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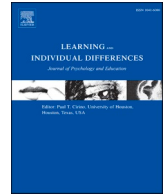
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PISA reading achievement, literacy motivation, and school burnout predicting Adolescents' educational track and educational attainment

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ABSTRACT

In this four-year longitudinal study, we examined how reading comprehension, as assessed with PISA reading achievement, literacy motivation, and school burnout symptoms at the end of comprehensive school predict the choice of educational track (academic or vocational) and educational attainment in upper secondary education. The sample consisted of 1351 Finnish students whose PISA reading achievement, self-concept of ability in literacy, task value in literacy, and symptoms of school burnout (cynicism and exhaustion) were assessed at the end of comprehensive school. Information concerning their educational track during the first year of upper secondary education was derived from self-reports and information concerning the completion of upper secondary education were collected from school registers. The results indicated that PISA reading achievement, self-concept of ability in literacy, cynicism, and exhaustion were unique determinants of educational track choice after comprehensive school. The results suggest that there is a need, in comprehensive schools, to consider not only the development of basic skills but also literacy motivation and school well-being, as these all can have a long-term impact on students' educational paths.

Educational relevance statement: The analyses of the present data showed relatively modest predictive value on the part of PISA performance for adolescents' later educational outcomes. The results of the present longitudinal study suggested that PISA reading score does not predict the completion of upper secondary education but that it is a unique predictor of educational choice after comprehensive school over and above other predictors in the model, suggesting that the explanation for the impact of PISA reading on educational track choice is not due to gender, parental socioeconomic status, or motivational or well-being factors. In addition to the PISA reading test score, a high self-concept in literacy and also symptoms of exhaustion increased the likelihood of attending general upper secondary school, whereas symptoms of cynicism increased the likelihood of attending vocational school. The results suggest that there is a need, in comprehensive schools, to consider not only the development of basic skills but also literacy motivation and school well-being, as these all can have a long-term impact on students' educational paths.

1. PISA Reading achievement, literacy motivation, and school burnout predicting Adolescents' educational track and educational attainment

In the lives of young people, educational track choices and educational attainment are of central importance because many aspects of their subsequent years are heavily affected by these educational decisions. These decisions are affected by various factors in a given context, including not only academic achievement but also motivational and socioemotional factors. In the present four-year longitudinal study,

we focus on the role of reading comprehension, as assessed with the PISA reading task, in upper secondary education outcomes, educational track choice (academic versus vocational track), and receiving a qualification from upper secondary education among Finnish youth. In addition to the skills assessed via the PISA reading task, we examine the role of other factors known to be associated with achievement, namely literacy motivation (operationalized in terms of self-concept of literacy and task value in literacy) and school burnout symptoms, to paint a more comprehensive picture of the prediction of educational outcomes.

The Programme for International Student Assessment (PISA) assesses

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15-year-old students' knowledge of and skills in reading comprehension more broadly than many other reading comprehension measures. It provides a reading comprehension assessment that requires not only fact retrieval and simple inferences but also more advanced comprehension skills that are needed in education and everyday life, such as the interpretation and integration of information from different parts of the material, as well as reflection on and the evaluation of the material and author. Furthermore, it includes not only analysis of texts but also figures and tables. The PISA scores and country rankings have gained much attention worldwide and affected educational policies in numerous countries. Despite their wide impact, there is, however, limited research information on their association with other measures longitudinally, for example, the predictive effects of PISA scores on educational choices and attainment. Thus, it is important to learn more about the impact of this reading comprehension measure on educational paths.

1.1. PISA Reading assessment and educational outcomes

The transition after comprehensive school is a major school transition in the Nordic countries and has considerable consequences for Finnish students', as they mainly move to either the academic or vocational track. The academic track (i.e., general upper secondary school) represents a focus on theoretical subjects, such as languages, mathematics, and science, and may often lead to university studies, whereas most of the subjects studied in vocational school (the vocational track) are more practical, with the aim of preparing students for working life. In the Finnish context, completing upper secondary education is a prerequisite for both accessing higher education and being able to enter the labor market.

Reading skills are important predictors of the educational choice made after comprehensive school (Savolainen, Ahonen, Aro, Tolvanen, & Holopainen, 2008; Torppa et al., 2023) and completion of education in young adulthood within the expected time (Aro et al., 2019; Torppa et al., 2023). It can be assumed that students with reading difficulties struggle in the text-heavy academic track courses and therefore, find the academic track challenging (Au, 2000). In line with this assumption, previous research has indicated that students with reading difficulties are likely to enroll in the vocational track rather than academic track (Hakkarainen, Holopainen and Savolainen, 2016). Moreover, previous studies have shown that reading difficulties in childhood or adolescence affect the educational level achieved in adulthood (Eloranta, Närhi, Eklund, Ahonen, & Aro, 2019; Lee, Daniels, Puig, Newgent, & Nam, 2008; McLaughlin, Speirs, & Shenassa, 2014), but these effects have been shown in some studies to be moderated by gender. Reading difficulties have been shown to have a stronger effect on upper secondary education choice for boys than for girls (Savolainen et al., 2008), and they have also been shown to play a larger role in educational attainment among boys than among girls (Kiuru et al., 2011).

Our interest was in finding out how reading comprehension at the end of 9th grade explain the choice of secondary education track and educational attainment later on. We focused on reading comprehension, because it includes skills such as understanding, using and reflecting on written information, which particularly can be assumed to predict educational outcomes (Torppa et al., 2023). To assess reading comprehension, we used the PISA reading assessment, which broadly measures students' capacity to understand, use, and reflect on written text in order to reach goals and develop knowledge at age 15 (OECD, 2022). The PISA reading assessment is not the only such global assessment, but PISA scores, in particular, have received wide interest in Finland, as in other OECD countries.

