



Academic Achievement and Subjective Well-being: A Representative Cross-sectional Study

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1 Introduction

Beyond cognitive outcomes, such as academic achievement, that have traditionally been used to evaluate learning objectives and the quality of an educational system, non-cognitive outcomes, such as student well-being, should be considered as a specific, distinctive and yet complementary aim of education (Hascher et al. 2018; Opendakker and Van Damme 2000). Benjamin Bloom in the mid-70 s already emphasized the importance of student well-being in regards to educational success (Bloom 1976), yet the concept has only been considered by educational policies in recent years. Such policies recognize the (reciprocal) relationship between student well-being and academic achievement, whereby

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student well-being has been considered both as an indicator of the quality of the educational system and as an outcome. Notable endeavours to integrate student well-being as an indicator of quality in education were launched by the United Nations Educational, Scientific and Cultural Organization (UNESCO) Happy Schools Project in 2014. This international project focuses on the need for education systems to go beyond strictly academic outcomes by providing a framework of definition and strategies to foster and measure well-being in the school context (UNESCO 2016)¹. In the same spirit, the Organization for Economic Co-operation and Development (OECD) first introduced the concept of student well-being in their Programme for International Student Assessment (PISA) in 2015. More specifically, PISA 2015 included a comprehensive set of well-being indicators that covered both negative factors (e.g., anxiety, low performance) and positive impulses (e.g., interest, engagement, motivation to achieve) that promote educational success (OECD 2017). At the national level, the Luxembourg School Monitoring Programme Épreuves Standardisées (Martin et al. 2015) consists of written (partly computer-based) tests and questionnaires. ÉpStan combines cognitive outcomes (i.e., a standardized record of competences in key school areas) and non-cognitive aspects, such as social inclusion, anxiety, motivation to learn as well as school and class climate for Grades 1, 3, 5, 7 and 9. Although the ÉpStan mainly aims to monitor the quality of the Luxembourgish educational system, data can be used to investigate relationships between the measured cognitive and non-cognitive outcome variables.

2 Theoretical Background

2.1 Subjective Well-being in School

In educational research, subjective well-being (SWB) has gained increasing interest as specific research has advanced the importance of emotional and affective factors when it comes to achieving learning objectives (Hascher et al. 2018; Pekrun 2005). According to Hascher (2008), who focused her research on SWB in the specific context of school, SWB can be considered an enhancer of academic achievement as it fosters the fulfilment of academic and social goals

¹A national counterpart of the Happy Schools Project is “CARAT”, which focuses on the school climate and was launched in 2014 by the division of pedagogical innovation within the ministry of education (Niles et al. 2016).

in positively experienced learning environments. As a consequence of growing interest, a challenge in addressing SWB in educational research occurs from the diversity or imprecision of related definitions and methods (Bücker et al. 2018; Hascher and Edlinger 2009). However, despite the heterogeneity of conceptual frameworks to model SWB, there is growing consensus that SWB is a complex, multi-dimensional phenomenon which combines affective and cognitive facets. The emotional dimension reflects the presence of positive feelings such as satisfaction and pleasure and the absence of negative feelings such as anxiety. The social dimension includes relationships with teachers and peers and class climate, whereas the cognitive dimension refers to academic self-concept and attitudes towards school (Bücker et al. 2018; Diener 1984; Hascher and Edlinger 2009). These three dimensions are also reflected in conceptions of perceived inclusion (Venetz et al. 2014).

In his theory of wellbeing, Seligman (2011) conceives wellbeing as a construct composed of five components: positive emotion, engagement, relationships, meaning and accomplishment. The so-called Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment (PERMA) model puts a strong focus on the inclusion of both hedonic (i.e., living a life of pleasure) and eudaimonic (i.e., living a purposeful life) components. In comparison, Hascher and colleagues (Hascher 2004; Hascher and Hagenauer 2011; Hascher and Lobsang 2004) proposed a multidimensional model of SWB representing a state of feeling induced by a combination of predominantly positive emotions and cognitions towards school and learning objectives as well as towards teacher – and peer relationships. Their model advances a stronger focus on hedonic components by including positive attitudes towards school, feelings of pleasure or happiness when in school as well as the extent of anxiety related to achievement. In comparison to the PERMA model, the conceptual framework of Hascher may be more appropriate to model SWB in preadolescent children, as preadolescents tend to be more responsive and thus more aware of hedonic aspects when self-evaluating their wellbeing. Eudaimonic aspects of SWB would require capacities of abstract reasoning and metacognition which start around age 8 and progress through adolescence reaching maturity in early adulthood (Rosso et al. 2004). Thus, concepts relating to human flourishing, purpose and community engagement may be more poorly understood by preadolescent children (Ravens-Sieberer et al. 2014).

