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Searching for Mediating Effects of Motivation and Socioeconomic Status on Student Achievement: Secondary Analysis of PISA 2018

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Searching for Mediating Effects of Motivation and Socioeconomic Status on Student Achievement: Secondary Analysis of Pisa 2018

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The Dimension of Equity in Educational Effectiveness Research

The examination of educational equality starts back during the first decades of the last century, however it becomes more systematic during the 1960s. One of the most important stimuli for a growing body of studies at that time, was the famous Coleman report of 1966. Briefly, in a study published by the US government under the title *Equality of Educational Opportunity,* Coleman et al. (1966) concluded that schools have a minor effect on changing student achievement after controlling for their background characteristics and social context. It was stated that social inequalities because of the strong influence of family and social environment (i.e., peers, neighbourhood), are very likely to be reproduced. Some years later, Jencks (1973) reached a similar conclusion, stating that student achievement is mainly attributed to students' "intelligence"; therefore, schools cannot do much. These studies influenced many researchers worldwide, demonstrating that *school does matter* and effective education can change student outcomes. Since then, a new wave of research emerged and continues until today, forming the field of educational effectiveness research (EER).

For decades, educational effectiveness was approached either by a sociological, psychological or economic viewpoint. As stated above, the sociological perspective of EER was catalytic in introducing the impact of socioeconomic status (SES) on student outcomes, with the concern that social inequalities reproduce. In general, these studies looked at factors related to the family background of students (social capital, ethnicity, etc.), as well as process and contextual variables that emerged from organisational theories, involving school climate and school structure. At the same time, psychologists emphasised factors such as aptitude, personality, and motivation, claiming that these predict learning outcomes. They also studied student behaviours that occur in classrooms and that are related to the learning process, such as learning strategies, time on task, or persistence. On the other hand, the economical perspective examined educational effectiveness linearly, based on the hypothesis that educational outputs are determined by the inputs, namely financial and material resources, student population and its characteristics. (Creemers & Kyriakides, 2008).

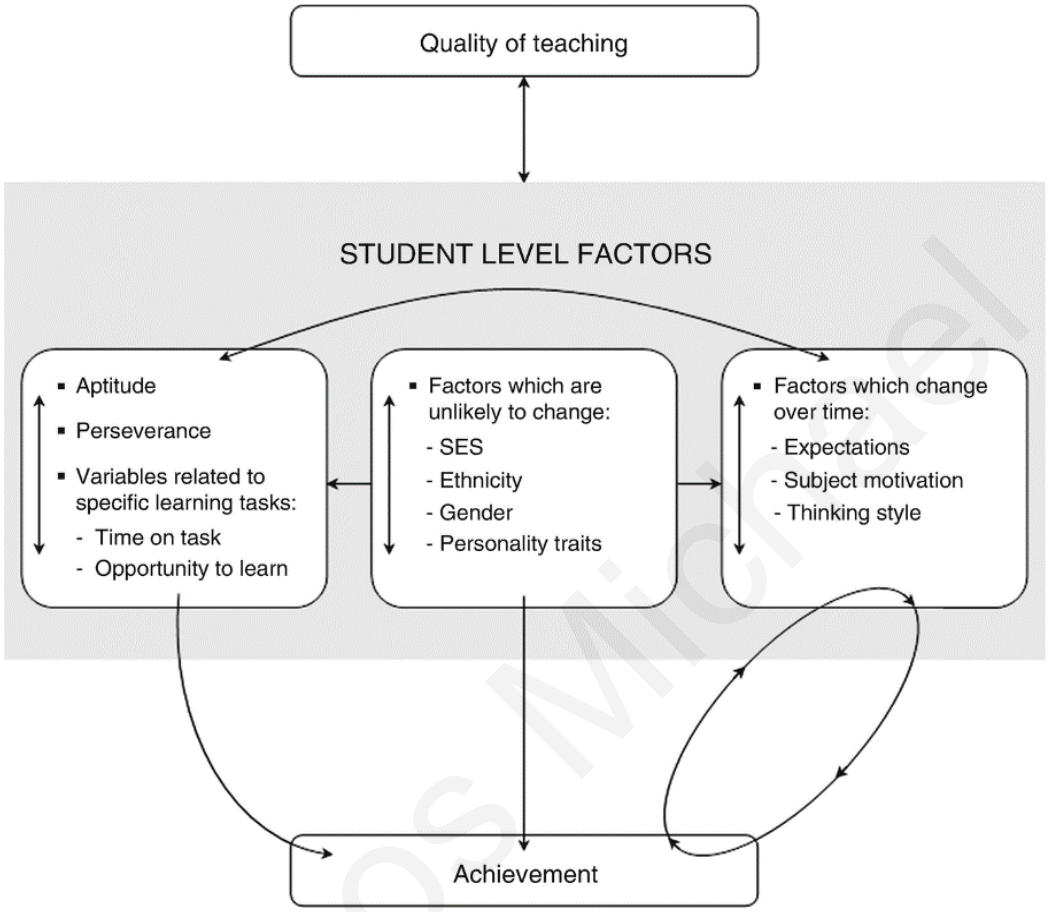
Around the 1990s, researchers started to view effectiveness through many interrelated factors within multilevel structures, paving the way for integrated models. These holistic approaches marked the third phase of EER, as an attempt to cover the weaknesses of single-perspective approaches. One of the most contemporary and well-elaborated theoretical models that share this perspective is the Dynamic Model of Educational Effectiveness (Creemers & Kyriakides, 2008), building on the work of prior models from the previous decades such as Creemers' comprehensive model (Creemers, 1994). The Dynamic Model illustrates the most important factors that affect student outcomes based on evidence, presenting educational

effectiveness as a structure of four interconnected levels: *student*, *teacher*, *school*, and *system*. Relationships between factors of the same level are also considered and displayed. In fact, this model highlights the complexity of effectiveness and the dynamic character of education, setting the baseline for the fourth phase of EER. Another important aspect of the contemporary EER is the intensive effort for the validation of theoretical models and the establishment of links with school improvement, examining the applicability of theoretical knowledge. Following this foundation, numerous empirical studies and meta-analyses provided strong evidence supporting the main assumptions of the dynamic model and its effects on school improvement, using the dynamic approach (see Creemers & Kyriakides, 2015). However, the focus of these studies has been mostly placed on teacher and school level factors, probably because researchers could intervene and influence them more easily. Based on the theoretical assumptions of school improvement research, this is a reasonable endeavour as these factors can be controlled by schools and teachers, who aim for improvement. Correspondingly, student level factors have received less attention. Despite the fact that their effect has been validated, the relations between them were not systematically studied.

The student level factors presented in the dynamic model can be split into three categories. First, there are sociocultural and economic factors, addressed by the sociological perspective of EER such as SES, gender, and ethnicity. Then, a group of factors deal with psychological characteristics such as expectations, subject motivation, and thinking style. Lastly, another group of factors which also emerged from the psychological perspective of EER are present, but they are predominantly related to learning such as aptitude and perseverance. As shown in *figure 1*, student level factors are also classified into two other categories: those that are not likely to change, like SES and gender, and those that might change over time, such as subject motivation and thinking style. As explained by Creemers and Kyriakides (2008), the factors that are likely to change are very much linked with the aims of EER. This means that while they are presented as explanatory variables of student achievement, they can also be considered as affective outcomes of education. For example, subject motivation might affect student achievement, while at the same time it is also a teaching goal. This dual and dynamic character of such factors is of particular interest, as they can be examined in various ways, and longitudinal studies are needed to investigate their impact as they might change over time. In addition, it is also suggested that knowing more about those factors, whether they are likely or unlikely to change, can be useful for practitioners in adapting their teaching or practices to the needs of emerged student groups, such as female students' interest in STEM, or lower-SES students' aptitude in math. In extension to this, relations between student level factors are expected to exist, however, more studies are needed to identify and address them more precisely.

Figure 1

Factors of the Dynamic Model Operating at the Student Level (Creemers & Kyriakides, 2008)



The aforementioned interrelations are of particular importance, especially from the perspective of the equity dimension of educational effectiveness. Socioeconomic status, which will be discussed further in the following section, has a strong presence within stable student-level factors and is directly related to this dimension. As stated before, socioeconomic status' effect on student achievement has been widely agreed upon. Socioeconomic status is also expected to affect factors of the same level, especially those related to sociopsychological characteristics, such as academic motivation. Therefore, investigating such interrelations can provide some theoretical background toward understanding the effects of SES and thus, the equity dimension.

Educational effectiveness dimensions are interrelated. *Quality* is achieved when student outcomes are more than expected, while *equity* is achieved when the achievement gap produced by the student socioeconomic backgrounds is reduced. Until today, research has placed more emphasis on the quality dimension, assuming that by promoting quality, equity might be also achieved (Kyriakides, Creemers, &

Charalambous, 2018). Although many steps towards achieving quality were made, the ability of education to reduce the variations in student learning outcomes attributed to students' background characteristics remains a main concern. While the achievement gap attributed to background inequalities is still present worldwide (Hanushek et al., 2019; OECD, 2019a), the need to make steps towards equity is critical. Moreover, the world is passing through an era where the Covid-19 pandemic has forced educational systems towards an emergent switch to distance learning. This shift is expected to have severe consequences in widening achievement gaps because students' learning now depends to a large extent on the technological resources of each household, which makes the need to focus on equity more urgent than ever (e.g., Anderson, 2020; Reza, 2020).

Therefore, given the need to react for achieving equity in education, utilising the most notable and recent contributions of EER, the present study aims to explore further the effects of SES in academic achievement. One of the most interesting factors to study within this context is academic motivation. Academic motivation, according to the perspective of each study, can be either seen as a stable trait linked to the personality or background of students, or a factor that can be changed over time. Because of its psychological and transversal character, it can also be seen as a predictor of achievement or a non-cognitive outcome by itself. It is generally considered an important asset in education (Maehr & Meyer, 1997) demonstrating a reciprocal relationship with academic achievement (Creemers & Kyriakides, 2008). It is apparently a versatile concept to study that involves several student background and behavioural characteristics. Accordingly, this study will investigate possible effects of SES in certain student motivational constructs that may be important for academic achievement. This will be achieved by exploiting secondary data from the Program for International Student Assessment (PISA) 2018, which helps generalize findings and permits one to comparatively examine the influence of the selected factors across countries. Furthermore, it is also expected that these findings could provide a reasonable starting point to further understand and explore the effects of SES in academic achievement through academic motivation, generating new research questions for future studies.

Section A: Socioeconomic Status and Student Achievement

1. Why is socioeconomic status important?

Social inequalities are always a current topic for social sciences and education in particular. Education has been seen as a great opportunity to equalize social disparities. However, despite efforts over the past 50 years, the achievement gap between high- and low-SES students fails to close (Hanushek et al., 2019). According to article 26 of the Universal Declaration of Human Rights (The United Nations, 1948), "*everyone has the right to education*" and primary stages of education shall be free and compulsory. At the same time, it is stated that "*parents have a prior right to choose the kind of education that shall be given to their children*". Therefore, despite good intentions, children from higher socioeconomic status are granted with a clear advantage over their lower-SES peers, as they can have access to more tutors, better quality schools, more learning materials and other factors that will be discussed in this section. Therefore, education does not become equal for all; neither does achievement or success (APA, 2007). Socioeconomic status is used as an instrument to view one's social position in comparison to others, and it depicts economic differences in societies, with ramifications in education. Therefore, socioeconomic status is the key agent to view social and educational inequalities, their cause, and their result.

2. What is socioeconomic status?

Although SES was a widely known concept, there has never been a common consensus on its definition and indicators (Kyriakides et al., 2018; McLoyd, 1998; White, 1982). The early definition by Chapin (1928) emphasized the importance of material and non-material possessions, which might give individuals or families an advantage within their community. Asserting the relative nature of SES, Mueller & Parcel (1981, p. 14) stated that "*socio-economic status is the relative position of a family or individual in a social system in which individuals are ranked according to their access to or control over wealth, power and status*". Later, the idea of capital has been linked to SES involving not only material and non-material deprivations (Krieger, Williams, & Moss, 1997), but also social advantages that bring into focus the importance of the social aspect and relationships (Coleman, 1988). According to Bradley & Corwyn (2002), capital is a convenient way to perceive SES because it encompasses its three main dimensions: financial capital (material resources), human capital (intellectual resources like education), and social capital (social connections and relationships that can make other resources available). Arguably, the most popular way to observe student SES is the threefold function of family income, parents' educational level and their occupational status (Sirin, 2005; White, 1982; Willms & Tramonte, 2019). A favourable combination of these three components is often related to privilege and power over others in their community, through the accessibility and control of resources (Mueller & Parcel, 1981).

In the PISA framework that will be used in this study, the concept of SES is presented as the economic, social, and cultural status (ESCS) of the student. ESCS favours the *gradient approach* of defining and analysing socio-economic differences among students. This approach is related to the definition given by Mueller and Parcel (1981) highlighting the relative nature of SES and reflecting the hierarchical ranking of individuals in modern societies. At the same time, ESCS does not ignore the *materialist view*, which advocates for the quantification of family income and wealth as essential resources in providing educational outcomes (Avvisati, 2020). Although no explicit theoretical foundation is provided by its creators, the concept of ESCS has been derived from the definition given by a panel of experts convened by the National Centre for Education Statistics (NCES) at the request of National Assessment Governing Board (NAGB) (Cowan et al., 2012):

> "SES can be defined broadly as one's access to financial, social, cultural, and human capital resources. Traditionally a student's SES has included, as components, parental educational attainment, parental occupational status, and household or family income, with appropriate adjustment for household or family composition. An expanded SES measure could include measures of additional household, neighbourhood, and school resources." (p.4)

3. How is socioeconomic status measured?

There is no single instrument to measure SES. In each study, this choice is up to the researchers, their perception or their available data. However, by definition, there is a tendency that SES should include quantification of information about financial, human, and social capital. These factors are usually represented by family income, parental education level, and parental occupational status (Bradley & Corwyn, 2002), the so called "big 3" (Cowan et al., 2012; Willms & Tramonte, 2019). Several additional data points have been proposed occasionally, such as housing expenses or rent of the household (Entwisle & Astone, 1994), and the estimated value of family assets (Ostrove et al., 1999) for a broader picture on financial capital. Other researchers might add household possessions, neighbourhood, and school resources. Another measure often used is cultural possessions at home, such as the number of books. In other cases, receiving free lunch at school might be used as a way to identify the low-SES student population to be examined. To better capture human capital, it has also been recommended to gather information about the number of parents or the presence of a grandparent at home (Entwisle & Astone, 1994).

The PISA index of economic, social and cultural status (ESCS) combines into one single score three components comprising a total of 20 items: parental education (educational level of the parent with the higher educational attainment), parental occupational status (occupational status of the parent with the higher occupational status), and information about home possessions. The last component is used as a financial and cultural capital indicator, while it includes information about the material wealth of the

household, cultural possessions, and home educational resources. Specifically, this scale consists of 16 survey questions addressing assets such as access to the internet, number of books and dictionaries at home, possession of a car, existence of a quiet room for the student to study and more (OECD, 2019a).

As in every International Large-Scale Assessment (ILSA), the strengths as well as the limitations of the ESCS of PISA as an instrument are well researched. The particular indicator and its components have occasionally received several critiques mainly questioning the transferability of the scale in all participating countries (e.g., Pokropek et al. 2017; Rolfe, 2021), undermining its reliability and validity. As stated by Rutkowski & Rutkowski (2013), the poor psychometric properties of the scale imply important limitations especially when making cross-country analyses. Other challenges of the scale acknowledged by OECD, the very organisation which developed it, are the inaccurate and missing data given by the students (Willms &Tramonte, 2015). However, after ongoing revisions and improvements over time, the validity as well as the cross-country comparability of the ESCS index is now considered relatively high (Avvisati, 2020). Furthermore, the hybrid character of ESCS allows for the examination of different aspects of inequality of opportunity in education through the creation of new indicators. Additionally, it also allows for individual treatment of its components, when this is desirable by the researchers.

4. The relationship between socioeconomic status and student achievement

Although the impact of SES is an enduring issue, the relationship between students' SES and their academic achievement is well-established. However, the extent to which student SES and academic achievement are related varies among studies. This can be attributed to the different definitions, indicators, and methods used to measure SES and student outcomes (White, 1982). Coleman (1966), who stimulated the interest around student SES, claimed that student achievement is basically a result of background factors. Therefore, for many years there was a widely accepted belief that SES is an important factor and generally responsible for achievement, a relationship that has been supported by numerous studies ranging from r = .68 - .86 (e.g., Baker, Shutz & Hinze, 1961; Dunnell, 1971; Klein, 1971; Levine, Stephenson & Mares, 1973; Thomas, 1962; with a correlation of r = .680, r = .755, r = .802, r = .865, r = .852 respectively, in White, 1982).

However, later large-scale studies demonstrated a lower correlation than before. Four decades ago, White (1982), conducting a meta-analysis of 101 studies at that time, found that SES accounted for just about 5% (r = .22) of the differences in student outcomes, declaring a weak correlation between them. Sirin (2005), examining published articles between 1990 and 2000 in the US, showed a 'medium to strong' SES-achievement relationship (r = .27). More recently, Harwell et al. (2017), reviewing and analysing the results of empirical evidence over the past three decades, stated that the SES-achievement relationship is 'surprisingly modest' (r = .22 on average), proving that it is not as strong as we thought. In China, recent

results of two meta-analyses indicate a moderate relationship at similar levels (Xue et al., 2020), marking a correlation of r = .24 (Liu, Peng & Luo, 2020). Unsurprisingly, the achievement gap is also present in more modern domains such as information and communication technology (ICT) literacy (r = .21; Scherer & Siddiq, 2019) revealing the diversity of this phenomenon.

Although not very strong, this relationship has been proved consistently in many societies around the world (Bradley & Corwyn, 2002; OECD, 2019a; Safrati, 2015). Moreover, it is discouraging that the SES-achievement gap has grown slightly through the years. Chmielewski (2019), combining international datasets over 50 years and representing 100 countries, found that the gaps have increased in most countries. This is in line with the findings of PISA, outlining that advantaged students performed better in reading than disadvantaged students by 89 and 87 score points in 2018 and 2009 respectively (OECD, 2019a). Particularly interesting is that in less-developed countries the effect of SES in student outcomes appears weaker than in higher income countries (Kim, Cho & Kim, 2019). This is also known as the Heyneman-Loxley effect. Heyneman and Loxley (1982) showed a pattern where not only the effect of SES increases in more economically developed countries, but the effect of school decreases simultaneously. These findings, apart from emphasizing the role of schooling within national socioeconomic changes, indicate a serious challenge for educational systems as their broader economic context advances.

5. How does socioeconomic status affect student achievement?

The gaps between students from different socioeconomic statuses begin very early in life (McCall, 1981). Families are children's first socializer groups, and their conditions could determine children's education and later lives. Cognitive development in early childhood also appears to have an impact on later school life (e.g., Bradley & Corwyn, 2002; Brooks-Gunn & Duncan, 1997; Buckley, Broadley & Cascio, 2019; Davis-Kean, 2005; Rodríguez-Hernández, Cascallar & Kyndt, 2020).

For some, the effects of SES are apparent. To analyse them, it should be noted that each component of SES addresses distinct aspects. For instance, parental income reflects a lack of economic resources, which implies fewer opportunities to reach better or more educational assets for the student (Sirin, 2005). Educational assets in this context refer to materials and services that can stimulate child development, creating a nurturing learning environment with more educational aids. Moreover, higher SES families have the opportunity to access schools with more resources, more tutors, and additional learning tools that support higher academic achievement. Adding to this, Barg (2019) has also demonstrated a correlation between SES and parental academic involvement, with the justification that fewer resources, such as time and money, inevitably prevent parents from being involved to their children's schooling.

Parental education is related to parental income as an indicator of economic resources as well. Parental education is also referred to as an intellectual resource. For example, it has been stated that first-generation students (i.e., the first members of the family to attend education further than high school) face more difficulties on the education ladder, because they lack experience on how next steps need to be taken (Pascarella et al., 2004). In addition, parents with higher educational levels tend to appreciate and value learning more, transmitting these values to their children. At the same time, they will always be a standby assistant to the learning difficulties of their children, because they are already equipped with the knowledge of lower educational levels.

Accordingly, parental occupation represents not only economic and educational status but also the prestige and culture of family's social stratum. Social capital theory (Coleman, 1988) explains that these types of resources (human actors or actions) are embedded into a society's structure and can be used by parents to facilitate both children's academic achievement and future life prospects. Brooks-Gunn & Duncan (1997) underlined the possible benefits of social connections for the children in terms of producing more experiences and opportunities for their cognitive development.