Longitudinal studies providing information about educational choices among students for whom there is data on the PISA reading assessment are available from some countries, such as Switzerland, Denmark, Australia, Canada, and the US. In these studies, higher PISA reading scores have been associated with a higher probability of successfully transitioning to post-comprehensive education (Scharenberg,

Wohlgemuth, & Hupka-Brunner, 2017). In addition, PISA reading scores have been associated with the type of upper secondary education that students choose. Higher PISA reading scores have been positively associated with a higher likelihood of choosing general upper secondary schools, for example, the academic track in Denmark (Jaeger, 2007) and Switzerland (Burger, 2021; Falter, 2010; Falter, Chávez-Juárez, & Ferro-Luzzi, 2012; Scharenberg, Rudin, Müller, Meyer, & Hupka-Brunner, 2014). Conversely, high PISA reading scores have been found to be negatively associated with choosing tracks other than academic ones (Burger, 2021), such as vocational education (Jaeger, 2007) and vocational programmes with low skill requirements (Falter, 2010).

Low PISA reading test scores have also been shown to predict the non-completion of upper secondary education, at least among disadvantaged readers. In a US sample, Mamedova et al. (2021) categorized PISA reading performers into three categories, low, middle, and high performers, and examined the associations between test scores and educational attainment four years later. They found that students belonging to the lowest reading performance category were less likely to have completed upper secondary education (high school) by age 19. Similarly, in a Canadian study, Knighton and Bussière (2006) divided PISA performers into five levels and found that belonging to the lowest two levels increased the likelihood of not completing upper secondary education (high school) by age 19. In Switzerland, Scharenberg et al. (2014) divided PISA reading performers into six levels and showed that the percentage of those who had not completed upper secondary education was much higher among students belonging to the lowest two levels than among students who belonged to the levels with higher PISA reading scores. Despite the notable impact of the PISA assessment on educational policies, very little is known about the predictive value of PISA reading test scores regarding educational attainment when PISA reading scores are handled as continuous variables. Polidano, Hanel, and Buddelmeyer (2013) used PISA reading test scores as a control variable when examining the association between family SES and school completion in Australia. They found that PISA reading test scores did not predict the completion of upper secondary education. In another Australian study, Mahuteau and Mavromaras (2014) focused only on students attending the academic track and found that low PISA reading scores were marginally, but nonetheless significantly, associated with a higher probability of school dropout by age 18. These studies were conducted in only one country and one school system, and more research is needed on the topic before generalizing the results. Moreover, most existing studies have focused only on the relationship between PISA reading scores and educational outcomes, without considering the role of the socioemotional factors. To understand the predictive value of PISA reading indicators for educational outcomes in a comprehensive way, the role of other relevant factors, such as students' literacy motivation and school-related well-being, should also be considered and addressed in research designs. Reading skills, literacy motivation, and well-being are known to be associated by adolescence, and the associations are reciprocal. For example, literacy motivation has been acknowledged as partially explaining differences in reading performance, and literacy motivation is partially explained by reading skills (Logan, Medford, & Hughes, 2011; Retelsdorf, Köller, & Möller, 2011).

1.2. The role of literacy motivation and school burnout in educational outcomes

In addition to skills, motivational factors provide a basis for students' educational plans and goals (Vasalampi, Salmela-Aro, & Nurmi, 2010), and they have been shown to predict educational attainment in upper secondary education (high school; West, Hughes, Kim, & Bauer, 2019). One of the most significant frameworks seeking to explain students' performance, choices, and educational attainment is the expectancy-value model (Eccles et al., 1983). According to this model, educational and other achievement-related choices are most directly related to two sets of beliefs: students' beliefs and perceptions about self and their

beliefs and perceptions about tasks. Students who believe they are competent and expect academic success (i.e., have a high self-concept of their ability) also value various academic tasks in terms of interest, importance, and usefulness, and they will ultimately work harder, perform better, pursue and receive higher grades, and attain a higher level of education (Eccles, 2005; Wigfield, Cambria, & Eccles, 2012). Students are also more likely to enter courses and educational tracks that they believe they can master and that have high value for them (Eccles, 2005).

Because literacy skills represent standard requirements for learning most academic subjects, beliefs and perceptions related to literacy, in particular, can be assumed to affect students' educational outcomes (see, e.g., Durik, Vida, & Eccles, 2006). According to the expectancy-value model and previous research, literacy motivation can either directly predict educational outcomes or act as a mediator between skills and educational outcomes (see e.g., Watt et al., 2012). For example, Durik et al. (2006) showed in their study that motivational beliefs in literacy predicted course selection, but motivational beliefs in literacy have also been found to have a mediating role between reading performance and educational choices and aspirations (Korhonen, Tapola, Linnanmäki, & Aunio, 2016; Nagy, Trautwein, Baumert, Köller, & Garrett, 2006). In the present study, we examined how the self-concept of ability in literacy and task value in literacy (in addition to PISA reading achievement) predict students' educational choices and completion of upper secondary education. Beside a direct effect, we tested also whether motivation mediate the effect of PISA reading achievement on educational outcomes. Students in Finland must make an important educational choice between general upper secondary school (the academic track) and vocational school (the vocational track) at age 15–16, after completing comprehensive school. Because this choice is influenced not only by their skills but also their motivation, we assumed that those students who have high self-concept of ability in literacy and value literacy tasks, will be more likely to enter an academic track and also to complete educational qualification because of their high literacy motivation.

