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The gender gap in financial literacy, attitude and saving behavior. Evidence from Austria

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Katharina Laura Reitsamer B.A. M.Sc.

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ABSTRACT (ENGLISH)

Financial literacy, attitude, and behavior are crucial inputs for financial well-being. Research shows that women are frequently less financial literate than men. This makes women susceptible to inadequate retirement planning and imprudent financial decisions. This thesis explores the gender gap in financial literacy, financial attitude, and saving behavior among vocational students in Vienna. The findings suggest that the men in this sample have higher financial literacy and saving levels, while women's attitudes are more long-term oriented than men's. Furthermore, the thesis reveals gender differences in the patterns of financial planning and gender-specific dynamics in the relationships between literacy, attitude, and saving. Lastly, the Oaxaca-Blinder decomposition results indicate that gender differences in financial knowledge and its application can explain part of the gender gap in saving behavior in this sample group.

ABSTRACT (GERMAN)

Finanzwissen, Finanzeinstellung und Finanzverhalten sind entscheidende Faktoren für finanzielles Wohlbefinden. Frauen weisen häufig ein niedrigeres Niveau an Finanzwissen auf als Männer. Das macht Frauen anfällig für eine unzureichende Altersvorsorge und unvorsichtige finanzielle Entscheidungen. Diese Arbeit untersucht die geschlechtsspezifischen Unterschiede im Finanzwissen, Finanzeinstellung und im Sparverhalten von Berufsschülern:innen in Wien. Die Ergebnisse deuten darauf hin, dass die Männer in dieser Stichprobe ein höheres Finanzwissen und ein höheres Sparniveau aufweisen, während die Einstellung der Frauen langfristiger orientiert ist als die der Männer. Darüber hinaus zeigt die Arbeit geschlechtsspezifische Unterschiede in der Finanzplanung und geschlechtsspezifische Dynamiken der Beziehungen zwischen Finanzwissen, Einstellungen und Sparverhalten auf. Schließlich deuten die Ergebnisse der Oaxaca-Blinder-Zerlegung darauf hin, dass geschlechtsspezifische Unterschiede im Finanzwissen und der Anwendung von Finanzwissen einen Teil des geschlechtsspezifischen Unterschieds im Sparverhalten in dieser Stichprobengruppe erklären können.

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ABBREVIATIONS

IHS	Institut für Höhere Studien/Institute of Advanced Studies
INFE	International Network on Financial Education
OECD	Organization for Economic Cooperation and Development
OeNB	Oesterreichische Nationalbank/Austrian National Bank
RAND ALP	RAND American Life Panel
WU Wien	Wirtschaftsuniversität Wien/ Vienna University of Economics and Business

1 INTRODUCTION

Financial well-being is paramount to achieving and sustaining one's desired living standards. Responsible financial behavior is necessary to accomplish and maintain financial well-being. In contrast, inadequate long-term planning and financially unviable decisions can lead to mental stress, depression or foster alcohol consumption or substance use.[1] In Austria, the Schuldenberatungen (2023)[2] reported that 66 % of the young people between 18 and 29 years who experience financial difficulties are at risk of depression. Among those without financial problems, the rate is 46 %. Furthermore, the Schuldenberatungen (2023) observed the worrying trend of increased financial hardships among the young population, with 21.8 % of their clients being 30 years or younger in 2023.

Previous research presents a strong relationship between financial behavior and financial literacy. Higher financial literacy is related to higher savings, better retirement planning, active stock market participation, improved debt management, and more resilience against economic shocks.[3] Therefore, it is important to increase financial literacy to promote good financial decision-making. This can enables individuals to plan their retirement, invest optimally, and be more resilient against economic shocks (Mahdzan & Tabiani, 2013).

Financial literacy levels are, however, concerningly low in numerous countries, including Austria[4]. According to the Austrian Survey of Financial Literacy (2019), which employs OECD methodology, the average score among individuals aged 39 to 58 was only 14.8 out of a possible score of 21. Among younger Austrians aged 15 to 28, the average score was even lower at 13.2 (Fessler et al., 2020). Given the low financial literacy in Austria (Fessler et al., 2020) and high financial debt, especially among the young (Schuldenberatungen, 2023), developing policies fostering responsible financial behavior is crucial.

Furthermore, there exists a substantial gender gap in financial literacy and behavior[5]. This gender gap in financial literacy implies that women are less equipped to plan their retirement, participate in the financial market, or manage debts. This gender gap in financial literacy is alarming since women, on average, receive lower incomes than men and work more often part-time (Ernst, 2023). In Austria, for example, 49.6% of the women work part-time, whereas only 11.6% of the men work part-time (Ernst, 2023). This means that women must plan and invest exceptionally well to accumulate wealth or save enough for retirement.

In light of this previous research, it appears crucial to discuss the presence of gender gaps in financial behavior and financial literacy among the Austrian youth and understand their interrelation. These insights can enable the development of strategies and programs that reduce the gender gap among the

[1] For a detailed analysis see: Brüggen et al. (2017), Szkody et al. (2023), Lusardi et al. (2010), OECD and European Union (2022).
[2] The Schuldenberatungen are the debt advice services of Austria (https://www.schuldenberatung.at/)
[3] For a detailed analysis see: Murendo and Mutsonziwa (2017), Lusardi and Mitchell (2007), Bucher-Koenen et al. (2021), Van Rooij et al. (2012), Lusardi and Tufano (2015) and (Hung et al., 2009).
[4] For evidence see: Atkinson & Messy (2012)
[5] For evidence see: Bucher-Koenen et al. (2021), Fernandes et al. (2014), Fonseca et al. (2012), Lusardi et al. (2010), Lusardi & Mitchell (2011, 2014) and Preston & Wright (2019).

Austrian youth, empowering all to reach their desired living standard. Therefore, I focus on the gender gap in saving behavior, financial literacy, and financial attitude among the young population in Austria. For this purpose, I use data from a lab-in-the-field experiment conducted jointly by the WU Wien (Wirtschaftsuniversität Wien) and the IHS (Institut für Höhere Studien) in 2023. The sample group consists of 1600 vocational students in Vienna, representing mainly young individuals who earn a monthly income, thus possessing financial independence. Therefore, financial decision-making is already vital to this group. Using this sample group, my first research question is:

Is there a significant gender difference in saving behavior, financial literacy, or financial attitude among Austrian vocational students?

Secondly, I want to answer the question:

Do gender differences in financial literacy and financial attitude contribute to the gender gap in saving behavior?

I employ student t-tests, boxplots, and other visualizations to answer the first research question. These methods enable me to gain insight into the gender gaps in saving behavior, financial literacy, and attitudes. To answer the second research question, I use an Oaxaca-Blinder decomposition. This allows me to decompose the potential gender gap in saving behavior, exploring whether gender differences in financial literacy and attitude account for the gender gap in saving. Furthermore, I compare this to the gender gap in saving behavior attributable to other factors, such as education and occupational choices.

My research contributes to the existing literature in several ways. Firstly, I contribute to the literature by developing a detailed framework and basing my empirical analysis transparently on this framework. My framework is strongly influenced by previously established frameworks (e.g., Atkinson and Messy, 2012; Hung et al., 2009; Huston, 2010; OECD, 2022). Overall, however, the literature still lacks a detailed conceptualization of financial literacy, and the nuances of the gender gap often remain unexplored (Stolper & Walter, 2017). Terms such as “financial knowledge” or “financial literacy” in the existing frameworks are frequently used interchangeably and remain vague (Hung et al., 2009). In my framework, I split financial literacy and financial attitude into more detailed components, permitting me to see in detail which components differ across genders and contribute to the gender gap in saving behavior. From a policy perspective, this detailed approach is valuable because it allows pinpointing an effective way of designing financial education to close the gender gap.

Furthermore, I introduce the variables *financial priorities* and *application of financial knowledge* in the framework based on ideas by Fisher and Montalto (2010), Hung et al. (2009), Huston (2010), and Xiao and Noring (1994). Therefore, I need to devise ways to measure these variables. I use textual analysis to investigate the answers to an open-ended question. Though textual analysis is well-suited for detecting intended and unintended information, allowing the extraction of interesting details from open-ended content, it is not often used in the financial context (Li, 2020). Using this method is a unique feature of this thesis. It contributes to the literature by implementing new ways to measure and model financial literacy and attitude components that have not been explored yet.

Lastly, though many papers have analyzed the relationship between financial behavior and financial knowledge, I use not only a new framework and new ways to measure variables, but I have the opportunity to draw upon a micro dataset from vocational students in Austria that gives interesting new insights. This group is notably underrepresented in this area of research since most studies focus on other sample groups, such as college students (e.g., Wagner and Walstad, 2023; Xiao et al., 2009). This further amplifies the novelty of my findings. It contributes to the literature by analyzing whether prior found relationships also hold in this sample group.

Using this framework and sample group, I find three main results. Firstly, the results suggest that men save significantly more than women in the time preference task. The gender gap is present not only in the amount saved but even more so in the form of saving. The textual analysis reveals that 43.8 % of the female participants incorporate "Saving," but only 9.5 % incorporate "Investment" into their financial plans. Conversely, almost 32 % of the male participants include "Investments," and 33.7 % include "Saving" in their financial plan. Hence, the open-ended question suggests that women prefer to save in liquid assets, such as cash, or transferring money to their bank accounts. At the same time, men consider investing in financial products significantly more often than women.

Secondly, my descriptive analysis as well as my regression results, indicate significant gender gaps in financial literacy, financial attitude, and saving behavior. Furthermore, the associations between these variables also differ across genders. Financial knowledge and long-term money attitude are positively and statistically significantly associated with saving behavior for women. Conversely, these associations remain insignificant for men. The relationship between application of financial knowledge and saving behavior is positive and statistically significant for both genders. Finding these differences illustrates the importance of tailored approaches in financial education and planning interventions to close the gender gap.

Lastly, the gender gap in financial literacy contributes to the gender gap in saving behavior. The gender gap in saving behavior is not attributable to the gender gap in financial attitude. Approximately 98 % of the gender gap in saving behavior is accounted for by the gender differences in financial knowledge and application of financial knowledge.

The thesis is structured as follows: Chapter 2 reviews the existing literature and introduces the theoretical framework. Chapter 3.1 provides an overview of the sample group and explains the measurement of variables. Chapter 3.2 delineates the Oaxaca-Blinder decomposition technique. Chapter 4.1.1 discusses the summary statistics of the key variables. Chapter 4.1.2. illustrates the textual analysis, providing details on the gender differences in answers to the open-ended question. Chapter 4.2.1 discusses the OLS regression results, Chapter 4.2.2. the decomposition results. Chapter 5 presents a discussion on issues regarding the regression and the textual analysis, elaborating on possible limitations of the thesis and highlighting future ideas for research. Chapter 6 concludes the thesis.

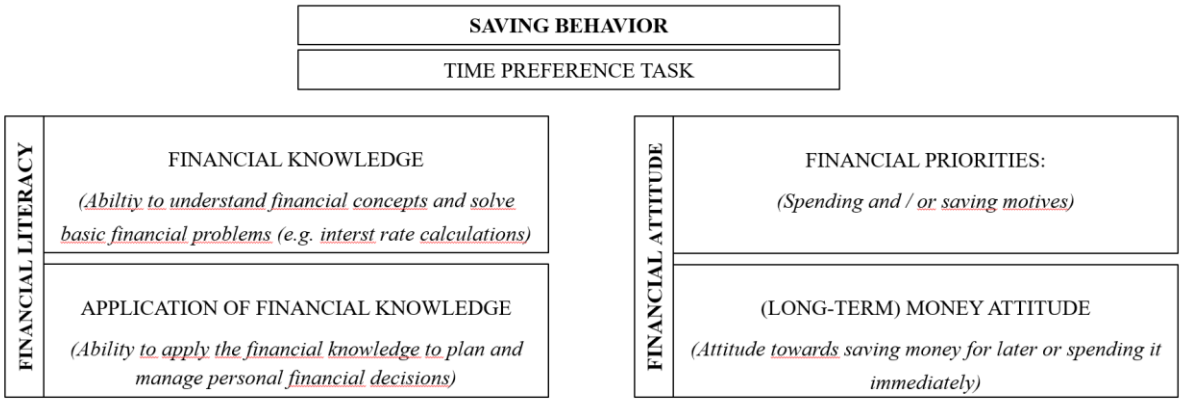
2 RELATED LITERATURE AND THEORETICAL FRAMEWORK

The literature related to financial literacy has gained momentum since 2009 (Goyal & Kumar, 2021). The literature closest related to this thesis encompasses contributions that discuss the conceptualization of financial literacy and establish theoretical frameworks that connect financial literacy, financial attitude, and financial behavior (e.g., Atkinson and Messy, 2012; Hung et al., 2009; Huston, 2010; Li, 2020; Remund, 2010; Santini et al., 2019) Furthermore, this thesis also relates closely to literature that explores reasons for the gender gaps in financial literacy, attitude, and behavior (e.g., Arellano et al., 2015; Cupák et al., 2018; Fonseca et al., 2012; Norvilitis et al., 2006; Preston and Wright, 2019; Tinghög et al., 2021). Lastly, this thesis relates to literature investigating the relationship between financial literacy, financial attitude, and financial behavior (e.g., Lusardi and Mitchell, 2011; Sharif et al., 2020; Stolper and Walter, 2017; Van Rooij et al., 2012).

