women fare? *American Economic Review: Papers & Proceedings*, *98*(2), 413–417. https://doi.org/10.1257/aer.98.2.413

Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature*, *52*(1), 5–44. https://doi.org/10.1257/jel.52.1.5

Lusardi, A., Mitchell, O. S., & Curto, V. (2010). Financial literacy among the young. *Journal of Consumer Affairs*, *44*(2), 358–380. https://doi.org/10.1111/j.1745-6606.2010.01173.x

Lusardi, A., Schneider, D., & Tufano, P. (2015). The economic crisis and medical care use: Comparative evidence from five high-income countries. *Social Science Quarterly*, *96*(1), 202–213. https://doi.org/10.1111/ssqu.12076

Miles, K. H., & Darling-Hammond, L. (1998). Rethinking the allocation of teaching resources: Some lessons from high-performing schools. *Educational Evaluation and Policy Analysis*, *20*(1), 9–29. https://doi.org/10.3102/01623737020001009

Montoya, D. Y., & Scott, M. L. (2013). The effect of lifestyle-based depletion on teen consumer behavior. *Journal of Public Policy & Marketing*, *32*(1), 82–96. https://doi.org/10.1509/jppm.10.086

Moreno-Herrero, D., Salas-Velasco, M., & Sánchez-Campillo, J. (2018). Factors that influence the level of financial literacy among young people: The role of parental engagement and students' experiences with money matters. *Children and Youth Services Review*, *95*, 334–351. https://doi.org/10.1016/j.childyouth.2018.10.042

Morgan, R. E. (2021). *Financial fraud in the United States, 2017*. U.S. Department of Justice. https://www.bjs.gov/content/pub/pdf/ffus17.pdf

Norvilitis, J. M., & MacLean, M. G. (2010). The role of parents in college students' financial behaviors and attitudes. *Journal of Economic Psychology*, *31*(1), 55–63. https://doi.org/10.1016/j.joep.2009.10.003

OECD. (2019a). PISA 2018 financial literacy framework. *PISA 2018 assessment and analytical framework* (pp. 119–164). OECD Publishing. https://doi.org/10.1787/a1fad77c-en

OECD. (2019b). *PISA 2018 results: What school life means for students' lives*. OECD Publishing. https://doi.org/10.1787/acd78851-en

OECD. (2020a). *Financial literacy data file* [Data set]. OECD Publishing. https://webfs.oecd.org/pisa2018/SPSS_STU_FLT.zip

OECD. (2020b). *PISA 2018 results: Are students smart about money?* OECD Publishing. https://doi.org/10.1787/48ebd1ba-en

Opletalová, A. (2015). Financial education and financial literacy in the Czech education system. *Procedia – Social and Behavioral Sciences*, *171*, 1176–1184. https://doi.org/10.1016/j.sbspro.2015.01.229

Ozkale, A., & Erdogan, E. O. (2020a). An analysis of the interaction between mathematical literacy and financial literacy in PISA. *International Journal of Mathematical*

Education in Science and Technology, 1–21. https://doi.org/10.1080/0020739x.2020.1842526

Ozkale, A., & Erdogan, E. O. (2020b). A conceptual model for the interaction of mathematical and financial literacies. *International Journal of Progressive Education*, *16*(5), 288–304. https://doi.org/10.29329/ijpe.2020.277.18

Pak, T.-Y. (2018). Financial literacy and high-cost borrowing: Exploring the mechanism. *International Journal of Consumer Studies*, *42*(3), 283–294. https://doi.org/10.1111/ijcs.12429

Potrich, A. C. G., Vieira, K. M., Coronel, D. A., & Bender Filho, R. (2015). Financial literacy in Southern Brazil: Modeling and invariance between genders. *Journal of Behavioral and Experimental Finance*, *6*, 1–12. https://doi.org/10.1016/j.jbef.2015.03.002

Potrich, A. C. G., Vieira, K. M., & Kirch, G. (2015). Determinants of financial literacy: Analysis of the influence of socioeconomic and demographic variables. *Revista Contabilidade & Finanças*, *26*(69), 362–377. https://doi.org/10.1590/1808-057x201501040

Preston, A. C., & Wright, R. E. (2019). Understanding the gender gap in financial literacy: Evidence from Australia. *Economic Record*, *95*(S1), 1–29. https://doi.org/10.1111/1475-4932.12472

Regan, S., & Paxton, W. (2003). *Beyond bank accounts: Full financial inclusion*. IPPR. https://www.ippr.org/files/images/media/files/publication/2011/05/beyond_bank_accounts_1297.pdf

Reiter, S., & Beckmann, E. (2020). *How financially literate is CESEE? Insights from the OeNB Euro Survey* (tech. rep.). Oesterreichische Nationalbank. https://www.oenb.at/dam/jcr:578c0407-1d22-4094-a312-b7ce3e82ae76/03_feei_Q3_20_How-financially-literate-is-CESEE.pdf