In terms of literacy motivation, we focused on the positive valence of literacy, but as suggested in the expectancy-value model, all tasks and goals have also a negative valence, such as emotional and psychological costs. Recently, school-burnout symptoms have become a global challenge and psychological cost that affects many students' lives and has adverse consequences. Schoolwork requires students to respond to various demands and achievement pressures, and school-burnout symptoms emerge when demands overtax students' resources (Salmela-Aro & Upadyaya, 2014). Empirical findings have indicated that school-burnout symptoms increase the likelihood of low school achievement, low effort in schoolwork (Madigan & Curran, 2021), truancy from school (Virtanen, Engels, Vasalampi, & Lerkkanen, 2021), intentions to drop out (Parviainen, Aunola, Torppa, Poikkeus, & Vasalampi, 2020; Vasalampi, Kiuru, & Salmela-Aro, 2018) and also concrete school dropout (Bask & Salmela-Aro, 2013). Thus, the emotional and psychological costs of burnout significantly affect students' educational choices and decrease students' possibilities to engage in upper secondary education (e.g., Virtanen et al., 2021).

In the school context, burnout symptoms refer to exhaustion related to studying and cynicism regarding one's studies and feelings of inadequacy as a student (Salmela-Aro, Kiuru, Leskinen, & Nurmi, 2009). These dimensions capture different aspects of the school burnout symptoms, and symptoms of exhaustion and cynicism have been suggested to serve as initial predictors of feelings of inadequacy (Parker & Salmela-Aro, 2011). In the present study, we focus on these two initial predictors: symptoms of exhaustion, which is a stress component of burnout, and symptoms of cynicism, which refers to individuals' way of distancing themselves from overtaxing situations (Maslach, Schaufeli, & Leiter, 2001).

Previous studies have shown that, although cynicism and exhaustion are both aspects of school burnout, they are separate constructs

(Salmela-Aro et al., 2009). Exhaustion has found to be manifested along with psychological distress regardless of a student's motivation, school engagement, valuing school, and academic achievement, whereas cynical students are less engaged, value school less, and have lower academic achievement (Tuominen-Soini & Salmela-Aro, 2014). The results offered by Salmela-Aro, Kiuru, and Nurmi (2008) indicate that exhaustion may be more likely among students in an academic track than those in a vocational track. This may due to the fact that students with ambitious educational goals also work hard to achieve these goals, which might, in turn, result in emotional exhaustion (e.g., Widlund, Tuominen, Tapola, & Korhonen, 2020). Students in a vocational track have been found to be more likely to have externalizing problems or cynical attitude toward their studies (Hakkarainen et al., 2016; Salmela-Aro et al., 2008), lower intrinsic motivation to academic goals (Vasalampi et al., 2010) and to focus on goals outside of school (Klaczynski & Reese, 1991) by the end of comprehensive school than those in an academic track. In the present study, we examine exhaustion and cynicism separately and assume that they may lead to different educational choices but that both increase the risk of the non-completion of upper secondary education (Bask & Salmela-Aro, 2013; Parviainen et al., 2020; Vasalampi et al., 2018).

1.3. The current study

In this four-year longitudinal study, we examined the predictive role of PISA reading achievement, as well as literacy motivation and symptoms of school burnout, in students' upper secondary educational track choices and educational attainment.

The following research questions were posed:

1. To what extent do PISA reading achievement, literacy motivation (self-concept of ability in literacy and task value in literacy), and the school burnout symptoms of cynicism and exhaustion in Grade 9 predict students' choice of an educational track (general upper secondary school versus vocational school) after comprehensive school? Does literacy motivation mediate the effect of PISA reading achievement on an educational choice?

Based on previous research (Burger, 2021; Falter, 2010; Falter et al., 2012; Jaeger, 2007; Scharenberg et al., 2014), the principles of the expectancy-value model (Eccles, 2005), empirical evidence concerning the self-concept of literacy ability and task values in literacy (Durik et al., 2006), and the importance of literacy skills in most academic subjects, we assumed that those students with high PISA reading scores and high literacy motivation would be more likely to choose an academic track over a vocational track (H1). We also assumed (H2) that literacy motivation has not only direct effect (Durik et al., 2006), but also partly mediates the effect of PISA reading achievement on educational choice (Korhonen et al., 2016; Nagy et al., 2006). We expected (H3) that exhaustion is more common among students entering an academic track than a vocational track (Salmela-Aro et al., 2008), whereas cynicism is more common among students entering a vocational track (Hakkarainen et al., 2016; Klaczynski & Reese, 1991; Salmela-Aro et al., 2008; Vasalampi et al., 2010).

2. To what extent do PISA reading achievement, literacy motivation (self-concept of ability in literacy and task value in literacy), and the school burnout symptoms of cynicism and exhaustion in Grade 9 predict the completion of upper secondary education? Does literacy motivation mediate the effect of PISA reading achievement on an educational attainment?

As PISA reading achievement and educational-attainment associations in the few studies using random samples have been shown to be marginal (Mahuteau & Mavromaras, 2014) or even non-significant (Polidano et al., 2013), we predicted (H4) weak or no associations.

However, based on the principles of the expectancy-value model (Eccles, 2005), we assumed that literacy motivation predicts educational attainment directly or mediates the effect of skills on educational attainment (H5). We also expected (H6) that school burnout symptoms (Bask & Salmela-Aro, 2013) would be significant predictors of educational attainment.

In the analyses, we controlled for gender because a strong gender gap is seen in PISA reading achievement, with girls significantly outperforming boys in reading across all countries that participated in PISA 2018 (OECD, 2020). Moreover, in the present sample, a comparable gender difference in PISA reading score has been reported (Manu et al., 2022). Girls also typically have a more positive self-concept and value literacy more than boys (Wigfield et al., 2012). In contrast, girls have been found to report more internalized problems (Pomerantz, Altermatt, & Saxon, 2002) and symptoms of exhaustion than boys (Parviainen et al., 2020). Thus, as it is possible that gender also plays a role in educational attainment or moderates the links between the predictors and educational outcomes (Kiuru et al., 2011; Savolainen et al., 2008), gender was included in the analyses as a covariate.