Overall, existing research indicates that financial literacy leads to higher retirement savings (Lusardi et al., 2010), better planning for the future (Lusardi and Mitchell, 2007), more active stock market participation (Stolper & Walter, 2017), and better debt management (Norvilitis et al., 2006). There is still discussion, however, about a comprehensive theoretical framework and the operationalization governing this framework. Many papers do not clarify their differentiation regarding financial literacy, knowledge, and financial education (Huston, 2010). Furthermore, there is a predominant emphasis on the relationship between theoretical financial knowledge and financial behavior. In contrast, preferences such as risk tolerance, time preference, or confidence have not received enough attention, even though they might have an equally essential influence on financial behavior or indirectly affect the relationship between literacy and behavior (Goyal & Kumar, 2021). Huston (2010) investigates the conceptualization of financial literacy in seventy-one papers. The evidence shows that most papers do not explicitly include a concept or framework of financial literacy. Hung et al. (2009) are an exception and introduce a framework defining financial literacy as an interplay of knowledge, the ability to apply this knowledge, confidence, and experience in financial matters. They argue that there is a distinction between financial attitudes and knowledge, and they stress the importance of adding both to the framework and analyzing them separately (Hung et al., 2009). Remund (2010) addresses the issue that financial literacy should not only incorporate theoretical knowledge. Huston (2010), Li (2020), and Fernandes et al. (2014) also emphasize the need for a comprehensive framework and highlight the importance of including not only financial knowledge but also the ability to apply this knowledge in a comprehensive framework.

The OECD International Network on Financial Education (INFE) has addressed the topic of financial literacy and developed a framework and toolkit to operationalize these variables (Atkinson & Messy, 2012). Therefore, they designed survey instruments that are now widely used to measure financial literacy. The framework comprises three main blocks: Financial Knowledge, Financial Attitude, and Financial Behavior (Atkinson & Messy, 2012). In this thesis, I create a framework akin to the one proposed by the OECD (see Atkinson & Messy, 2012). However, I made minor adjustments to account for the suggestions and criticisms highlighted by several authors as described above. Figure 1 presents this framework. It consists of three blocks: Financial Literacy, Financial Attitude, and Saving Behavior.

The block Financial Literacy differs from the OECD framework block Financial Knowledge by incorporating not only financial knowledge (henceforth: *knowledge*) but also the variable application of financial knowledge (henceforth: *application*). Whereby *knowledge* models theoretical financial knowledge and *application* represents the ability to apply this theoretical knowledge to financial decisions, as Huston (2010) or Hung et al. (2009) suggested. Most other studies include solely theoretical financial knowledge and exclude a variable that measures the ability to apply this financial knowledge (Atkinson & Messy, 2012; Li, 2020).



Source: Author's compilation based on frameworks by Huston (2010), Hung et al. (2009), and Atkinson and Messy (2012)

FIGURE 1. THEORETICAL FRAMEWORK

In the second block, Financial Behavior, I diverge from the OECD framework, which includes budgeting and financial planning. Instead, I only include saving behavior (henceforth: *saving*) due to data availability. Furthermore, contrary to many studies (e.g., De Bassa Scheresberg, 2013; Lusardi and Mitchell, 2007), I do not use survey questions to elicit saving behavior but a time preference task. In time preference tasks, commonly employed in behavioral economics, participants choose between a smaller payment sooner or a larger payment later, allowing researchers to assess the trade-offs between present and future considerations of the participants (Sutter et al., 2019). For instance, Sutter et al. (2013) used eight different choice lists, where participants selected between receiving 10 euros today or slightly higher amounts in three or six weeks. The authors demonstrate that time preference tasks in economic experiments reliably represent actual saving behavior. Epper et al. (2020) provided further evidence that time preference tasks serve as effective measures to model saving behavior.

The third block in my framework, Financial Attitude, also deviates from the OECD framework. It consists of long-term money attitudes (henceforth: *attitude*) and financial priorities (henceforth: *priorities*). *Attitude* mirrors the financial attitudes outlined in the OECD framework. I included *attitude* to analyze the connection between long-term attitudes and financial behavior, as suggested by Goyal and Kumar (2021), Howlett et al. (2008), and Norvilitis et al. (2006). Similar to financial attitudes in the OECD framework, *attitude* in this thesis models the attitudes toward saving, the long-term orientation

of participants (Atkinson & Messy, 2012), and the willingness to withstand the temptation of spending money immediately (Van Rooij et al., 2012).

It is interesting to investigate gender differences in *attitude* since age, gender, or socio-economic aspects might influence long-term orientation (Greene & DeBacker, 2004). Nurmi (1987) interviewed adolescents regarding their long-term planning, fears, and hopes about the future. The interviews showed that worries about the future related to occupation or wealth do not differ significantly between genders (Nurmi, 1987). Steinberg et al. (2009) discuss future orientation across age and gender and find that women exhibit higher scores regarding planning and caring for the future and anticipating future consequences. Greene and DeBacker (2004) also discuss adolescents' long-term orientation and future goals. They conclude that women follow a greater diversity of future goals but want to achieve them relatively quickly compared to men. This might increase the risk of women being overwhelmed with the diverse goals that must be achieved in a brief timeframe, leading to increased anxiety of failure. Consequently, women might withdraw from pursuing their future goals quicker than men (Greene & DeBacker, 2004).

The second variable in the Financial Attitude block, namely financial priorities (henceforth: *priorities*), measures the motives for spending or saving money. Various authors (e.g., Fisher & Anong, 2012; Santini et al., 2019; Xiao & Anderson, 1997; Xiao & Noring, 1994) deliberate on the different motives and patterns behind saving behavior. They argue that the reasons for saving can influence the motivation and the form of saving. Most economic models assume a uniform saving motive that applies to all individuals in the model. In the life-cycle model by Modigliani (1966), people save to maximize their expected lifetime utility and to smooth consumption. Hence, individuals save during their working period and dissave during retirement, making retirement the saving motive (Dirschmid & Glatzer, 2004). In other models, the bequest motive or precautionary saving reasons are often cited (Fisher & Montalto, 2010; Xiao & Anderson, 1997). Nevertheless, many empirical studies found that the motives for saving decisions frequently deviate from standard economic theories (Rodriguez-Palenzuela & Dees, 2016). Xiao and Anderson (1997) argue that there is not one exclusive saving motive for all households and that saving motives might change over time and with circumstances. Their study found, for example, that a household's saving motive changes with its financial position. Furthermore, the financial instruments used for saving might change depending on the purpose of saving (Xiao and Anderson, 1997). A household might use low-risk retirement schemes to save for retirement and buy stocks as they get richer to save for personal growth motives (Xiao & Anderson, 1997). Hence, consumers' saving motives are crucial to understanding the financial attitudes of people and understanding them can help policymakers establish financial education programs suited to people's needs (Fisher & Anong, 2012; Xiao & Anderson, 1997). By including *priorities* in the Financial Attitude block, I aim to capture the influence of emotions, sentiments, and expectations about the future on the willingness to save, as highlighted by Devaney et al. (2007).

This thesis is also related to research that discusses possible reasons for the gender gap in financial literacy and behavior. Almost all studies in this field confirm the existence of such a gender gap, but the reasons for this gap remain less evident (e.g., Arellano et al., 2015; Bucher-Koenen et al., 2021; Cupák

et al., 2018; Lusardi et al., 2010; Preston and Wright, 2019; Ruiz-Palomo et al., 2023). Cupák et al. (2018) investigated financial knowledge scores for 12 countries and found a significant gender gap across all countries. The knowledge scores for men were significantly higher in all countries than the women's knowledge scores. These gender gaps remain largely unexplained even when age, education, or employment status are added as control variables. Fonseca et al. (2012) employed data from the RAND American Life Panel to investigate financial decision-making within married couples and whether this relates to financial knowledge. Their findings indicate that both women and men make more financial decisions for the household as their general education increases relative to their spouses' education. However, while financial knowledge improves for men when they increase their engagement in financial decisions, this does not happen for women. Preston and Wright (2019) drew upon the Household, Income, and Labour Dynamics Australia data. They found that human capital variables, such as education or labor market variables like occupation, can only explain 16 % of the gender gap in financial knowledge.

Some researchers (e.g., Allgood and Walstad, 2016; Arellano et al., 2015; Bucher-Koenen et al., 2021) examine the potential influence of non-cognitive skills like motivation or confidence on the gender gap. Allgood and Walstad (2016), among others, presented evidence that confidence in one's financial ability is equally important in explaining financial behavior as actual financial knowledge. Arellano et al. (2015) used PISA data for Spain and observed that male participants exhibit higher self-confidence in financial topics, which explains some of the gender gaps in financial behavior. Bucher-Koenen et al. (2021) discuss the gender gap in stock market behavior. They reveal that although part of the gender gap in stock market behavior is attributable to gender differences in financial knowledge, 38 percent is due to the gender gap in confidence rather than actual financial knowledge. But, despite controlling for non-cognitive skills, such as confidence, a large part of the gender gap remains unexplained (Allgood and Walstad, 2016).

Tinghög et al. (2021) ascertain that women's self-confidence is low in male-dominated areas. Hence, rather than confidence per se, stereotypical beliefs play the driving role in the gender gap. Their research unveils that women perform worse in reading tasks that include financial context, whereby they outperform men in reading tasks without financial context. These results demonstrate that women are uncomfortable in the financial domain, traditionally considered more male-dominated (Tinghög et al., 2021). Driva et al. (2016) also discuss the gender gap and stereotypical beliefs. In a field experiment across German schools, they could not detect a significant difference in confidence levels between male participants and female participants. However, teenagers of both genders regard finance as a male-dominated topic. They believe that male participants have more interest in financial matters, perform financial tasks better, and are more likely to work in a finance-related job in the future (Driva et al., 2016).

Several authors, including Lusardi et al. (2010), Ruiz-Palomo et al. (2023), Sharif et al. (2020), and Sinnewe and Nicholson (2023), highlight the impact of parental and peer influences on the gender gap in financial knowledge and behavior. Sharif et al. (2020) assert that parents' behavior is the most critical

factor. Using a structural equation mode, they demonstrate that the interaction of parents with their children differs for male and female participants, contributing to the gender gap in financial behavior.

Contrary to literature in this field, my thesis does not primarily aim to explain the gender gap. However, I investigated the existence of gender gaps in financial literacy, behavior, and attitudes in my sample. Additionally, I incorporate the abovementioned findings in the regression analysis and add control variables for financial confidence, education, and occupation.

This thesis also relates to literature that discusses the relationship between financial literacy and financial behavior. Stock market participation, for example, is linked to financial literacy (Bucher-Koenen et al., 2021; Stolper & Walter, 2017; Van Rooij et al., 2012). Bucher-Koenen et al. (2021) investigate whether financial literacy predicts a person's likelihood of holding stocks or mutual funds. Their results indicate that a one standard deviation increase in financial literacy results in an approximately nine percentage point higher probability of owning stocks. The results from Deuflhard et al. (2019) illustrate that financial literacy can impact the profitability of investing even in simple financial products such as a savings account. They argue that a lack of financial knowledge results in failing to identify the best offer or misperceiving the gains of switching to a more profitable option. Van Rooij et al. (2012) examine the role of financial confidence and find that more confident individuals are more inclined to engage in the stock market and buy more complex products.

Numerous studies focus on the relationship between saving behavior and financial literacy. Chang (1994) defines saving as delaying consumption to meet financial goals. It might be rational to dissave at certain times to smooth consumption. This might be the case for young people, who currently earn no income but expect higher income in the future. Nevertheless, dissaving often stands in the way of reaching financial goals (Chang, 1994). Lusardi and Mitchell (2008; 2011) used the Health and Retirement Study data to explore the connection between savings decisions and financial literacy. Their analysis encompassed an individual’s ability to assess the adequate amount of retirement savings. The findings show that those individuals that are more financial literate also demonstrate better saving and planning behavior, develop a plan, and stick with it. De Bassa Scheresberg (2013) uses National Financial Capability Study survey data. The results underscore that young people who lack financial knowledge are less likely to save for retirement or for precautionary motives. Murendo and Mutsonziwa (2017) observed the same correlation between saving behavior and financial literacy in the survey they conducted in Zimbabwe.

Howlett et al. (2008) examined the relationship between saving behavior and financial attitude. The results of their economic experiment conducted at a university in the USA revealed that the likelihood of contributing to a 401(k) plan is higher for those with more future-oriented attitudes. However, this relationship only holds true for those with basic financial knowledge. If basic financial knowledge is missing, then future orientation hardly impacts participation in a 401(k) plan (Howlett et al., 2008).

Nevertheless, several researchers (e.g., Fernandes et al., 2014; Sharif et al., 2020; Sinnewe and Nicholson, 2023) question this robust relationship between financial literacy and financial behavior. Fernandes et al. (2014) analyze the relationship between financial literacy and several types of financial

behavior, such as saving for an emergency and active participation in the financial markets. Their results indicate that the positive correlation between financial literacy and behavior significantly diminishes when personality traits, such as confidence in information gathering or risk preferences, are controlled for. Sinnewe and Nicholson (2023) find that financial literacy does not significantly influence day-to-day financial issues. It is, however, essential for the outcome of big financial decisions, such as entering the stock market. They further highlight the critical role of motivation in shaping the connection between financial behavior and financial literacy, arguing that only motivated individuals recognize the importance of financial literacy and are willing to acquire it to excel in the financial markets.

3 DATA AND EMPIRICAL STRATEGY

3.1 DATA

The dataset originates from a lab-in-the-field experiment conducted in Vienna in five vocational schools by the IHS and the WU Wien. The data was collected between April and June 2023 as part of the Project: "Peer effects in adolescents' saving behavior" by Dr Kerstin Grosch, Dr Sabine Neuhofer, and Dr Martin G. Kocher, founded by the OeNB.[6] Overall, 1656 students participated, of whom 810 were male, 821 were female, and 25 were divers. Due to the small sample size of diverse participants, no meaningful statistical analysis is possible; thus, these observations were dropped. Hence, my full sample consists of 1631 participants. The experiment encompasses three treatment arms. In the descriptive analysis, I consider the full sample. However, in this thesis's regression and decomposition analysis, I focus solely on the control group. The control group comprised 850 participants (409 male, 441 female). This decision is made to mitigate the potential impact of treatment effects on assessing the gender gap in saving behavior. Additionally, I use only data from the control group when presenting descriptives related to the variable influenced by the treatment, namely saving behavior. This approach ensures that any observed differences in saving behavior remain independent of the applied treatments.