In cases where home resources are used as an indicator of SES, as in PISA, a better idea of the role of households as learning environments is generated. For example, home possessions such as books, computers, or other educational means, could function as additional learning stimuli for students after school or during the summer break (Coleman, 1988; Entwisle, Alexander & Olson, 1997; McLoyd, 1998). Furthermore, as capital theory posits, fewer resources limit the ability of families to better address children's educational needs and reinforce their academic success (Dika & Singh, 2002). For these apparent reasons, children from low SES backgrounds inevitably have fewer possibilities to access better and more opportunities that enhance their learning capacity.

Apart from financial, educational, and occupational differences, socioeconomic groups are expected to differ in more aspects of life. The sciences of sociology and psychology can provide some foundation to understand how these groups function, however, their effects on education are not clear yet. Or at least, there is no comprehensive framework to explain the behavioural implications of SES on students to justify the disparities in academic achievement. Only a few sets of studies were found to examine this topic systematically and extensively from those perspectives; the most influential are presented below.

From the field of social psychology, Kraus and his colleagues (Kraus et al. 2012; Kraus & Stephens, 2012) proposed the *social cognitive theory of SES* in an effort to identify behavioural patterns of social classes. In particular, they presented how social class environments guide psychological experiences, proposing nine self-concept and social behavioural patterns among low and high SES individuals. For example, it is argued

that people from low SES backgrounds make decisions that favour a *conjoint model of agency* (i.e., similar to others' decisions). It is explained that this pattern derives from the tendency of attributing the consequences of their life to external forces, because of the few material and economic resources they possess, that allow for only minor control over their environment. On the other hand, people from high SES backgrounds present a more self-focused thinking, favouring a *disjoint model of agency*. They make decisions that display a preference for individuality, given the fact that greater economic resources allow more personal choice and control on external situations (Stephens et al. 2007, 2011; Kraus et al. 2012).

In educational settings, university students who reported higher subjective SES indeed reported higher levels of personal control over their life outcomes (Kraus et al., 2009), which might lead to more achievement-focused choices and persistence in their academic life. Another pattern relevant to decision-making refers to the tendency of low-SES individuals to focus on their proximal needs instead of their distal goals (Sheehy-Skeffington, 2020). It is explained that during daily decisions, their attention is more directed towards present concerns rather than future accomplishments, given the uncertainty caused by resource scarcity and environmental instability.

Another example presented by the social cognitive theory of SES is the concept of social threat. It is supported that lower-class individuals are more vigilant to social threats than their upper-class peers. Testing this hypothesis in education, a study has documented that low SES students at a prestigious university felt more socially rejected and presented negative attitudes about their own academic competency in comparison to others (Johnson, Richeson & Finkel, 2011). These negative stereotypes created by social classes have direct effects on academic performance through the negative perceptions of their intellectual ability (Croizet and Claire, 1998). In general, although some of the assumptions of the emerging social cognitive theory were found to apply, further research is required to validate or adapt the theoretical model in educational settings.

Much earlier, Kohn (1959, 1976) who was especially interested on the psychological consequences of social classes, after years of research identified a set of patterns. He investigated the influence of parents' occupation on family values. In a nutshell, he described that middle-class parents who usually work in positions that require more initiative, thought, and independent judgment, are more likely to promote the concept of *self-direction* within their families. For children, self-direction refers to standards of behavior that value responsibility, independent decision-making, and reasonable intention behind actions. On the contrary, working-class parents, whose work is often more routinized, repetitive, supervised by others and less complex, give more emphasis to a sense of *conformity* in their family. Conformity is described as obedience to authority figures, and compliance of what is socially accepted, in terms of beliefs or actions. Therefore, students who were taught conformity will be content to choose occupational positions similar to

their parents, given their acceptance of social structures and rules in their society. In addition, the concept of time management is also important for this theory. While working-class parents make a clearer separation of working and leisure hours, the more professional parents usually overlap their work and home lives. For children, this might mean that after school follows either playtime (conformity) or homework and other useful activities (self-direction; Goyette, 2017). Even though Kohn supported this distinction with much evidence, a more recent study reported that both values - self-direction and conformity - paradoxically appeared in both social classes, but in different ways (Weininger, Lareau & LaRossa, 2009). This could be explained by the societal changes which have occurred throughout time in working structures and professions.

Lareau (2011) closely observing the lives of twelve 10-year-old children of both working- and middle-class families for five consecutive years, showed that inequality spreads through cultural structures of social classes. She argued that there are several invisible but powerful set of cultural depositories derived from the social classes' way of living that impact children's life experiences. To depict these differences, she presented two approaches on how parents raise their children, namely *concerted cultivation* and *accomplishment of natural growth*. Concerted cultivation, which was observed in middle-class families, refers to parental efforts that foster children's talents, skills, and educational interests, being actively involved in their intellectual, social, and personal development. On the other hand, working-class families are more concerned with sustaining the natural growth of their children by providing them with the basics (food, shelter, comfort, or other basic support). Given their daily economic challenges, this basic support is viewed by parents as an accomplishment. Based on this framework, Lareau presented different patterns in three main areas. First, it was observed that middle-class families hold an organised schedule of extra-curricular activities carefully selected to benefit children in various aspects (e.g., developing talents, socialization, intellectual development). In working-class families, children were given a great freedom to play with friends without any supervision, while parents focused on getting through the day. Second, differences on the quantity and quality of the language used within families were found. While in middle-class houses more vocabulary and verbal reasoning took place, in poorer houses less talking and more verbal directives were observed. This fact is very likely to affect children's linguistic competence during school years. Lastly, regarding the ability of parents to influence schools, middle-class parents appeared to be more involved and eager to intervene, while poorer parents allowed more authority from the professionals. These opposing parental practices might give distinct advantages and disadvantages to both groups of children, however, the schools of today's society favour organised, cognitively developed, and involved individuals.

In conclusion, there are indications that SES affects behavioural and psychological characteristics of students, which consequently might affect educational outcomes. However, their degree of impact is not apparent, neither is it methodologically clear whether these factors have an indirect effect within this equation. In other words, we are not sure if these internal processes (e.g., academic motivation) mediate the relationship between SES and academic achievement (Muijs, 2007). As explained before, this study will investigate if any type of effects related to academic motivation exist between SES and student achievement. Therefore, in the following section, some evidence found in the literature providing a background and reasoning on why the specific variables were selected to be investigated (*presented in Part C*), will be reviewed. Moreover, it is assumed that academic motivation theories consider the effect and importance of their factors for student academic achievement. Therefore, the focus in the next section will be placed on the effect of SES on these factors, rather than their effect on student outcomes, a topic that is less studied and where robust evidence is limited.

Section B: Socioeconomic Status and Academic Motivation

1. Why academic motivation?

The versatility of academic motivation as a concept might provide some background to understanding how various internal processes of students are affected. Theoretical frameworks and models in academic motivation focusing on the effects of SES or social class begin to appear during the last decade, approaching the topic again from different perspectives. The dynamic model (Creemers & Kyriakides, 2008) adopts six student-level factors that are somehow relevant to academic motivation according to theories' perspective: *subject motivation*, *perseverance*, *expectations*, *time on task* or even *aptitude* and *thinking style*. Furthermore, teacher-level factors reveal more elements that deal with the concept of academic motivation as by-products of effective teaching. For example, *orientation* as a teaching practice can increase the *perceived value* of the learning activity; *application* can provide opportunities to increase students' *self-competence*; *questioning* might promote content *mastery* instead of just performing; or *creating a learning environment in classroom* might promote *belonginess*. However, these were not systematically examined in relation with SES, validating the model's contribution for achieving equity in education.

Academic motivation theories often mention several environmental factors, including family characteristics in some cases, as driving forces of motivation. Such connections might increase our understanding of how student behaviours are affected by their proximal environments and help hypothesising about the influence of SES. Additionally, in order to conceptualize such relationships, researchers often strived to examine parental beliefs, values and behaviours, relying on the hypothesis that these might be influenced by their SES and that they affect relevant student motivation constructs in turn (e.g., Alexander et al., 1994; Eccles et al., 1982; Kohn, 1959, 1976).

Academic motivation is a broad term and is not always defined among studies. Researchers focus on specific components of motivation in each study based on their theoretical approach. For example, self-determination theory (Ryan & Deci, 2000) adopts the idea of intrinsic motivation, which represents the level of engagement in learning that emerges from the student's inherent interest and their own intention for enjoyment and satisfaction. The desired outcomes that eventually derive from the stimulation of intrinsic motivation are independent learning, increased commitment and effort, sense of integrity, high-quality performance, and well-being. For expectancy-value theory (Eccles et al., 2015), as initially originated by the work of Atkinson, motivation is depicted as a function between expectancy and value. This means that students will exhibit higher levels of motivation if they believe they can accomplish the activity (self-competence) and this activity leads to a desirable or attractive outcome (perceived value). The criteria for perceiving the activity's value are interest (i.e., enjoyment), utility (i.e., related to a goal), attainment (i.e.,

"necessary") and that the cost is not greater than the benefit. A beneficial function between these constructs eventually leads to achievement-related choices, higher engagement, and more persistence. Accordingly, in the achievement-goal theory (Ames, 1992), the concept of goals is more central. This means that students will show higher motivation levels if they believe that the specific activity will facilitate the achievement of their goals. Therefore, they are prompted to strive for good learning results, developing attributes such as persistence, effort-based strategies, increased time on task and commitment. Social cognitive theory (Bandura, 2001; Schunk & DiBenedetto, 2020) perceives motivation as a self-regulation process driven by reciprocal interactions between people and their environment. A favourable interaction between internal and environmental factors will lead to motivational outcomes (i.e., choice, effort persistence, achievement and environmental regulation) to affect and maintain goal-directed activities. This being said, from the perspective of EER, approaching motivation using specific elements, which is the case in this study, can help in identifying which of them are actually important for academic achievement and in guiding more targeted interventions.

In this study, four components will be examined. It was almost impossible for all components to be part of one theoretical framework, as the PISA 2018 dataset does not adopt any in particular. It even includes similar terms from different perspectives, such as self-concept and self-efficacy or interest and intrinsic motivation (OECD, 2019b). Therefore, it is almost impossible that a definition of academic motivation could represent the scope of this study and encompass the four components that were selected. However, further explanations for each variable will be given at section C.

2. The effects of socioeconomic status on academic motivation

The relationship between SES and academic motivation is unclear. During the composition of this study, no meta-analysis or reviews addressing this relationship were found, while numeric corelations are rarely detected in the literature. This could be a result of academic motivation multiformity as a concept, which does not allow for a combination of studies and their findings. However, recent elaborations and frameworks that consider the effects of SES in academic motivation along with other studies address, to some extent, the components to be examined in this study.

2.1 Mastery-approach orientation of achievement goals

From the perspective of achievement goal theory (Ames, 1992), the parental nurturing approach of cognitive development and effective learning strategies represent the mastery approach orientation of goals, where students strive to understand their work deeper and develop new skills. Their genuine positive attitudes towards learning, influenced by their parents' appreciation of learning, are accompanied with the belief that quality learning results can facilitate the attainment of distal goals. They are then driven by the

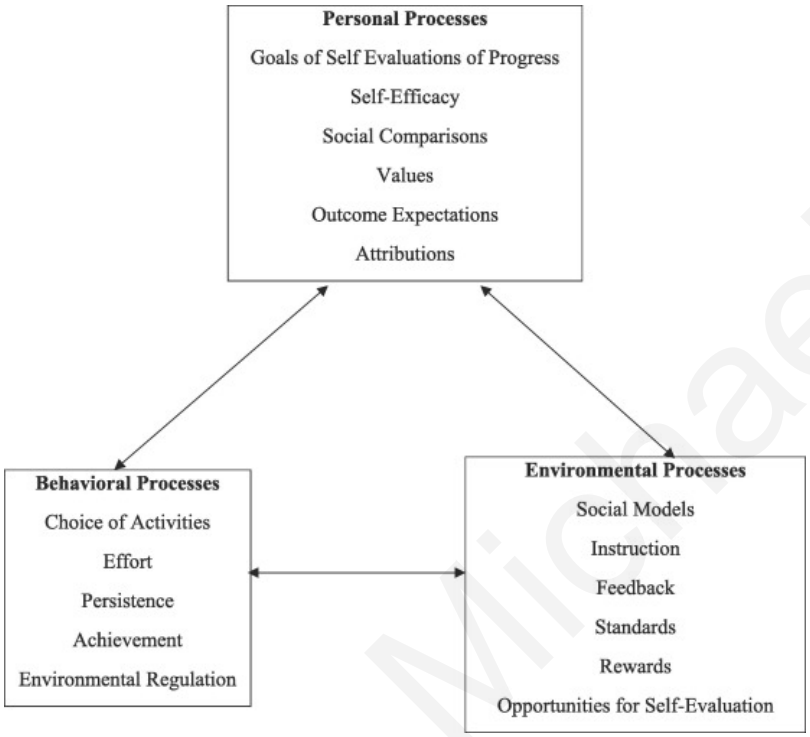
idea that learning opportunities should be seized, displaying higher levels of persistence and commitment. In addition, they perceive school and classroom as useful environments, and they are discerned with active participation cultivating an internal sense of belonginess. Investigating the formation of goals in the same framework, Berger and Archer (2016, 2018) observed that students of higher-SES backgrounds showed a stronger mastery approach of goals. On the other hand, they observed that lower-SES students shared performance goals more often, which is explained as maladaptive in education. Performance goals are represented with a failure-avoiding motivational pattern associated with fear of not succeeding, producing lower-quality learning outcomes (Ames, 1992). Moreover, under this orientation, students are prompted to look to others' abilities using them as a reference point to assess the level of their abilities. Thus, learning is developed in a competitive manner through comparison of capabilities, a process that produces feelings of self-doubt and a need for superiority. Among other stereotypes, social class is often seen as a channel of superiority and a sign of cognitive aptitude levels, negatively marking low-SES student groups (Jury et al., 2015). The *mastery-approach orientation of achievement goals* scale (ST208 in PISA 2018) is aligned with this idea. Therefore, relationships between SES and student achievement are also possible.

2.2 Working motive and mastery achievement motive

In *social cognitive theory*, Bandura (1989) presents the idea that student motivation and behavioural patterns of learning are driven by reciprocal interactions with their environments. The most contemporary redesigned triadic model of reciprocal interactions (*figure 2*) illustrates three interconnected groups of factors: personal, behavioural and environmental. Personal processes include outcome expectations, values, goals, self-efficacy, attributions, and social comparisons; while environmental processes involve social models, standards, opportunities of self-evaluation, feedback, rewards and instruction. Behavioural processes lead students' actions involving effort, *persistence*, achievement, choice of activities and environmental regulation (Schunk & DiBenedetto, 2020). Hoover-Dempsey and Sandler (1997) suggest three main practices of parental involvement affecting academic outcomes that fit with this model: modelling that involves showing interest and time in school-related activities and subjects; reinforcement that indicates attention, praise and rewards to learning-related behaviours; and direct instruction presenting the parent as a second 'teacher' at home. Although not ensured, such involvement is not expected to be expressed by lower SES parents because of their reduced available time and lack of subject-specific knowledge (Avvisati, Besbas & Guyon, 2010; Eccles & Harold, 1993). Following these assumptions, students of low-SES backgrounds are more likely to express lower levels on the behavioural factors listed in the *figure 4*. The *working motive and mastery achievement motive* scale (ST182 in PISA 2018) involves elements of persistence, effort, regulation and choice, therefore it is expected to show some relationship with both SES and academic achievement.

Figure 2

Key Behavioural, Environmental, and Personal Processes of Social Cognitive Theory (Schunk & DiBenedetto, 2020)



2.3 Enjoyment of reading

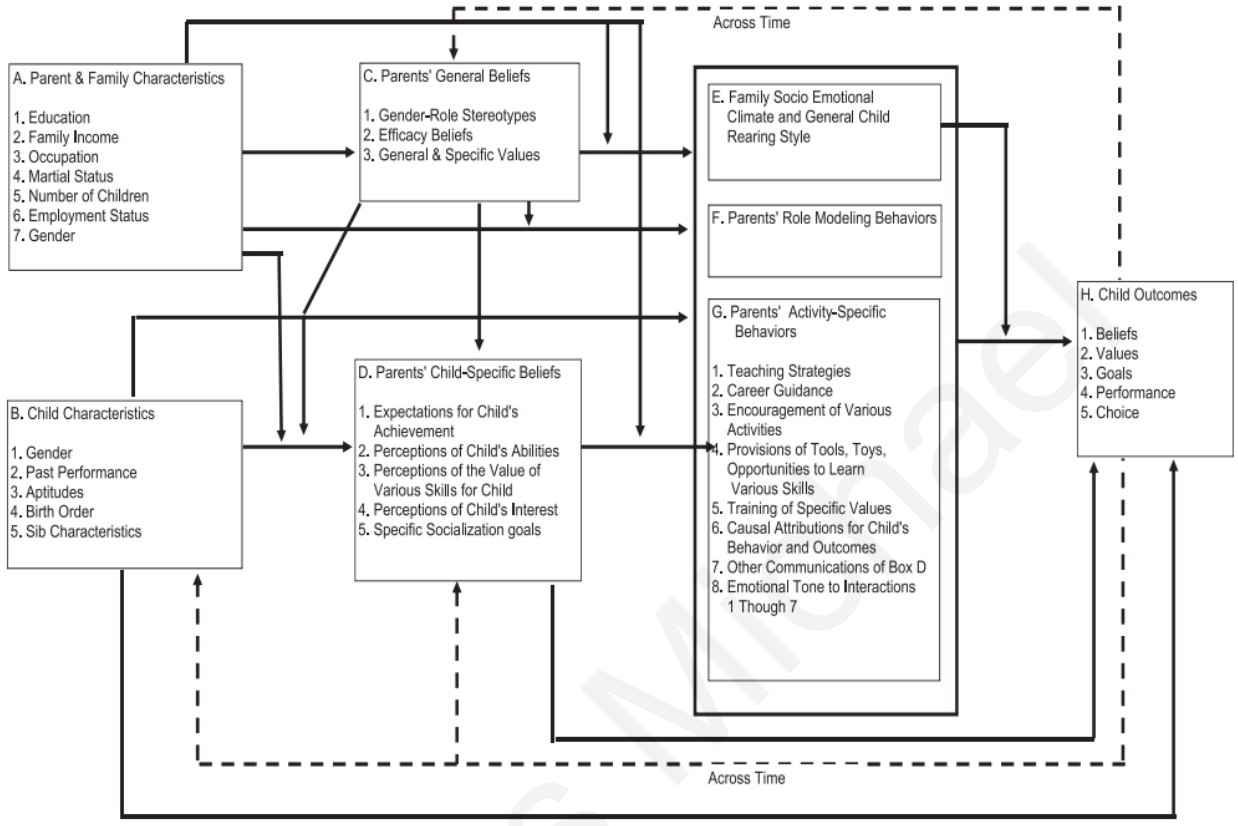
Conspicuous as this may appear, it was found that parents' interest and participation in certain academic subjects are positively associated with their children's participation in these domains (Simkins, Davis-Kean, & Eccles, 2005). These parental promotive behaviours on academic subjects might begin very early, through play, and continue during their children's school years, through active involvement and support. In fact, Jacobs and Bleeker (2004) demonstrated that the children who had more math and science toys at home, expressed higher levels of interest in math six years later. In addition, parents can be more supportive with children's homework or the development of learning strategies, while they did as learners in the past (Alexander, Entwisle & Bedinger, 1994). Therefore, higher parental education levels allow them to be more efficient 'teachers' at home and provide better cognitive stimulation, because they are aware of what their children are being taught and what they will be required to know in the future. Accordingly, *enjoyment of reading* (ST160 in PISA 2018) is expected to have an effect on the reading performance of students and be related to their SES.