We also controlled for parental education and occupational status in the analyses because, according to previous research, high parental socioeconomic status is associated with higher PISA scores (e.g., Manu et al., 2022; OECD, 2019b; Scheiber, Reynolds, Hajovsky, & Kaufman, 2015), an increased likelihood of entering academic track (Falter, 2010; Falter et al., 2012; Jaeger, 2007), and a lower dropout probability (Mahuteau & Mavromaras, 2014).

Finally, based on the second research question, students' educational track was added to the model as a covariate because it is possible that the role of PISA reading achievement, literacy motivation, and school-burnout symptoms in educational attainment is different for students in academic and vocational tracks (see, e.g., Mahuteau & Mavromaras, 2014).

2. Method

This study used existing longitudinal data from the First Steps follow-up study (Lerkanen et al., 2006-2016) and its extension, the School Path: From First Steps to Secondary and Higher Education study (Vasalampi & Aunola, 2016-). The entire follow-up comprises a 13-year period, from kindergarten to the third year (i.e., last year) of upper secondary education. In the First Steps study, approximately 2000 children born in 2000 were followed ten times from kindergarten to the end of lower secondary school (Grade 9) in four municipalities around Finland (two medium-sized, one large, and one rural) to examine student learning, motivation, and problem behavior in different interpersonal contexts, such as students' academic performance, motivation and engagement, social skills, peer relations, and well-being. In the School Path study, the participants of the First Steps follow-up study and their new classmates ($N \sim 4160$) were followed twice after the transition to upper secondary education. At this phase, the focus was on the participants' educational decisions and their motivation and well-being during upper secondary education. A special strength of the study is that it includes not only self-reports but also PISA tests at the end of comprehensive school and registered information from school registers concerning participants' completion of upper secondary education.

In the present study, data from three time points that extended across the two phases of the follow-up were used. Data collection for Time1 (T1) took place in 2016, at the end of the final year of lower secondary school (Grade 9, 15–16 years of age), that for Time 2 (T2) took place during the first year of upper secondary education, in 2017; and Time 3 (T3) took place at the end of year 2019 (i.e., 3.5 years from the start of upper secondary education). At T1 and T2, questionnaires were administered in the classrooms during normal school days. At T3, register information was collected from school registers on the completion of upper secondary education. In Finland, upper secondary education typically lasts 3 years. Written informed consent was obtained from

participants' guardians for data collection in lower secondary school (T1), and participants themselves provided informed written consent to confirm their voluntary participation in the secondary phase (T2–T3). The ethical statement for the follow-up study was obtained in 2006 and 2018 from the Ethical Committee of the University of Jyväskylä.

We focused only on students who entered general upper secondary (the academic track) or vocational school (the vocational track) after comprehensive school because those are the typical options for youth in Finland. The final sample of the present study consisted of 1351 students, and 933 (53.3 % girls) of them were in upper secondary schools, and 418 (38.8 % girls) were in vocational schools.

2.1. Educational system in Finland

Finnish children enter pre-primary education in August of the year they turn six. They enter the 9-year comprehensive school a year later, in the August of the year they turn seven. Comprehensive school consists of primary school (Grades 1–6) and lower secondary school (Grades 7–9). After this point, students apply, in a joint application process, for entry into upper secondary education, typically either a general upper secondary school (academic track) or a vocational school (vocational track). At the time of data collection, 94 % of the grade-9 students applied to upper secondary education (Statistics Finland, 2022). Since 2021, upper secondary education has been mandatory for all youths under 18 years of age. However, students can easily switch tracks and the subjects they study within the tracks after the beginning of secondary education.

2.2. Measures

2.2.1. PISA Reading achievement

Reading achievement was assessed at T1 with the PISA reading test (OECD, 2010, p. 26; 2013, p. 45) using a booklet with eight types of reading materials. The students were asked to read each type of material before answering the associated questions. The reading materials included tables, graphs, and figures, in addition to continuous text. Altogether, the PISA reading test included 15 multiple-choice questions and 16 questions that required written responses. Of the questions, 12 required students to access and retrieve information, 12 required them to integrate and interpret information, and seven required them to reflect on and evaluate information. Students had 60 min to complete the test. The total score consisted of the number of accurate answers, with a maximum score of 31. Confirmatory factor analysis (CFA) was conducted to examine the consistency of the three different components of the PISA reading test. The results of the saturated CFA model suggested that one PISA reading test factor can be formed: the factor loadings ranged between 0.72 and 80. The Cronbach's alpha reliability coefficient for the full sample was 0.94.

2.2.2. Literacy motivation

Literacy motivation assessment focused on the following: 1) self-concept of ability in literacy and 2) task value in literacy.

2.2.2.1. Self-concept of ability in literacy. Students' self-concept of their ability in literacy/their mother tongue was assessed at T1 with a questionnaire based on the ideas presented by Eccles and Wigfield (1995) and the scale developed by Wigfield et al. (1997). The original domain-specific questionnaire was modified by shortening it from five questions to three questions. The modified scale has been used in several previous studies and shown good psychometric properties (e.g., Pesu, Viljaranta, & Aunola, 2016; Viljaranta, Tolvanen, Aunola, & Nurmi, 2014).

Students were asked to answer three questions. Two of them were assessed using a 5-point Likert scale from 1 = poor/not very good to 5 = very good: "How good are you at literacy?"; "How good are you at literacy as compared to other students in your class?" The third question

contained a five-point Likert scale from 1 = easy to 5 = difficult: “How difficult are assignments related to literacy for you?” Confirmatory factor analysis was conducted to examine the consistency of the three questions. The results of the saturated CFA model suggest that the questions form one self-concept of ability factor. The factor loadings were 0.88, 0.93, and – 0.60, respectively. Cronbach alpha was $\alpha = 0.95$.