The sample included participants from five vocational schools in Vienna: catering and hotel industry (356 participants, 243 male, 113 female), horticulture (85 participants, 43 male, 42 female), beauty professions (290 participants, 48 male, 242 female), business administration (560 participants, 193 male, 367 female), and electrical-event and information engineering (340 participants, 283 male, 57 female). The average age of female participants and male participants was 18.7 years. The average income for female participants was 540 Euros. For male participants, the average income was 665 Euros. Further details are in the Appendix (Table A. 1 and Table A. 2)

Outcome variable:

Figure 1 in Chapter 2 describes the five key financial variables examined in this thesis. The dependent variable is *saving*. In the behavioral economics literature, saving behavior is often modeled using time preference tasks, in which participants are asked whether they prefer a specific money amount now or a

[6] More information on the project can be found at: https://www.ihs.ac.at/research/research-projects/finanzstudie-2023/ or https://www.ihs.ac.at/research/research-projects/projectdetail/peer-effects-in-adolescents-saving-behavior/

slightly higher amount in the foreseeable future (Sutter et al., 2019). Epper et al. (2020) hypothesize that people's discounting rate explains their different saving behaviors. Based on their findings, time preference tasks reliably and accurately model saving behavior (Epper et al., 2020; Sutter et al., 2019). The time preference task employed in this thesis to investigate saving behavior is incentivized and closely resembles tasks used in other papers. The design mirrors, in particular, the task used by Epper et al. (2020). Participants face twelve decisions, each time choosing between 100 points today or 120 points in six weeks. This task is incentivized. The *saving* variable is the number of patient decisions: the number of decisions a participant allocated the points to "receive today".

Key explanatory variables:

The explanatory variables consist of two main blocks: Financial Literacy and Financial Attitude (see Figure 1). Financial Literacy is divided into two variables: *knowledge* and *application. Knowledge* is usually evaluated with questions that test the understanding of financial and economic concepts (e.g., Cupák et al., 2018; Fonseca et al., 2012; Lusardi and Mitchell, 2008). The OECD/INFE designed a survey incorporating seven knowledge questions to measure financial literacy (OECD, 2022). This thesis uses these seven questions, proposed by the OECD, to elicit financial knowledge. These questions capture how much individuals know about inflation, interest rates, and risk diversification. Each correctly answered question earns the participant one score. Therefore, the highest attainable score for financial knowledge is seven (OECD, 2022).

The ability to apply *knowledge* to make better financial decisions is an essential factor influencing financial behavior, though it is seldomly included in empirical analysis (Aydin & Akben, 2019; Fernandes et al., 2014; Goyal & Kumar, 2021; Stolper & Walter, 2017). In my thesis, I include this *application.* To generate this variable, I implement textual analysis. According to Li (2020), textual analysis is valuable in the context of financial literacy. It can help detect intended and unintended information, allowing the extraction of interesting details from open-ended content. The dataset includes an open-ended question regarding hypothetical money planning: "If you received 120,000 EUR today, what would you do with it?". The answers to this open-ended question reveal much about an individual's ability to apply financial concepts to develop a financial plan. Evaluating this open-ended text, thus, gives new and unique insights into the ability of individuals to make sound financial decisions when (hypothetically) endowed with a large amount of money. When evaluating the response, I consider four aspects, delineated in Table 1. Each fulfilled aspect contributes one score, except for the aspect *detailed,* which contributes two scores. I add up all the scores to derive the overall score. Hence, as Table 1 shows, the *application* variable takes values from zero to five, whereby a score of five indicates that the individual applies financial knowledge very well. More details on this variable can be found in the discussion in Chapter 5.

The second block of explanatory variables consists of the variables measuring financial attitude: *attitude* and *priorities*. Several researchers have identified long-term preferences as a significant predictor of financial behavior (Norvilitis et al., 2006; Sinnewe & Nicholson, 2023). In my thesis, the measurement of *attitude* aligns with the OECD, as presented by Atkinson and Messy (2012). Three statements, each with answers ranked on a Likert scale from one to five, are used. A higher score indicates a more future-

oriented answer. The scores are added and divided by three to get the average, as Atkinson and Messy (2012) outlined. The thesis adopts two statements from the OECD framework, namely, "I'd rather spend money than save it for later" (OECD, 2022 p.28) and "Money is meant to be spent" (OECD, 2022 p.28). I replace the third statement the OECD (2022) uses: " I tend to live for today and let tomorrow take care of itself" (OECD, 2022 p.28), with the statement, "I set long-term financial goals and try to achieve them." (OECD, 2022 p.28). Even though this statement is also part of the OECD toolkit to measure financial literacy, it is not used by the OECD to measure financial attitudes.

TABLE 1- MEASURING APPLICATION OF FINANCIAL KNOWLEDGE

	Description	Score
long-term	Is the financial plan long-term oriented?	0-1 [0 = no, 1 = yes]
detailed	Does the answer include multiple purposes for using the money?	0-1 [0 = no, 1 = yes]
	Does the answer specify how the financial plan or goal will be achieved?	0-1 [0 = no, 1 = yes]
sophisticated	Does the answer include specific numbers or exact percentages?	0-1 [0 = no, 1 = yes]
feasible	Is the plan feasible with the available funds?	0-1 [0 = no, 1 = yes]

The variable *priorities* is created with textual analysis. I assign the responses to the open-ended question "If you received 120,000 EUR today, what would you do with it?" to various saving or spending motives. These motives are based on Katona's (1975) classification of saving categories to elicit reasons for saving and adjusted following inspiration from Devaney et al. (2007), Fisher and Anong (2012), and Xiao and Noring (1994). The categories include: "Daily Necessities, Durable purchases, Emergency, Retirement, Children or family, Personal growth, and Altruistic motives." Furthermore, "Saving" and "Investment" were added because some participants did not have specified saving or spending motives. (see Appendix Table A. 3 for more detail)

Control variables

As mentioned in Chapter 2, the literature has identified several factors potentially leading to a gender gap in financial literacy and financial behavior (Bucher-Koenen et al., 2021; Lusardi and Mitchell, 2014; Sharif et al., 2020). A large body of literature attributes the gender gap in financial behavior to differences in financial confidence (e.g., Allgood and Walstad, 2016; Bucher-Koenen et al., 2021; Van Rooij et al., 2012). Consequently, I add financial confidence (henceforth: *confidence*) as a control variable in the regression analysis in Chapter 4.2. I use the answer to the question available in the dataset by the IHS & the WU Wien: "How many of the seven knowledge questions do you think you answered correctly?" to elicit financial confidence. The variable takes values from zero, indicating the belief that no question was correctly answered, to seven, indicating the belief that all questions were correctly answered. This approach to assessing financial confidence is similar to Lusardi and Mitchell (2014).

Additionally, education (Fonseca et al., 2012; Lusardi et al., 2010; Santini et al., 2019) and occupation (Preston and Wright, 2019) have been investigated in relation to the gender gap in financial literacy. Therefore, the regression analysis in this thesis includes the variable *education*, measured by the highest degree attained. Furthermore, the regression analysis incorporates the variable *school* to control for the participants' choice of vocational school, representing the occupational sectors.

3.2 DECOMPOSITION TECHNIQUE

The decomposition method's core idea is to describe a variable's distribution by a set of factors that differ systematically across two groups (O'Donnell et al., 2007). This thesis uses the Oaxaca-Blinder decomposition (Oaxaca, 1973) to elucidate the gender differences in the means of *saving*. This thesis will use a twofolded Oaxaca-Blinder decomposition. The model divides the difference in the mean value of *saving* into two parts: one explained by gender differences in *knowledge*, *attitude,* and *application* and the other one remianing unexplained. The latter is attributable to differences in coefficients or due to unobserved variables (Hlavac, 2014). The analysis remains purely descriptive. Thus, it is impossible to infer causality from the results of this thesis.

There are several ways to express the gender gap in mean outcomes. In general the researcher decides which reference coefficients to use (Hlavac, 2014). For example, a common approach in labor economics is to weigh the differences in the independent variable by the coefficients of the men and the differences in the coefficients by the independent variables of the women. (O'Donnell et al., 2007). In labor economics, this approach suggests that men receive remuneration based on their characteristics, but women do not, highlighting the discrimination against women in the labor market (O'Donnell et al., 2007).

Several researchers have developed different approaches for the Oaxaca-Blinder decomposition (Jann, 2008). Neumark (1988), for example, uses the coefficients from a pooled model[7] (see equation 1). The notation of equations (1), (2), and (3) is adapted from (Jann, 2008) and (Böheim et al., 2021).

$$y^{male} - y^{female} = \Delta x \beta^{p} + [x^{men}(\beta^{men} - \beta^{p}) + x^{female}(\beta^{p} - \beta^{female})] \qquad \textbf{(1)}$$

$y^{male} - y^{female}$ represents the difference in the mean of the variable *saving* of men and women. x is a vector of the independent variables, in my case, *knowledge, attitude,* and *application*. Δx is the difference in the vector of independent variables between men and women. β^{men} are the coefficients for men, β^{female} the coefficients of women and β^{p} are the coefficients obtained from a pooled OLS regression (Jann, 2008). Hence, in the approach by Neumark (1988), the differences in independent variables, Δx , are weighted by the coefficients from a pooled regression (Jann, 2008).

Reimers (1983), on the other hand, suggests to weight Δx by the mean of the coefficient vector. (see equation 2)

[7] excluding the group indicator variable, in this case gender.

$$\beta^* = 0.5\beta^{men} + 0.5\beta^{female} \quad \textbf{(2)}$$

Yet another approach, proposed by Cotton (1988), suggests weighting Δx by coefficients that are weighted using group sizes; in this case, n_{men} and n_{women}, the sample group of men and women, respectively (see equation 3)

$$\beta^* = \frac{n_{men}}{n_{men} + n_{women}}\beta^{men} + \frac{n_{women}}{n_{men} + n_{women}}\beta^{female} \quad \textbf{(3)}$$

I include approaches (1), (2), and (3) in this thesis and compare the results.

Next to the overall decomposition, a detailed decomposition delineates the contribution of the different independent variables to the gap in *saving* (Jann, 2008). Therefore, this thesis will incorporate a detailed Oaxaca-Blinder decomposition to analyze the extent to which gender variations in *knowledge*, *application,* and *attitude* contribute to the gender gap in *saving*.

4 EMPIRICAL RESULTS

4.1 DESCRIPTIVE STATISTICS

4.1.1 KEY FINANCIAL VARIABLES

Table 2 presents the summary statistics for the key financial variables defined in Chapter 3.1. The findings disclose that women are less patient. Women make, on average, approximately seven patient decisions out of the twelve, whereas men have a slightly higher average of 7.7. This difference is statistically significant. This finding confirms Falk et al.'s (2018) cross-country study that women are slightly less patient than men, even though this only applies to their aggregated results. Their country-specific analysis shows that in only 68 % of the countries, women are less patient than men. In contrast to the time preference task in this thesis, their time preference task is not incentivized, and they add a self-assessment question that tests participants' willingness to delay rewards. The significant gender difference in saving behavior also contradicts the findings of several other authors that use incentivized time preference tasks to measure saving behavior. Horn et al. (2022), for example, found no significant gender difference in their incentivized time preference task conducted in Hungarian schools with 1088 high school students participating. Sutter et al. (2013) also measured saving behavior with an incentivized time preference task. They found no gender differences, even though the dimensions of payment sizes and waiting time are comparable to the ones used in this thesis. The thesis also contradicts the findings of Castillo et al. (2011), who showed that women possess more patience than men. However, their participants are significantly younger than the sample group in this thesis.

Even though the significant gender difference in this thesis contradicts some previous findings regarding time preference tasks, it supports evidence from studies such as Agarwalla et al. (2015), Mahdzan and Tabiani (2013), and Murendo and Mutsonziwa (2017). These studies use survey questions to assess saving behavior, revealing that women save less and have less defined saving plans. De Bassa Scheresberg (2013) also discovered that women are less likely to have emergency savings. A recent study by Wagner and Walstad (2023) included survey questions regarding saving patterns for emergencies or retirement and highlighted that women engage significantly less in these financial behaviors than men.

Regarding *attitude*, Table 2 shows that women score 3.4 on average, slightly higher than men’s average score of 3.3. However, the difference is statistically significant only at the 10 % level. Given that *attitude* ranges from 0 to 5, a value of 3 signifies the midpoint between short- and long-term attitudes. This finding suggests that participants, irrespective of gender, lean slightly more towards long-term than short-term orientation. Atkinson and Messy (2012) present similar results. Women score higher on average across 14 countries except for Poland and Albania. Similarly, Agarwalla et al. (2015), who focus on the young urban population in India, assert that women exhibit significantly higher attitude scores than men. Thus, the finding about the urban young in Austria in this thesis confirms the finding of the urban young in India by Agarwalla et al. (2015).

TABLE 2 - SUMMARY STATISTICS BY GENDER

			Male			Female				
	Min	Max	N	Mean	SD	N	Mean	SD	Diff.	p-value
Saving	0	12	409	7.653	4.619	441	7.045	4.313	0.607	0.048**
Attitude	1	5	810	3.344	0.796	821	3.413	0.776	-0.069	0.080*
Knowledge	0	7	810	4.337	1.606	821	3.234	1.425	1.103	0.000***
Application	0	5	810	2.143	1.172	821	1.878	1.058	0.265	0.000***
Application: long term[1]	0	1	810	0.772	0.420	821	0.669	0.471	0.103	0.000***
Application: detailed[2]	0	2	810	0.454	0.610	821	0.415	0.522	0.039	0.164
Application: sophisticated[3]	0	1	810	0.111	0.315	821	0.034	0.182	0.077	0.000***
Application: feasible[4]	0	1	810	0.806	0.396	821	0.759	0.428	0.047	0.022**

Note: [1]Is the financial plan future-oriented?; [2]Does the answer include multiple purposes for using the money? Has the individual already put thought into financial planning?; [3]Does the answer include specific numbers or exact percentages?; [4]Is the plan feasible with the available funds?

Application of financial knowledge is the aggregate score of the above 4: long-term, detailed, sophisticated, and feasible.