2.4 Expected occupational status

The concept of expectations is discussed in many studies and appears to be multidimensional. Parents' expectations might involve perceptions about children's ability in certain activities, their academic performance, their educational attainment or their future identities. Parental educational status was found to have an indirect effect on children's academic achievement through their expectations and specific parenting behaviours (Davis-Kean, 2005). For example, educational level in upper classes can be viewed as a family 'cultural' outcome and parents with a university degree expect their children to continue the 'family tradition' (Teenzine et al., 1994). As a matter of fact, these educational pathways within the family have been described as "simple, linear, and predictable" (Hossler, Schmit & Vesper, 1999, p.2). Expectations have important practical implications for parents. For instance, their transmission was found to be achieved by discussing and communicating academic aspirations more often with their children (e.g., Lareau, 2011; Plank & Jordan, 2001). In addition, parents with higher expectations are concerned about the provision of cognitive and emotional support according to their children's needs, from their early years of schooling (Hoover-Dempsey & Sandler, 1997). The dynamic model has recognised that parents with a higher educational level are more likely to appreciate learning and schooling. They transmit higher expectations to their children by being more actively involved in providing them with learning support (Kyriakides et al., 2018) and arousing students' academic interest and motivation (Chen & Stevenson, 1995; Dotterer, McHale & Crouter, 2009). In turn, children are likely to internalize parental values, viewing them as role models (Lawrence, 2016), which might consist of internal forces, making students aspire to reach their parents level of occupational status. The Situated Expectancy-Value Theory (SEVT; Eccles & Wigfield, 2020), a recent contribution that aims to summarize the social, cultural and family effects on student motivation (*figure 3*), generally confirms that SES has an impact on parents' expectations regarding their children's short-term successes, as well as educational aspirations. In addition, the authors explain that parents from disadvantaged areas might not identify any benefits of schooling, because of the limited opportunities of higher status jobs in their society. This depreciation and disengagement on schooling along with other life stressors are very likely to have negative effects on academic motivation and conventional school success in general. The idea that parents are seen as role models is presented in SEVT as well, explaining that children adopt certain behaviours, values, goals and self-perceptions through observational learning of parents' jobs and leisure activities. Expanding on this, Wilson (1987) supported that what adults of proximal society do with their time indirectly affects children's self-concepts and subjective task values in certain domains. This often implies negative consequences on academic achievement in poorer neighbourhoods.

Figure 3

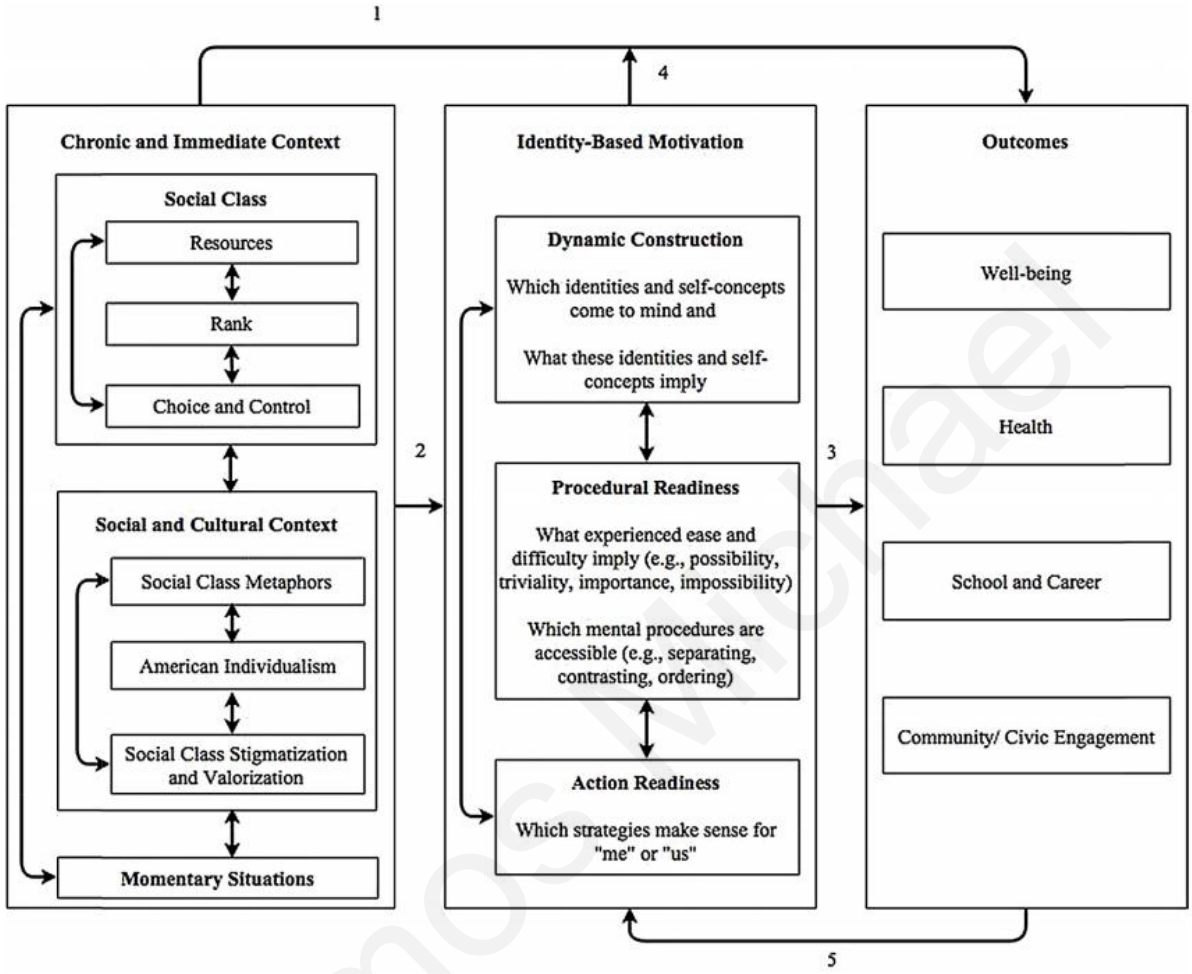
Eccles and Colleagues' Model of Parents' Socialization of Motivation (Eccles & Wigfield, 2020)



The idea of expected occupational status is also integrated in identity-based motivation theory (*figure 4*; Fisher, O'Donnell & Oyserman, 2017). In brief, this theory focuses on the motivational force of the future identity that individuals create for themselves. Financial scarcity in modern societies, apart from simply providing fewer resources, produces feelings of insecurity, uncertainty, lack of choice and reduced control. These constraints form the chronic cultural context which lead to certain meaning-making interpretations and inferences of experiences. Central to this is the perception that higher aspirations, desired identities and future goals might be difficult to obtain because of today's obstacles; therefore pursuing them is meaningless. The main behavioural outcomes of such inferences are low effort, lack of initiative and lower perceived ability. Furthermore, this theory builds on the stigmatization of social class accompanied with negative perceptions on social mobility, explaining why low-SES individuals often fail to direct their actions and persist enough to achieve their distal goals because of social class metaphors (Fisher, O'Donnell & Oyserman, 2017; Oyserman, 2009). In PISA 2018, students are asked to note their *expected occupational status* (ST114) which, based on the above, is expected to be related to their SES with effects to their academic performance.

Figure 4

Identity-Based Motivation and Social Class, a Process Model (Fisher, O'Donnell & Oyserman, 2017)



Considering the effect of socio-psychological mechanisms on academic motivation constructs, a growing body of research has started to design interventions addressing the socioeconomic gap. For example, Harackiewicz et al. (2014) managed to close the achievement gap for first-generation university students in Biology using value affirmations to promote self-integrity and self-worth. This produced a positive chain reaction, combatting students' negative stereotypes about their aptitude on the specific course. Therefore, they proceeded with more achievement-choices such as not dropping-out and persisting to achieve. Browman and Destin (2016), promoting an actively supporting environment toward socioeconomic diversity, managed to raise the levels of academic efficacy, expectation, and belongingness of low-SES university students. Using the framework of identity-based motivation, Browman et al. (2017) attempted to manipulate low-SES students' beliefs on socioeconomic mobility and demonstrate its plausibility. This way, researchers managed to increase students' academic resilience, enhancing their psychological

inclination to persist during academic difficulties, while schools were proved congruent to their desired future identities.

On their own, academic motivation theories can provide some theoretical basis regarding the mediating role of relevant variables in the relationship between student background or contextual factors and academic achievement. The effects of family demographic characteristics on student achievement are mostly indirect, while they can be mediated by parents' beliefs, practices, and psychological resources (Davis-Kean, 2005; Eccles & Wigfield, 2020). In fact, a recent meta-analysis (Kim, Mok & Seidel, 2020) found that parental influence exerted a stronger effect than SES, while student achievement-motivation had a small mediation effect in that relationship (r= .10). Furthermore, other studies reported stronger mediating effects of academic motivation constructs within the SES and academic achievement relationship (e.g., Kriegbaum and Spinath, 2016; Weiser & Riggio, 2010).

Section C: The Present Study

1. Introduction

Through the years, Educational Effectiveness Research (EER) has guided our understanding of the educational process and what matters the most for achieving higher student outcomes, informing research, policy, and practice. The contribution of the dynamic model of educational effectiveness has been valuable, accompanied with a strong theoretical framework, empirical evidence, and well-elaborated connections with school improvement. Depicting the complexity of education and summarizing the soundest solutions, it has demonstrated its ability to improve the quality dimension of educational effectiveness (Creemers & Kyriakides, 2015). The dimension of equity is a persisting concern in an era where socioeconomic disparities in education need immediate attention.

The achievement gap attributed to socioeconomic status fails to close worldwide. This is probably an indication to further understand this phenomenon. When a problem is not resolved with the selected solutions, redefining is required. There are still essential questions about why and how student background characteristics determine academic achievement that need to be examined. In order to understand the effects of SES on student outcomes, researchers have reasonably moved their attention outside school settings. The sociopsychological perspective of educational effectiveness can contribute to more robust integrated approaches during the investigation of the equity dimension. This perspective explains that SES is a vital characteristic of families' social condition, with effects on the psychological and behavioural aspects of individuals; but what about their children's education?

If we want to talk about equity in education, we need to understand perfectly *what*, *how*, and *why*. There are apparent evidence-based reasons explaining that reduced capital and resources limit the material and intellectual dynamism of individuals (e.g., learning opportunities). We also know that cognitive differences between socioeconomic groups begin at home very early. However, little is known about the students' psychological and behavioural factors that are influenced by SES, and which in turn affect academic achievement. When discovering these elements, the EER needs to be bold enough to discuss social groups' values, beliefs, and perceptions that guide students' academic behaviours and actions as they were found important enough to mediate the effect of SES (Eccles & Wigfield, 2020). On the other hand, financial or educational resources without utilization are not an advantage.

Academic motivation is a broad element to study. Different theoretical perspectives exist which do not allow a consensus to be adopted by the EER. However, academic motivation theories can provide some understanding of how several psychological and behavioural elements are influenced by family and social

characteristics. Recent elaborations of these theories focus particularly on SES, offering good ground for exploitation by the EER. Therefore, within the effort of explaining how SES affects student outcomes, academic motivation's role might be appealing. Academic motivation theories can be used as a 'stepstone' to view students' behaviours and processes during the exploration of the equity dimension of educational effectiveness. At the same time, it is always acknowledged that apart from motivation, other factors might exist within the SES-student achievement relationship with direct or indirect effects.

The dynamic model's student level factors that are related to academic motivation do not fully coincide with the terminology and viewpoints of academic motivation literature, especially of the models that focus on social class. This makes it difficult to combine theoretical assumptions and empirical findings, in the effort to validate or strengthen its framework. Therefore, given that the relationships between student level factors were not systematically studied and that the validation studies towards the dimension of equity are limited, the scope of this study could be opened up.

The present study aims to partly explain the relationship between SES and student outcomes, using academic motivation constructs. Mapping and adopting a theoretical framework of academic motivation might seem ideal, but it could be feasible under other conditions as the selection of the components to be investigated in this study are limited to the PISA 2018 dataset. Therefore, the focus is on certain components that are found to be important within the academic motivation literature, assuming that these are influenced by SES and in turn affect student outcomes.

1.1 Research questions

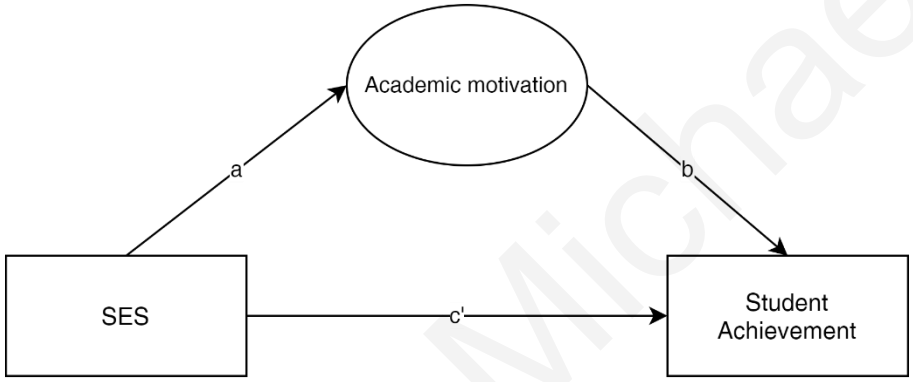
The present study relies on the hypothesis that selected motivational constructs (expected occupational status, enjoyment of reading, working motive and mastery achievement motive, and mastery-approach orientation of achievement goals) act as mediators and partly explain the relationship between SES and student achievement. The hypothesized relationship is illustrated in figure 5. The examination of relationships between SES and academic motivation builds on the existing literature with evidence, regarding the effects of SES on students' academic motivation. At this stage, we could claim causal effects, as SES is a stable factor, and it is not expected to be affected by students' motivation. Second, the relationships between motivation and achievement can contribute to the research of academic motivation and educational effectiveness, stressing the importance of each motivation element. However, at this stage, we could not claim causal effects as reciprocal relationships are also possible. Lastly, the most critical part of examining the mediating role of motivation constructs within the SES-achievement relationship indicating indirect effects, gives valuable information to our understanding of the dimension of equity from the sociopsychological point of view of educational effectiveness research. In addition, the model will

follow a cross-country analysis to examine contextual differences between the selected countries. The research questions are:

1. Do selected academic motivation constructs mediate the relationship between students' SES and academic achievement, and to what extent?
2. Are there any contextual differences among sample countries regarding the emerged mediation models?

Figure 5

Illustration of Mediation Model



a = the effect of SES on academic motivation

b = the effect of academic motivation on student achievement

ab = the mediated or indirect effect of SES on student achievement through academic motivation

c' = the direct effect of SES on student achievement

2. Methodology

2.1 The PISA 2018 data

The models were tested using data from PISA 2018. PISA (Program for International Student Assessment) is an international survey run by the OECD (Organization for Economic Cooperation and Development) and addresses 15-year-old students to assess their performance in three literacy domains every three years: reading, mathematics, and science. These domains rotate in each cycle to form the major focus of the assessment. Along with student performance in these subjects, a set of other variables are collected through questionnaires handed to students, teachers, school principals, and, in some cases, parents. The major domain of the 2018 data collection was reading, and around 80 countries or educational systems took part in the survey. The data used in this study were download as SPSS files from OECD's website[1].

PISA, as well as other International Large-Scale Assessments (ILSA), can provide a rich series of variables along with achievement scores from a substantial number of students in each country, making it a valuable resource for researchers who aspire to conduct secondary analyses. As evidenced in this study, the large samples can strengthen the generalisation of findings. Another essential reason that advocates for the use of PISA in this study is the satisfactory level of reliability and validity of its socioeconomic status scale (Avvisati, 2020).

2.2 Sample countries

The countries included in the present study accord to one main criterion: the equity gap. In the OECD report released in 2019 under the title "*PISA 2018 Results (Volume II): Where All Students Can Succeed"*, information about the percentage of variance in reading performance explained by ESCS (R^2) is provided for all participating countries[2]. This indicator shows the strength of the socioeconomic gradient and refers to how well socioeconomic status predicts performance in reading within countries/economies. As expected, this value appears to be statistically significant in all countries. Information on the magnitude of socioeconomic gradient as well as the mean performance in reading for all countries which participated in PISA 2018, are presented in Appendix 1. On average, socioeconomic status accounted for 12% of the variation of reading performance within countries (OECD, 2018).

The hypothesized model was tested in five countries which demonstrated different strength of the gradient explained above. Belarus and Hungary presented high levels of achievement gap (19.8% and 19.1% of the variation in reading performance predicted by ESCS), Iceland and Estonia had one of the lowest magnitudes

[1] https://www.oecd.org/pisa/data/2018database/
[2] https://doi.org/10.1787/888934038780

of this indicator (6.6% and 6.2% respectively), and Poland was found to be close to the OECD average (11.6%). Regarding countries' performance in reading, Estonia and Poland are ranked above and the other three countries slightly below OECD average. This selection supports the generalization of findings regardless of the achievement gap magnitude in each country. Moreover, the geo-cultural characteristics of these countries were also considered in this process. The sample includes countries of the same region (Europe) in order to avoid any differences accounted by contextual factors not examined in this study.

2.3 Variables

Dependent variable. The dependent variable in all analyses is the achievement score in reading literacy, as it was the focus domain of the PISA 2018 cycle. As for all subjects, the reading framework is updated for each cycle. The renewed definition of reading literacy given by the OECD (2019b) is "*understanding, using, evaluating, reflecting on and engaging with texts in order to achieve one's goals, to develop one's knowledge and potential and to participate in society*". As explained in the assessment and analytical framework (OECD, 2019b), reading performance was built in three main characteristics: text, processes and scenarios. These depict the level of proficiency measuring the variety of materials read by the students, their cognitive approaches as readers, and their broader purposes for engaging with texts. In the PISA 2018 dataset, reading scores are given in an aggregated scale based on the mean of three subscales reflecting locating, understanding, evaluating and reflecting the information skills of students. In the present study, student achievement was reflected using the *Plausible Value 1 in Reading* (PV1READ) variable. Descriptive statistics for this variable in each country are presented in table B.1.

Independent variable. Socioeconomic status in PISA 2018 consists of a composite measure that reflects the financial, social, cultural and human capital available to students (Erreygers, Clarke, & Van Ourti, 2012). The PISA index of economic, social and cultural status (ESCS) combines three equally weighted components into one single score (a total of 20 items): parents' education (educational level of the parent with the higher educational attainment), parents' occupational status (occupational status of the parent with the higher occupational status), and information about home possessions. The last component is used as a financial and cultural capital indicator including information about the material wealth of the household, cultural possessions, and home educational resources. It specifically consists of 16 survey questions addressing home assets such as access to the internet, number of books and dictionaries at home, possession of a car, existence of a quiet room for the student to study and more (OECD, 2019a). To enhance the index's cross-country comparability, country-specific parameters were assigned where needed, adjusting the homogeneity of interpreted items. The ongoing revisions and improvements of the scale throughout time brought its validity to a relatively high level (Avvisati, 2020). In PISA 2018, the variable is labelled as

Index of economic, social and cultural status (ESCS) with values transformed into z-scores. Descriptive statistics for this variable in each country are presented in table B.2.

Mediating variables. The PISA 2018 database provides the items, as well as the factors, that reflect the motivation constructs tested as mediators in this study. However, a Confirmatory Factor Analysis (CFA) preceded the process of the mediation model analyses therefore only the items comprised the initial variables. As presented below, one motivation element consists of only one item, and the other three were treated as latent variables. Descriptive statistics for all variables are presented in Appendix 2. ***Mastery-approach orientation of achievement goals***. As Ames (1992) explains from the perspective of achievement goal theory, the mastery-approach orientation of goals derives from the belief that quality learning results will facilitate their future goals. Therefore, students with high standards and goals are more likely to adopt effective learning strategies such as mastery orientation. Parental educational level might obscure certain values towards learning and its utility, possibly affecting goal orientation. Parents who did not experience the benefits of education and learning or carry a sense of inability and unsuccessful school results, are not prompted to lead their children on the development of new skills and the exploitation of learning opportunities, as a means of achieving their goals. The variable *mastery-approach orientation of achievement goals* consists of three items answered on a five-point Likert scale ranging from "Not at all true of me" to "Extremely true of me" (Table 1.1).

Table 1.1

Items of Mastery-approach Orientation of Achievement Goals

Name	Label
ST208Q01HA	My goal is to learn as much as possible.
ST208Q02HA	My goal is to completely master the material presented in my classes.
ST208Q04HA	My goal is to understand the content of my classes as thoroughly as possible.

Working motive and mastery achievement motive. Students' work ethic or persistence can be either viewed as an outcome of academic motivation or one of its constructs. In any case, persistence has a strong presence in almost all motivational theories, as well as in educational effectiveness models (see Carrol's model, Comprehensive model). The Dynamic model adopts the term of perseverance that is relevant to persistence, indicating the extent to which students put effort into learning (Kyriakides & Tsangaridou, 2008). As explained by Kraus et al. (2009), lower SES individuals, because of the sense of reduced control and choice on external conditions, might express lower levels of persistence to intervene and change them. This attitude of not investing much effort could be attributed to their low background educational and occupational levels. Therefore, they might feel condemned to remain on their current level of abilities and conditions, as

they do not believe that persisting and putting more effort in changing results. Consequently, children growing up with low standards of persistence, might adopt those attitudes in their educational life. This variable consists of four items answered on a four-point Likert scale ranging from "Strongly disagree" to "Strongly agree" (Table 1.2).