2.2.2.2. Task value in literacy. Students’ task value in literacy was assessed at T1 with a questionnaire developed based on Eccles et al. (1983). Students were asked to rate six questions using a 5-point Likert scale from 1 = not at all to 5 = very much. The items capture the following dimensions concerning literacy in general/the mother tongue: 1) interest value (“How much do you like literacy in school?”; “How readily do you do literacy assignments or write essays?”), 2) importance value (“How important is it for you to get good grades in literacy?”; “How important is it for you that you do well in literacy?”), and 3) utility value (“How useful do you feel the literacy is for your future plans?”; “How useful is the literacy in your daily life?”). According to the results of CFA, overall task value in literacy could be examined by forming one latent factor of all six questions when residuals were allowed to correlate within one dimension ($\chi^2(6) = 28.48, p < .001, CFI = 0.99, TLI = 0.99, RMSEA = 0.05, SRMR = 0.01$). The factor loadings ranged between 0.63 and 0.82. The Cronbach’s alpha of the scale was $\alpha = 0.87$.

2.2.3. School burnout symptoms

School burnout symptoms of exhaustion and cynicism were assessed at T1 using six items from the School Burnout Inventory (SBI; Salmela-Aro et al., 2009). Two of the three burnout dimensions were used in the current data collection (inadequacy was excluded). Moreover, four items assess symptoms of exhaustion in the original SBI, but one item (i.e., “The pressure of my schoolwork causes me problems in my close relationships with others”) was excluded from the data collection.

In the present study, three items assessed cynicism (“I feel a lack of motivation in my schoolwork”; “I feel that I am losing interest in my schoolwork”; “I’m continually wondering whether my schoolwork has any meaning”), and three items assessed exhaustion (“I often sleep badly because of matters related to my schoolwork”; “I brood over matters related to my schoolwork a lot during my free time”; “The pressure of my schoolwork disturbs my life outside school”). Students rated the items using a 5-point Likert scale from 1 = completely disagree to 5 = completely agree. Separate latent factors representing symptoms of cynicism and exhaustion were formed. In these saturated models, factor loadings ranged between 0.74 and 0.89 for cynicism and between 0.68 and 0.88 for exhaustion. The Cronbach’s alpha was $\alpha = 0.85$ for cynicism and $\alpha = 0.85$ for exhaustion.

2.2.4. Educational track

Information about the students’ educational track in upper secondary education was collected from students at T2 and T3. The information from T2 (from the first year of upper secondary education) was used as a primary source of information, but if a student did not participate in T2 assessment, information from T3 was used (from the third year of upper secondary education). Students reported whether they were in 1 = general upper secondary school, 2 = vocational school, 3 = training for vocational school, 4 = a double-degree program (i.e., a combination of the academic and vocational tracks), 5 = some other form of education, or 6 = not in education. For the present study, only students responding either 1 (in general upper secondary school) or 2 (vocational school) were included in the analyses.

2.2.5. Educational attainment

Information about educational attainment was based on registered information collected in schools. The variable was treated as a dummy-coded variable: 0 = completion of upper secondary education in the normative 3 to 3.5 years (i.e., achieving qualification between years

2016 and 2019); 1 = non-completion of upper secondary education by the end of 2019. This information was achieved for 2029 general upper secondary school students, and 1617 (79.2 %) of them achieved qualification within the normative timeframe, whereas 412 (20.2 %) did not. Information was also collected for 1532 vocational school students, and 1048 (59.7 %) of them achieved qualification within the normative timeframe, whereas 484 (27.6 %) did not.

2.2.6. Covariates

Parental education included three categories: 1 = less than comprehensive school (0.3 %), 2 = completion of comprehensive school (32.5 %), and 3 = completion of upper secondary education (67.2 %). The parental occupational status variable included seven categories: 1 = entrepreneurs, 2 = higher white collar, 3 = lower white collar, 4 = workers, 5 = students, 6 = pensioners, 7 = others. In the present study, the occupational status variable was used as an ordinal scale and only categories 1 to 4 were taken to account. Categories 5 to 7 were excluded. Participants’ gender was coded as 0 = girl and 1 = boy.

2.3. Statistical analyses

To address the research questions, data were analysed using a logistic regression model with latent factors (structural equation model; SEM), as the outcome variables were dichotomous. In the first research question, one dependent variable was the dummy-coded educational track choice after comprehensive school (0 = general upper secondary school, 1 = vocational school). The model was specified as follow: the grade-9 predictors (i.e., independent latent factors, such as the PISA reading test, the self-concept of ability in literacy, task value in literacy, school burnout symptoms of exhaustion, and school burnout symptoms of cynicism) and three control variables (parental education, parental occupational status, and participant gender) were included in the model, and their main effects were examined. Moreover, the model included indirect effects from PISA reading test to educational choice via literacy motivation. Gender was used in the analysis as a categorical variable (0 = girl, 1 = boy). To examine whether the predictions of latent factors regarding educational track would differ depending on gender, the interaction terms between gender and each latent factor were tested in separate analyses.

In the second research question, the dependent variable was completion of upper secondary education (0 = completion of upper secondary education, 1 = non-completion), and the model was carried out as follows: the grade-9 predictors, meaning the independent latent factors, and four control variables (gender, parental education, parental occupational status and students’ educational track) were included to the model, and the main effects and indirect effects from PISA reading to educational attainment via literacy motivation were examined. Gender (a parameter for a girl) and educational track (a parameter for a general upper secondary school) were used in the analysis as categorical variables. Next, to examine whether the predictions of the latent factors regarding educational attainment would differ depending on educational track, the interaction terms between educational track and each latent factor were tested in separate analyses.

The SEM modeling was conducted using the Mplus statistical package (Version 8.8). The parameters of the model were estimated using full information maximum-likelihood estimation, in which all possible information was used for the model, assuming that the missing data is missing at random (Muthén & Muthén, 1998-2017). The Akaike information criterion (AIC), Bayesian information criterion (BIC), and adjusted Bayesian information criterion (AdjBIC) were used to compare the models (χ^2 test is not available in logistic models in Mplus).

