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Governing Board

THE PISA HAPPY LIFE DASHBOARD: VISUALISING KEY INDICATORS ON STUDENT WELL-BEING FROM THE PISA SURVEY

Exceptional meeting of the PISA Governing Board

19 March 2024
Virtual conference

This cancel and replace version of the document corrects the year of the meeting as stated on the cover page to "2024". No other modifications were made.

Andreas Schleicher, Director for Education and Skills and Special Advisor on Education Policy to OECD's Secretary-General (andreas.schleicher@oecd.org)

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Abstract

Students are much more than their grades. Beyond performing well in school, students must learn to manage relationships with their teachers, peers and family, confront stress, find purpose in what they do, and deal with a series of factors oftentimes beyond their control – all of this, during a particularly sensitive period of their lives. How they do across all these dimensions of life shapes their well-being – which in turn affects their school performance and their life outcomes beyond school.

In the aftermath of the COVID-19 pandemic, the imperative for schools and the education system at large to prioritise student well-being has become more pronounced. This paper introduces a novel dissemination tool at the OECD aimed at presenting the key PISA indicators on well-being in a user-friendly format. Based on internationally validated data, the Happy Life Dashboard seeks to offer policy makers, educators, parents, and other stakeholders a comparative perspective on how well schools are fostering the essential foundations for students to lead fulfilling lives.

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1. Introduction

How can we measure how well students are doing? The first answer that comes to mind is to check their grades in classroom assignments or on standardised tests. When a student performs well at school, it is generally seen as a sign of a successful education system, and people expect them to succeed in the future too. But students are more than just their grades. Only looking at how well they do in school does not tell the whole story about their success in education.

Even parents agree: when asked about their hopes for their children, some mention 'achievement' or 'success', but most emphasise 'happiness', 'confidence', 'friends', 'health', and 'satisfaction' (Seligman et al., 2009[1]; The Children's Society, 2015[2]; OECD, 2015[3]). Parents also consider school safety and a pleasant environment when choosing a school for their child. In a nutshell, they prioritise their children's well-being. Education policy makers are similarly recognising the importance of focusing on the overall development of children, not just their academic performance.

Research has highlighted the importance of student well-being as an indicator of the quality of current life and, at the same time, as a predictor of future success (e.g. (Richards and Huppert, 2011[4])). Empirical studies show that performance in standardised assessments explains only a fraction of how well students will do in life (Sternberg, 1995[5]; Stankov, 1999[6]). Success in life depends in fact on a wider set of personal attributes that are only partially correlated with test scores: among others, motivation, perseverance, community spirit and belief in one-self are essential ingredients, though far more difficult to measure, particularly in an international context (OECD, 2013[7]).

Over the years, PISA has amassed a substantial volume of data pertaining to students' well-being. This wealth of information serves a crucial role in providing context and insights into the variations in cognitive test performance, both at the national and international levels. However, media attention tends to focus only on performance rankings, even if the true potential of PISA in informing effective policy making lies in paying attention to the diverse array of outcomes it measures.

Recognising the importance of students' well-being and taking stock of prior initiatives, the Secretariat established a communication tool referred to as the PISA Happy Life Dashboard (HLD). Leveraging data from the published PISA database, the HLD provides user-friendly access to information on nine crucial topics (or dimensions) that are vital for students' overall life quality. These insights are presented through interactive and intuitive graphs, allowing users to explore them easily.

The aim of this paper is to explain the HLD in the body of literature on students' well-being, as well as present its methodology in detail. The paper is organised as follows: Section 2 offers a brief overview of the literature on the relevance of student well-being, presents prior definitions of the construct and describes a few notable examples of initiatives aiming to measure well-being. Section 3 presents the HLD, including its theoretical underpinnings, data sources, methodology in treating the data, and current limitations. Section 4 concludes the paper.

2. Well-being: what is it and how can it be measured?

Recent years have been characterised by a renewed focus on the topic of well-being – and of student well-being in particular. Research has highlighted the close relationship between well-being and academic performance: students who enjoy better levels of well-being also tend to display better performance in the classroom (Kaya and Erdem, 2021[8]; Lyons and Huebner, 2015[9]).