Table 1.2

Items of Working Motive and Mastery Achievement Motive

Name	Label
ST182Q03HA	I find satisfaction in working as hard as I can.
ST182Q04HA	Once I start a task, I persist until it is finished.
ST182Q05HA	Part of the enjoyment I get from doing things is when I improve on my past performance.
ST182Q06HA	If I am not good at something, I would rather keep struggling to master it than move on to something I may be good at.

Enjoyment of reading. An individual's enjoyment and internal satisfaction conducting an activity represents the main idea of intrinsic motivation, contrasted by extrinsic motivation where the individual is imposed to act by external factors (Ryan & Deci, 2000). It can be also related to the term of subject motivation used in the dynamic model (Creemers & Kyriakides, 2008), when reading performance is used to measure student outcomes. Children raised in families where reading is a usual activity or it is perceived as an opportunity to learn and socialize, are expected to develop an attitude of enjoyment towards reading. Higher SES families are expected to express more joy and utility towards reading, often represented by a higher number of books at home. Students' positive attitudes towards reading could be a great psychological asset for academic achievement. The scale consists of five items responded to on a four-point Likert scale ranging from "Strongly disagree" to "Strongly agree" (Table 1.3). Three of them are negatively worded, therefore they were reversed.

Table 1.3

Items of Enjoyment of Reading

Name	Label
ST160Q01IA[a]	I read only if I have to.
ST160Q02IA	Reading is one of my favourite hobbies.
ST160Q03IA	I like talking about books with other people.
ST160Q04IA[a]	For me, reading is a waste of time.
ST160Q05IA[a]	I read only to get information that I need.

[a]*Reversed*

***Expected occupational status*.** From the identity-based motivation perspective, career aspirations are a strong indicator of one's future self or future identity (Oyserman, 2015). This self-image could be positively related to the educational life of an individual, and highly influenced from family and the proximal social environment, such as parental occupational status. Parents are often viewed as role models by their children, who are usually driven to follow their professional footsteps (Lawrence, 2016). Higher aspirations could be a strong motivational force for adolescents' current school achievement. In PISA 2018, students were asked to answer one open-ended question on "*What kind of job do you expect to have when you are about 30 years old?*". Their answers were coded and ranked based on the International Standard Classification of Occupations (ISCO) of ILO. Then, codes were mapped to the PISA International Socio-Economic Index (ISEI) allowing easier interpretations, where higher scores of the variable express higher expected occupational status. Table B.3 provides the descriptive statistics of this variable (BSMJ).

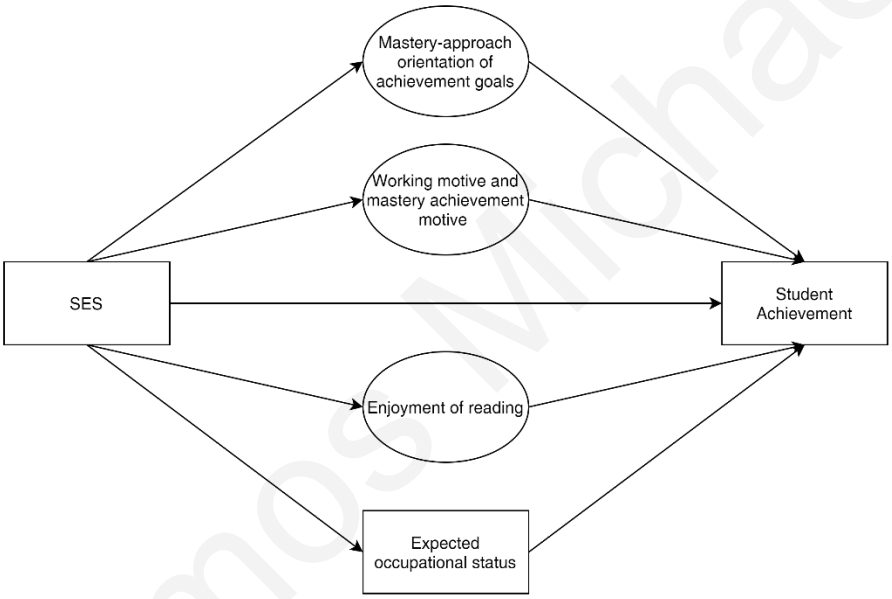
2.3 Statistical analyses

The PISA 2018 database is available in SPSS data files. Therefore, IBM SPSS Statistics software (version 20.0.0) was used to identify the sample and variables included in this study. Descriptive statistics as well as covariance matrices were also calculated using this software. Confirmatory Factor Analysis (CFA) and Mediation models were conducted in the EQS model-fitting program, Version 6.1 for Windows (Bentler, 2002). The total number of items analysed are I = 15 with one being the outcome variable (plausible value), one independent variable (ESCS as constructed by PISA) and 13 plausible mediator items. The covariance matrices (Appendix 3) as extracted from SPSS, were entered in EQS for the construction of the CFA and mediation models. The more complex mediating relationships were investigated with Structural Equation Modeling (SEM) to confirm path models with more flexibility (Kline, 2011). These paths were determined based on theoretically meaningful assumptions described in previous sections. The direct effect of SES (ESCS) on academic achievement (Plausible Value 1) was determined beforehand in all countries. Therefore, motivational constructs were assumed for a partial mediation. Before testing the assumed

mediation model (figure 6), each variable formed a mediation model alone in order to detect any problematic fits. Then, according to the results, certain variables were included or excluded to form the final models. The parameters of the models were estimated using the maximum likelihood method (Hu & Bentler, 1999). Apart from the estimation of regression coefficients, residual variances and covariances, the fit measures used to evaluate the models were the model test statistic (chi-square with degrees of freedom and p-value), Comparative Fit Index (CFI), and Standardised Root Mean Square Residual (SRMR), Root Mean Square Error of Approximation (RMSEA), and 90% Confidence Interval of RMSEA[3].

Figure 6

The Hypothesized Mediation Model



[3] According to Hu and Bentler (1999), if chi-square is non-significant, CFI > .95, RMSEA < .05, and SRMR ≤ .05 then the model can be considered well fitted.

3. Results

3.1 Measurement models

As explained above, three mediating elements consist of several items as given by PISA data. Therefore, a Confirmatory Factor Analysis (CFA) has been conducted for each one, before adding them to the structural models as mediators. All confirmatory factor models fitted well in all countries (see tables 2.1 and 2.2). In a few cases, an asymmetrical distribution of standardized residuals was observed, which has been corrected by adding a covariance to the model between those residuals with parameters >.10. The factor loadings for all latent variables by country are presented in Appendix 4, and the 15 emerged models are depicted in Appendix 5. For *Mastery-approach Orientation of Achievement Goals* no fit indices were available as degrees of freedom were equal to 0, therefore model fitness is limited to the measures of standardized solution. As shown in the tables below, most of the confirmatory factor models indicate a statistically significant chi-square, however this can be attributed to the large number of observations.

Table 2.1

Confirmatory factor model fit of Working Motive and Mastery Achievement Motive

Country	χ^2	df	CFI	RMSEA	SRMR	RMSEA 90% CI
Belarus	28.468***	2	.996	.048	.012	.033 - .064
Hungary	19.888***	2	.995	.042	.012	.026 - .059
Poland	20.640***	1	.996	.059	.010	.039 - .083
Iceland	8.540*	2	.999	.032	.008	.012 - .055
Estonia	19.174***	2	.995	.040	.012	.025 - .057

*p < .05 **p < .01 ***p < .001

Table 2.2

Confirmatory factor model fit of Enjoyment of reading

Country	χ^2	df	CFI	RMSEA	SRMR	RMSEA 90% CI
Belarus	62.383***	3	.993	.058	.013	.046 - .071
Hungary	7.708	4	1.000	.013	.004	.000 - .028
Poland	37.269***	3	.997	.045	.008	.033 - .059
Iceland	79.361 ***	4	.989	.076	.018	.061 - .090
Estonia	41.239***	2	.996	.061	.010	.045 - .078

*p < .05 **p < .01 ***p < .001

2.2 Structural models for each mediator

The first research question was if and to what extent academic motivation, at least partially, mediate the association between SES and student achievement. As explained before, each motivation construct has been regressed separately into a structural equation model (SEM) to capture their fitness as mediators. The second research question was concerned with contextual differences among sample countries regarding the models which emerged. Therefore, the same process was followed for five different samples. The indirect and direct effects of the structural models for each mediator are presented in Appendix 6. The total effect of SES on academic achievement in each country is presented in table 3.1.

Table 3.1

Direct effect of SES on Academic Achievement before mediation

Country	β	SE	R^2
Belarus	.445*	.895	.198
Hungary	.433*	.901	.188
Poland	.331*	.944	.109
Iceland	.244*	.970	.060
Estonia	.250*	.968	.063

*p < .05

Mastery-approach orientation of achievement goals did not exhibit convincing results in all countries. Fit indices for Belarus, Hungary, Poland, and Estonia did not reach an acceptable level, but most importantly, indirect effects were low. For Belarus, the distribution of standardized residuals was asymmetrical, and RMSEA was well above .05. For Hungary and Estonia, RMSEA was above .05 and its 90% confidence interval was out of the acceptable range. For Poland, model fitness was not far from the acceptable levels, but indirect effects were not convincing. Only for Iceland did fit indices indicate a good model fit (χ^2 = 29.79*** (df = 3), CFI = .996, SRMR = .012, RMSEA 90% CI = [.04 – .07]) with meaningful indirect path effects. The indirect effect for Iceland from SES to academic achievement through mastery-approach orientation of achievement goals was estimated to .047*, while the direct effect of SES to academic achievement reduced from .244* to .197*. The results of all mediating models regarding this motivation construct are presented in table 4.1.

Table 4.1

Mediating model results for Mastery-approach orientation of achievement goals

Country	χ^2	df	CFI	RMSEA	SRMR	RMSEA 90% CI	Indirect path effects	
							SES→Mot.	Mot.→Ach.
Belarus	284.56***	3	.971	.127	.041	.115 - .140	.095*	.020
Hungary	127.26***	3	.984	.090	.027	.077 - .103	.114*	.132*
Poland	116.20***	3	.985	.082	.022	.069 - .095	.110*	.138*
Iceland	29.79***	3	.996	.052	.012	.036 - .070	.200*	.237*
Estonia	178.26***	3	.979	.105	.027	.092 - .118	.163*	.161*

Note. SES = Socioeconomic status (ESCS), Mot. = Academic motivation (Mastery-approach orientation of achievement goals), Ach. = Academic achievement

*p < .05 **p < .01 ***p < .001

Regarding *working motive and mastery achievement motive*, the assumed mediation model was again not well-supported by the results. For all countries, there were problems with the distribution of standardized residuals and fit indices. Indirect effects were again noteworthy only for Iceland, and at a lower extent for Poland and Estonia. Therefore, given the noteworthy effects, only the case of Iceland has been considered for the final hypothesized models (χ^2 = 227.20*** (df = 7), CFI = .957, SRMR = .036, RMSEA 90% CI = [.09 – .11]). The total indirect effect from SES to academic achievement, through working motive and mastery achievement motive was estimated to .046*, while the direct effect of SES to academic achievement reduced from .244* to .198*. The results of all mediating models regarding this motivational construct are presented in table 4.2.

Table 4.2

Mediating model results for Working motive and mastery achievement motive

Country	χ^2	df	CFI	RMSEA	SRMR	RMSEA 90% CI	Indirect path effects	
							SES→Mot.	Mot.→Ach.
Belarus	263.74***	7	.968	.080	.036	.071 - .088	.126*	.042*
Hungary	538.37***	7	.899	.122	.060	.113 - .130	.084*	.048*
Poland	258.40***	6	.959	.086	.039	.078 - .096	.135*	.214*
Iceland	227.20***	7	.957	.098	.036	.087 - .109	.208*	.224*
Estonia	481.25***	7	.893	.113	.051	.104 - .121	.133*	.136*

Note. SES = Socioeconomic status (ESCS), Mot. = Academic motivation (Working motive and mastery achievement motive), Ach. = Academic achievement

*p < .05 **p < .01 ***p < .001

Accounting only for *enjoyment of reading*, the model fit indices generally indicated a well-fitted mediation model in almost all countries. Moreover, indirect effects were by far larger and more concrete than the previous motivation constructs. Enjoyment of reading fitted the data very well for Belarus (χ^2 = 134.66*** (df = 10), CFI = .989, SRMR = .017, RMSEA 90% CI = [.04 – .05]), Hungary (χ^2 = 75.59*** (df = 11), CFI = .996, SRMR = .034, RMSEA 90% CI = [.03 – .04]), and Poland (χ^2 = 132.10*** (df = 10), CFI = .991, SRMR = .047, RMSEA 90% CI = [.04 – .05]) with total indirect effects equal to .090*, .084*, and .096* respectively. For Iceland (χ^2 = 224.16*** (df = 11), CFI = .973, SRMR = .030, RMSEA 90% CI = [.07 – .09]) and Estonia (χ^2 = 415.96*** (df = 9), CFI = .963, SRMR = .036, RMSEA 90% CI = [.09 – .10]), the explanatory power was lower but enough to consider this motivation construct in the creation of the final models, given the relatively good model fit (.054* and .063* respectively). The results of all mediating models regarding this motivational construct are presented in table 4.3.

Table 4.3

Mediating model results for Enjoyment of reading

Country	χ^2	df	CFI	RMSEA	SRMR	RMSEA 90% CI	Indirect path effects	
							SES→Mot.	Mot.→Ach.
Belarus	134.66***	10	.989	.046	.017	.039 - .053	.298*	.302*
Hungary	75.59***	11	.996	.034	.012	.027 - .041	.232*	.361*
Poland	132.10***	10	.991	.047	.015	.040 - .054	.246*	.389*
Iceland	224.16***	11	.973	.077	.030	.068 - .085	.157*	.346*
Estonia	415.96***	9	.963	.092	.036	.085 - .100	.194*	.325*

Note. SES = Socioeconomic status (ESCS), Mot. = Academic motivation (Enjoyment of reading), Ach. = Academic achievement

*p < .05 ** p < .01 *** p < .001

As for *expected occupational status*, analyses could not provide fit indices as degrees of freedom were equal to 0. Therefore, only parameters of standardized solution were considered. Standardized coefficients were higher than the previous motivation constructs, especially for Belarus, Hungary and Poland. The effect explained through expected occupational status was .107*, .148*, and .109* accordingly, reducing to a large extent the direct effect of SES to academic achievement. For Iceland (.042*) and Estonia (.064*), the explanatory power was lower, but enough to consider this motivation construct on the final mediation models. The indirect effects of all mediating models regarding this motivational construct are presented in table 4.4.

Table 4.4

Mediating model results for Expected occupational status

Country	χ^2	df	CFI	RMSEA	SRMR	RMSEA 90% CI	Indirect path effects	
							SES→Mot.	Mot.→Ach.
Belarus	-	-	-	-	-	-	.330*	.325*
Hungary	-	-	-	-	-	-	.391*	.379*
Poland	-	-	-	-	-	-	.330*	.330*
Iceland	-	-	-	-	-	-	.188*	.224*
Estonia	-	-	-	-	-	-	.244*	.262*

Note. SES = Socioeconomic status (ESCS), Mot. = Academic motivation (Expected occupational status), Ach. = Academic achievement

*p < .05 ** p < .01 *** p < .001

2.3 Mediation structural models for each country

As a final step, the four mediators were added into a single mediation model for each country, forming the hypothesized model (see figure 6). However, in most cases the solutions presented serious limitations. Therefore, considering the results of the SEM models presented above, where each mediator was regressed separately, certain motivation constructs were removed until model parameters reached a good fit. The results of the emerged SEM model for each country are summarized in table 5.1. Along with the mediation effects, associations between the motivation constructs were calculated as well.

Table 5.1

Model fit parameters and effects of final mediation models

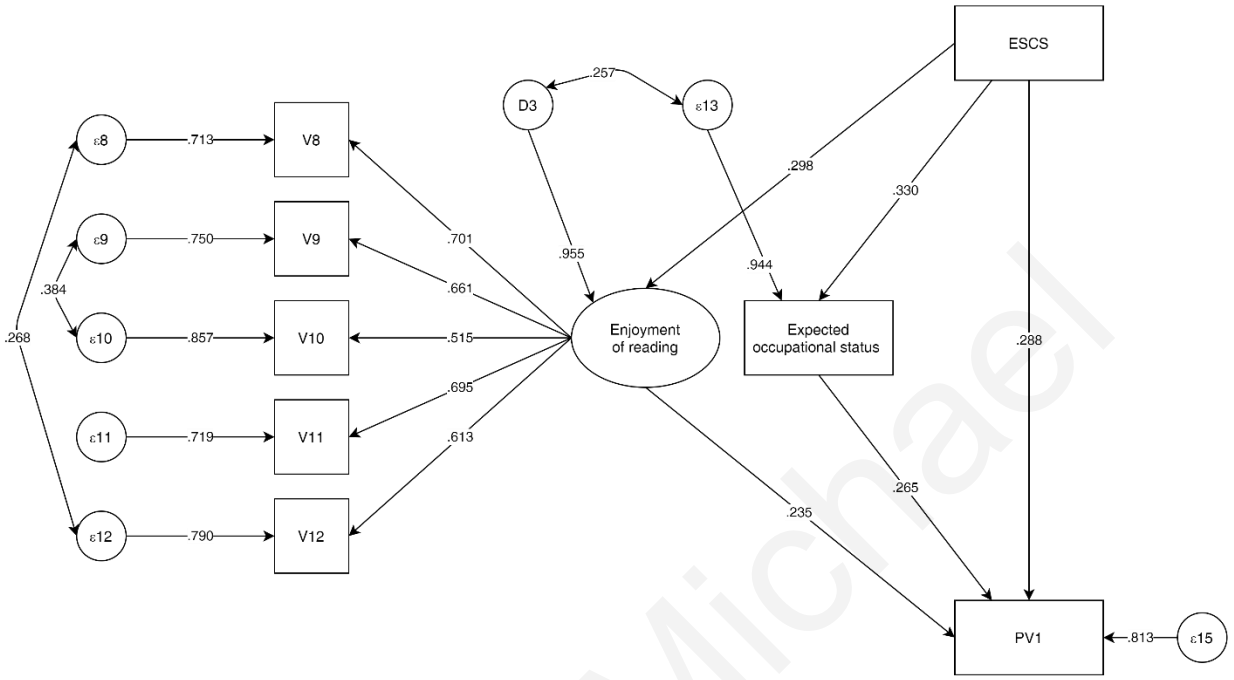
Country	χ^2	df	CFI	RMSEA	SRMR	RMSEA 90% CI	Total indirect effects	Direct effect SES→Ach.
Belarus	157.15***	14	.989	.042	.018	.036 - .048	.157*	.288*
Hungary	88.81***	15	.996	.031	.013	.025 - .037	.193*	.240*
Poland	525.94***	42	.977	.045	.034	.042 - .049	.168*	.163*
Iceland	720.34***	74	.970	.051	.038	.048 - .055	.112*	.132*
Estonia	444.36***	13	.964	.079	.034	.073 – .085	.102*	.148*

*p < .05 **p < .01 ***p < .001

Belarus. The final model for Belarus presented a good fit with *Enjoyment of reading* and *Expected occupational status* as mediators. Including *mastery-approach orientation of achievement goals* and *working motive and mastery achievement motive* did not lend any further explanatory power to how SES are associated with student achievement, nor a good model fit. The direct effect of SES on academic achievement decreased from .445* to .288*, allowing an indirect effect of .157* through the selected mediators. The emerged SEM presented in figure 7 fitted the data well (χ^2 = 157.15*** (df = 14), CFI = .989, SRMR = .018, RMSEA 90% CI = [.04 – .05]). The indirect effects of *enjoyment of reading* and *expected occupational status* were estimated to .070* and .087* respectively. Moreover, the association between these two mediators was .257*.