3. Results

Descriptive information and correlation coefficients between latent factors and observed variables are presented in Table 1.

Table 1

Descriptive information and correlations between observed variables and latent factors (PISA reading achievement, self-concept of ability in literacy, task value in literacy, school burnout symptoms of cynicism and exhaustion) included into the study.

	1	2	3	4	5	6	7	8	9	10
1 PISA reading achievement										
2 Self-concept of ability in literacy	0.23***									
3 Task value in literacy	0.17***	0.38***								
4 Symptoms of cynicism	-0.15***	-0.21***	-0.32***							
5 Symptoms of exhaustion	0.05**	-0.01	0.03*	0.22***						
6 Parental education	0.08***	0.07***	0.05**	-0.05***	0.01					
7 Parental occupational status	-0.07**	-0.09***	-0.05*	0.01	-0.04	-0.13***				
8 Gender ^a	-0.09***	-0.09***	-0.11***	0.04*	-0.12***	0.00	-0.01			
9 Educational track ^b	-0.20***	-0.17***	-0.14***	0.16***	-0.03*	-0.09***	0.04***	0.04***		
10 Educational attainment ^c	-0.06***	-0.05***	-0.03*	0.06***	0.02	-0.02**	0.01	0.04***	0.04***	
<i>N</i>	1512	1712	1711	1702	1702	2102	1937	5054	3795	4852
<i>Mean</i>	20.26	3.40	3.36	2.33	2.40	2.67	3.41	0.48	0.46	0.32
<i>SD</i>	6.20	0.77	0.82	1.00	1.04	0.48	1.06	0.50	0.50	0.50
<i>Minimum, Maximum</i>	0, 32.73	1, 5	1, 5	1, 5	1, 5	1, 3	1, 7	0, 1	0, 1	0, 1

Note. * $p < .01$; ** $p < .01$; *** $p < .001$. ^a0 = girl, 1 = boy; ^b0 = general upper secondary school, 1 = vocational school; ^c1 = completion of upper secondary education, 0 = non-completion of upper secondary education.

In accordance with our first research question, we examined whether the latent factors of PISA reading achievement, self-concept of ability in literacy, task value in literacy, and the school-burnout symptoms of cynicism and exhaustion predict educational track choices (general upper secondary school or vocational school) after comprehensive school. Gender, parental education, and parental occupational status were controlled for in the model and also indirect effects from PISA reading achievement to educational choice via literacy motivation were examined. The model fit indices for the model including all the main effects and indirect effects via self-concept and task value were as follows: AIC = 53,558.82, BIC = 53,934.63, AdjBIC = 53,709.08. Based on the R^2 value, the observed variables predicted 57 % of the total variance in educational track choice, and several significant main effects were found (Table 2). Reading achievement based on the PISA, self-concept of ability in literacy, the school-burnout symptoms of cynicism and exhaustion, and parental education were all significant predictors of educational track selection. The findings indicated that the higher the students' performance on the PISA reading test and the higher their self-concept of ability in literacy, the more likely they were to enter general upper secondary school. Furthermore, we found that the more symptoms of exhaustion the students reported, the more likely they were to enter general upper secondary school, whereas the more symptoms of cynicism they reported, the more likely they were to enter vocational school. Higher parental education predicted a higher probability of entering general upper secondary school. Task value in literacy and parental occupational status did not predict educational track choice. Moreover, we found that beside of the main effect self-concept of ability in literacy also mediated the effect of PISA reading test to educational choice ($\text{stand.}\beta = -0.40^{**}$, $s.e. = 0.12$). Task value instead did not significantly mediate the effect of PISA on educational choice. Finally, the models including interaction terms between gender and each latent

Table 2

PISA reading achievement, literacy motivation and school burnout symptoms at the end of comprehensive school predicting post-comprehensive educational track (0 = general upper secondary school, 1 = vocational school).

	Standardized β	s.e.
Gender ^a	0.07*	0.04
Parental education	-0.27***	0.03
Parental occupational status	0.06	0.04
PISA reading achievement	-0.49***	0.06
Self-concept of ability in literacy	-0.19**	0.06
Task value in literacy	0.07	0.06
Cynicism	0.21***	0.05
Exhaustion	-0.15**	0.05

Note. * $p < .05$; ** $p < .01$; *** $p < .001$. ^a0 = girl, 1 = boy, categorical variable, parameter is for a girl.

independent predictor, separately, revealed that none of the tested interaction terms was statistically significant; that is, gender did not moderate any of the regression paths.

In our second research question, we examined whether the latent factors of PISA reading achievement, self-concept of ability in literacy, task value in literacy, and the school-burnout symptoms of cynicism and exhaustion predict the completion of upper secondary education. Gender, parental education, parental occupational status, and educational track were controlled for in the model. The model fit indices for the model including all the main effects were as follows: AIC = 43,775.40, BIC = 44,144.13, AdjBIC = 43,915.43. Based on the R^2 value, the observed variables predicted 3.6 % of the total variance, and only one main effect was significant: the control variable educational track predicted educational attainment. Non-completion was more common among students in the vocational track than among students in the academic track (Table 3). Moreover, neither indirect effect via self-concept of ability nor via task value from PISA reading test to educational attainment was significant. Similarly, none of the two-way interactions between educational track and the independent latent factors was significant in separate models including the main effects and interactions. Thus, educational track did not moderate any of the regression paths.

4. Discussion

The present study examined the extent to which PISA reading achievement, literacy motivation, and symptoms of school burnout predict educational choice and attainment among Finnish students. We followed students from the end of comprehensive school to the end of

Table 3

PISA reading achievement, literacy motivation and school burnout symptoms at the end of comprehensive school predicting educational attainment from upper secondary education (0 = completion, 1 = non-completion).