2.2 Academic Achievement in the Luxembourgish Education System

In Luxembourg, school attendance is compulsory for students aged four to sixteen years (for a detailed description of the Luxembourgish school system, see Lenz and Heinz 2018). Primary education consists of four learning cycles, with each cycle lasting two years (i.e., students attend primary school for a minimum of six and a maximum of eight years). If learning objectives have not been reached within the 2-year period, an extension of a learning cycle is a common intervention to cope with academic failure or developmental immaturity. By the end of primary education, 20.5 % of students have at some stage been retained in a learning cycle (MENJE 2018). From the age of 12 years, students enter secondary level, education, which is hierarchically structured in three levels: Enseignement secondaire classique (ESC), Enseignement secondaire général (ESG) and Enseignement secondaire général – voie de preparation (ESG-P). Successful completion of the highest academic track (ESC; seven school years), will give the student access to university. Within the middle track (ESG) there are options to complete a technical stream (eight school years), which prepares the student for the technical baccalaureate; a technician's stream (seven school years) that prepares the students for the technician certificate; and a vocational stream (six school years), which prepares students for a professional qualification. The technical and technician streams will provide access to higher education, whilst completion of the vocational stream allows direct access to professional life. Passage through the lowest track (ESG-P, three school years) is integrated in the ESG and designed for students who experience significant educational difficulties. The preparatory system will allow these students to attend classes in the lower levels of the ESG or to enter the vocational stream (Lenz and Heinz 2018).

In secondary education, grade retention varies with school tracks (Klapproth and Schaltz 2015; MENJE 2018). In the school year 2016/2017, 16.9 % of students within the ESC had repeated at least one grade, whereas within the ESG track 62.4 % of the students had fallen behind (MENJE 2018). Grade repetitions seem relatively common for students within the ESG track, but may be most pronounced for students in ESG-P track (Klapproth and Schaltz 2015). Considering these figures, grade retention is a more common practice in Luxembourg in comparison to other European countries (Eurydice 2011) and can be considered a salient indicator of academic achievement. However, there is consistent empirical evidence that grade retention does not provide positive

outcomes in the mid- and long-term, but rather has a negative and even harmful effect on several school-related behaviours such as psychosocial adjustment (Hattie 2009; Holmes 1989; Jimerson 2001). Retained students are reported to skip more classes and show more negative attitudes toward school in general than their promoted peers. Furthermore, retained students were reported to be more likely to drop out of school (Jimerson 1999; Roderick 1994).

2.3 Luxembourg School Monitoring Programme: Épreuves Standardisées

The Luxembourg School Monitoring Programme Épreuves Standardisées (ÉpStan) assess students' academic competencies, learning motivation and attitudes towards school at the beginning of each learning cycle of compulsory education (i.e., at the beginning of grade levels 1, 3, 5, 7 and 9). Thus, in primary school, the ÉpStan are administered three times (in the first term of cycles 2, 3 and 4 or Grade 1, 3 and 5 respectively) and twice in secondary school (i.e., in Grade 7 and 9). The tests are developed in accordance with the Luxembourgish curriculum by experienced elementary and secondary school teachers under the methodological guidance of scientific staff from the Luxembourgish Centre for Educational Testing (LUCET). In the frame of ÉpStan all students enrolled in public schools following the national curriculum take part, meaning that the ÉpStan are not conducted in private schools or public international schools. The ÉpStan aims at evaluating students' academic achievement against predefined competence standards and as such assess if educational goals from the previous learning cycles have been met. The tests are developed in accordance with the Luxembourgish curriculum by experienced elementary and secondary school teachers under the methodological guidance of scientific staff from the Luxembourgish Centre for Educational Testing (LUCET) (further details may be found on www.epstan.lu). In the grades of interest in the current research, namely Grades 5 and 9, the educational goals defined for the previous learning cycles – cycle 3 for Grade 5 and school years 7 and 8 for Grade 9 – are tested to see whether and to what extent they have been achieved in three areas of competence: German reading comprehension, French reading comprehension and mathematics (Martin et al. 2015).