Figure 7

Belarus' Mediation Model



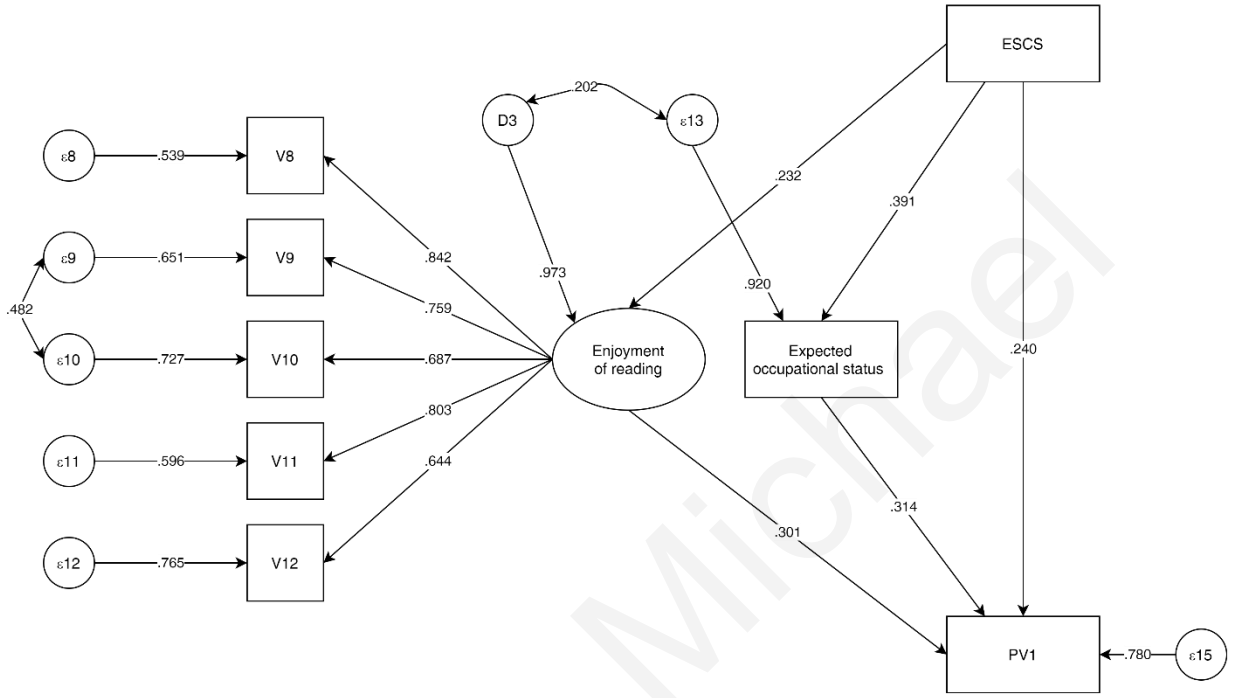
Note. Total effect of SES on academic achievement: .455*. Indirect effects through mediators: .157*. Indirect effect through enjoyment of reading: .070*. Indirect effect through expected occupational status: .087*.

* p < .05 ** p < .01 *** p < .001

Hungary. The emerged model for Hungary was very similar to Belarus' model. Hungary and Belarus are countries with a very strong socioeconomic gradient, meaning that SES explains the variance in reading scores to a large extent, in comparison to other countries which participated in PISA 2018. *Enjoyment of reading* and *expected occupational status* behaved well as mediators, while *mastery-approach orientation of achievement goals* and *working motive and mastery achievement motive* contributed negatively to model fitness. The indirect effects through the selected motivation constructs were estimated to .193*, allowing a direct effect of SES to academic achievement equal to .240*. The final model presented in figure 8 fitted the data well (χ^2 = 88.81*** (df = 15), CFI = .996, SRMR = .013, RMSEA 90% CI = [.03 – .04]), while the association between the two mediators was .202*.

Figure 8

Hungary's Mediation Model



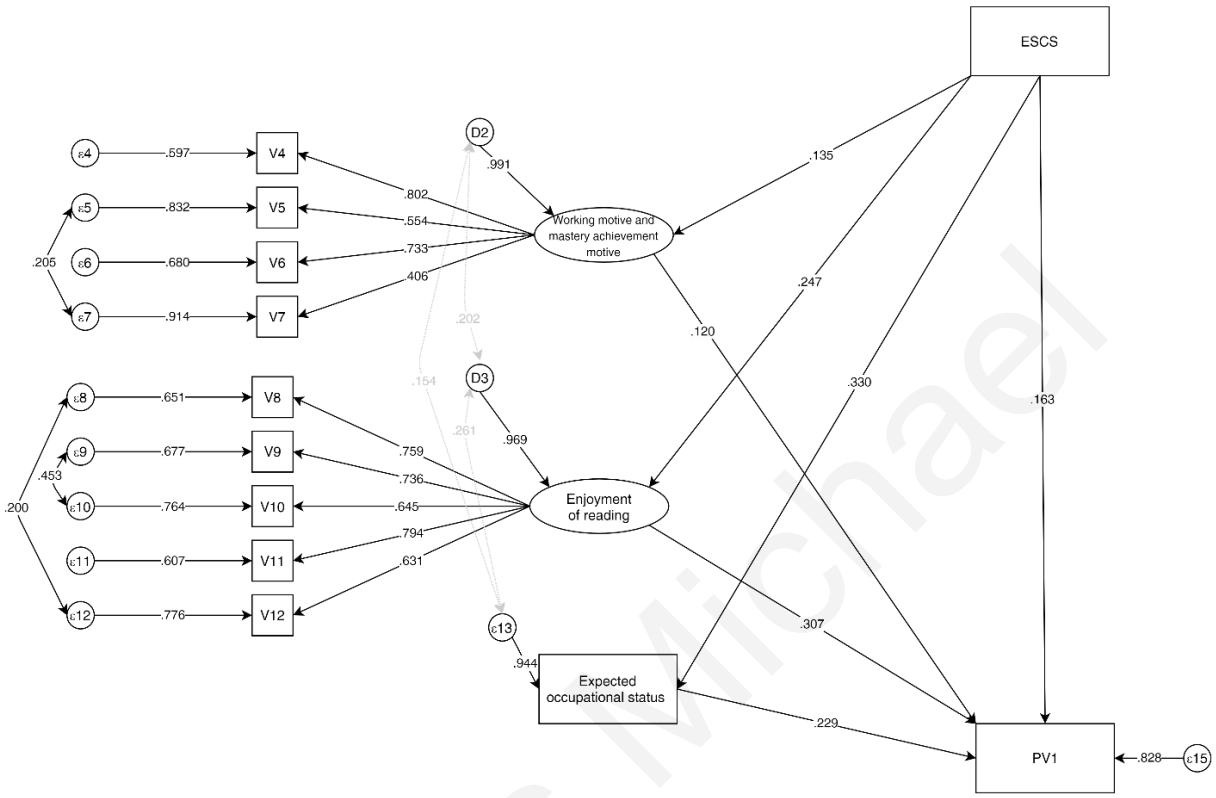
Note. Total effect of SES on academic achievement: .433*. Indirect effects through mediators: .193*. Indirect effect through enjoyment of reading: .070*. Indirect effect through expected occupational status: .123*.

* p < .05 ** p < .01 *** p < .001

Poland. Poland's final model reached a good fit with *enjoyment of reading*, *expected occupational status*, and *working motive and mastery achievement motive* as mediators. The final mediator presented very low mediating effects, however it was still included in the final model because of the good fitness indicated by the chi-square value. *Mastery-approach orientation of achievement goals* presented very low indirect effects and limited the good fit of the mediation model. The emerged model is shown in figure 9 (χ^2 = 525.94*** (df = 42), CFI = .977 SRMR = .034, RMSEA 90% CI = [.04 – .05]). Poland was selected from another group of countries, where the effect of SES on academic achievement (.331*) was close to the OECD average. This association was explained partially through the three mediators of academic motivation with indirect effects at .168*. The direct effect of SES on academic achievement dropped to .163*. The association between the two mediators was statistically significant but low.

Figure 9

Poland's Mediation Model



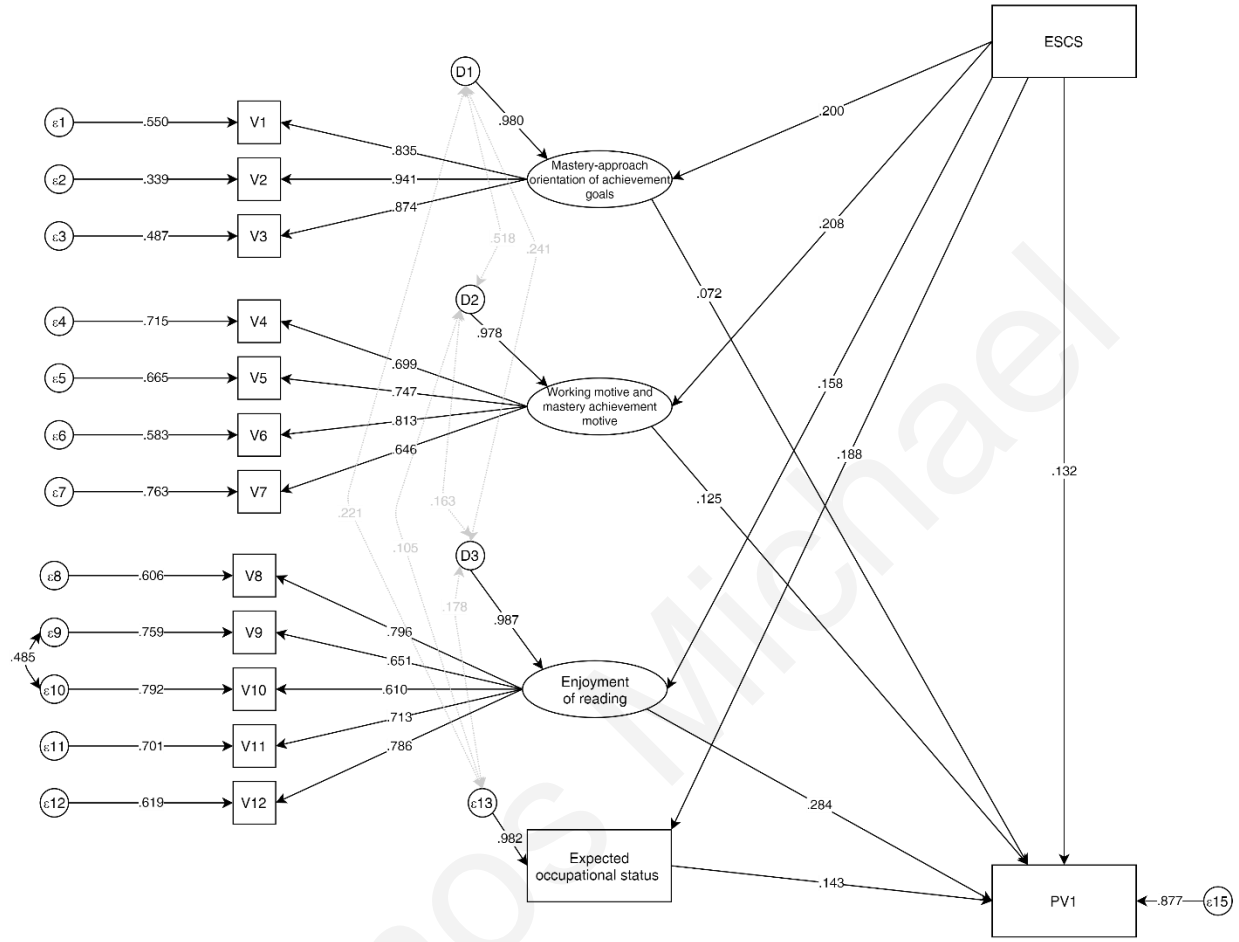
Note. Total effect of SES on academic achievement: .331*. Indirect effects through mediators: .168*. Indirect effect through working motive and mastery achievement motive: .016*. Indirect effect through enjoyment of reading: .076*. Indirect effect through expected occupational status: .076*.

* p < .05 ** p < .01 *** p < .001

Iceland. Iceland, as well as Estonia, are ranked at the bottom of the list about the explanatory power of SES on the variance of reading scores among PISA 2018 countries. As indicated by the results of SEM models where mediators were regressed separately, all four motivation constructs presented good fit parameters and effects. When mediators were added together, forming the hypothesized model, the parameters showed a good fit (χ^2 = 720.34*** (df = 74), CFI = .970, SRMR = .038, RMSEA 90% CI = [.05 – .06]). As shown in figure 10, the direct effect of SES on academic achievement was estimated at .132*, while mediators explained the rest through indirect effects (.112*). The indirect effects for each mediator and the associations between them are shown in figure 10 below. The strongest indirect effect was presented through *enjoyment of reading*, while the strongest relationship between mediators was observed between *mastery-approach orientation of achievement goals* and *working motive and mastery achievement motive* (.518*).

Figure 10

Iceland's Mediation Model

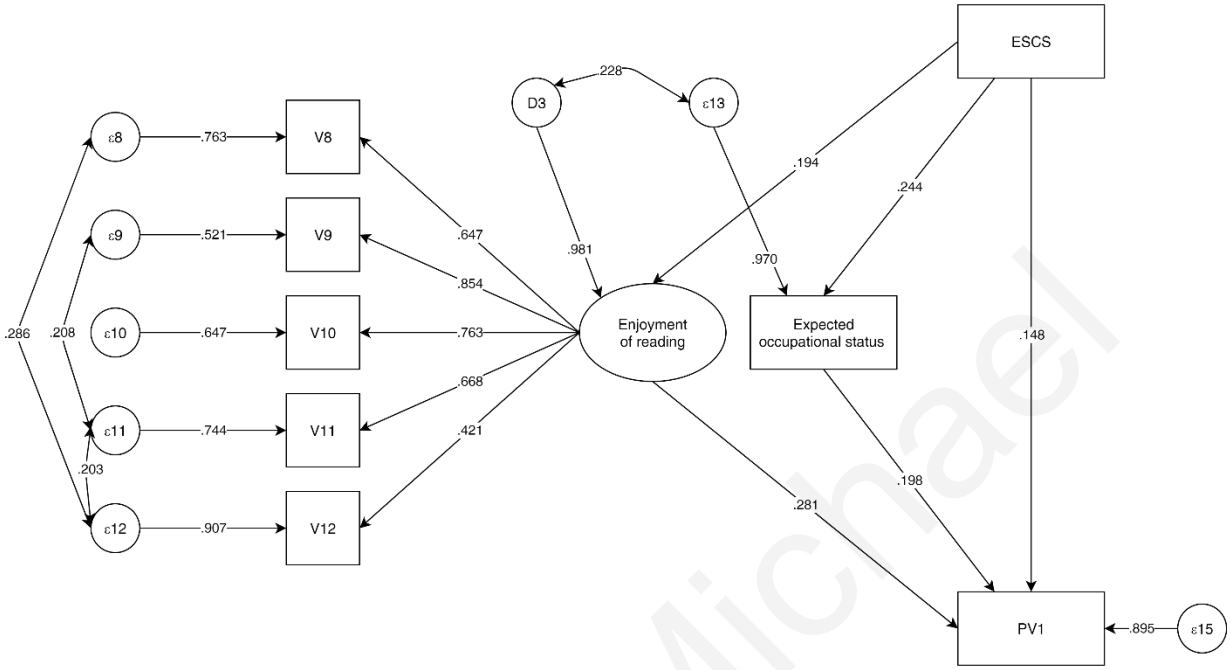


Note. Total effect of SES on academic achievement: .244*. Indirect effects through mediators: .112*. Indirect effect through mastery-approach orientation of achievement goals: .014*. Indirect effect through working motive and mastery achievement motive: .026*. Indirect effect through enjoyment of reading: .045*. Indirect effect through expected occupational status: .027*.
* p < .05 ** p < .01 *** p < .001

Estonia. Estonia's model demonstrated a good fitness only with *enjoyment of reading* and *expected occupational status* as mediators. The emerged model is depicted in figure 11(χ^2 = 444.36*** (df = 13), CFI = .964, SRMR = .034, RMSEA 90% CI = [.07 – .09]). The effect of SES on academic achievement reduced from .250* to .148*, as indirect effects through mediators were estimated to .102*. The relationship between the two motivation constructs was .228*.

Figure 11

Estonia's Mediation Model



Note. Total effect of SES on academic achievement: .250*. Indirect effects through mediators: .102*. Indirect effect through enjoyment of reading: .054*. Indirect effect through expected occupational status: .048*.

* p < .05 ** p < .01 *** p < .001

4. Discussion

Key findings

This study demonstrates the mediation role of certain motivation elements between SES and academic achievement. When testing the hypothesized model assumption in five countries, the partial mediation ranges from 32% to 50%, explaining this relationship (see table 6.1). Accordingly, the direct effect of SES on academic achievement was significantly reduced. These results are consistent for *enjoyment of reading* and *expected occupational status* in all sample countries, regardless of their achievement gap gradient.

Table 6.1

Partial mediation, Direct, and Indirect effects

Country	Total effect of SES on academic achievement	Indirect effects through motivation constructs	Direct effect of SES on academic achievement	Percentage of partial mediation	Mediators fitted the model
Belarus	.445*	.157*	.288*	32.28%	F3, V4
Hungary	.433*	.193*	.240*	44.57%	F3, V4
Poland	.331*	.168*	.163*	50.75%	(F2), F3, V4
Iceland	.244*	.112*	.132*	45.90%	F1, F2, F3, V4
Estonia	.250*	.102*	.148*	40.80%	(F2), F3, V4

Note. F1 = Mastery-approach orientation of achievement goals, F2 = Working motive and mastery achievement motive, F3 = Enjoyment of reading, V4 = Expected occupational status.

*p < .05

Regarding *enjoyment of reading*, findings support arguments that higher SES students might develop more positive attitudes towards learning, which lead to higher academic performance. Therefore, the basic idea of intrinsic motivation (Ryan & Deci, 2000) is also evident in this study, adding the element of SES as a predicting factor from the perspective of equity. The mediation role of this motivation construct also supports the presence of subject motivation in the dynamic model (Creemers & Kyriakides, 2008), displaying relationships between factors of the same level. *Expected occupational status* is well explained in the identity-based theory of motivation (Fisher, O'Donnell & Oyserman, 2017), where social class and cultural context are fundamental precedents of motivation levels. This study supports this idea with good mediation effects within SES and academic achievement. This element is also relevant to the concept of long-term goals, expectations, and aspirations reported by more authors. On the other hand, *mastery-approach orientation of achievement goals* did not support the study assumption, as initially stated by Berger and Archer (2016, 2018). A possible explanation of these opposing results might rely on the dissimilarity of the self-reporting scale adopted by PISA and because they did not use individual but school

SES. *Working motive and mastery achievement motive* did not fit the models either, at least not consistently. Only in two countries, which appear to be those with the lowest achievement gap gradient, did this motivation element fit well, but with low indirect effects. Final models also lead to the conclusion that in countries where the achievement gap is smaller, indirect effects are distributed through more motivation factors but with lower explanatory power in each of them.

Another aspect of this study's findings relies on contextual characteristics and motivation. Four countries belong to a similar geo-cultural area i.e., central-eastern Europe (Belarus, Hungary, Poland, Estonia), while Iceland is not part of this cluster. The emerged model of Iceland, which presents slight differences from the other models, might indicate that countries with different contextual characteristics might have an impact on the role of motivation within the SES-academic achievement relationship.

Limitations

The present study identifies and accepts three basic limitations. First, as it uses secondary data, the selection of variables was limited to what was included in the PISA 2018 dataset. Second, the study is cross-sectional which is recommended for studying mediation, but it does not allow the establishment of legitimate cause and effect, or reciprocal relationships. Therefore, to draw such predictive conclusions, other types of longitudinal studies are needed. However, we can confidently claim that the relationships with the independent variable of SES are of a particular direction, as SES is a stable factor, and it is not expected to be affected by the behavioural processes of students. However, it remains unclear whether and how much academic achievement reinforces *enjoyment of reading* and *expected occupational status*. For mainly practical reasons, this study is limited to the examination of five countries, only for the subject of reading. Furthermore, due to the finite length of this thesis study, instead of ideally testing all motivational constructs that are available in PISA, a more targeted approach was followed, selecting only four elements.