Saving is the outcome of the time preference task (only observations unaffected by the peer treatment have been included for this variable)

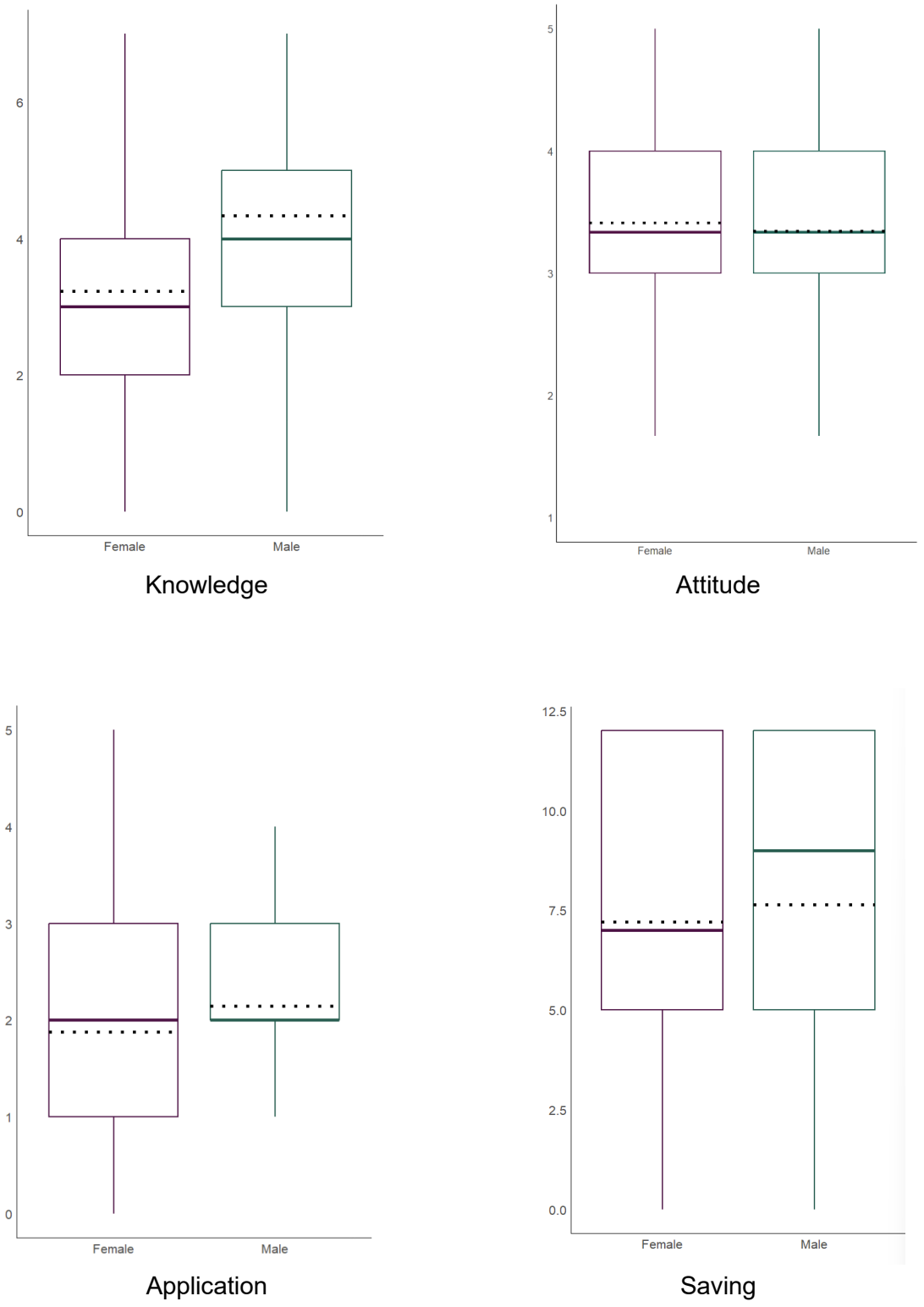
Statistical significance levels: *p < 0.1, **p < 0.05 and ***p < 0.0

Table 2 shows that the overall scores regarding *knowledge* are relatively low. Furthermore, the difference between men and women is considerable. On average, men correctly answer 4.3 out of the seven knowledge questions, and women only 3.2. The low overall score and the significant gender difference align with other studies' findings. The OECD (2020) study found that in all participating economies (except for Poland), women consistently have lower financial knowledge scores than men. Cupák et al. (2018) found a gender difference in financial knowledge of 0.4 in Austria using the OECD/INFE survey data. The gender gap of 1.1 found in this thesis is even larger than that found by Cupák et al. (2018). Hence, it seems that the gender gap in *knowledge* is more prominent among the specific sample group in this thesis than in the sample surveyed by the OECD.

Table 2 presents the aggregate score and the four disaggregated aspects regarding *application*. Overall, the aggregated scores are very low. Women only attain an average score of 1.8 out of 5. Men achieve a higher score of 2.1. The gender difference is statistically significant. Concerning the disaggregated scores, men attain significantly higher average scores than women. The only exception is developing a detailed financial plan, which is not significantly different across genders. Otherwise, the results suggest that men's financial plans are more feasible and long-term oriented than women's. This is interesting, given that women's *attitude* was significantly more long-term oriented. Potentially, these results suggest that women do not transfer this long-term attitude into developing specific financial plans. Furthermore, men's financial plans are more sophisticated on average, indicating they more often comprise exact numbers or percentages.

To gain even more insight into the distribution of the key financial variables and gender differences therein, Figure 2 presents boxplots of these financial variables. In Figure 2, the dotted line represents the mean, and the solid line signifies the median value. Regarding *knowledge*, the mean for both genders slightly exceeds the median, indicating that *knowledge* is positively skewed for both genders. This finding suggests that more than half of the participants possess lower scores in *knowledge* than the mean score. Furthermore, Figure 2 shows that men have higher median and mean knowledge scores than women.

Regarding *attitude*, the mean and median are nearly identical for both genders. Furthermore, there is no large gender divide, which aligns with the finding in Table 2 that the difference across genders is almost negligible, even though being statistically significant. In the case of *application*, Figure 2 shows that the median value is similar across genders. The same is true for the mean value of this variable. There are no substantial discrepancies across genders, even though the difference in means is statistically significant, as presented in Table 2. Notably, the mean of this variable for men slightly exceeds their median, suggesting a positively skewed distribution. Conversely, the opposite is true for women, indicating slightly negatively skewed data. Regarding *saving*, the mean value does not suggest such a large difference across genders. The median value, however, suggests a more considerable gender discrepancy. The data for the men is highly negatively skewed.



Note: Number of observations for female participants: 821. Number of observations for male participants: 810. Except for *saving*, for which the number of observations for female participants is 441 and the number of observations for male participants is 409.
The dotted line marks the mean. The solid line marks the median.

FIGURE 2. BOX PLOTS OF THE DISTRIBUTION OF THE FINANCIAL VARIABLES

Hence, more than half of the male participants chose to save more than the mean value of *saving*. For women, the opposite is true. The distribution is positively skewed, indicating that less than half of the female participants chose to save less than the mean value of *saving*.

Furthermore, not only the gender differences in the distributions of these variables but also differences in their correlation are of interest. Therefore, Table 3 presents Spearman's rank correlation coefficients between *knowledge*, *application*, *attitude,* and *saving* for women. Table 4 presents these correlations for the male participants.

Firstly, Table 3 and Table 4 show that the correlation coefficient between *saving* and *knowledge* is positive and highly significant for both genders. This result confirms the findings of other studies. Agarwalla et al. (2015) also find a positive and significant association between financial knowledge and behavior, in their sample group of urban Indian young. However, they do not look exclusively at saving behavior, but also at financial planning and budgeting. Aydin and Akben (2019) also find a positive correlation between financial knowledge and behavior among Turkish university students. The positive and highly significant correlation for both genders is in line with the literature, even though some authors, such as Fernandes et al. (2014), argue that this relationship becomes insignificant once personality traits are controlled for in the analysis.

Furthermore, Table 3 and Table 4 indicate that the newly created variable *application* is positive and highly significantly correlated with saving behavior, suggesting that not only the theoretical financial knowledge but also the practical ability to use this knowledge is correlated to saving behavior, as indicated by, e.g., Hung et al. (2009) and Huston (2010).

It is also becoming evident in Table 3 and Table 4 that *knowledge* and *application* are positive and highly significantly correlated. This finding suggests a positive relationship between theoretical knowledge and the ability to use this knowledge. Since the coefficient is 0.283 for women and 0.266 for men, it also shows that although they are correlated, the correlation is far from perfect. This indicates that even though they are associated, theoretical knowledge and the application of this knowledge are not identical and measure two different skill sets.

Moreover, the results in Table 3 and Table 4 illustrate that *knowledge* and *attitude* are not correlated. This supports evidence from Agarwalla et al. (2015), who also find an insignificant relationship. Furthermore, Aydin and Akben (2019) also find no significant correlation between these variables. However, the result contradicts the suggestion of other authors, such as Sinnewe and Nicholson (2023), who argue that long-term preferences, the willingness to save, and financial knowledge are connected. Sinnewe and Nicholson (2023) conclude that those who are more long-term oriented are also more motivated to gain financial knowledge to engage in financial behavior that helps them achieve their long-term goals.

Table 3 reveals a fascinating finding. *Attitude* exhibits a positive and statistically significant correlation with *saving* for female participants. Table 4 shows that this correlation remains positive but statistically insignificant for male participants. The insignificant result for the male participant is surprising, given that previous studies find that financial attitudes can predict financial behavior (e.g., Howlett et al., 2008;

Norvilitis et al., 2006). However, prior research, such as Agarwalla et al. (2015) or Aydin and Akben (2019), also finds an insignificant correlation between financial behavior and financial attitudes. The finding in this thesis that the relationship between *saving* and *attitude* differs across genders is exciting and probably crucial for designing financial education programs targeted at specific gender groups.

There is another exciting finding regarding *attitude*. Table 3 indicates that for female participants, there is a positive but statistically insignificant correlation between *attitude* and the *application*. Table 4 reveals a significant correlation among the male participants. This finding suggests interesting gender dynamics. For male participants, *attitude* correlates with how men apply financial knowledge and develop a financial plan. This correlation is insignificant for female participants.

TABLE 3 - CORRELATIONS BETWEEN FINANCIAL VARIABLES FOR WOMEN

	Saving	Knowledge	Attitude
Saving			
Knowledge	0.181***		
Attitude	0.106***	0.003	
Application	0.176***	0.283***	0.076

Note: Number of observations: 441. Statistical significance levels: *p < 0.1, **p < 0.05 and ***p < 0.01

Regarding actual *saving*, however, the correlation with *attitude* is positive and statistically significant for women, whereas, for men, this correlation remains insignificant. Hence, women's *attitude* correlates with their actual saving behavior. On the other hand, men's *attitude* is associated with their hypothetical money planning, thus, their ability to formulate a sound financial plan, not their actual saving behavior. It might be that attitudes affect the financial decision-making process differently for men and women. Considering such gender-specific patterns in financial decision-making can help design targeted and effective financial education programs.

TABLE 4 - CORRELATIONS BETWEEN FINANCIAL VARIABLES FOR MEN

	Saving	Knowledge	Attitude
Saving			
Knowledge	0.208***		
Attitude	0.028	-0.024	
Application	0.174***	0.266***	0.158***

Note: Number of observations: 409. Statistical significance levels: *p < 0.1, **p < 0.05 and ***p < 0.01

4.1.2 TEXTUAL ANALYSIS

This section elaborates on the textual analysis, which examines the answers to the open-ended question, "If you received 120,000 EUR today, what would you do with it?" Firstly, word clouds illustrate men's and women's most frequently used words, giving a first impression of the similarities and differences of words used to explain their financial plans. Secondly, I discuss the gender differences in *priorities* and assess them in an economic context. In addition to revealing how financial priorities differ by gender, this section also addresses how the views and attitudes of participants of an economic experiment differ from conventional economic theory. Lastly, a detailed look at the disaggregated score of the newly

Note: Women's most frequently used words, answering the question, "If you received 120,000 EUR today, what would you do with it?" The Figure includes 80 most used words

FIGURE 3: WOMEN'S MOST FREQUENTLY USED WORDS TO DESCRIBE THEIR FINANCIAL PLAN

created variable *application* provides more details on the four aspects of this variable and compares which aspects differ across genders.

The first striking result from the word clouds, presented in Figure 3 and Figure 4, is the prevalence of long-term-oriented words in the answers. "Sparen" (to save) or "Investieren" (to invest) are by far the most frequently used words. However, this finding also reveals a noticeable gender difference. Whereas "Sparen" is very prominent for women, the word "Investieren" is much less often used. On the other hand, "Sparen" and "Investieren" are equally prominent words for the male participants.

Several authors have identified that women are less active in the financial market. (Barber and Odean, 2001) For example, Bucher-Koenen et al. (2021) and Van Rooij et al. (2012) find that women engage less in stock markets due to lower confidence in their financial abilities. The word choice in the answer here might be a reflection of this phenomenon. Consistent with the argument that women are less active in the financial market, women's answers include words that describe complex financial products less often.

Note: Men's most frequently used words, answering the question, "If you received 120,000 EUR today, what would you do with it?" The figure includes 80 most used words

FIGURE 4. MEN'S MOST FREQUENTLY USED WORDS DESCRIBING THEIR FINANCIAL PLAN

Women, for example, use "Sparkonto" (savings account) more regularly than men. But men use the word "Aktien" (stocks) more often than women. Furthermore, whereas men use the term "Krypto" (crypto), women do not use this word frequently enough for it to appear in the word cloud. Thus, the word clouds imply that despite both genders including long-term oriented words, the word choice suggests that the forms of saving might differ across genders.