2.4 Relationship Between Subjective Well-being and Academic Achievement

Results of experimental mood-induction research indicate that positive and negative mood significantly affects how much interest children show for a given task and how they rate the level of difficulty as well as the expected effort they need to apply to solve the task (Edlinger and Hascher 2008; Pekrun 2005). Consequently, academic achievement can be affected by these variables with a potentially different impact at distinct stages of development. A longitudinal study by Gutman und Vorhaus (2012) identified small to medium correlations between dimensions of well-being (emotional, behavioural, social and school well-being) and concurrent and future academic achievement in a cohort of children followed from age 7 to age 13. For example, the authors reported that emotional well-being was predictive of academic achievement in younger children, whereas in secondary education no significant association was found (Gutman and Vorhaus 2012). Kirkcaldy and colleagues (2004) focused on secondary education and explored data issued from 30 countries. They identified a significantly positive association between SWB and PISA competence scores with the strongest correlation being reported for reading literacy ($r = 0.63$).

Considering the reported diversity of definitions and methods when exploring SWB in school, conclusions about the magnitude of the relationship between SWB and academic achievement are mixed. A recent meta-analysis targeted this issue and synthesized 151 effect sizes from 47 studies including 38.946 participants (Bücker et al. 2018). Results indicated a statistically significant small mean effect size (average $r = 0.16$, 95 % CI [0.11, 0.23]), thus confirming the impact of socio-emotional factors on academic achievement. The correlation was stable across various levels of demographic variables (age, gender, country and level of education), different domains of SWB (e.g., academic vs. life in general), different components of SWB (emotional vs. cognitive well-being) as well as alternative measures of academic achievement or SWB. Even though these findings appear robust, the authors concluded that future research should aim to further explore the impact of different dimensions of SWB and to include other potentially relevant moderator variables such as ability level, socioeconomic status and migration background. Furthermore, most of the included studies had focused on secondary and tertiary education, with only 3 % of effect sizes coming from primary school. Considering these limitations and recommendations, the present contribution aims to investigate the relationship between SWB and academic achievement in relation to demographic characteristics, educational level and pathways.

3 Research Question

This contribution investigated the relationship between four distinct dimensions of subjective well-being in school and standardized competence test scores at two different time-points of compulsory education (i.e., Grade 5 – primary education and Grade 9 – secondary education). Grades 5 and 9 were chosen based on the assumption that in these grades, students had been taught in relatively stable class compositions within the same educational setting for at least two years. Additionally, based on developmental perspectives and empirical evidence, we assumed self-perceptions of students in Grade 5 would be more reliable and stable than in earlier grades (Guay et al. 2003; Marsh 1989). Targeted dimensions of SWB included academic self-concept, school anxiety, social inclusion, and emotional inclusion. General academic self-concept and school anxiety have been identified as key components of school related affect and motivation (Gogol et al. 2017), whereas social and emotional inclusion reflect the extent to which students feel accepted and embedded in their classes and school (Venetz et al. 2014). The research aims of the study are twofold:

1. The first aim concerns the levels of SWB in relation to the specificities of the Luxembourgish school system with a high rate of grade retention (Eurydice 2011) and a strongly segmented secondary school system (MENJE 2020). More specifically, the following questions will be addressed:
 - *To what extent do the four dimensions of SWB differ as a function of grade (Grade 5 vs. Grade 9)?*
 - *To what extent does SWB vary between students who did or did not experience grade retention?*
 - *For Grade 9, to what extent does SWB differ between students the different secondary school tracks (ESC vs. ESG vs. ESG-P)?*
2. The second aim of the study concerns the relationship between SWB and academic achievement. In this context the following questions will be addressed:
 - *To what extent do the four dimensions of SWB predict academic achievement after controlling for students' sociodemographic characteristics (gender, migration background, socioeconomic status)?*

Both research questions consider the relationship between academic achievement and SWB. For research question 1, we consider indirect measures of academic achievement (i.e., grade retention and school tracking), whereas for research

question 2, we used actual student performance. Based on research indicating a positive association between academic achievement and SWB (for a review see Bücker et al. 2018), we expected that students that experienced grade retention would report lower levels of SWB, especially in the domain of academic self-concept and school anxiety, than students that did not experience grade retention. Similarly, we expected the SWB of Grade 9 students to be associated with school track, whereby students in the higher tracks would report higher levels of SWB than students in lower tracks.

4 Methods

4.1 Sample

Data was retrieved from the Luxembourgish School Monitoring Programme (Martin et al. 2015) in November 2018, which comprised of an entire cohort of 5th and 9th graders. More specifically, 5159 Grade 5 students and 6279 Grade 9 students were assessed. It is important to note, that this data is of cross-sectional nature (i.e., students in Grade 5 are not the same as in Grade 9). In Grade 9, 28.5 % of the students attended the highest academic track (ESC), 61.6 % attended the intermediary track (ESG), and 9.9 % attended the lowest track (ESG-P). See Table 1 for additional sample characteristics.