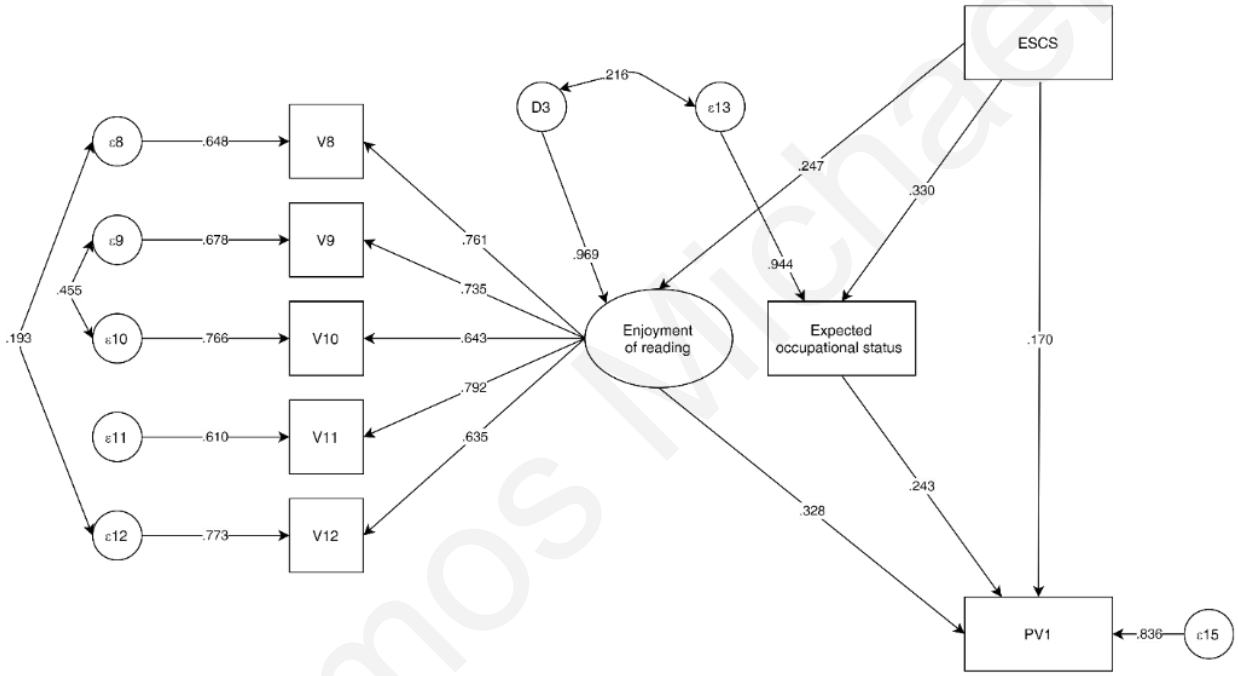
Additionally, minor limitations were identified during the analysis phase. In a few cases during the preparatory analyses, fit indices were not available for certain CFA and SEM models as 0 degrees of freedom resulted from the equations. However, when the final structural models were tested, indicators showed satisfactory model fits for those pre-analyses. Another metric limitation relies on the statistically significant chi-square of all predicted SEM models. Beside the fact that a nonsignificant result would indicate a good model fit rejecting the null hypothesis (as predictions should match the actual data), chi-square appears to be statistically significant because of its sensitivity to the large sample sizes. Therefore, it is not a problematic indicator for the good fit of the models.

For two countries, models appeared to fit well in more than one tests. Poland's final model could stand with *enjoyment of reading* and *expected occupational status* as mediators with a good fit. This alternative model

is shown in figure 12 (χ^2 = 145.65*** (df = 10), CFI = .991, SRMR = .015, RMSEA 90% CI = [.04 – .06]). Indirect effects through the two mediators of academic motivation estimated at .161*, while the direct effect of SES on academic achievement dropped to .170*. Similarly, for the case of Estonia, an alternative model could include three mediators with a good fit. This model is presented in figure 13 (χ^2 = 1051.22*** (df = 42), CFI = .938, SRMR = .046, RMSEA 90% CI = [.06 – .07]). However, indirect effects through working motive and mastery achievement motive were estimated at just .005*, therefore it was not adopted as final.

Figure 12

Alternative mediation model for Poland

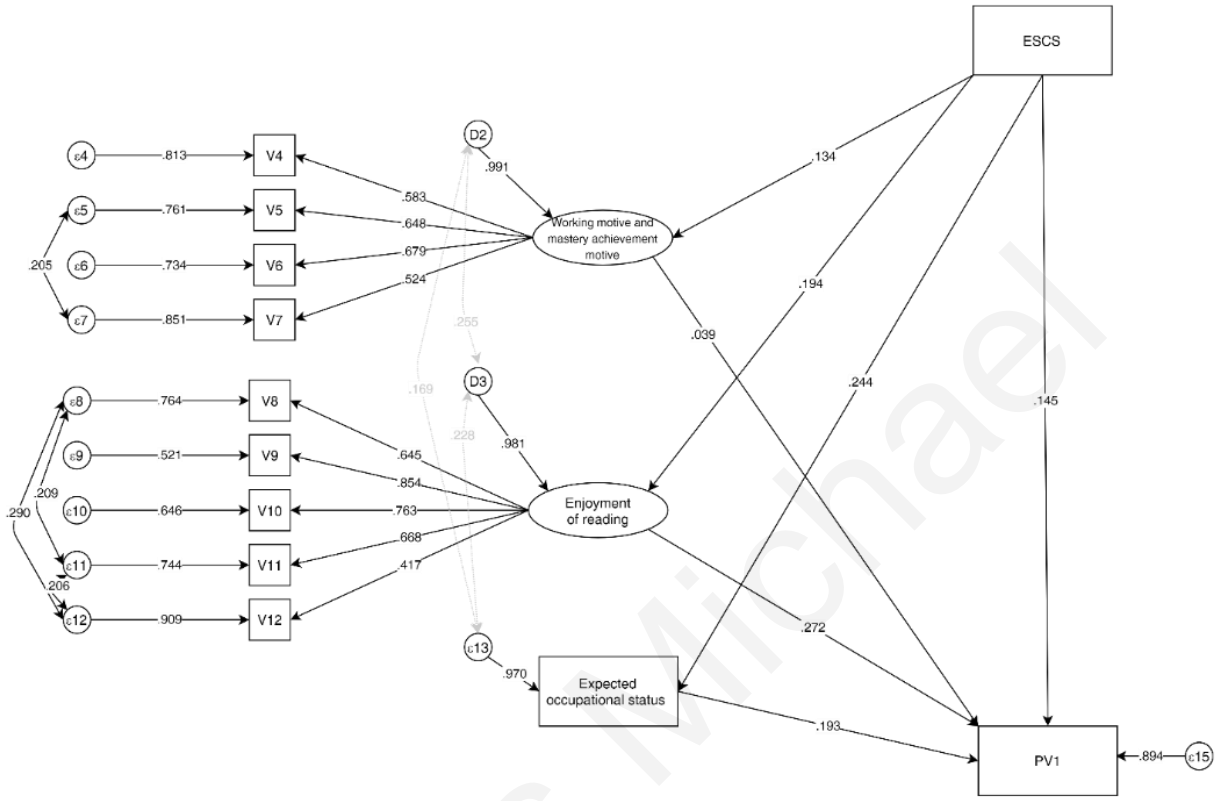


Note. Total effect of SES on academic achievement: .331*. Indirect effects through mediators: .161*. Indirect effect through enjoyment of reading: .081*. Indirect effect through expected occupational status: .080*.

* p < .05 ** p < .01 *** p < .001

Figure 13

Alternative mediation model for Estonia



Note. Total effect of SES on academic achievement: .250*. Indirect effects through mediators: .105*. Indirect effect through working motive and mastery achievement motive: .005*. Indirect effect through enjoyment of reading: .053*. Indirect effect through expected occupational status: .047*.

* p < .05 ** p < .01 *** p < .001

Contribution to literature and implications for further research

The integrated approach of this study, examining variables from the sociological and psychological perspective of EER, provides some evidence on the investigation of the equity dimension. Knowing whether certain motivational factors are important for academic achievement and whether they are influenced by SES builds on our understanding of why disadvantaged students still perform poorer than their advantaged counterparts, and if they could do better when they are motivated. This study also supports the mediation role of academic motivation within the SES-student achievement relationship, which is still under investigation (e.g., Kriegbaum and Spinath, 2016; Weiser & Riggio, 2010). Given the fact that motivation is a complex concept, not all of its aspects fit every assumption, therefore it should be used carefully.

The consistent results of two motivation elements investigated in this study advocate that certain aspects are important from the dimension of equity, therefore practical efforts should be targeted. Lower-SES students are expected to have lower career aspirations than their counterparts, which leads to lower academic performance. Role models, career guidance and counselling, or goal setting assistance are only some examples of practical interventions which will eventually raise students' standards and ambition, mitigating the gap between high- and low-SES students. Similarly, it is also expected that low-SES students are equipped with different attitudes towards reading, or interests. Therefore, schools should also adapt to such properties and create an environment where less favourable attitudes are accepted but reinforced towards enjoyment and satisfaction. In general, schools and practitioners need to be aware of students' internal motivation processes, during their effort to equalize the gap between them. Lower-SES students present a need to receive particular attention on the affective aspect of school outcomes, which will eventually have positive effects on their academic performance.

Replication of analyses could be performed using previous and future PISA -or other datasets-, and country samples, to confirm findings. As this study examines only four motivation elements, more studies are encouraged to examine the mediating role of other components. Further research on the effect type and size of motivational constructs can provide a better conceptual understanding of the importance of motivation within the achievement gap relationship. Going forward, such studies can identify possible paths through which SES could be mediated or moderated, opening up the scope on studying equity. These efforts can inform stakeholders of any level such as teachers, school leaders, policymakers and of course parents, about the attention they need to give to students' motivation for school achievement. However, fostering academic motivation is not a straightforward process because of its multiple dimensions.

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Appendix 1: Socioeconomic gradient of PISA 2018 countries

Table A.1

Socioeconomic gradient and reading score of countries participated in PISA 2018

Country	Mean reading score in PISA 2018	Strength of socioeconomic gradient: Percentage of variance in reading performance explained by ESCS* (R^2) (%)	Difference between advantaged and disadvantaged students** in reading (score units)
OECD average	487	12.0	89
Spain	m	m	m
Peru	401	21.5	110
Belarus	**474**	**19.8**	**102**
Hungary	**476**	**19.1**	**113**
Romania	428	18.1	109
Philippines	340	18.0	88
Luxembourg	470	17.8	122
France	493	17.5	107
Slovak Republic	458	17.5	106
Moldova	424	17.3	102
Belgium	493	17.2	109
Germany	498	17.2	113
Argentina	402	17.1	102
Panama	377	17.0	95
Czech Republic	490	16.5	105
Malaysia	415	16.3	89
Brunei Darussalam	408	16.0	103
Uruguay	427	16.0	99
Switzerland	484	15.6	104
Costa Rica	426	15.6	83
Bulgaria	420	15.0	106
Brazil	413	14.0	97
Ukraine	466	14.0	90
Israel	470	14.0	121
Colombia	412	13.7	86
Mexico	420	13.7	81
Portugal	492	13.5	95
Lithuania	476	13.2	89
Singapore	549	13.2	104
Austria	484	13.0	93
New Zealand	506	12.9	96
Chile	452	12.7	87
B-S-J-Z (China)	555	12.6	82
Lebanon	353	12.2	103
Slovenia	495	12.1	80
United States	505	12.0	99

Thailand	393	12.0	69
Poland	**512**	**11.6**	**90**
Saudi Arabia	399	11.5	74
Chinese Taipei	503	11.4	89
Turkey	466	11.4	76
United Arab Emirates	432	11.1	105
Greece	457	10.9	84
Ireland	518	10.7	75
Sweden	506	10.7	89
Netherlands	485	10.5	88
North Macedonia	393	10.2	80
Australia	503	10.1	89
Denmark	501	9.9	78
Georgia	380	9.4	68
United Kingdom	504	9.3	80
Finland	520	9.2	79
Italy	476	8.9	75
Dominican Republic	342	8.9	65
Qatar	407	8.6	93
Korea	514	8.0	75
Japan	504	8.0	72
Serbia	439	7.8	73
Indonesia	371	7.8	52
Albania	405	7.8	61
Jordan	419	7.7	64
Croatia	479	7.7	63
Malta	448	7.6	85
Norway	499	7.5	73
Russia	479	7.3	67
Bosnia and Herzegovina	403	7.3	58
Latvia	479	7.2	65
Morocco	359	7.1	51
Cyprus	424	6.8	69
Canada	520	6.7	68
Iceland	**474**	**6.6**	**72**
Estonia	**523**	**6.2**	**61**
Montenegro	421	5.8	55
Hong Kong (China)	524	5.1	59
Kosovo	353	4.9	40
Baku (Azerbaijan)	389	4.3	41
Kazakhstan	387	4.3	40
Macao (China)	525	1.7	31

**ESCS refers to the PISA index of economic, social and cultural status.*
***A socio-economically advantaged (disadvantaged) student is a student in the top (bottom) quarter of ESCS in his or her own country/economy.*

Appendix 2: Descriptive statistics of variables

Table B.1

Descriptive statistics of Plausible Value 1 in Reading (PV1READ)

Country	n	Missing	$\bar{x}$	SD	Median
Belarus	5803	0	475.57	89.13	476.78
Hungary	5132	0	483.04	96.63	484.53
Poland	5625	0	513.16	96.95	515.58
Iceland	3296	0	473.07	103.34	476.16
Estonia	5316	0	523.70	92.60	525.39

Table B.2

Descriptive statistics of Index of Economic, Social and Cultural Status (ESCS)

Country	n	Missing	$\bar{x}$	SD	Median
Belarus	5763	40	-.11	.76	-.06
Hungary	5083	49	-.06	.92	-.09
Poland	5556	69	-.14	.85	-.25
Iceland	3222	74	.54	.82	.72
Estonia	5202	114	.10	.79	.14

Table B.3

Descriptive statistics of Mastery-approach Orientation of Achievement Goals items

Country	n	Missing	$\bar{x}$	SD	Median
Belarus					
ST208Q01HA	5710	93	2.98	1.01	3.00
ST208Q02HA	5676	127	3.37	1.04	3.00
ST208Q04HA	5667	136	3.47	1.04	4.00
Hungary					
ST208Q01HA	4944	188	2.81	1.07	3.00
ST208Q02HA	4927	205	3.14	1.08	3.00
ST208Q04HA	4916	216	3.43	1.08	3.00
Poland					
ST208Q01HA	5474	151	3.28	1.03	3.00
ST208Q02HA	5462	163	3.31	0.99	3.00
ST208Q04HA	5462	163	3.62	0.99	4.00
Iceland					
ST208Q01HA	3021	275	3.50	1.05	4.00
ST208Q02HA	3023	273	3.61	1.04	4.00
ST208Q04HA	3012	284	3.73	1.03	4.00
Estonia					
ST208Q01HA	5105	211	3.21	.99	3.00
ST208Q02HA	5095	221	3.10	.99	3.00
ST208Q04HA	5093	223	3.30	1.09	3.00

Table B.4

Descriptive statistics of Working Motive and Mastery Achievement Motive items

Country	n	Missing	$\bar{x}$	SD	Median
Belarus					
ST182Q03HA	5685	118	2.78	.68	3.00
ST182Q04HA	5670	133	2.93	.66	3.00
ST182Q05HA	5679	124	3.16	.63	3.00
ST182Q06HA	5670	133	3.00	.66	3.00
Hungary					
ST182Q03HA	4966	166	2.90	.76	3.00
ST182Q04HA	4955	177	2.99	.75	3.00
ST182Q05HA	4952	180	3.21	.67	3.00
ST182Q06HA	4944	188	2.77	.81	3.00
Poland					
ST182Q03HA	5490	135	3.10	.72	3.00
ST182Q04HA	5478	147	2.76	.74	3.00
ST182Q05HA	5484	141	3.30	.69	3.00
ST182Q06HA	5484	141	2.76	.77	3.00
Iceland					
ST182Q03HA	3028	268	2.82	.85	3.00
ST182Q04HA	3020	276	2.81	.79	3.00
ST182Q05HA	3009	287	3.08	.77	3.00
ST182Q06HA	3016	280	2.85	.79	3.00
Estonia					
ST182Q03HA	5111	205	2.64	.75	3.00
ST182Q04HA	5117	199	2.76	.71	3.00
ST182Q05HA	5103	213	3.07	.72	3.00
ST182Q06HA	5107	209	2.77	.73	3.00

Table B.5

Descriptive statistics of Enjoyment of Reading items

Country	n	Missing	$\bar{x}$	SD	Median
Belarus					
ST160Q01IA[a]	5731	72	2.64	.84	3.00
ST160Q02IA	5695	108	2.51	.79	2.00
ST160Q03IA	5705	98	2.60	.81	3.00
ST160Q04IA[a]	5703	100	3.20	.74	3.00
ST160Q05IA[a]	5718	85	2.44	.84	2.00
Hungary					
ST160Q01IA[a]	5059	73	2.75	1.00	3.00
ST160Q02IA	5023	109	2.21	.96	2.00
ST160Q03IA	5024	108	2.17	.98	2.00
ST160Q04IA[a]	5036	96	2.96	.96	3.00
ST160Q05IA[a]	5041	91	2.59	.96	3.00
Poland					
ST160Q01IA[a]	5546	79	2.76	.99	3.00
ST160Q02IA	5520	105	2.33	.97	2.00
ST160Q03IA	5526	99	2.37	.92	2.00
ST160Q04IA[a]	5527	98	3.02	.93	3.00
ST160Q05IA[a]	5535	90	2.65	.90	3.00
Iceland					
ST160Q01IA[a]	3176	120	2.36	.98	2.00
ST160Q02IA	3164	132	1.93	.91	2.00
ST160Q03IA	3163	133	2.08	.99	2.00
ST160Q04IA[a]	3166	130	2.85	.95	3.00
ST160Q05IA[a]	3167	129	2.49	.95	2.00
Estonia					
ST160Q01IA[a]	5172	144	2.64	.97	3.00
ST160Q02IA	5139	177	2.12	.91	2.00
ST160Q03IA	5151	165	2.23	.92	2.00
ST160Q04IA[a]	5168	148	2.96	.94	3.00
ST160Q05IA[a]	5176	140	2.60	.88	3.00

[a]*Reversed*

Table B.6

Descriptive statistics of Student's Expected Occupational Status, SEI (BSMJ)

Country	n	Missing	$\bar{x}$	SD	Median
Belarus	4850	953	62.63	21.42	72.83
Hungary	4097	1035	55.78	23.84	56.64
Poland	4716	909	63.07	20.82	70.34
Iceland	2435	861	64.91	19.25	70.10
Estonia	4146	1170	64.72	20.14	73.38

Appendix 3: Covariance matrices by country

Table C.1

Covariance matrix for Belarus

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
V1	1.02														
V2	0.64	1.07													
V3	0.57	0.83	1.09												
V4	0.21	0.22	0.22	0.46											
V5	0.16	0.17	0.16	0.20	0.44										
V6	0.13	0.17	0.17	0.20	0.19	0.40									
V7	0.18	0.20	0.20	0.22	0.21	0.23	0.44								
V8	0.04	0.10	0.12	0.05	0.02	0.05	0.04	0.70							
V9	0.15	0.19	0.21	0.12	0.07	0.08	0.09	0.33	0.63						
V10	0.14	0.19	0.21	0.11	0.06	0.10	0.09	0.23	0.38	0.65					
V11	0.06	0.13	0.14	0.07	0.03	0.08	0.05	0.30	0.26	0.22	0.55				
V12	0.01	0.05	0.08	0.03	0.00	0.01	0.01	0.40	0.27	0.20	0.27	0.70			
V13	0.91	2.98	3.42	0.96	0.20	1.97	1.35	3.92	3.73	3.91	3.69	3.30	458.96		
V14	0.02	0.07	0.09	0.04	0.02	0.07	0.04	0.13	0.12	0.12	0.12	0.11	5.40	0.58	
V15	-9.65	6.24	8.52	2.07	-1.37	10.23	3.24	19.76	17.45	16.89	21.50	16.75	834.13	30.33	7944.57

Note. V1 = ST208Q01HA; V2 = ST208Q02HA; V3 = ST208Q04HA; V4 = ST182Q03HA; V5 = ST182Q04HA; V6 = ST182Q05HA; V7 = ST182Q06HA; V8 = ST160Q01IA_REV; V9 = ST160Q02IA; V10 = ST160Q03IA; V11 = ST160Q04IA_REV; V12 = ST160Q05IA_REV; V13 = BSMJ; V14 = ESCS; V15 = PV1READ.

Table C.2

Covariance matrix for Hungary

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
V1	1.14														
V2	0.75	1.16													
V3	0.65	0.81	1.16												
V4	0.26	0.26	0.22	0.57											
V5	0.23	0.27	0.24	0.24	0.56										
V6	0.17	0.21	0.22	0.21	0.22	0.45									
V7	0.19	0.20	0.16	0.20	0.24	0.18	0.66								
V8	0.20	0.15	0.19	0.07	0.03	0.07	-0.04	1.00							
V9	0.25	0.19	0.22	0.09	0.04	0.08	-0.02	0.62	0.93						
V10	0.22	0.16	0.22	0.09	0.03	0.08	-0.04	0.56	0.71	0.96					
V11	0.20	0.16	0.21	0.08	0.03	0.09	-0.05	0.65	0.55	0.51	0.92				
V12	0.08	0.02	0.06	0.01	-0.04	0.02	-0.07	0.52	0.46	0.43	0.48	0.93			
V13	4.54	3.85	5.69	1.31	1.01	2.38	-1.01	5.11	4.66	5.41	5.10	4.02	568.26		
V14	0.08	0.08	0.14	0.04	0.03	0.07	-0.02	0.17	0.14	0.17	0.17	0.14	8.54	0.84	
V15	10.89	13.79	22.92	5.63	2.14	12.73	-12.84	34.52	29.32	31.32	35.65	25.39	1129.34	38.31	9337.28

Note. V1 = ST208Q01HA; V2 = ST208Q02HA; V3 = ST208Q04HA; V4 = ST182Q03HA; V5 = ST182Q04HA; V6 = ST182Q05HA; V7 = ST182Q06HA; V8 = ST160Q01IA_REV; V9 = ST160Q02IA; V10 = ST160Q03IA; V11 = ST160Q04IA_REV; V12 = ST160Q05IA_REV; V13 = BSMJ; V14 = ESCS; V15 = PV1READ.