	Standardized β	s.e.
Gender ^a	-0.04	0.04
Parental education	-0.03	0.04
Parental occupational status	0.01	0.04
Educational track ^b	0.10*	0.05
PISA reading achievement	-0.07	0.07
Self-concept of ability in literacy	-0.12	0.11
Task value in literacy	-0.02	0.09
Cynicism	-0.01	0.07
Exhaustion	0.09	0.06

Note. * $p < .05$. ^a0 = girl, 1 = boy, categorical variable, parameter is for a girl. ^b0 = general upper secondary school, 1 = vocational school, parameter is for a general upper secondary school.

upper secondary education. During the upper secondary studies, information on students' educational track (academic versus vocational) was derived from self-reports, and information on the completion of upper secondary education was collected from school registers. The results indicated that PISA reading achievement, self-concept of ability in literacy, cynicism, exhaustion, and parental education were unique determinants of educational track choice after comprehensive school. Differences in PISA reading achievement, literacy motivation, and well-being at the end of the comprehensive school did not predict the completion of either track.

The first research question focused on the predictors of educational choice after comprehensive school. This transition is a major one in the Nordic countries, in which students mainly choose between the academic track versus the vocational track. We found that, after controlling for parental education and parental occupational status, students with better PISA reading achievement, a more positive self-concept in literacy, and more exhaustion at the end of comprehensive school were more likely to enter the academic track than the vocational track. Students reporting more symptoms of cynicism, in contrast, were more likely to enter the vocational track than the academic track. Our findings confirmed our hypothesis (H1) and previous results indicating that reading skills matter in educational choice (Hakkarainen et al., 2015) and that higher PISA reading scores are positively associated with choosing a more academic track (e.g., Burger, 2021; Falter, 2010; Falter et al., 2012; Jaeger, 2007; Scharenberg et al., 2014). Moreover, the results expanded previous findings by showing that PISA reading achievement predicted educational track choice over and above other predictors in the model, suggesting that the explanation for the impact of PISA reading on educational track choice is not due to gender, parental socioeconomic status, or motivational or well-being factors. However, it is important to note that the PISA reading achievement was not a sole predictor, and the educational choice is probably influenced also by factors that were not in the model. It is also possible that during the school years other factors have had effect on student's PISA achievement in Grade 9, and this is why it now predicts educational outcomes above other factors assessed in the model. Instead, the findings suggest that other factors do not explain the relation from PISA reading score to the outcome and students are aware of their skill level and the requirements of the various educational options when they make their educational track choice. This interpretation was supported by the finding that differences in PISA reading achievement were not predictive of educational attainment in either track (i.e., reading proficiency does not, in itself, strongly determine student progress).

Our findings were in line with Eccles, 2005; see also Durik et al., 2006) expectancy-value model, which holds that, in addition to skills, beliefs of one's skills predict individual differences in post-comprehensive educational choices. A strong self-concept in literacy and a high skill level are likely to be significant predictors of choosing an academic track, as reading skills contribute to overall success in theoretical subjects. Self-concept in literacy also mediated the effect of the reading skills to educational choice as found in previous studies (Korhonen et al., 2016; Nagy et al., 2006; see also Watt et al., 2012) and assumed in our hypothesis (H2). Together these results highlight the importance of the support for competence beliefs during all school years (Eccles et al., 1983). However, in contrast to the H2, task value placed on literacy was not a significant predictor (direct or indirect) of an educational choice. Thus, it may be that, at the end of comprehensive school, students are considering their future careers and making educational choices practically based on the beliefs they have about their competence, placing less emphasis on what tasks they value (see also, e.g., Durik et al., 2006). This is also in line with the results by Korhonen et al. (2016) suggesting that self-concept in reading was more important than interest in reading for students' educational aspirations (i.e., highest academic degree they wanted to achieve) during the transition from comprehensive school to upper secondary school.

The symptoms cynicism and exhaustion were both significant

predictors of educational choice but had differential effects as assumed in H3: exhaustion predicted choosing to enter general upper secondary education, whereas cynicism predicted entering vocational school. Thus, our results add to the work of Salmela-Aro et al. (2008) by showing educational-track-related differences based on school-burnout symptoms at the end of comprehensive school. It is possible that students planning to embark on an academic track value academic achievement highly during comprehensive school and set high goals for themselves, which may, for some, be associated with the risk of exhaustion (Roderick & Camburn, 1999). This explanation would be in line with a recent result by Widlund et al. (2020) showing that ambitious educational aspirations were related to higher levels of exhaustion among ninth grade students. Among students with lower interest in academic tasks (Vasalampi et al., 2010) or focus rather on things outside of school (Klaczynski & Reese, 1991), on the other hand, a cynical attitude toward school and less intrinsic motivation may lead to the vocational track, which is considered less academically demanding (Hakkarainen et al., 2016).

With our second research question, we examined whether performance on the PISA reading test, literacy motivation and symptoms of cynicism and exhaustion predict the completion of upper secondary education within the normative timeframe (i.e., receiving an upper secondary qualification). Gaining an improved understanding of the factors predicting upper secondary qualification is relevant, as attaining an upper secondary education is a prerequisite for both accessing higher education and being able to enter the labor market. In our data, non-completion of upper secondary school was more common among students in the vocational track than among students in the academic track, which is in line with Finnish educational statistics (Statistics Finland, 2022).

Overall, even when we used a relatively comprehensive set of factors in our modeling, the model could predict <4 % of the variance in upper-secondary-education completion within the normative timeframe. This finding suggests that the explanations for students' non-completion may include unique individual factors, such as context-specific factors in the educational setting, the fit between an individual's choice and wishes and their environment, and the life situation of the students, and it may be difficult to predict non-completion early.