For both grades, we identified the group of students that were on regular or advanced paths within the school system and the group of students that was delayed (i.e., students with irregular pathways who experienced grade retention). The student's birth year was used as a proxy for educational path. More specifically, students attending Grade 5, who were born in 2008, were considered to be on regular or advanced pathways, whereas students born in or before 2006 were classified as on irregular pathways. For students born in

Table 1 Sample characteristics by grade for ÉpStan 2018 (own illustration)

	Female	Migration Background	Age		HISEI*
			min–max	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
Grade 5	49.6 %	55.3 %	9–13	10.61 (0.69)	47.92 (16.46)
Grade 9	48.0 %	56.9 %	13–18	14.99 (0.97)	43.87 (17.31)

Note. *Highest International Socio-Economic Index of Occupational Status (Ganzeboom 2010; Ganzeboom and Treiman 1996)

2007, no classification was applied as the dataset only included birth year, which did not allow us to determine if the student was delayed (when born before September 2007) or on a regular path (when born on or after September 1st, 2007). This procedure resulted in the identification of 521 (10 %) Grade 5 students on irregular pathways, with at least one year of grade retention, 2541 students (49 %) on regular or advanced pathways, and 2097 students unclassified (i.e., born in 2007; 41 %). A similar approach was followed for Grade 9, whereby 1637 students (26 %) were identified to be on irregular pathways, with up to three grade retentions, 2223 students (35 %) on regular pathways and 2419 students unclassified (39 %).

4.2 Instruments

4.2.1 Subjective Well-Being

Four indicators of subjective well-being were used (i.e., general academic self-concept, school anxiety, social- and emotional inclusion). Given the extent of the ÉpStan assessment, long forms of scales cannot be considered and hence all constructs were measured on single item scales (for an empirical foundation see Gogol et al. 2014). General academic self-concept, reflecting students' mental representation of their academic abilities (Brunner et al. 2010) was measured with the item: "I am good at most school subjects". To measure experiences of anxiety across school subjects, the item "I am afraid of most school subjects" was used (Gogol et al. 2017). Emotional and social inclusion were measured on the items "I like going to school", and "In my class, we get along well", respectively. Students rated all questions on a 4-point Likert scale ranging from 1 "not at all true" to 4 "certainly true", whereby we used a visual scale in Grade 5 and a verbal scale in Grade 9. Missing responses on these items were recorded for between 2 and 3 % of students in Grade 5, and between 1 and 5 % in Grade 9.

4.2.2 Achievement

The ÉpStan was used to assess students' academic competencies, learning motivation and attitudes towards school. For both Grade 5 and Grade 9, French reading comprehension, German reading comprehension as well as mathematics are assessed. Language tests comprise continuous (i.e., literary or factual texts) and discontinuous text forms (i.e., tables, illustrations or assembly instructions) and focus on the sub-skills of identifying and understanding information presented in a text as well as analyzing texts. The Mathematical tests comprises tasks, which are presented in a decontextualized and/or contextualized way

and designed to be as language free as possible. In Grade 9 three different test versions with different difficulty levels are available depending on the academic track students are enrolled in. Tests in different tracks were equated using common items and Rasch parameters were jointly estimated for all tracks. This means that test scores from students in different tracks are on the same scale and can be compared directly even though they completed partially different tests (Martin et al. 2015).

4.2.3 Student Background Variables

Within the ÉpStan assessment, students (in Grades 5 and 9) and parents (only in Grade 5) were asked to complete a questionnaire concerning the students' socioeconomic family background among other variables. The parental occupational status is defined by the International Socio-Economic Index of Occupational Status (Ganzeboom 2010; Ganzeboom and Treiman 1996). The values of this index vary from 10 to 89 (ISCO-08) or 16 to 90 (ISCO-88) and are based on information regarding the professional occupation of parents. The higher the value of these variables, the higher the socioeconomic status of the family. For each student, the occupation of either mother or father was used, whichever reflected the highest status. Regarding migration background, students whose parents were both born in a country other than Luxembourg were considered having a migration background, regardless of their own country of birth.