Table C.3

Covariance matrix for Poland

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
V1	1.07														
V2	0.63	0.98													
V3	0.57	0.69	0.98												
V4	0.23	0.19	0.21	0.52											
V5	0.21	0.19	0.17	0.25	0.55										
V6	0.20	0.17	0.21	0.29	0.20	0.48									
V7	0.18	0.18	0.14	0.18	0.22	0.17	0.59								
V8	0.14	0.11	0.15	0.08	0.03	0.07	0.00	0.99							
V9	0.19	0.16	0.20	0.10	0.06	0.10	0.03	0.57	0.95						
V10	0.18	0.16	0.20	0.11	0.06	0.10	0.02	0.44	0.64	0.85					
V11	0.17	0.13	0.18	0.12	0.05	0.12	0.02	0.55	0.51	0.44	0.86				
V12	0.07	0.05	0.08	0.04	0.00	0.03	-0.03	0.52	0.42	0.33	0.42	0.80			
V13	3.99	3.30	3.99	2.13	1.10	2.56	0.42	4.52	4.37	4.22	5.42	3.79	433.44		
V14	0.09	0.06	0.09	0.06	0.03	0.08	0.02	0.16	0.13	0.14	0.16	0.12	5.81	0.72	
V15	13.85	10.31	18.84	14.15	4.27	17.17	-1.96	29.70	29.27	27.60	35.41	22.99	814.64	27.16	9399.51

Note. V1 = ST208Q01HA; V2 = ST208Q02HA; V3 = ST208Q04HA; V4 = ST182Q03HA; V5 = ST182Q04HA; V6 = ST182Q05HA; V7 = ST182Q06HA; V8 = ST160Q01IA_REV; V9 = ST160Q02IA; V10 = ST160Q03IA; V11 = ST160Q04IA_REV; V12 = ST160Q05IA_REV; V13 = BSMJ; V14 = ESCS; V15 = PV1READ.

Table C.4

Covariance matrix for Iceland

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
V1	1.10														
V2	0.85	1.07													
V3	0.78	0.88	1.07												
V4	0.27	0.29	0.27	0.73											
V5	0.27	0.30	0.27	0.37	0.62										
V6	0.31	0.34	0.33	0.37	0.36	0.60									
V7	0.24	0.29	0.26	0.30	0.30	0.32	0.62								
V8	0.16	0.15	0.17	0.02	0.05	0.11	0.06	0.96							
V9	0.17	0.16	0.17	0.03	0.06	0.12	0.06	0.50	0.83						
V10	0.19	0.19	0.21	0.07	0.08	0.16	0.06	0.47	0.62	0.97					
V11	0.23	0.24	0.25	0.07	0.09	0.17	0.06	0.50	0.39	0.41	0.90				
V12	0.14	0.15	0.16	0.02	0.05	0.12	0.03	0.60	0.41	0.42	0.52	0.90			
V13	4.35	4.52	4.60	0.70	1.51	2.46	0.82	2.35	2.64	4.10	3.23	2.57	370.51		
V14	0.14	0.16	0.16	0.11	0.09	0.12	0.08	0.08	0.06	0.13	0.11	0.09	2.95	0.67	
V15	22.96	26.78	29.84	14.57	11.25	25.38	5.55	25.48	21.10	30.10	32.81	28.49	520.71	20.62	10679.45

Note. V1 = ST208Q01HA; V2 = ST208Q02HA; V3 = ST208Q04HA; V4 = ST182Q03HA; V5 = ST182Q04HA; V6 = ST182Q05HA; V7 = ST182Q06HA; V8 = ST160Q01IA_REV; V9 = ST160Q02IA; V10 = ST160Q03IA; V11 = ST160Q04IA_REV; V12 = ST160Q05IA_REV; V13 = BSMJ; V14 = ESCS; V15 = PV1READ.

Table C.5

Covariance matrix for Estonia

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
V1	.99														
V2	.64	.99													
V3	.66	.81	1.18												
V4	.19	.16	.14	.57											
V5	.22	.22	.23	.21	.51										
V6	.19	.16	.17	.22	.21	.51									
V7	.15	.16	.16	.17	.20	.18	.53								
V8	.10	.04	.06	.05	.05	.10	.02	.93							
V9	.16	.10	.10	.10	.09	.13	.04	.50	.83						
V10	.16	.11	.12	.09	.07	.14	.03	.41	.55	.84					
V11	.18	.12	.17	.06	.09	.15	.03	.50	.47	.43	.88				
V12	.04	.03	.06	-.01	.01	.03	-.02	.39	.30	.23	.34	.76			
V13	4.32	3.52	3.70	1.31	1.72	2.71	.72	2.94	3.81	3.89	4.55	1.43	405.69		
V14	.14	.09	.13	.03	.05	.07	.01	.08	.10	.13	.14	.05	3.92	.64	
V15	17.57	11.19	21.30	1.25	6.26	17.68	-3.28	20.60	21.80	24.04	33.34	17.84	574.20	18.54	8575.38

Note. V1 = ST208Q01HA; V2 = ST208Q02HA; V3 = ST208Q04HA; V4 = ST182Q03HA; V5 = ST182Q04HA; V6 = ST182Q05HA; V7 = ST182Q06HA; V8 = ST160Q01IA_REV; V9 = ST160Q02IA; V10 = ST160Q03IA; V11 = ST160Q04IA_REV; V12 = ST160Q05IA_REV; V13 = BSMJ; V14 = ESCS; V15 = PV1READ.

Appendix 4: Confirmatory Factor Analyses of mediators

Table D.1

Confirmatory Factor Analysis of Mastery-approach Orientation of Achievement Goals

Observed variable	Factor loading	SE
Belarus		
ST208Q01HA	.66*	.012
ST208Q02HA	.93*	.012
ST208Q04HA	.83*	.012
Hungary		
ST208Q01HA	.73*	.014
ST208Q02HA	.90*	.013
ST208Q04HA	.78*	.014
Poland		
ST208Q01HA	.70*	.013
ST208Q02HA	.88*	.012
ST208Q04HA	.80*	.012
Iceland		
ST208Q01HA	.83*	.015
ST208Q02HA	.95*	.014
ST208Q04HA	.87*	.015
Estonia		
ST208Q01HA	.72*	.012
ST208Q02HA	.89*	.012
ST208Q04HA	.84*	.013

*p < .05

Table D.2

Confirmatory Factor Analysis of Working Motive and Mastery Achievement Motive

Observed variable	Factor loading	SE
Belarus		
ST182Q03HA	.66*	.009
ST182Q04HA	.65*	.009
ST182Q05HA	.71*	.008
ST182Q06HA	.76*	.009
Hungary		
ST182Q03HA	.63*	.012
ST182Q04HA	.68*	.011
ST182Q05HA	.65*	.010
ST182Q06HA	.54*	.013
Poland		
ST182Q03HA	.81*	.010
ST182Q04HA	.57*	.011
ST182Q05HA	.72*	.010
ST182Q06HA	.42*	.011
Iceland		
ST182Q03HA	.71*	.014
ST182Q04HA	.76*	.013
ST182Q05HA	.79*	.012
ST182Q06HA	.65*	.013
Estonia		
ST182Q03HA	.59*	.011
ST182Q04HA	.66*	.011
ST182Q05HA	.64*	.011
ST182Q06HA	.55*	.011

*p < .05

Table D.3

Confirmatory Factor Analysis of Enjoyment of Reading

Observed variable	Factor loading	SE
Belarus		
ST160Q01IA[a]	.72*	.012
ST160Q02IA	.66*	.011
ST160Q03IA	.49*	.012
ST160Q04IA[a]	.68*	.010
ST160Q05IA[a]	.63*	.012
Hungary		
ST160Q01IA[a]	.85*	.012
ST160Q02IA	.76*	.012
ST160Q03IA	.68*	.013
ST160Q04IA[a]	.80*	.012
ST160Q05IA[a]	.64*	.013
Poland		
ST160Q01IA[a]	.78*	.013
ST160Q02IA	.74*	.012
ST160Q03IA	.64*	.012
ST160Q04IA[a]	.77*	.012
ST160Q05IA[a]	.65*	.012
Iceland		
ST160Q01IA[a]	.81*	.016
ST160Q02IA	.65*	.016
ST160Q03IA	.60*	.018
ST160Q04IA[a]	.70*	.016
ST160Q05IA[a]	.79*	.016
Estonia		
ST160Q01IA[a]	.64*	.013
ST160Q02IA	.88*	.010
ST160Q03IA	.75*	.010
ST160Q04IA[a]	.64*	.012
ST160Q05IA[a]	.41*	.013

[a]Reversed
*p < .05

Appendix 5: Confirmatory Factor Analyses models

Confirmatory Factor Analysis model of Mastery-approach Orientation of Achievement Goals

Figure E.1.1

Belarus

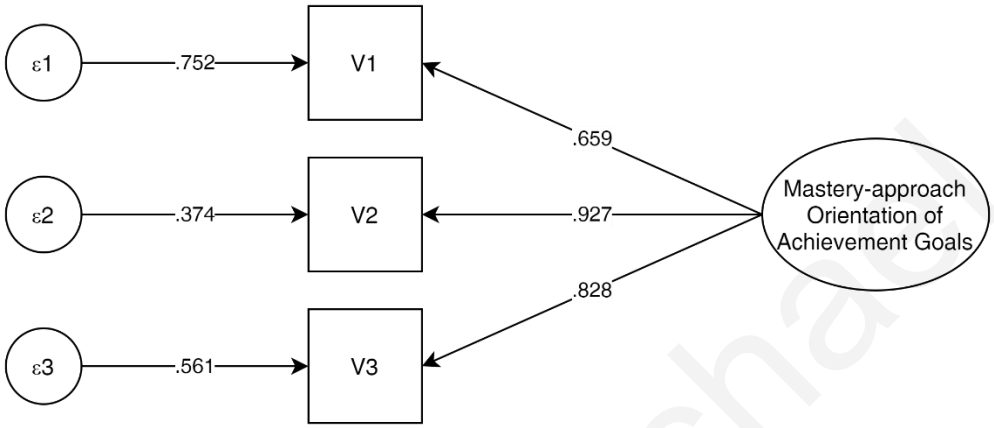


Figure E.1.2

Hungary

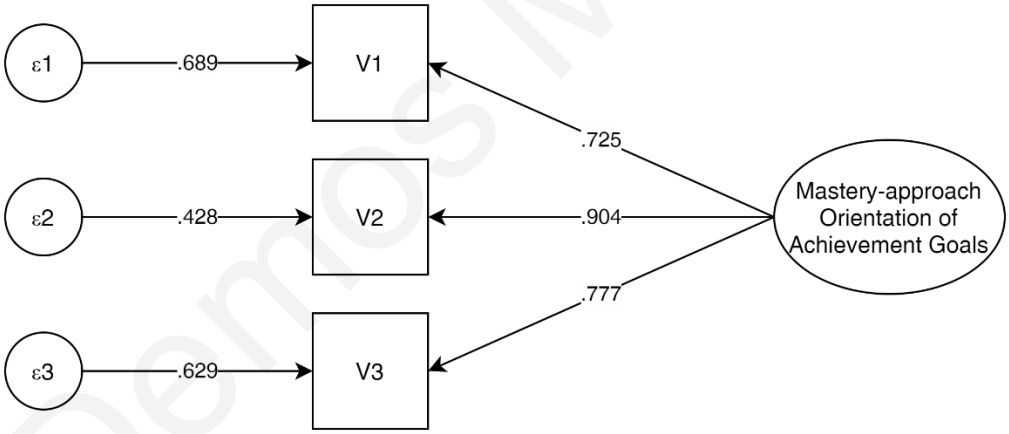


Figure E.1.3

Poland

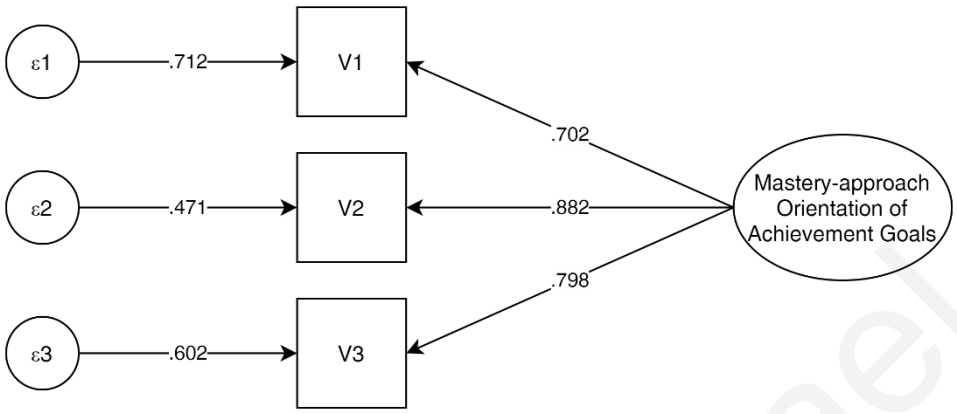


Figure E.1.4

Iceland

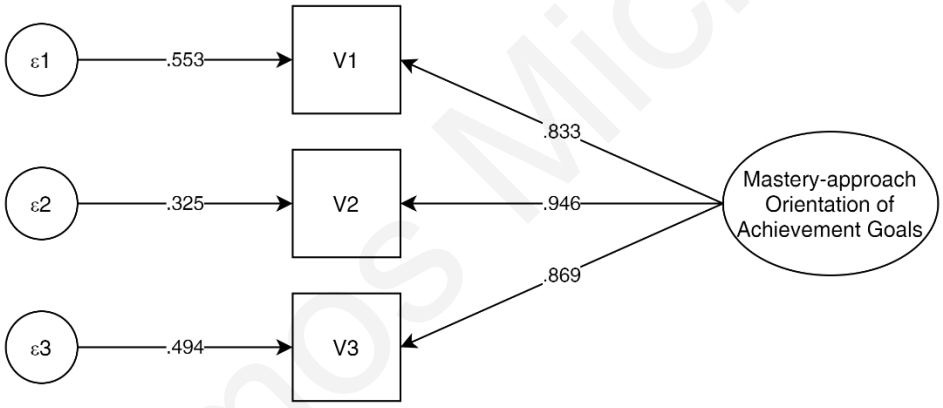
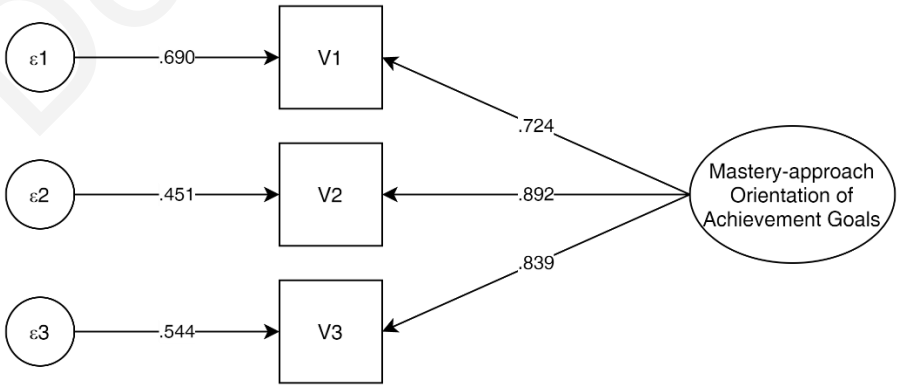


Figure E.1.5

Estonia



Confirmatory Factor Analysis model of Working Motive and Mastery Achievement Motive