Furthermore, it is interesting that family plays a vital role in the answers. The words "Familie" (family), "Eltern" (parents), and "Mutter" (mother) appear regularly in male and female participant's answers. Sharif et al. (2020) and Sinnewe and Nicholson (2023) argued that parental influence is essential for financial decision-making. The answers do not indicate that the participants see their parents in the role of financial advisors. Several times, the participants' answers suggest that they have no idea how to use the money and want to avoid responsibility by delegating the choice to their parents. On the other hand, many answers indicated the willingness to share the money with their parents simply to ensure their financial well-being or show gratitude.

Regarding words describing items that participants want to buy, gender differences are not as pronounced. Long-term purchases such as "Immobilien" (Buildings), "Wohnungen" (flats), and "Haus" (house) frequently appear in the answers of male and female participants. Moreover, "Auto" (car) is among the most cited items, as are "driving license" and "Urlaub" (holidays). Though the relative frequency varies across genders, the items mentioned seem to be very similar across genders.

Next, these initial impressions provided by the word clouds will be further investigated by examining the *priorities*. Figure 5 presents the *priorities* by gender. As discussed in Chapter 3.1, participants can

have several priorities, not only one. In this survey, many people did have multiple saving and spending motives, as suggested by Xiao and Anderson (1997).

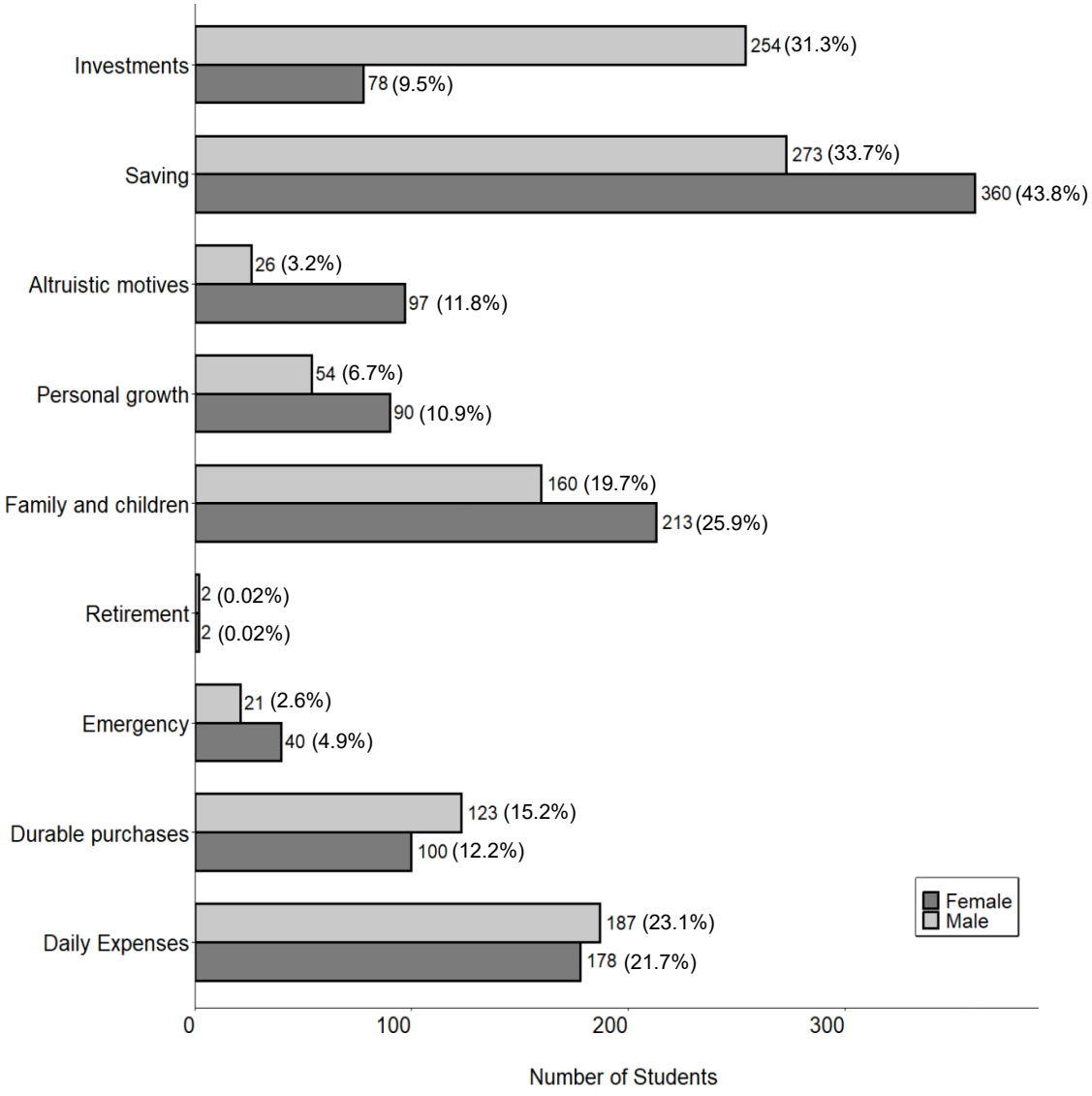
Before focusing on the gender aspect, it is interesting to discuss the economic context of these priorities. Participants in this experiment might use or view some terms different from conventional economic theory, such as the terms "investment" and "saving." In economics, investments are conventionally an instrument to save, not a substitute for saving, e.g., in the Euro Survey, people are asked about their saving habits, where saving options include cash, bank accounts, life insurance, mutual funds, or pension funds (Rodriguez-Palenzuela & Dees, 2016). On a macro level, the saving level is defined as the part of the income not spent on consumption (Statistik Austria, 2023). Macroeconomic models hardly address the form of saving or the fact that individuals might not choose the most optimal form of saving for them.

However, the answers to the open-ended question make it evident that the respondents do not see investment as a form of saving but rather as a complement to it. Many answers differentiate between savings and investments as two separate categories. Many answers define saving as "keeping money aside for the future" in the form of cash or a savings account, whereas investment is seen more like a business idea promising to yield high returns. Hence, the answers indicate that the goal of saving is to ensure liquidity in the future, whereas the goal of investing is to accumulate money; many participants talk about "multiplying money by investing."

Most interestingly, Figure 5 shows that the preference for investment and saving are very different across genders: 43.8 % of women include "Saving" as one of their motives in their financial plan, but only 33.7 % of men do so. However, regarding investment, 31.3 % of men include investment in their financial plans, whereas only 9.5 % of women do so. Given this striking difference, the question arises why women want to invest so much less and prefer to hold liquid assets, such as cash, that yield no returns.

Various models elucidate the preference for holding liquidity (Stix, 2013). One example is holding liquidity for precautionary purposes, as (Tobin, 1958) described. In this case, the reason for holding liquidity stems from the uncertainty about the future (Stix, 2013). This model does, however, not explain the remarkable gender difference in preference for liquid savings. Risk preferences could potentially explain this sizeable gender difference. Numerous studies identified men exhibiting higher risk tolerance than women (e.g., Croson and Gneezy, 2009; Falk et al., 2018). Since investments might yield higher returns but entail more risk, female participants, who tend to be more risk-averse, might avoid investments. Following Tinghög et al. (2021), stereotypical beliefs could account for the substantial gender difference. Investments might be perceived as more closely associated with the financial market than savings, leaving female participants discouraged or unconfident to engage in this male-dominated realm. The gender difference in financial knowledge might also contribute to this gender divide. If men have higher financial knowledge levels, they might know more about financial products and are willing to invest in more complex products. This explanation would align with the findings of De Bassa Scheresberg (2013) or Lusardi and Mitchell (2008).

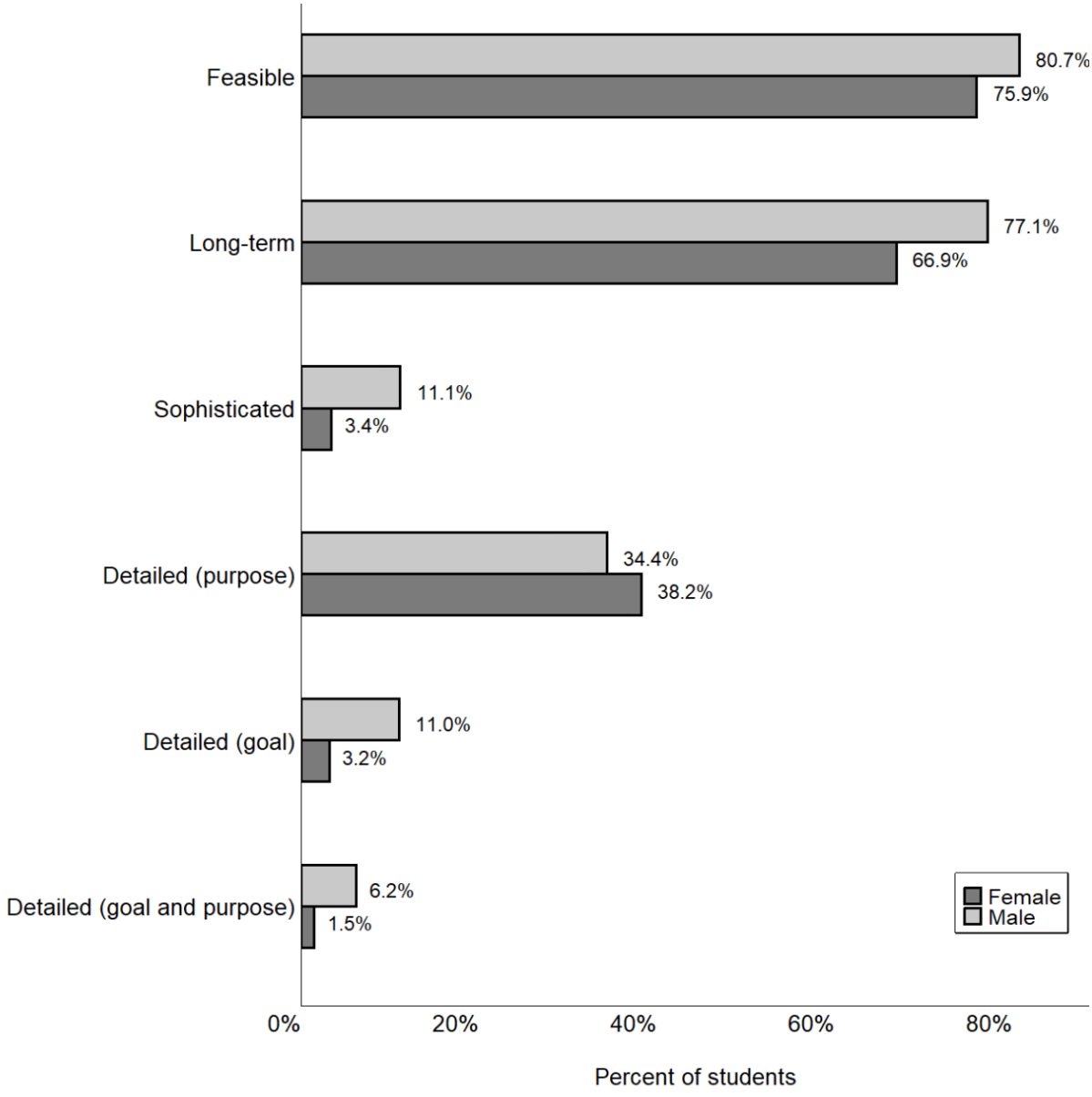
Regarding other priorities besides savings and investments, another notable result in Figure 5 is that very few participants, 0.02 % of both genders, actively named retirement as their saving motive. It is possible that many of those who stated that they wanted to "save" or "invest" had retirement motives in mind without explicitly mentioning them in their answers. Nevertheless, it is interesting that participants did not mention saving for retirement, which is the saving motive proposed by the life-cycle hypothesis by Modigliani (1966) more actively in their answers. However, other authors also found that people do not plan for retirement. For example, Lusardi and Mitchell (2011) discovered that even among those older than 50, only 9 % developed a retirement plan, and only 38 % of those who indicated that they did plan could stick with it.



Note: Number of female participants: 821. Number of male participants: 810. Priorities are not mutually exclusive, and individuals can have multiple priorities.

FIGURE 5. FINANCIAL PRIORITIES BY GENDER

Similarly, only a few participants, 4.9% of women and 2.6% of men, explicitly mentioned "Emergency" as their saving motive. Also, in this case, those who answered "save" or "invest" might implicitly consider emergency motives without explicitly mentioning them. Nevertheless, this finding is noteworthy since economic models often highlight the precautionary saving motive, as Xiao and Anderson (1997) discussed.



Note: Number of female participants: 821. Number of male participants: 810.
Feasible: Is the financial plan feasible with the available funds?
Long-term: Is the financial plan/goal long-term oriented?
Sophisticated: Does the plan contain exact numbers/percentages or figures?
Detailed (purpose): Does the answer include multiple purposes for using the money?
Detailed (goal): Does the answer specify how the financial plan or goal will be achieved?
Detailed (purpose and goal) Answer includes multiple purposes and specifies how the goal is achieved.

FIGURE 6. APPLICATION OF FINANCIAL KNOWLEDGE - DISAGGREGATED SCORES

Apart from the gender differences in saving and investments, we can also see gender differences in other saving and spending motives, even though the gender differences are less pronounced in the other categories. In their answers, more women (11.8 %) than men (3.2 %) express altruistic motives, such as donations or supporting NGO projects. Similarly, more women (10.9 %) than men (6.7 %) mention personal growth, including spending or saving on education or workshops, traveling, or recreational activities, as their motive. Confirming the observation in the word clouds, Figure 5 illustrates that many participants want to give money to their parents or save for their children, whereby slightly more women (25.9 %) than men (19.7 %) express this motive. Regarding durable purchases, the gender difference is negligible. 15.2 % of men and 12.2 % of women mention this motive. The same applies to daily expenses, which 23.1 % of male and 21.7 % of female participants mention in their financial plans.