4.3 Data Preparation and Analysis

To compare students' subjective well-being across grades, educational paths (regular vs. irregular) and secondary school tracks (ESC vs. ESG vs. ESG-P), two mixed model analyses were conducted. This type of analysis allows for the comparison of means of different groups on multiple outcome variables at the same time (akin to a multivariate analysis of variance or MANOVA) while accounting for the fact that the observations of students belonging to the same class may not be independent in the statistical sense. Academic self-concept, school anxiety, social inclusion, and emotional inclusion were included as related dependent variables whereby we investigated mean differences based on grade and educational path (Model 1) or secondary school track (Model 2). To test for group differences in detail, we then employed multiple comparisons based

on the estimated models. To address our second research question, investigating the relationship between SWB and school achievement, we first modelled a latent factor of academic achievement through confirmatory factor analyses (CFA) using the *ÉpStan* scores of the three competency tests (German and French reading comprehension, mathematical ability). Using this procedure, one achievement factor was detected explaining 65 % of the shared variance in Grade 5 (factor loadings ranging from 0.74–0.85) and 69 % in Grade 9 (factor loadings ranging from 0.80–0.85). We calculated factor scores that capture this common variance for each student and used these scores as the measure for academic achievement. For this variable, 3 % of students had missing data in Grade 5 vs. 8 % in Grade 9. The latter, comparatively high, number is explained by the fact that not all tests were administered to all students in all domains in Grade 9. We then used step-wise regression analyses, which is a statistical procedure that identifies the relationship between variables after controlling for others and allows for the estimation of one (criterion) variable based on different levels (or values) of the other (predictor) variables. More specifically, we used step-wise regression to predict academic achievement by academic self-concept, school anxiety, social inclusion, and emotional inclusion after controlling for student background variables (gender, parents' occupational status and migration background). As in the analyses discussed above, the lack of statistical independence resulting from the clustered data had to be considered. In this case, we corrected the standard errors estimated in the step-wise regression.

For all analyses we employed multiple imputation under a mixed model in order to deal with missing data. In this procedure, a statistical model is estimated that quantifies the relationships between all variables. Based on this model missing data points are filled in with “plausible” values – not once, but multiple times, creating multiple mostly identical datasets that differ only where previously data was missing. The analyses are then performed using each of these datasets and the results are combined in a way that considers the added insecurity introduced by the missing data.

The analyses described above were performed using R version 4.0.3 (R Core Team 2020) with the packages *mitml* (Grund et al. 2019), *mitools* (Lumley 2019), *jomo* (Quartagno and Carpenter 2020), *lme4* (Bates et al. 2015), *jtools* (Long 2020), *multcomp* (Hothorn et al. 2008), *emmeans* (Lenth 2020), and *survey* (Lumley 2004).

5 Results

5.1 Differences in Subjective Well-being in Relation to Specificities in the School System

To test for differences in SWB in relation to grade and educational pathways, Grade (5 vs. 9) and educational pathway (regular vs. irregular) were entered as factors to compare the four dimensions of SWB. Mixed model results showed statistically significant differences in SWB based on grade, $F(8, 121,164) = 180.61$, $p < .001$, as well as educational pathway, $F(8, 63,989) = 17.75$, $p < .001$. The interaction of grade \times path was significant as well, $F(7, 94,621) = 189.10$, $p < .001$ (see Table 2 for descriptive statistics). Post-hoc tests revealed significant main effects for grade on all dimensions of SWB (academic self-concept, $z = 17.50$, $p < .001$; school anxiety, $z = -16.90$, $p < .001$; social inclusion, $z = 7.60$, $p < .001$, and emotional inclusion: $z = 17.50$, $p < .001$). For all four dimensions, students in Grade 5 reported higher SWB than students in Grade 9. More specifically, students in Grade 5 reported significantly higher levels of perceived academic self-concept, social- and emotional inclusion and lower levels of school anxiety compared to students in Grade 9 (see Fig. 1).

Similarly, univariate results for educational pathway indicated significant differences for all dimensions of SWB. More specifically, students on regular pathways reported significantly higher levels of academic self-concept ($z = 7.30$, $p < .001$), as social inclusion ($z = 3.71$, $p = .001$), and emotional inclusion ($z = 2.54$, $p = .006$, and lower levels of school anxiety ($z = -6.97$, $p < .001$) compared to students that had repeated one or more grades (see Fig. 2).

In the second mixed model analysis, secondary school track (ESC vs. ESG vs. ESG-P) was entered as factor and the four dimensions of SWB as dependent variable. Results of this analysis, including students in Grade 9 only, showed that SWB varied as a function of school track, $F(2, 40,219) = 15.71$, $p < 0.001$ (see Table 2 for descriptive statistics). The interaction term between dimension and school track was significant, indicating that the school track effect was not uniform across SWB dimensions, $F(6, 14,339) = 34.29$, $p < .001$. Post hoc analyses (Tukey) revealed that perceived SWB decreased with school track. That is, for all four dimensions, students in ESC reported significantly higher levels of SWB compared to students in other tracks ($p = .001$ for all comparisons). Furthermore, students in ESG reported significantly higher levels of SWB compared to students in ESG-P (p ranging from $< .001$ to $.019$; see Fig. 3).