Figure E.2.1

Belarus

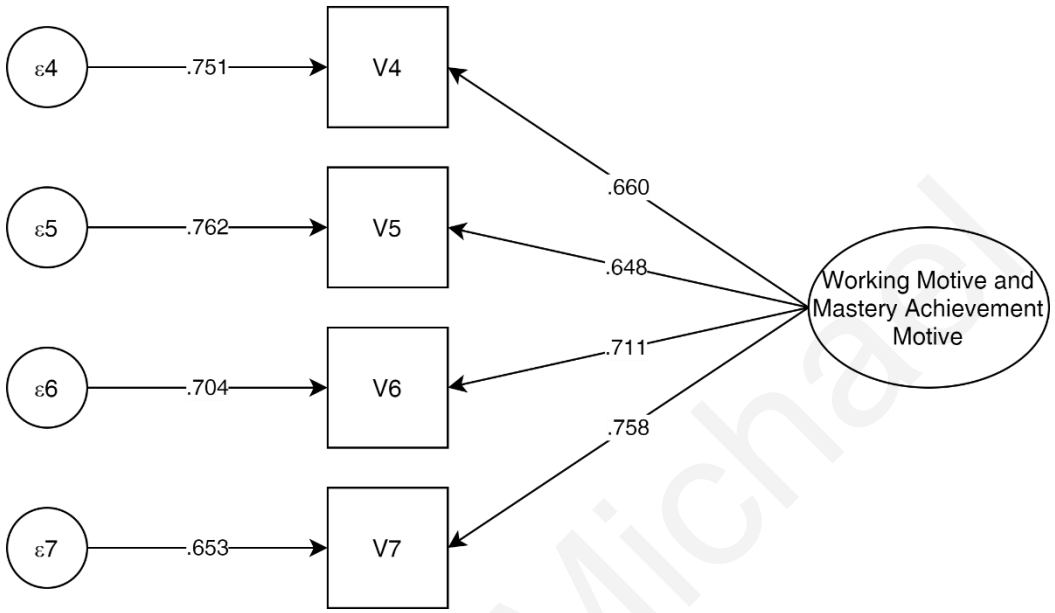


Figure E.2.2

Hungary

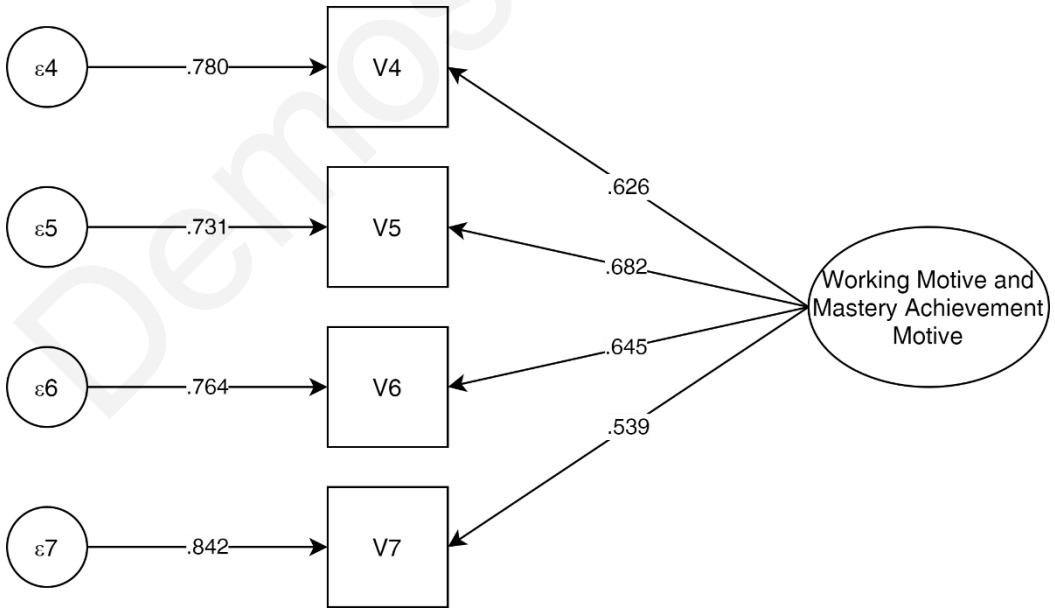


Figure E.2.3

Poland

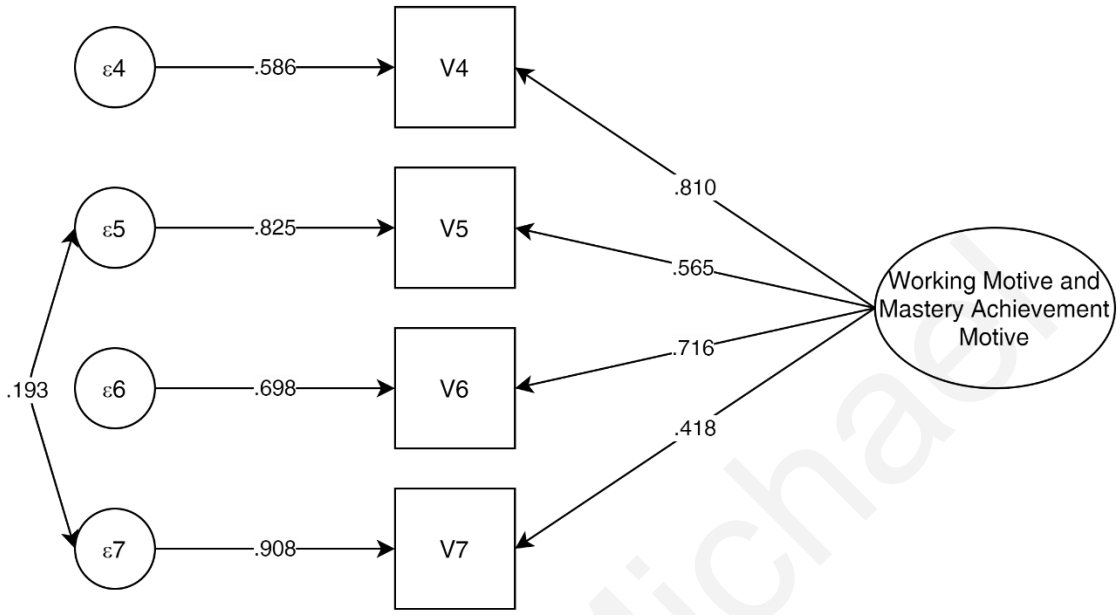


Figure E.2.4

Iceland

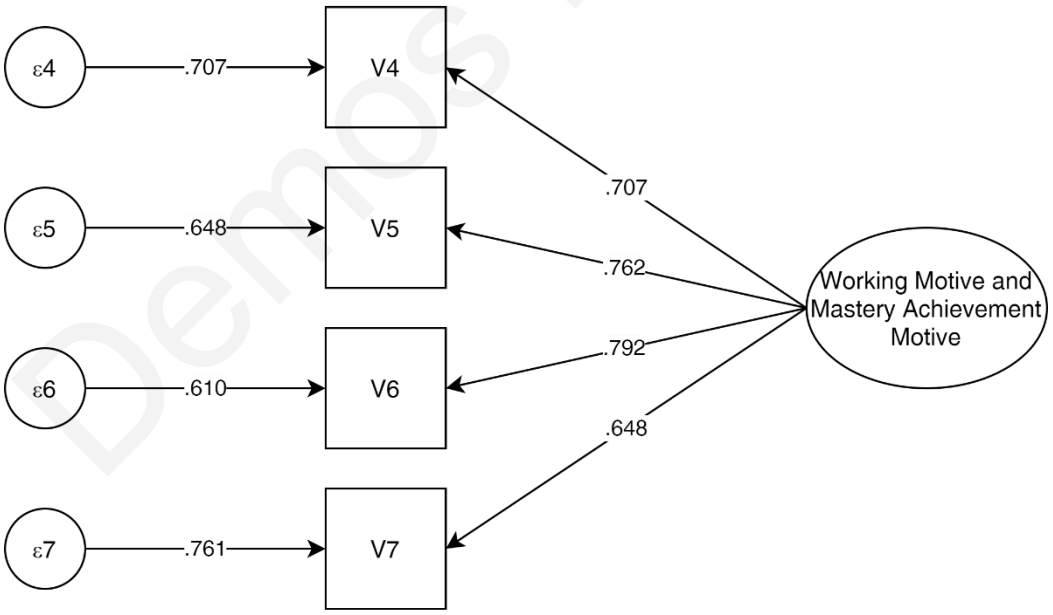
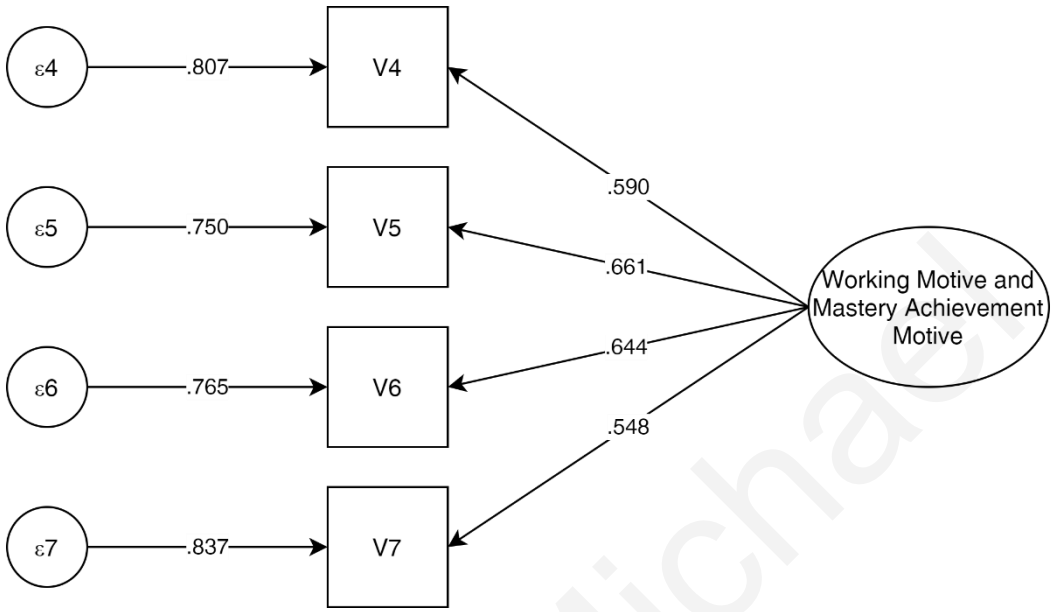


Figure E.2.5

Estonia



Confirmatory Factor Analysis model of Enjoyment of Reading

Figure E.3.1

Belarus

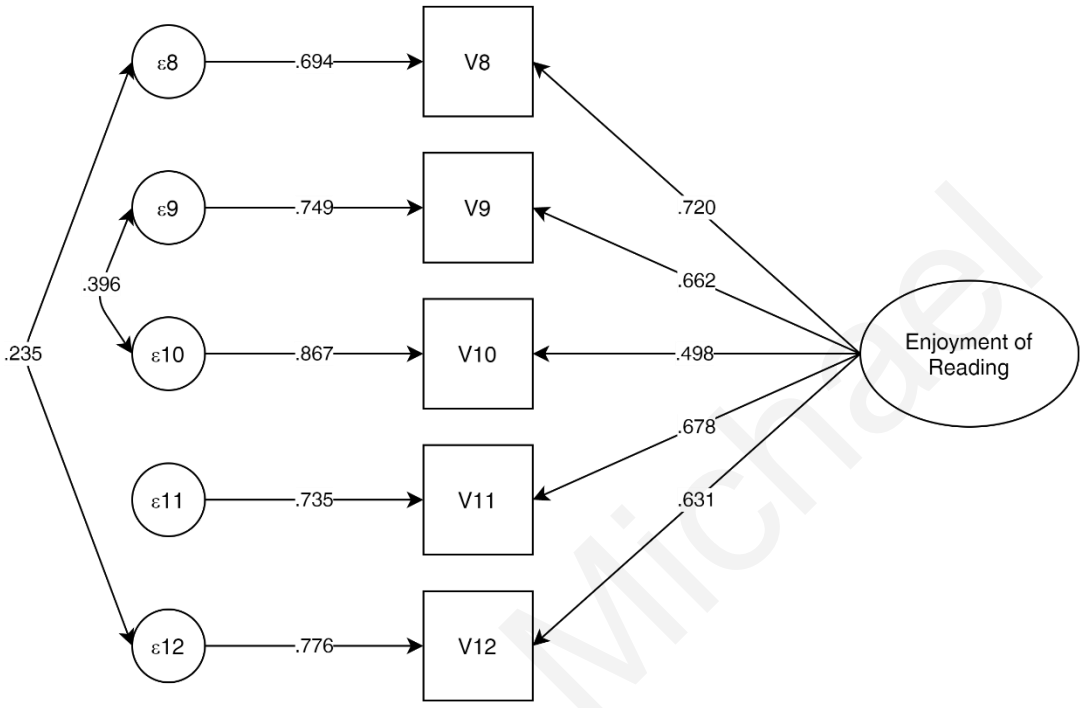


Figure E.3.2

Hungary

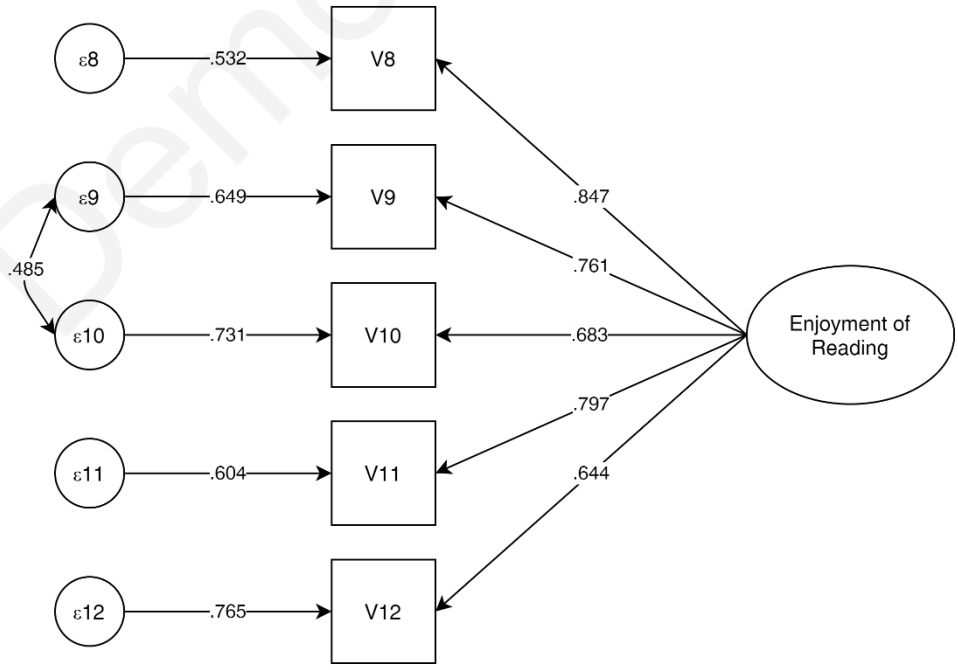


Figure E.3.3

Poland

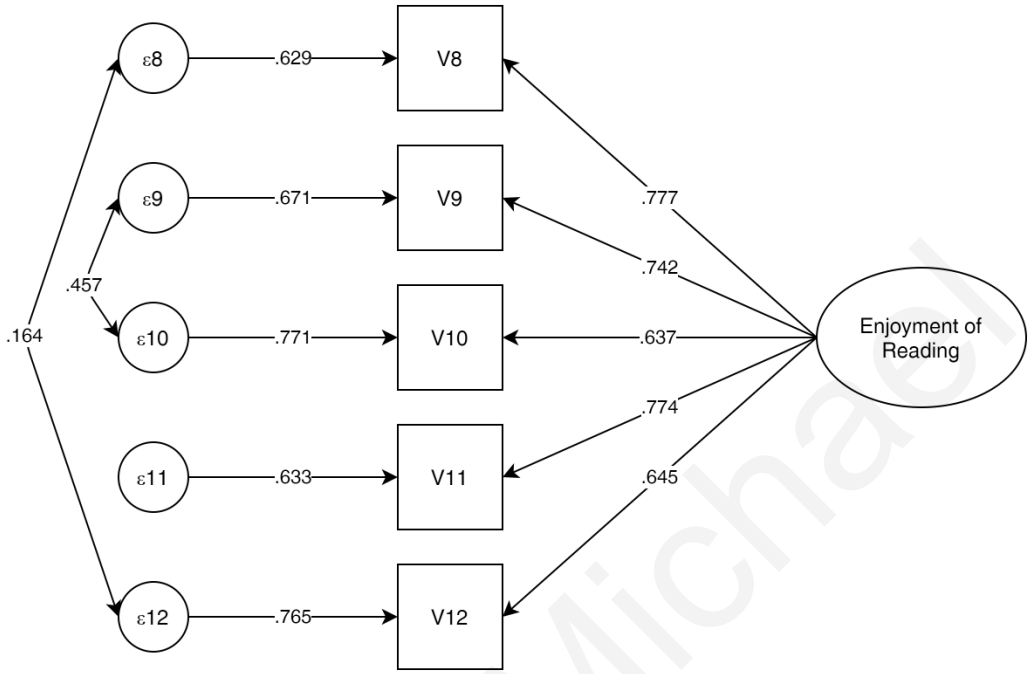


Figure E.3.4

Iceland

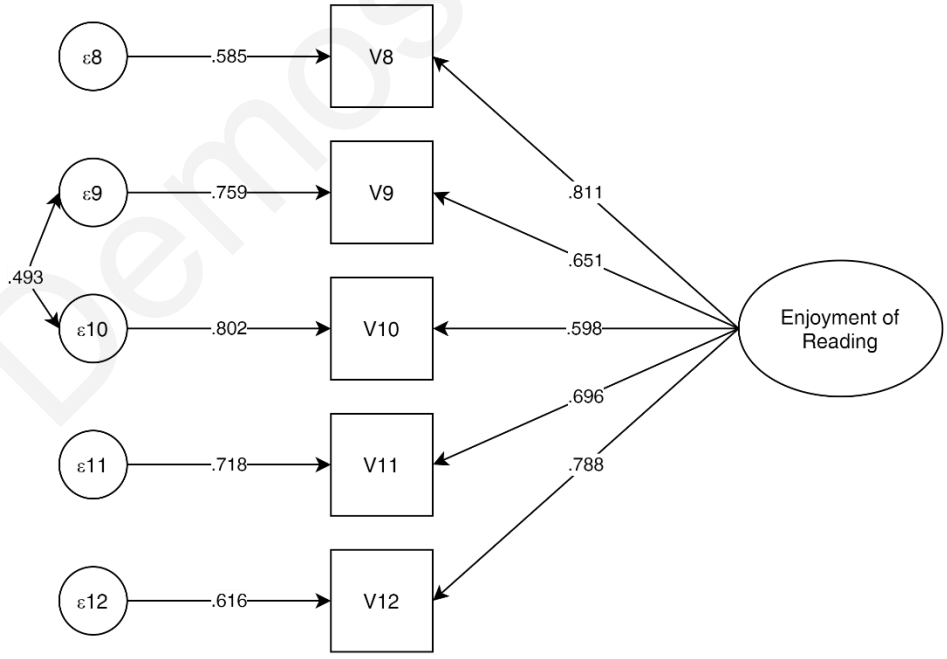
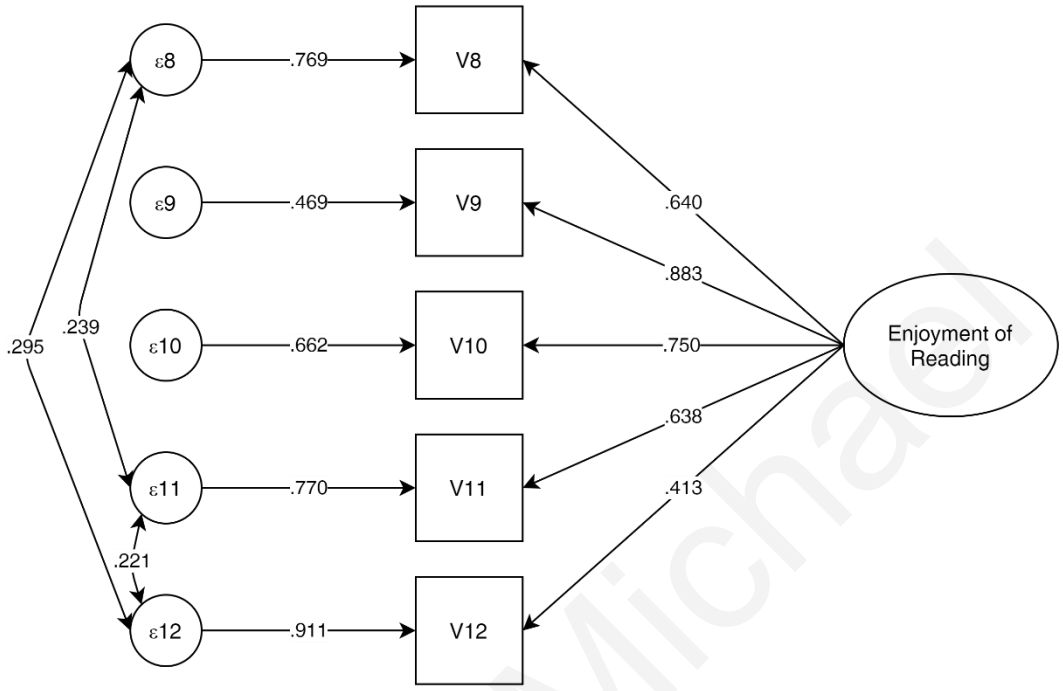


Figure E.3.5

Estonia



Appendix 6: Effects of motivation constructs as mediators (regressed separately)

Table F.1

Mastery-approach Orientation of Achievement Goals

Country	Total effect	Indirect path		Direct effect	Explanatory power
	SES→Ach.	SES→Mot.	Mot.→Ach.	SES→Ach.	
Belarus	.445*	.095*	.020	.443*	.002
Hungary	.433*	.114*	.132*	.418*	.015
Poland	.331*	.110*	.138*	.316*	.015
Iceland	.244*	.200*	.237*	.197*	.047
Estonia	.250*	.163*	.161*	.224*	.026

Note. SES = Socioeconomic status (ESCS), Mot. = Academic motivation (Mastery-approach orientation of achievement goals), Ach. = Academic achievement

*p < .05 **p < .01 ***p < .001

Table F.2

Working motive and mastery achievement motive

Country	Total effect	Indirect path		Direct effect	Explanatory power
	SES→Ach.	SES→Mot.	Mot.→Ach.	SES→Ach.	
Belarus	.445*	.126*	.042*	.440*	.005
Hungary	.433*	.084*	.048*	.429*	.004
Poland	.331*	.135*	.214*	.302*	.029
Iceland	.244*	.208*	.224*	.198*	.047
Estonia	.250*	.133*	.136*	.232*	.018

Note. SES = Socioeconomic status (ESCS), Mot. = Academic motivation (Working motive and mastery achievement motive), Ach. = Academic achievement

*p < .05 **p < .01 ***p < .001

Table F.3

Enjoyment of reading

Country	Total effect	Indirect path		Direct effect	Explanatory power
	SES→Ach.	SES→Mot.	Mot.→Ach.	SES→Ach.	
Belarus	.445*	.298*	.302*	.355*	.090
Hungary	.433*	.232*	.361*	.349*	.084
Poland	.331*	.246*	.389*	.235*	.096
Iceland	.244*	.157*	.346*	.190*	.054
Estonia	.250*	.194*	.325*	.187*	.063

Note. SES = Socioeconomic status (ESCS), Mot. = Academic motivation (Enjoyment of reading), Ach. = Academic achievement

*p < .05 **p < .01 ***p < .001

Table F.4

Expected occupational status

Country	Total effect	Indirect path		Direct effect	Explanatory power
	SES→Ach.	SES→Mot.	Mot.→Ach.	SES→Ach.	
Belarus	.445*	.330*	.325*	.338*	.107
Hungary	.433*	.391*	.379*	.295*	.148
Poland	.331*	.330*	.330*	.222*	.109
Iceland	.244*	.188*	.224*	.202*	.042
Estonia	.250*	.244*	.262*	.187*	.064

Note. SES = Socioeconomic status (ESCS), Mot. = Academic motivation (Expected occupational status), Ach. = Academic achievement

*p < .05 **p < .01 ***p < .001

Appendix 7: Summary of results

Table G.1

Partial mediation, Direct, and Indirect effects

Country	Total effect of SES on academic achievement	Indirect effects through motivation constructs	Direct effect of SES on academic achievement	Percentage of partial mediation
Belarus	.445*	.157*	.288*	32.28%
Hungary	.433*	.193*	.240*	44.57%
Poland	.331*	.168*	.163*	50.75%
Iceland	.244*	.112*	.132*	45.90%
Estonia	.250*	.102*	.148*	40.80%

*p < .05