Figure 6 displays the disaggregated scores of the variable *application.* Approximately 75 % of women and 80 % of men developed a feasible financial plan. The aspect *feasible* tests whether an individual comprehends the magnitude of financial resources and develops appropriate plans. A plan is not feasible if it is not achievable because it exceeds the funds received (e.g., buying a house and car in Vienna and saving the rest is not feasible with 120.000 Euros). However, plans are also unfeasible if they stay too low under the budget (e.g., a plan to go for dinner is not feasible because a dinner will not cost 120.000 Euros). Figure 6 shows that both genders have a good understanding of what is feasible with the funds received.

Additionally, most participants developed a long-term plan, indicating they are not impulsive spenders but incorporate future considerations in their decision-making. Financial plans that include saving, investing, or buying long-term purchases such as houses were considered long-term oriented. Interestingly, more men (77.1 %) than women (66.9 %) made long-term plans, a surprising result also visible in Table 2. Even though women seem to have more long-term-oriented attitudes, they do not incorporate this in their actual financial plans. On the other hand, only a few participants developed sophisticated financial plans, including exact numbers, percentages, or other figures. The inclusion of exact numbers indicates that the financial plan is precise. Hence, the aspect *sophisticated* assesses how thoroughly the idea has been developed. Only 11.1 % of men and 3.4 % of women used numbers to describe their financial plans.

The *detailed* aspect consists of two sub-aspects. Firstly, it assesses whether the financial plan includes multiple purposes for using the received money. Secondly, it examines whether the financial plan specifies how to achieve these purposes and goals. For example, if an individual states that they want to invest, the financial plan would be specific if it names the investment products. Very few individuals have a financial plan that incorporates both sub-aspects; among the male participants, only 6.2 %, and among the female participants, only 1.5 %. However, more women (38.2 %) than men (34.4 %) included multiple purposes for using the received money. On the other hand, more men (11 %) than women (3.2 %) specified how to achieve their financial goals. The gender differences, except in the aspect *detailed*, are all significant, as delineated in Table 2.

4.2 REGRESSION AND DECOMPOSITION RESULTS

4.2.1 OLS REGRESSION ANALYSIS

This chapter presents the results of the OLS regressions and the Oaxaca-Binder decomposition. Table 5 presents the OLS regression, which includes key financial and control variables, as described in Chapter 3.1. The Huber-White robust standard errors are in parentheses. As a robustness check, the same regression was run using standard errors clustered on the session level in case the observations in one session are not independently distributed. Using cluster-robust standard errors does not alter the results.

The regression analysis in Table 5 reveals exciting results regarding the relationship between the outcome *saving* and the explanatory financial variables. It indicates significant differences in these relationships across genders.

Regarding the relationships for male participants, one unit increase in *knowledge* is associated with a 0.209 increase in *saving*. Moreover, an increase of one score in *attitude* is associated with a 0.056 increase in *saving*. Given that *saving* ranges from zero to twelve, these coefficients, particularly for *attitude*, are relatively small. Furthermore, these coefficients are insignificant. Regarding *knowledge* and *attitude*, women's dynamics differ from men's. The coefficients of *knowledge* and *attitude* are larger than those for male participants and statistically significant. Regarding *application*, the coefficients for male and female participants are both statistically significant. For female participants, an increase of one score in *application* is associated with a 0.586 increase in *saving*. For the male participants, this is slightly lower at 0.395.

Numerous studies support the significant association between *knowledge* and *saving* found among the female participants in this thesis. Yet this support, at the same time, contradicts the insignificant effects seen among the male participants. De Bassa Scheresberg (2013), Lusardi and Mitchell (2007), and Stolper and Walter (2017) find that financial knowledge predicts saving for retirement or emergency. Similarly, Murendo and Mutsonziwa (2017) conducted a survey in Zimbabwe with 4000 participants, revealing that participants' perceptions of financial matters and their knowledge of financial terms predicted saving behavior and led to higher saving levels. Several studies also find that financial attitudes can explain financial behavior, hence supporting the significant association found for female participants. For example, Norvilitis et al. (2006) examine credit card debts and financial attitudes among university students and find that attitudes towards credit card use and impulsiveness in spending decisions are predictors of credit card debt. Similarly, Howlett et al. (2008) suggest that those individuals with greater future orientation more frequently engage in retirement planning, at least if they also have a basic level of financial knowledge.

However, contrary findings suggest that financial knowledge and attitude are not associated with financial behavior(e.g., Fernandes et al., 2014; Sharif et al., 2020; Woodyard and Robb, 2012). While these studies confirm the findings among male participants in this thesis, they contradict the findings for female participants. For example, Fernandes et al. (2014) propose that personality traits, such as impulsiveness rather than financial knowledge, predict saving behavior. Consequently, their findings of

insignificant financial knowledge contradict this thesis's findings for female participants but support those for male participants. Sinnewe and Nicholson (2023) illustrated that financial knowledge only matters for event-based financial behavior, such as entering the stock market while having little influence on everyday financial habits. If the time preference task in this thesis resembles saving habits rather than event-based decisions, this could explain the insignificant effects for male participants. However, it cannot explain the significant results for women.

The fact that the dynamics of the relationships differ between genders is an exciting finding. The results show that not only do men and women exhibit different levels of key financial variables, but the dynamics of these variables also differ across genders. The Spearman rank coefficients also indicated this exciting finding, as presented in Table 3 and Table 4. Previous research has not discussed these gender-specific dynamics comprehensively, and it remains unclear why the relationships differ across genders. One idea could be that the relative importance of actual financial knowledge and perceived financial knowledge (confidence) differs across genders. Numerous papers (e.g., Allgood and Walstad, 2016) explored the relative importance of knowledge versus confidence in shaping financial behavior. However, no study identifies whether their relative importance differs across genders. For men, confidence might matter more than actual knowledge for saving behavior. For women, actual knowledge might be more important for saving behavior than confidence. Women may be more inclined to seek out and rely on comprehensive financial knowledge before taking action. At the same time, men may feel more comfortable acting on their perceived confidence alone. This might be an explanation for the insignificant *knowledge* coefficients for men.

Furthermore, another idea would be that the underlying stereotypical beliefs might lead to disparities in the dynamics. Tinghög et al. (2021) and Driva et al. (2016) identified that women perform less effectively in financial contexts and show more anxiety toward financial matters. Hence, for women, the pressure to counteract stereotypes and the associated anxiety may make them more reliant on comprehensive knowledge as a prerequisite for financial action. In contrast, men may feel less pressure to prove their financial competence and may prioritize confidence over knowledge when making financial decisions.

However, these ideas remain vague hypotheses since evaluating the reasons for the different dynamics across men and women goes beyond the scope of this thesis. Further research is essential to validate whether and for what reasons the relationships between knowledge, behavior, and attitudes vary across genders, as suggested by the findings in this thesis. Such insight is vital for policymakers since considering these differences in the design of financial education programs can enhance their effectiveness and might help to target them to the appropriate demographic group.

TABLE 5: OLS REGRESSIONS

	Saving	
	(1) Male	(2) Female
Key variables		
Knowledge	0.209	0.305*
	(0.172)	(0.168)
Attitude	0.056	0.167*
	(0.097)	(0.087)
Application	0.395**	0.586***
	(0.184)	(0.188)
Controls		
School: Horticulture	-0.135	-2.054**
	(1.091)	(0.909)
School: Beauty professions	-0.029	-0.933
	(0.854)	(0.651)
School: Business admin.	0.161	-0.641
	(0.593)	(0.594)
School: Engineering	1.296**	-0.517
	(0.564)	(1.100)
Education: Matura	2.144*	2.319**
	(1.109)	(1.147)
Education: Apprenticeship	0.286	-1.393
	(1.581)	(1.326)
Education: compulsory school years completed	0.187	0.857
	(0.984)	(0.967)
Education: Other	0.978	1.148
	(1.352)	(1.078)
Financial confidence	0.384**	0.259*
	(0.169)	(0.148)
Constant	2.798*	2.294
	(1.587)	(1.414)
N	409	441
R^2 adjusted (%)	7.04 %	6.76 %
F-statistics	3.577***	3.659***

Note: Robust standard errors are reported in parentheses.

Statistical significance levels: *p < 0.1, **p < 0.05 and ***p < 0.01.

Baseline for school variable: Hospitality school

Baseline for education variable: failed to complete compulsory school years successfully

Looking at *application* in Table 5 illustrates that this newly created variable is associated with saving behavior for both genders. This finding confirms Huston's (2010) and Hung et al.'s (2019) suggestion that not only theoretical knowledge but also the application of financial knowledge influences financial behavior. Indeed, *knowledge* and *application* are statistically significantly associated with saving for women. For men, interestingly, only *application* exhibits statistical significance.

Confidence was added as a control variable, as elucidated in Chapter 3.1, motivated by several studies identifying that financial confidence impacts credit card and investment behavior (Allgood & Walstad, 2016) or retirement savings and stock market participation (Van Rooij et al., 2012). The results in this thesis corroborate these findings, revealing a statistically significant association between *saving* and *confidence* for both genders, whereby the effect size is larger for men than for women. Considering the different dynamics of relationships for men and women mentioned earlier, it's interesting to revisit the differences in confidence and financial knowledge between men and women. For female participants, both *confidence* and *knowledge* are statistically significantly related to *saving*. For male participants, this is only true for *confidence*.

As a further control variable, a school dummy was added, inspired by Preston and Wright's (2019) study in which they argued that occupational choices and labor market variables might be related to financial knowledge. In this thesis, *school* is a good proxy for occupation and labor market choices, as the choice of vocational school defines the sector in which the individual works or intends to work. Interestingly, among male participants, enrollment in the engineering vocational school exhibits a positive relationship with *saving*. In contrast, among female participants, enrollment in the horticulture vocational school negatively correlates with *saving*. Nevertheless, the data does not reveal discernible patterns concerning occupational choices, with most school dummies showing insignificance. Consequently, occupational choices correlate little with *saving* in this sample group.

Lastly, *education* was added as a control variable because numerous papers have identified a significant relationship between education and financial behavior. For example, Mahdzan and Tabiani (2013) highlight that education plays a pivotal role in shaping saving behavior, and those with higher education levels also save more. Interestingly, Fisher (2010) finds that the effects of education differ across genders. Whereas higher education levels positively relate to savings among men, there is no such significant effect for women. Table 5 shows that having a "Matura" (secondary school diploma) fosters a statistically significant and positive relationship with *saving* for both genders. The other education levels remain insignificant. One must note, however, that the sample group in this thesis is particular, as it comprises only vocational students who display little variance in educational levels. The education levels among the entire Austrian population might be more heterogeneous. These results might not be representative of group with more heterogeneous educational backgrounds.

Table 5 illustrates a low R^2 of approximately 7 % for the OLS regression of both genders. The low R^2 is relatively common in this field of research, and comparable regression analyses often yield similar R^2 values. De Bassa Scheresberg (2013) observed an R^2 value ranging from 0.16 to 0.2 when regressing financial literacy and several control variables on financial behavior. Bucher-Koenen et al. (2021) found R^2 between 0.024 and 0.067 when regressing financial knowledge and a gender dummy on stock market

participation. Fernandes et al. (2014) achieved a higher R^2 of 0.4 in their OLS regression, analyzing the effects of financial knowledge and personality traits on positive saving behavior, including purchasing bonds, stocks, mutual funds, or holding a savings account. It should be noted, however, that numerous papers (e.g., Lusardi and Mitchell, 2008, 2007; Murendo and Mutsonziwa, 2017) use probit rather than OLS regressions, given that their dependent variables are often binary, for example, the decision whether to save or not.

There are several potential reasons for the low R^2 observed in this thesis. The data might not be ideally suited for a linear model. Regarding the dependent variable, for example, many participants opted to save either nothing or everything. This raises questions about whether it would be more appropriate to create a binary variable distinguishing between saving everything and saving nothing and subsequently employ a probit model similar to the studies mentioned above.

Furthermore, the sample group exclusively of vocational students is particular and might be more homogeneous than the overall Austrian population. Most participants are similar in age, education level, and state of life. While this homogeneity is advantageous for targeted analysis, it may also result in reduced variations in the sample group, e.g., in their education, age, or knowledge, contributing to a lower R^2. Given that the primary goal of this analysis is to understand the associations between saving behavior and the explanatory financial variables, rather than illustrating a model that fully predicts saving behavior, the low R^2 is not necessarily a problem.

A more severe issue is that the analysis may be susceptible to omitted variable bias. *Knowledge*, *attitude,* or *application* might be connected to variables omitted from the study. Economic preferences, such as risk preference, might potentially correlate with *attitude* or *application* and simultaneously be potential determinants of saving behavior. Thus, the analysis in this study remains descriptive, and no causal statements can be derived. This is a major limitation of this thesis. However, it seems common in this research field to refrain from causal inference. Only a few papers facilitate causal interpretation by incorporating, for example, instrumental variable analysis. Chapter 5 includes a more elaborate debate about the limitations of this thesis.

4.2.2 OAXACA-BLINDER DECOMPOSITION RESULTS

The Oaxaca-Blinder decomposition is common in labor economics to display the wage gap between genders or ethnicities (e.g., Oaxaca, 1973; Reimers, 1983). The decomposition delineates the part of the gap explained by variations in characteristics such as age or experience and the unexplained part attributed to discrimination against women or minorities in the labor market (Oaxaca, 1973). To the best of my knowledge, in the financial literacy context, no papers have analyzed the gender gap in saving behavior using an Oaxaca-Bilder decomposition. However, a few papers decomposed financial literacy into an explained and unexplained part. For example, Cupák et al. (2018) studied financial knowledge across 12 countries. They decomposed the gender gap in financial knowledge into the parts attributable to the differences in observable characteristics and the parts unexplained by these characteristics. In Austria, one of the 12 countries analyzed, the gender differences in characteristics could explain only 0.063 of the gender gap in knowledge. Fonseca et al. (2012) found congruent results using data from the

RAND ALP. Preston and Wright (2019) also employed the Oaxaca-Blinder decomposition to analyze whether gender differences in human capital, such as education, field of study, or city of residence, or occupational choices, such as sector of work, industry, or union membership, contribute to the gender gap in financial knowledge. Remarkably, labor market and human capital variables explain only 21.5% of the gender gap.