Table 2 Descriptive statistics for the dimensions of subjective well-being as a function of grade, educational pathway and school track (own illustration)

Model 1	N	Self-concept			Anxiety			Social Inclusion			Emotional Inclusion		
		Grade 5	Grade 9	Total	Grade 5	Grade 9	Total	Grade 5	Grade 9	Total	Grade 5	Grade 9	Total
		M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Regular Path	4596	3.44 (0.61)	2.99 (0.69)	3.23 (0.69)	1.32 (0.70)	1.80 (0.87)	1.54 (0.82)	3.31 (0.77)	3.14 (0.83)	3.23 (0.81)	3.19 (0.90)	2.77 (0.95)	3.00 (0.94)
Irregular Path	1997	3.25 (0.72)	2.82 (0.73)	2.93 (0.75)	1.52 (0.84)	1.95 (0.93)	1.84 (0.93)	3.24 (0.86)	3.01 (0.86)	3.07 (0.86)	3.17 (0.96)	2.70 (1.00)	2.82 (1.01)
Total	6693	3.41 (0.63)	2.92 (0.71)	3.14 (0.72)	1.36 (0.73)	1.86 (0.90)	1.63 (0.87)	3.30 (0.79)	3.01 (0.84)	3.18 (0.83)	3.19 (0.91)	2.75 (0.97)	2.94 (0.97)
Model 2													
ESC	1734		3.00 (0.67)			1.72 (0.81)				3.23 (0.76)			2.88 (0.89)
ESG	3643		2.89 (0.71)			1.89 (0.90)				3.05 (0.85)			2.69 (0.98)
ESG-P	526		2.80 (0.86)			2.01 (1.02)				2.84 (0.99)			2.56 (1.08)
Total	5903		2.91 (0.72)			1.85 (0.89)				3.09 (0.84)			2.74 (0.97)

Note. Data in grey reflect non-significant differences between groups.

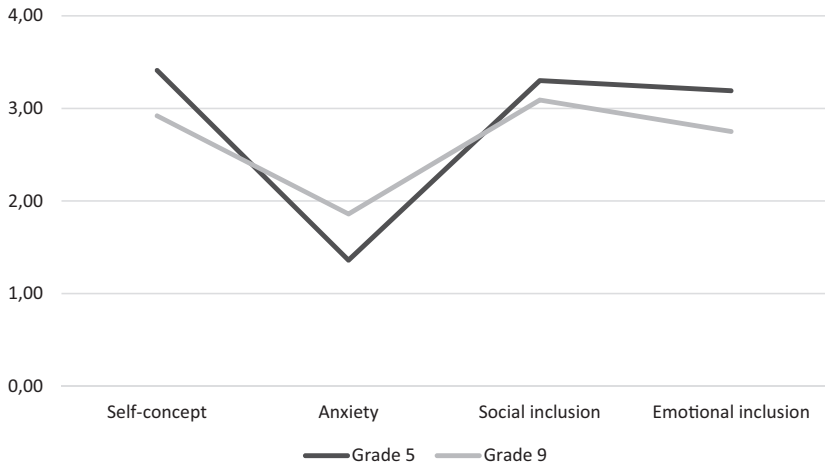


Fig. 1 Dimensions of SWB in relation to school grade (Grade 5 vs. Grade 9) (own illustration)

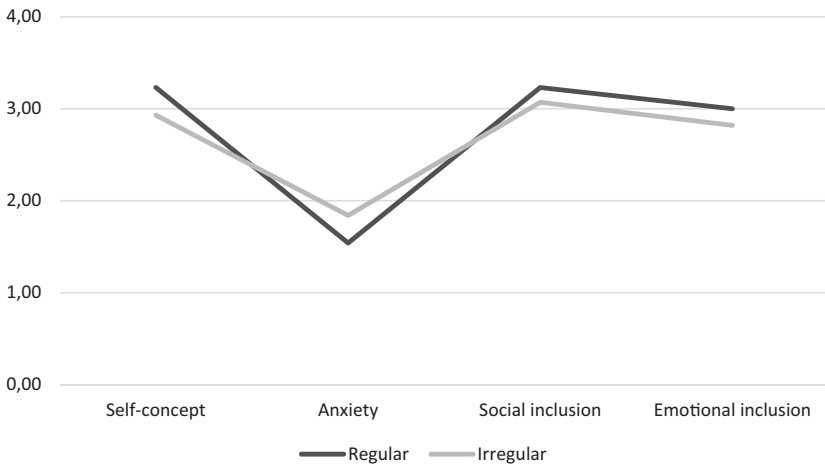


Fig. 2 Dimensions of SWB in relation to educational pathway (regular vs. irregular) (own illustration)