Rust, K. (2014). Samping, weighting, and variance estimation in international large-scale assessments. In L. Rutkowski, M. von Davier, & D. Rutkowski (Eds.), *Handbook of international large-sclae assessment: Background, technical issues, and methods of data analysis* (pp. 117–153). CRC Press. https://doi.org/10.1201/b16061-11

Seeleib-Kaiser, M. (2016). The end of the conservative German welfare state model. *Social Policy & Administration*, *50*(2), 219–240. https://doi.org/10.1111/spol.12212

Serido, J., & Deenanath, V. (2016). Financial parenting: Promoting financial self-reliance of young consumers. In J. J. Xiao (Ed.), *Handbook of consumer finance research* (pp. 291–300). Springer. https://doi.org/10.1007/978-3-319-28887-1_24

Silgoner, M., Greimel-Fuhrmann, B., & Weber, R. (2015). Financial literacy gaps of the Austrian population. *Monetary Policy & the Economy*, *Q2*, 35–51. https://www.oenb.at/dam/jcr:a23bbdba-3696-4ed8-a4d5-656bbf09e0e0/mop_2015_q2_analyses02.pdf

Skagerlund, K., Lind, T., Strömbäck, C., Tinghög, G., & Västfjäll, D. (2018). Financial literacy and the role of numeracy–How individuals' attitude and affinity with numbers influence financial literacy. *Journal of Behavioral and Experimental Economics*, *74*, 18–25. https://doi.org/10.1016/j.socec.2018.03.004

Skiba, R., Ritter, S., Simmons, A., Peterson, R., & Miller, C. (2006). The safe and responsive schools project: A school reform model for implementing best practices in violence prevention. In S. R. Jimerson & M. Furlong (Eds.), *Handbook of school violence and school safety: From research to practice* (pp. 631–650). Lawrence Erlbaum. https://psycnet.apa.org/record/2006-03632-041

Sole, M. A. (2014). Financial literacy: An essential component of mathematics literacy and numeracy. *Journal of Mathematics Education at Teachers College*, *5*(2), 55–62. https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1011&context=nc_pubs

Stone, D. M., Simon, T. R., Fowler, K. A., Kegler, S. R., Yuan, K., Holland, K. M., Ivey-Stephenson, A. Z., & Crosby, A. E. (2018). *Vital signs*: Trends in state suicide rates — United States, 1999–2016 and circumstances contributing to suicide — 27 states, 2015. *Morbidity and Mortality Weekly Report*, *67*(22), 617–624. https://doi.org/10.15585/mmwr.mm6722a1

Sutter, M., Weyand, M., Untertrifaller, A., & Froitzheim, M. (2020). *Financial literacy, risk and time preferences–Results from a randomized educational intervention* (Discussion Paper 2020/17). Max Planck Institute for Research on Collective Goods. https://homepage.coll.mpg.de/pdf_dat/2020_17online.pdf

Tang, N. (2017). Like father like son: How does parents' financial behavior affect their children's financial behavior? *Journal of Consumer Affairs*, *51*(2), 284–311. https://doi.org/10.1111/joca.12122

Taylor, S. M., & Wagland, S. (2013). The solution to the financial literacy problem: What is the answer? *Australasian Accounting, Business and Finance Journal*, *7*(3), 69–90. https://doi.org/10.14453/aabfj.v7i3.5

Thomson, S., & De Bortoli, L. (2017). *PISA 2015: Financial literacy in Australia.* Australian Council for Educational Research. https://research.acer.edu.au/cgi/viewcontent.cgi?article=1028&context=ozpisa

Uline, C., & Tschannen-Moran, M. (2008). The walls speak: The interplay of quality facilities, school climate, and student achievement. *Journal of Educational Administration*, *46*(1), 55–73. https://doi.org/10.1108/09578230810849817

Utkarsh, B., Pandey, A., Ashta, A., Spiegelman, E., & Sutan, A. (2020). Catch them young: Impact of financial socialization, financial literacy and attitude towards money on financial well-being of young adults. *International Journal of Consumer Studies*, *44*(6), 531–541. https://doi.org/10.1111/ijcs.12583

Wang, M.-T., & Degol, J. L. (2016). School climate: A review of the construct, measurement, and impact on student outcomes. *Educational Psychology Review*, *28*(2), 315–352. https://doi.org/10.1007/s10648-015-9319-1

Yoshino, N., Morgan, P. J., & Wignaraja, G. (2015). *Financial education in Asia: Assessment and recommendations* (Working Paper Series No. 534). Asian Development Bank Institute. https://www.adb.org/sites/default/files/publication/161053/adbi-wp534.pdf