In contrast to the findings mentioned above, I do not discuss the gap in financial knowledge attributable to the differences in characteristics. I examine the gender gap in *saving* and discuss whether *knowledge*, *application*, and *attitude* contribute to this gap. As mentioned in Chapter 3.2, I use three different approaches to the Oaxaca-Blinder decompositions: Cotton (1988), Neumark (1988), and Reimers (1983).

Table 6 presents the results of the twofold Oaxaca-Blinder decomposition. The gender gap in *saving* is 0.607. The gender differences in *knowledge*, *application*, and *attitude* contribute substantially to this gender gap, namely 0.596 in Reimers's (1983) approach, 0.594 in Cotton's (1988) approach, and 0.6 in Neumark's (1988) approach. This equals 98 %, 97 %, and 99 % of the gender gap, respectively. Additionally, it becomes evident that the variance across the three different approaches is almost negligible. The unexplained part is insignificant and small, with 0.011 in Reimers's (1983) approach, 0.014 in Cotton's (1988) approach, and 0.007 in Neumark's (1988) approach. This equals 1.9 %, 2.2 %, and 1.2 % of the gender gap, respectively.

TABLE 6 - OVERALL TWOFOLDED OAXACA-BLINDER DECOMPOSITION

	Reimers (1983)	Cotton (1988)	Neumark (1988)
Gender gap	0.607	0.607	0.607
Explained	0.596***	0.594***	0.600***
	(0.129)	(0.129)	(0.123)
Unexplained	0.011	0.014	0.007
	(0.317)	(0.317)	(0.278)
% explained	98.1	97.8	98.8
% unexplained	1.9	2.2	1.2

Note: Dependent variable: Saving; Explanatory variables: Knowledge, Attitude, Application
There are 409 men and 441 women in the sample group. The average patient decision of men is 7.653.
The average patient decision of women is 7.045.
Standard errors are reported in parentheses.
Statistical significance levels: *p < 0.1, **p < 0.05 and ***p < 0.01

Moreover, I employed the Oaxaca-Blinder decomposition to analyze whether *confidence*, *education*, and *school* contribute to the gender gap in saving, presented in Table A. 4, Table A. 5, and Table A. 6 in the Appendix. The gender difference in *confidence* accounts for 0.774 (128 %) of the gender gap in *saving* in the Neumark (1988) approach up to 0.803 (132 %) in the Reimers (1983) approach. This

finding suggests that the variation in *confidence* overexplains the gender gap in *saving* in this sample group.

The gender difference in *education* accounts for merely 4.4 % of the gender gap in *saving* in the Reimers (1983) approach and 6.1 % in the Neumark (1988) approach. The variation in *education* accounts for a smaller share of the gender gap in *saving* than the decomposition with the financial variables, *knowledge*, *application*, and *attitude*. This might suggest that education does not automatically translate into financial education. It is necessary to have education programs that specifically target financial education. The results also indicate that these financial education programs are essential to close the *saving* gender gap not only for those with lower levels of education but also for those with or in pursuit of higher education.

TABLE 7 - DETAILED VARIABLE BY VARIABLE OAXACA-BLINDER DECOMPOSITION

	Reimers (1983)	Cotton (1988)	Neumark (1988)
Explained	0.596	0.594	0.600
Knowledge	0.482***	0.480***	0.489***
	(0.116)	(0.116)	(0.120)
Attitude	-0.041	-0.042	-0.041
	(0.030)	(0.032)	(0.031)
Application	0.155***	0.155***	0.152***
	(0.058)	(0.059)	(0.056)
Unexplained	0.011	0.014	0.007
Knowledge	0.235	0.236	0.228
	(0.802)	(0.806)	(0.765)
Attitude	-1.565	-1.564	-1.564
	(1.300)	(1.298)	(1.320)
Application	-0.069	-0.069	-0.066
	(0.582)	(0.584)	(0.548)
Intercept	1.410	1.410	1.410
	(1.551)	(1.551)	(1.523)

Note: Dependent variable: Saving; Explanatory variables: Knowledge, attitude, and application
There are 409 men and 441 women in the sample group. The average patient decision of men is 7.653.
The average patient decision of women is 7.045.
Standard errors are reported in parentheses.
Statistical significance levels: *p < 0.1, **p < 0.05 and ***p < 0.01.

The gender gap in *saving* attributable to occupational choices, represented by the variable *school*, is 56.3 % in the Reimers (1983) variation, up to 71.8 % in the Neumark (1988) variation. Hence, occupational choice does not seem irrelevant in explaining the gender gap in saving behavior. One hypothetical reason might be that the different occupations require different levels of numeracy or

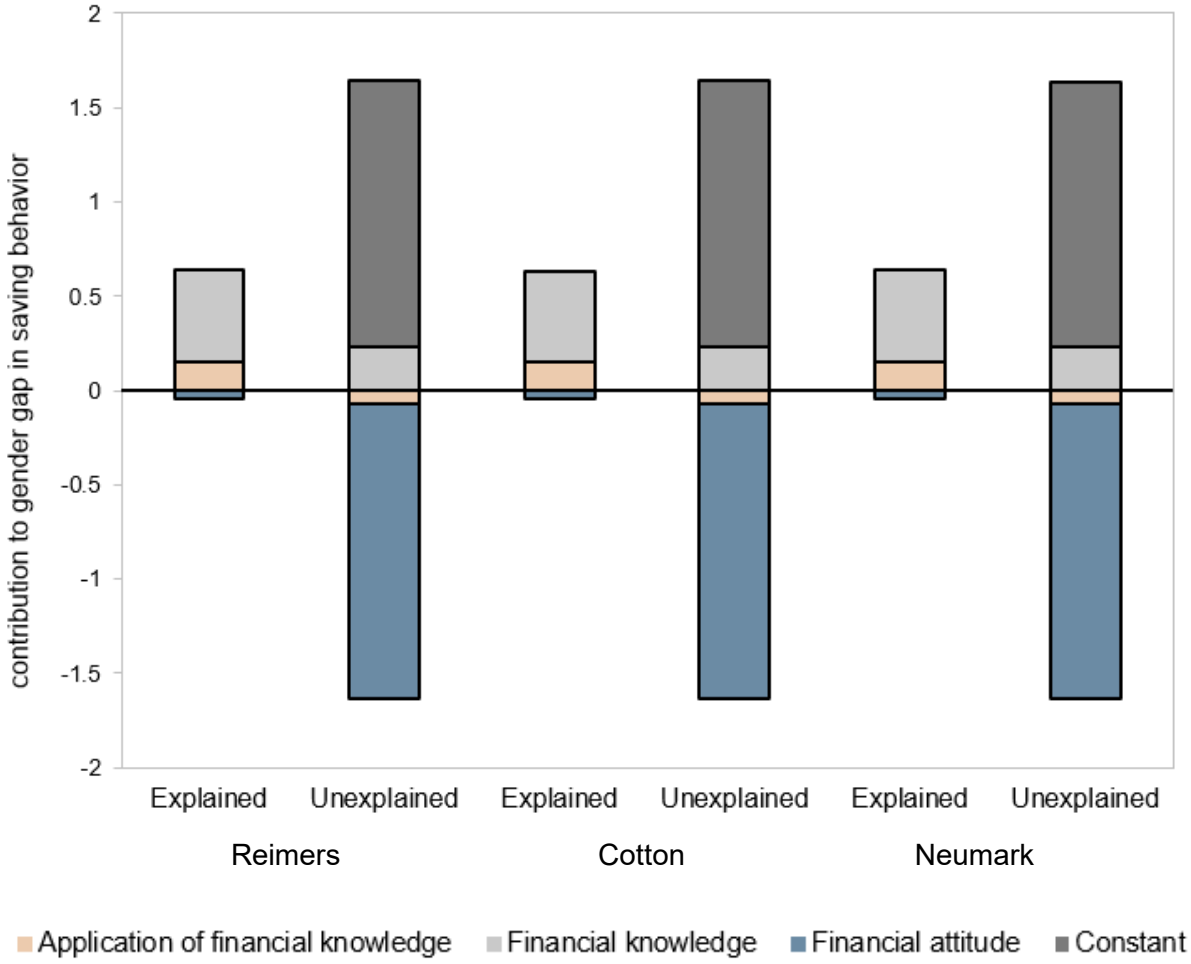
analytical reasoning, which might be related to the gender gap in *knowledge*. An apprenticeship in engineering might require more mathematical skills than an apprenticeship in a beauty profession. Nevertheless, the Oaxaca-Blinder decomposition with the variables *knowledge*, *application*, and *attitude* explains a larger share of the gender gap in *saving.* Thus, to close the gender gap, financial education programs seem to be relevant for all occupations.

Table 7 presents the detailed Oaxaca-Blinder decomposition results with *knowledge*, *application,* and *attitude* as explanatory variables. *Knowledge* contributes the most to the explained part, ranging from 0.480 in the Cotton (1988) approach to 0.489 in the Neumark (1988) approach. *Application* also contributes to the explained part of the gender gap, with values ranging from 0.152 in the Neumark (1988) approach and up to 0.155 in the Cotton (1988) and Reimers (1983) approaches. Regarding *attitude*, the value is negative, suggesting that this variable actually contributes negatively to the gender gap in *saving*. Hence, it closes the gender gap rather than contributes to it. This is unsurprising, given that women exhibit higher *attitude* scores than men. However, the value is insignificant, and the effect size is small. Regarding the unexplained part, all values remain insignificant.

Figure 7, adapted from O'Donnell et al. (2007), illustrates the results from Table 7. Figure 7 visualizes the contributions of the differences in the means of each variable and the unexplained parts, hence the differences in coefficients on each variable (O'Donnell et al., 2007). It shows that the gender difference in *knowledge* contributes the most to the gender gap in *saving*, as presented in Table 7. Figure 7 also helps to explain the insignificance and small overall size of the unexplained part. The effects of the different coefficients offset each other. While the intercept and the coefficient of financial knowledge contribute to the unexplained part, the negative effect of the coefficients of financial attitudes offset this.

The results presented in Table 7 and Figure 7 imply that financial education programs aiming at closing the gender gap in saving behavior might want to prioritize financial knowledge and the application of this knowledge. Considering that the textual analysis reveals that more men than women include "Investments" in their hypothetical financial plan, financial education programs could include a part concerned with the knowledge about investing. This part could consist of questions such as: What is an ETF? What is the difference between an investment yielding 2 % or 4 % returns, and what does this difference mean regarding wealth accumulation in 30 years? Moreover, the financial education program should address the application of knowledge to close the gender gap. In the context of investments, this could include guidance on investment procedures and risk, opening a bank or financial broker depot, or contacting financial advisors.

Financial education programs focusing on *knowledge* and *application* might help close the gender gap. On the other hand, focusing on *attitude*, such as addressing the importance of planning for the future or discouraging immediate spending of all available funds, does not seem to close the gender gap, according to my results. The gender difference in *attitude* does not contribute to the gender gap in *saving*, and women, as seen in Table 2, have higher *attitude* scores.



Note: Figure adapted from (O'Donnell et al., 2007). Dependent variable: Saving; Explanatory variables: Knowledge, attitude, and application.
There are 409 men and 441 women in the sample group. The average patient decision of men is 7.653.
The average patient decision of women is 7.045.

FIGURE 7. CONTRIBUTIONS OF DIFFERENCES IN MEANS AND COEFFICIENTS TO THE GENDER GAP IN SAVING

5 DISCUSSION AND LIMITATIONS

Two main issues in this thesis may be perceived as factors diminishing the ambition or reliability of this thesis. Firstly, my thesis is purely descriptive, and no causal statements can be inferred from the results. Secondly, the use of textual analysis may be unconventional. It provides me with some interpretational freedom, lacks methodological rigor, and is not bound to prior established standards. This chapter aims to give more context regarding these two issues.

Since I use simple OLS regressions, I cannot claim to find any causal relationships. Though in economic research, many authors focus on establishing causal statements, in the particular field of financial literacy, several publications employ simple OLS or probit models (e.g., De Bassa Scheresberg, 2013; Lusardi and Mitchell, 2008). Lusardi and Mitchell (2014) address the concern that several papers within this field are susceptible to a potential endogeneity bias. They also compare and summarize various studies that utilize instrumental variable analysis, eliminating this problem and enabling causal interpretation. For example, Christiansen et al. (2008) look at the number of new universities in the nearby neighborhood and use this as an instrument for financial knowledge. Agnew et al. (2013) argue that the financial knowledge of siblings or parents is a good instrument for financial knowledge. Instrumental variable analysis allows for causal statements, but finding a suitable instrument is time-consuming and difficult. In my case, it goes beyond the aim of this Master's thesis, and I argue that my results are interesting even without any causal statements. The primary goal was to explore gender differences in the variables *knowledge*, *application*, *attitude*, and *saving* and the gender differences in the connections between these variables within this specific sample group. This thesis can answer these questions using the OLS regression and the decomposition analysis.

The OLS regression analysis has a few limitations in itself in this thesis. The OLS regression has a low R^2, as discussed in Chapter 4.2.1. Furthermore, in the time preference task, many individuals chose to save everything or nothing, making the distribution of the variable *saving* suboptimal for an OLS regression analysis. This constitutes another limitation in this thesis and should be considered when interpreting results.

The reason for including textual analysis in this thesis was to learn more about how individuals apply financial knowledge to establish hypothetical financial plans and, secondly, to delineate the financial priorities of individuals. The advantage of the open-ended question is the enhanced freedom for participants to answer without being constrained to predefined categories. This flexibility facilitates a broader range of responses and more variations in the answers. The disadvantage arises from the lack of a straightforward standard approach, which leads to a somewhat subjective interpretation of the data. Nevertheless, for this thesis, the advantage of the more explorative approach of the textual analysis outweighs the disadvantage of the method's lack of standardization.