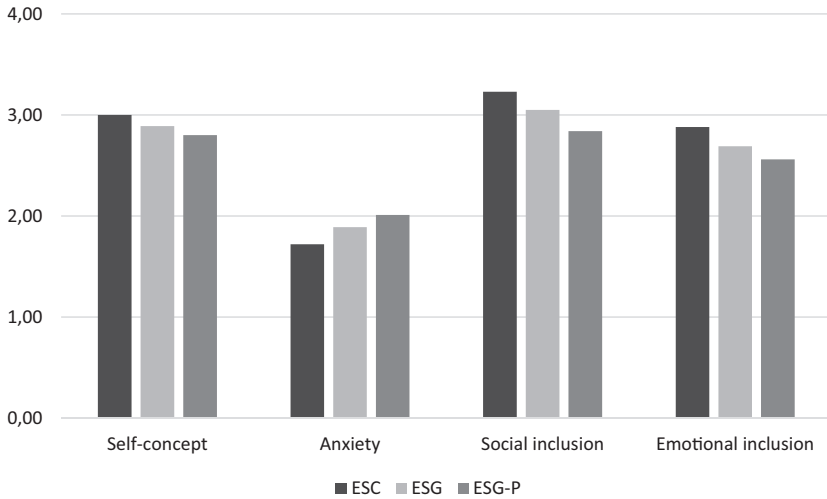


Fig. 3 Dimensions of SWB in relation to school track (ESC vs. ESG vs. ESG-P) (own illustration)

5.2 Predictive Value of Subjective Well-being

To test the relationship between SWB and academic achievement we conducted a step-wise regression analysis for each grade. In the first step, we entered demographic characteristics (i.e., gender, migration background and HISEI) as predictor variables (Model 1). In a second step, we added the four dimensions of SWB (Model 2). Results indicated that 14 % and 18 % of variance in academic achievement in Grade 5 and Grade 9 respectively, could be predicted by demographic characteristics. For both grades, the four dimensions of SWB explained a significant additional proportion of variance. In Grade 5, only the dimensions school anxiety and academic self-concept significantly contributed to the prediction, whereas in Grade 9 all four SWB dimension did (see Table 3).

Table 3 Results from predicting academic achievement through subjective well-being (own illustration)

Variables	Grade 5 ($N = 4990$)		Grade 9 ($N = 5783$)	
	Model 1	Model 2	Model 1	Model 2
	β	β	β	β
Gender	0.08**	0.10***	0.07	0.08
Migration Background	-0.14***	-0.07*	-0.17***	-0.15***
HISEI	0.34***	0.30***	0.40***	0.37***
Academic self-concept		0.20***		0.12***
School anxiety		-0.10***		-0.11***
Social inclusion		0.01		0.04*
Emotional inclusion		0.01		0.06***

Note. For Grade 5, $R^2 = .13$ for Step 1 ($p < .001$); $\Delta R^2 = 0.06$ for Step 2 ($p < .001$); For Grade 9, $R^2 = .19$ for Step 1 ($p < .001$); $\Delta R^2 = .04$ for Step 2 ($p < .001$); * $p < .05$; ** $p < .01$; *** $p < .001$

6 Discussion

This contribution aimed at investigating dimensions of subjective well-being in relation to students' educational pathways and academic achievement. Drawing on representative full cohort data from the Luxembourg School Monitoring Programme "Épreuves Standardisées" 2018, results indicated subjective well-being to be higher in Grade 5 than in Grade 9, to be lower when students experience grade retention as well as in less prestigious secondary school tracks, and to predict a significant amount of variance in academic achievement.