In contrast to some previous studies (Knighton & Bussière, 2006; Mamedova et al., 2021; Scharenberg et al., 2014), but in line with our hypothesis (H4) and with some studies (Mahuteau & Mavromaras, 2014; Polidano et al., 2013), PISA reading achievement did not predict educational attainment 3.5 years later in the present sample. One reason for this may be previous studies' being mostly focused on comparisons between students belonging to PISA reading categories (e.g., Knighton & Bussière, 2006; Mamedova et al., 2021; Scharenberg et al., 2014). Prior studies have, for example, found a significant association between PISA reading scores and educational attainment among the poorest readers. Studies using continuous PISA scores in Australian samples have had findings which are similar with the findings of the present study: Mahuteau and Mavromaras (2014) found a marginal negative association between PISA reading test scores and school dropout in an academic track, whereas Polidano et al. (2013) reported a non-significant association. The difference between findings may also be linked to the features of the educational context. In the Finnish educational system, students with reading difficulties receive strong support during their early school years due to integrated special education in schools and the flexibility of upper-secondary-education arrangements. It is possible that the support for special-needs students also helps students with poor PISA results to continue with their studies and complete secondary education. The present data do not, unfortunately, allow us to consider these contextual factors, but in future studies, this should be examined in more detail.

The findings concerning literacy motivation and school burnout symptoms contrasted with our hypotheses (H5 & H6), the principles of the expectancy-value model (Eccles, 2005) and a few existing studies

focusing on the role of school burnout symptoms on school dropout (Bask & Salmela-Aro, 2013). One possible explanation is that these factors play a role particularly among special groups. For example, in their study, Bask and Salmela-Aro (2013) compared those scoring high and low in burnout (the highest 10 percentage to the lowest 10 percentage) and found that those scoring high were almost four times more likely to drop out than those with a very low level of cynicism.

We controlled for parental education and occupational status in the analyses and found that parental education predicted students' educational choices but not their educational attainment. Previous research has indicated that students from families with higher educational status are more likely to choose academic educational tracks (Falter, 2010; Falter et al., 2012; Jaeger, 2007), which lead to higher-status qualifications, than students of similar ability from lower-status families. It has been shown that parents with high educational levels are more involved in their children's schooling (Rowan-Kenyon, Bell, & Perna, 2008), which is likely to affect their children's educational choices. However, it is also important to note that PISA reading assessment, literacy motivation, and symptoms of school burnout predicted students' educational track, even after controlling for parental education (see also, e.g., Knighton & Bussière, 2006). Thus, although parents likely affect their children's educational aspirations, students' experiences in school also play a critical role.

4.1. Limitations

There are some limitations that should be taken account before generalizing the results of this study. First, the study was conducted within one school system, the Finnish system. The study should thus be replicated in different school systems before the results can be generalized. Second, we focused on two of the most common educational choices/tracks in our study and excluded approximately 300 students who made some other choice after comprehensive school. It is possible that literacy skills, literacy motivation, and well-being are differently related to the choices students make after comprehensive school or educational attainment among these students than those included in the present study. The reading skills, literacy motivation, and school-related well-being of this group should be further examined in future studies. Third, self-concept in literacy was assessed with only three items, and feelings of inadequacy were not assessed as a symptom of school burnout. In future studies, broader measures could be useful in painting a more complete picture of the role of self-concept in literacy and symptoms of burnout in educational outcomes. Fourth, task value in literacy was assessed with one-factor. The model fit indices were the same in the one-factor and in the three-factor solution, but the correlations between factors were high (>0.70) in the three-factor solution, which indicates that one-factor solution is a better choice for this paper. However, in future studies focusing more detail on the role of task values in learning or educational paths, it would be important to examine the role of separate values. Fifth, in the present study none of the included independent variables statistically significantly predicted educational attainment. This could stem from the fact that there were rather few students who did not graduate. It is also possible that lack of statistically significant predictors reflect variability in students' reasons for the non-completion of education. That is, some may have challenges in school and low motivation, but some highly motivated students may take a gap year for example in abroad, or simply choose to use more years for their upper secondary education studies than expected. We were not able to control this in our data, but this should be examined in the future studies with longer follow-ups and more details on the reasons for the non-completion in the expected time. Finally, the Finnish school system underwent a reform in 2020, after which upper secondary education became mandatory for all youths under 18 years of age. This reform of the school system may have caused some changes (e.g., in the dropout rates or normative timeframe used in upper secondary education) that could not be addressed using these data.

5. Conclusion

In line with the OECD, 2019, OECD, 2019b report, our findings suggest that progress on the PISA test, in and of itself, leaves many questions unanswered. Most importantly, the analyses of the present data showed relatively modest predictive value on the part of PISA performance for adolescents' later educational outcomes. The results of the present longitudinal study suggested that PISA reading scores do not predict the completion of upper secondary education but that they are a unique predictor of educational choice after comprehensive school, even when literacy motivation and school-burnout symptoms have been controlled for. In addition to the PISA reading test score, a high self-concept in literacy and also symptoms of exhaustion increased the likelihood of attending general upper secondary school, whereas symptoms of cynicism increased the likelihood of attending vocational school. These findings provide relevant suggestions for enhancing support for students choosing to enter both academic and vocational tracks in the form of flexible studies, a low threshold support, digitally accessible guidance services, and building interactive and emotionally engaging learning communities for students while they are entering the transition phase and during their studies. An efficient support system requires a holistic approach, including support for not only to the development of academic skills but also school well-being.

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CRediT authorship contribution statement

Kati Vasalampi: Conceptualization, Methodology, Formal analysis, Resources, Writing – original draft, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Asko Tolvanen:** Methodology, Software, Formal analysis. **Minna Torppa:** Conceptualization, Methodology, Resources, Writing – review & editing, Supervision. **Anna-Maija Poikkeus:** Resources, Writing – review & editing, Funding acquisition. **Hilla Hankimaa:** Writing – original draft, Writing – review & editing. **Kaisa Aunola:** Conceptualization, Methodology, Writing – review & editing, Supervision, Funding acquisition.

Declaration of competing interest

We have no known conflict of interest to disclose.

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