It is nonetheless essential to transparently outline how I designed the aspects of the variable *application* and *priorities*. Firstly, I carefully assessed the open-ended answers of 200 randomly selected observations to develop the aspects. With this first investigation, I identified the most dominant variations within the answers. Next, I examined the statements the OECD toolkit proposes to elucidate

financial behavior to get inspiration about potential aspects that should be considered (OECD, 2022). Several of the OECD statements addressed long-term planning, which was an aspect I also observed in the open-ended answers. Several individuals articulated that they would save, invest, or make long-term investments (such as in the housing markets). This is what I termed *long-term*. The OECD toolkit (OECD, 2022) also includes statements about budgeting and expense tracking. But, these aspects did not suit the answers to the open-ended question, and none of the participants addressed it. Nevertheless, several participants provided exact numbers or percentages, indicating a higher level of consideration regarding specific amounts allocated to different areas of the financial plan. Thus, I decided to add the category *sophisticated*, examining whether participants included exact numbers or percentages in their answers, a skill also needed for expense tracking. Within the same realm of thinking, I introduced the aspect *feasible* to assess participants' ability to design a financial plan within a given budget, a skill also needed for budgeting. Given the wide range of plans that the participants expressed, I deemed this category important, ranging from excessive underspending of the received fund, such as a simple dinner, to excessive overspending on a house with a car in Vienna.

Lastly, I added the aspect *detailed,* evaluating whether a participant provided multiple purposes for spending or saving money. This aspect also evaluates if the answers were specific about how the financial goals would be achieved. I included this aspect to assess an individual's level of consideration and interest in developing, expressing, and sharing their detailed financial plan. There were vast differences among participants in this aspect. While some answers were merely one word, other participants wrote extensively to describe their financial plans. While developing the variable *application*, I refrained from evaluating the diverse purposes to which individuals allocated their money. Hence, someone who uses the money for holidays and family gets the same score in the aspect *detailed* as someone who invests and saves the money. On the other hand, with the variable *priorities,* I categorize the purposes that individuals spend or save money for using the categories described in Chapter 3.1. Further clarification, descriptions, and examples of these categories are provided in Table A. 3 in the Appendix.

When designing the variable *application*, I initially considered adding the aspect *responsibility.* This idea emerged since some participants indicated uncertainty about what to do with the money and consequently wanted to leave it to their parents so that they could decide for them. This shows these participants are not ready to make independent financial decisions and avoid responsible behavior. However, it was often impossible to determine whether participants wanted to give money to their parents as a nice gesture or to escape responsibility. Hence, I did not pursue this aspect any further.

In the analysis of *priorities*, any answer indicating that money is given to parents, regardless of the reason, falls into the category "Family and Children." Participants that only indicated *"I do not know"* were rare. They scored zero in the *application* variable, and I excluded them from the *priorities* analysis. After deciding which aspects and which categories to use, I coded all remaining observations according to these aspects to develop the variable *application* and *priorities*. This process was done manually.

Following this elaboration on the textual analysis, it is important to highlight further research opportunities that emerge in the context of this thesis. Firstly, in the discussion on time preference tasks,

it became evident that the results are somewhat inconclusive. Some results (e.g., Falk et al., 2018) suggest women are less patient, while other results indicate the opposite. (e.g.Castillo et al., 2011). (see Chapter 3.1). Hence, conducting the analysis using a different approach to measure *saving*, for example, by adopting Falk et al.'s (2018) methodology and comparing the results to the ones in this thesis, would be interesting. To measure patience, Falk et al. (2018) combined an unincentivized time preference task with a self-assessment question about the willingness to wait. A self-assessment question about patience is available in the IHS & WU Wien dataset, making it possible to run the analysis with this different *saving* measure and compare the results.

Secondly, it would be interesting to run an Oaxaca-Blinder decomposition and investigate whether gender differences in *knowledge*, *application,* or *attitude* account for the gender gap not only in saving behavior but also in stock market participation. Such an analysis would, however, require a different dataset. It might also be interesting to use a different variation of the Oaxaca-Blinder decomposition, for example, an Oaxaca-Blinder decomposition for non-linear models (see Sinning et al., 2008). Given that many individuals choose to save everything or nothing, the variable *saving* could be transformed into a binary variable, e.g., saving more than or less than half. Similarly to other papers (e.g., Lusardi and Mitchell, 2008, 2007; Murendo and Mutsonziwa, 2017), a probit model could be established, and a non-linear Oaxaca-Blinder decomposition could be used. The results could then be compared to the results in this thesis, giving insights into whether the results found in this thesis are robust to a change in the regression model.

Lastly, as discussed in Chapter 4.2, not only do the levels of *knowledge*, *application*, *attitude*, and *saving* significantly differ between genders, but also the correlations among these variables exhibit gender-specific differences. So far, a large body of literature has identified the gender difference in the variables and established reasons explaining these differences. An interesting idea could be to research further whether the finding that the correlations between the variables differ between genders is confirmed using different data. Furthermore, exploring the reasons behind the gender difference in correlations might be interesting. For example, further research could determine whether the relative influence of actual financial knowledge and perceived financial knowledge on saving or investment behavior differs across genders and why this could be the case. The above-presented ideas are potential research opportunities that can be investigated using this dataset or similar data.

6 CONCLUSION

This thesis investigated the gender differences in financial literacy, financial attitude, and saving behavior for vocational students in Vienna. Furthermore, the thesis intended to identify whether potential gender differences in financial literacy and financial attitude can explain part of the gender gap in saving behavior. To answer these questions, I employed student t-tests, visualizations, OLS regressions, and Oaxaca-Blinder decompositions. The results indicate that among vocational students in Vienna, financial literacy, financial attitude, and saving behavior differ significantly between gender. Furthermore, the findings suggest that gender differences in financial literacy contribute considerably to the gender gap in saving behavior.

Conclusion

With this thesis, I contribute to the literature on the gender gap in financial literacy and behavior in several ways. Firstly, I developed a theoretical framework by combining existing frameworks and suggestions by various authors, making my framework very detailed. I also added components that many other frameworks in this context ignored. Moreover, I employed textual analysis, a novelty in this context. This explorative approach delivers new insights into young people's financial planning and goals. Furthermore, my sample group, namely vocational students, is understudied. Nevertheless, this sample is compelling in the context of financial literacy. It represents young individuals with a monthly income who already experience financial independence. Thus, this sample already has to make financial decisions regularly.

The issue of financial literacy and behavior has gained momentum not only in the academic literature but also among policymakers. Policymakers in many countries started campaigns or launched strategies to increase financial literacy.[8] Thus, it is also interesting to summarize the relevant policy implications of this thesis. The lessons this thesis can provide are, however, only suggestive, as this thesis only looks at a specific sample group that might not be representative of the whole population of a country. Furthermore, the thesis can only suggest ideas for financial education programs that aim to close the gender gap in financial literacy rather than enhance financial literacy levels overall. Nevertheless, since financial literacy and behavior are significantly different between gender, policies to close this gender gap are vital to allow every individual to achieve financial well-being.

Firstly, the results in this thesis suggest that financial literacy, attitude, and saving differ significantly between gender, but also the dynamics of the relationships between these variables differ across gender. The design of financial education programs aimed at closing the gender gap should consider these gender-specific patterns in the financial decision-making process to make the programs as effective as possible. Furthermore, the results in this thesis indicate that financial education programs should be implemented across all education levels and all occupations. Lastly, the results suggest that financial education programs designed to close the gender gap in saving behavior should incorporate financial knowledge and how to apply it as crucial elements in their design.

[8] For example in Austria: The national financial literacy strategy launched in 2021. For more detialed see: https://www.bmf.gv.at/en/the-ministry/National-Financial-Literacy-Strategy/overview-national-financial-literacy-strategy.html

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8 APPENDIX

TABLE A. 1. SAMPLE DESCRIPTION: VOCATIONAL SCHOOL

School	Gender		Total
	Male	**Female**	**Total**
School: Hospitality *(Berufsschule für Gastgewerbe)*	243 (30%)	113 (13.8%)	356
School: Horticulture *(Berufsschule für Gartenbau und Floristik)*	43 (5.3%)	42 (5.1%)	85
School: Beauty professions *(Berufsschule für Schönheitsberufe)*	48 (5.9%)	242 (29.5%)	290
School: Business administration *(Berufsschule für Bürokaufleute)*	193 (23.8%)	367 (44.7%)	560
School: Engineering *(Berufsschule Elektro-,Veranstaltungs-, Informationstechnik)*	283 (34.9%)	57 (6.9%)	340
Total	810	821	1631

TABLE A. 2. SAMPLE DESCRIPTION: EDUCATION

Education	Gender		Total
	Male	**Female**	**Total**
Education: Matura	49 (6%)	32 (3.9%)	81
Education: Previous apprenticeship	37 (4,6%)	44 (5.4%)	81
Education: compulsory school years successfully completed	630 (77.8%)	609 (74.2%)	1239
Education: failed to complete compulsory school years successfully	41 (5.1%)	51 (6.2 %)	92
Education: Other	53(6.5%)	84 (10.2)	137
No data	0 (0%)	1 (0.1%)	1
Total	810	821	1631

Appendix

TABLE A. 3. FINANCIAL PRIORITIES: FURTHER DESCRIPTION AND EXAMPLES

Category	Definition and examples
Daily Expenses	Funds spent on purchases needed in everyday life or non-durable purchases that cannot be used as a store of value. Answers often included: *Dinners, food, clothes, shoes, and cars.*
Durable purchases	Funds spent on or saved for durable purchases and purchases that retain value over a long time. Answers often included: *Houses, apartments.*
Emergencies	Funds spent on or saved for emergencies.
Retirement	Funds saved for retirement.
Family and children	Funds spent on family matters or saved for (future) children. Answers often included: *Buying houses/apartments for family members*, or *helping family members settle debt issues*.
Personal growth	Funds spend on personal growth. Answers often included*: Buying equipment needed for work*, *holidays, and travels*, *plans to move abroad*, *saving for self-employment, investing in a new career (e.g., musician or in sports)*
Altruistic motives	Funds spent for altruistic purposes. Answers often included: *Donation to charity or religious organizations.*
Saving	Funds saved in cash, on a bank account, or not further specified. Answers often use the following expressions: *Save money, keep money aside for the future, do not spend everything at once, put it in my savings account.*
Investment	Funds invested. Answers often use the following expressions: *Invest, invest in stocks, buy cryptocurrencies, invest to multiply money, invest in ETFs, invest in gold.*

Note: Categories based on Katona (1975). With adjustments following: Devaney et al. (2007), Fisher & Anong (2012) and Xiao & Noring (1994).

TABLE A. 4. OAXACA-BLINDER DECOMPOSITION: FINANCIAL CONFIDENCE

(Dependent variable: Saving (time preference); Explanatory variables: Financial confidence)

Twofolded Oaxaca-Blinder decomposition

	Reimers (1983)	**Cotton (1988)**	**Neumark (1988)**
Gender gap	0.607	0.607	0.607
Explained	0.803***	0.796***	0.774***
	(0.155)	(0.155)	(0.138)
Unexplained	-0.195	-0.195	-0.166
	(0.334)	(0.334)	(0.268)
% explained	132.1	131.0	127.4
% unexplained	-32.1	-31.0	-27.4

Note: There are 409 men and 441 women in the sample group. The average patient decision of men is 7.653. The average patient decision of women is 7.045.
Standard errors are reported in parentheses.

Statistical significance levels: *p < 0.1, **p < 0.05 and ***p < 0.01.

TABLE A. 5. OAXACA-BLINDER DECOMPOSITON: SCHOOL

(Dependent variable: Saving (time preference); Explanatory variables: Vocational school)

Overall and Variable by Variable twofolded Oaxaca-Blinder decomposition

	Reimers (1983)	**Cotton (1988)**	**Neumark (1988)**
Gender gap	0.607	0.607	0.607
Explained (total)	0.342	0.338	0.436
	(0.170)**	(0.171)**	(0.139)***
School: Horticulture	0.003	0.003	0.004
	(0.010)	(0.012)	(0.012)
School: Beauty professions	0.130	0.129	0.140**
	(0.079)	(0.078)	(0.065)
School: Business administration	-0.049	-0.050	-0.030
	(0.060)	(0.060)	(0.055)
School: Engineering	0.241	0.238	0.321
	(0.108)**	(0.110)**	(0.090)***
Unexplained (total)	0.266	0.270	0.171
	(0.345)	(0.349)	(0.274)
% explained (total)	56.2	55.6	71.8
% unexplained (total)	43.8	44.4	28.2

Note: There are 409 men and 441 women in the sample group. The average patient decision of men is 7.653. The average patient decision of women is 7.045.
Standard errors are reported in parentheses.

Statistical significance levels: *p < 0.1, **p < 0.05 and ***p < 0.01.

Baseline for school variable: Hospitality school

TABLE A. 6. OAXACA-BLINDER DECOMPOSITON: EDUCATION

(Dependent variable: Saving (time preference); Explanatory variables: Education)

Overall and Variable by Variable twofolded Oaxaca-Blinder decomposition

	Reimers (1983)	**Cotton (1988)**	**Neumark (1988)**
Gender gap	0.607	0.607	0.607
Explained (total)	0.027	0.028	0.037
	(0.054)	(0.054)	(0.053)
Education: Matura	0.032	0.032	0.034
	(0.033)	(0.033)	(0.034)
Education: Apprenticeship	0.014	0.014	0.015
	(0.020)	(0.020)	(0.021)
Education: compulsory school years completed	-0.020	-0.019	-0.016
	(0.021)	(0.021)	(0.020)
Education: Other	-0.009	-0.009	-0.006
	(0.027)	(0.026)	(0.024)
Unexplained (total)	0.580	0.580	0.570
	(0.308)*	(0.308)*	(0.303)*
% explained (total)	4.4	4.6	6.1
% unexplained (total)	95.6	95.6	93.9

Note: There are 409 men and 441 women in the sample group. The average patient decision of men is 7.653. The average patient decision of women is 7.056.
Standard errors are reported in parentheses.

Statistical significance levels: *p < 0.1, **p < 0.05 and ***p < 0.01.

Baseline for education variable: failed to complete compulsory school years successfully.