Grade 5 students reported significantly higher levels of perceived academic self-concept, social- and emotional inclusion and lower levels of school anxiety compared to Grade 9 students. These results are in line with the conclusions by Hascher und Edlinger (2009), that SWB varies per school setting and that initial positive feelings toward school may decrease over time (i.e., the longer students are in the school system). In combination with the results of our hierarchical regression analyses, which suggest the relationship between SWB and achievement remains relatively constant between grades, the decrease of SWB appears worrisome. The absence of the moderating effect of grade is in line with the results of the meta-analysis of Bückner and colleagues (2018). However, although the meta-analysis also failed to detect a moderating effect of SWB

dimensions, our results suggest differential effects of SWB dimensions between grades. Although in Grade 5, only academic self-concept and school anxiety were related to achievement, in Grade 9 all four dimensions of SWB significantly contributed to the explanation of variance in achievement. Hence, whilst SWB decreases with age, the impact of the different dimensions on achievement becomes more visible. It should be noted however, that in the meta-analysis, the vast majority of effect sizes came from secondary and higher education with (much) older students, with only a small percentage of studies conducted in primary. This may have resulted in a different comparative framework as in the current study.

Students, who experienced grade retention, reported lower academic self-concept and social inclusion, as well as higher school anxiety, replicating previous findings that demonstrated a rather negative effect of grade retention (Hattie 2009). In the present study, retained students gave lower ratings of social inclusion, indicating that they perceived the students within their class to get along less well than students on a regular pathway. As students may experience grade retention repeatedly (up to three years by Grade 9), social inclusion may become increasingly challenging given the widening of the age gap and associated differences in developmental maturity in relation to their peers (A. J. Martin 2009). Consequently, the current study contributes to the growing body of evidence showing an association between grade retention and SWB. In line with previous findings, our results indicate that lower achieving students may develop negative attitudes toward school (e.g., Gogol et al. 2017; Van Houtte 2006), which in turn may affect their school engagement and hence long term educational success (Jimerson and Ferguson 2007; A. J. Martin 2011; Roderick 1994).

Results further showed that for Grade 9 students perceived SWB decreases with school track. Students attending the more prestigious ESC track reported significantly higher levels of SWB compared to students in other tracks. Especially students registered with the preparatory scheme (ESG-P) may be vulnerable when it comes to academic and socio-emotional wellbeing as they provided significantly lower ratings for all four dimensions of SWB. In line with the conclusions by Belfi and colleagues (2012), who reported that ability-grouped classes had a positive impact on the school well-being of high-performing students, whereas the contrary was observed for weaker students, our results also imply that there is a cumulative (dis)advantage (i.e., high performance leads to more opportunities for future success and increased SWB, whereas lower performance relates to reduced opportunities and in turn less change of future

success and decreased SWB). In line with prior (national) research on performance differences between academic tracks (see e.g., Keller et al. 2012, 2013), the present study thus provides further evidence for the presence of a so-called Matthew effect (Merton 1968) in the national secondary educational system.

7 Limitations and Implications

This research drew on cross-sectional data from large-scale assessment in 2018. Therefore, when comparing Grade 5 and Grade 9, it is important to note that these are not the same students followed longitudinally, but rather two different cohorts. An implicit assumption of the present paper is, that Grade 5 anno 2018 and Grade 9 anno 2018 are identical in their functioning and composition, and thus comparable. This assumption is supported by the fact that we are working with population data, and that the birth years of both cohorts remain relatively close. In addition, due to the lack of students' birth month, several students remained unclassified regarding their school path. Whilst this approach increased certainty in correct classification and contrasted the groups of interest, for future research, a replication and extension of the present findings with longitudinal data seems desirable. Longitudinal data may also allow for a more comprehensive comparison to further elaborate the decline in SWB to a finer distinction and considering an even more precise level of retention.

Future research should also consider the relationship between students and teachers as it was reported to influence students' sense of belonging at school (OECD 2017). In general, current educational research (in Luxembourg) is very much input/output-focused. To gain a better understanding of the educational processes and the students' educational paths, research should also focus on the interaction processes between students, their peers, and their teachers and their impact on their academic and non-academic development (Jennings and Greenberg 2009).

8 Conclusion

From an international perspective, the results of the present study contribute to the growing empirical body of knowledge on grade retention and early tracking as prominent yet questionable pedagogical interventions to target students in need of support. Whereas most studies on the aforementioned educational mechanisms focus on academic outcomes (i.e., school grades, diploma, results in standardized

achievement tests), the current study shows their impact on socio-emotional well-being is considerable and should not be neglected. From a national perspective, the results of this study are critical new pieces of information, which could inform an already ongoing discussion on how to complement or replace existing, generic mechanisms of diversity management (i.e., performance grouping and grade retention) through more specific, genuinely pedagogical interventions (Fischbach et al. 2016; Martin et al. 2015; Wrobel et al. 2013). Such discussion could lead to the adaptation of school and education to an increasingly heterogeneous student population in a continued attempt to ultimately reduce educational inequalities.

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