Gutman and Vorhaus (2012[10]) conducted a study examining the correlation between the well-being of students aged 7, 10, and 13 and their concurrent and subsequent educational outcomes. Among their key findings, they highlighted that students with higher well-being levels tend to achieve better academically and exhibit greater engagement with school. The authors noted that the relevance of well-being, particularly emotional and behavioural aspects, in explaining variations in school engagement increases as students progress in their educational journey, while the explanatory role of students' characteristics (e.g. gender, family background) decreases.

On the other hand, Govorova and colleagues (2020[11]) analysed data from PISA 2015 to explore which components of well-being most significantly impact academic performance. Their findings show that the cognitive aspect of well-being (including enjoyment of science, self-efficacy, instrumental motivation, test anxiety) consistently correlates with students' performance across all considered countries. The authors observed a limited capacity of schools to positively influence students' well-being, speculating that this might result from inadequate integration of socio-emotional education and limited time allocated for non-academic aspects in curricula (Govorova, Benítez and Muñiz, 2020[11]).

Several other studies have delved into the relationship between well-being and academic outcomes. A meta-analysis by Bücker and colleagues (2018[12]), encompassing 47 studies, generally supports a positive and statistically significant (albeit of small to medium effect size) connection between subjective well-being and academic performance. The authors found this relationship to persist even after accounting for various demographic variables (e.g. age, gender) and considering different domains of subjective well-being along with varying measures of academic achievement. In a more recent overview, Lindorff (2020[13]) also summarises international studies on student well-being and academic performance, similarly concluding that while evidence of the link exists, its strength is moderate. The relationship between academic performance and student well-being is likely bidirectional; just as well-being impacts academic performance, the reverse has also been observed (Tobia et al., 2018[14]; Ng, E. Huebner and J. Hills, 2015[15]).

Layard and colleagues (2014[16]) highlight that a child's emotional health and conduct are the most potent childhood predictors for adult life satisfaction, with academic performance being the weakest among those considered. Lindorff (2020[13]) reports that improved student well-being can lead to increased concurrent and future engagement with school, support smoother transitions between primary and secondary education, and be associated with students achieving higher levels of education compared to their parents. She also investigates the potential impact of whole-school initiatives promoting student well-being, finding solid evidence that such programs can positively contribute to students' mental health, self-esteem, and motivation, as well as help reduce dropouts.

The overall school environment plays a crucial role in shaping various aspects of students' lives: alongside non-school-related factors, it contributes to determining their current well-being (García Bacete et al., 2014[17]) (OECD, 2017[18]; OECD, 2019[19]; Lindorff, 2020[13]; Cárdenas et al., 2022[20]). Given the profound influence of schools on student well-being and the implications for their lives, it is crucial to measure well-being as comprehensively and reliably as possible. Better metrics help identify areas for

improvement, such as aspects of students' well-being that schools might need to focus on more attentively, understand existing best practices, and generally inform and support the creation of positive learning environments that foster well-being and balanced growth.

This increased attention towards measuring and supporting well-being becomes particularly important after the widespread shutdown experienced by learning institutions during the COVID-19 pandemic. While the internet facilitated online classes and maintained some degree of connectedness, learners worldwide were mostly deprived of in-person interaction with their peers and could not rely on the full support of their teachers – sometimes at crucial junctures in their school and personal lives. This exceptional situation created several additional challenges for both teachers and learners, impacting not only their learning but also their well-being (Ortega Pacheco and Barrero Toncel, 2022[21]; Mazrekaj and De Witte, 2023[22]).

Measuring student well-being poses several challenges, starting with the absence of a universally agreed-upon definition. In a recent scoping review, Hossain, O'Neil, and Strnadová (2022[23]) emphasise that student well-being is generally seen as a multidimensional concept. Despite this shared understanding, researchers adopt different conceptualisations, leading to diverse sets of domains and indicators. Even when similar domains are chosen, they often get labelled differently. Consequently, the body of evidence on student well-being is fragmented, making it challenging to effectively use research findings in promoting well-being in schools – whether through developing new policies and programs or evaluating existing ones (Hossain, O'Neill and Strnadová, 2022[23]).

When defining student and adolescent well-being, it is crucial to recognise the differences between these populations and adults, who have been more extensively studied. Dimensions of well-being relevant to adults, such as job satisfaction and work-life balance, may not apply to students or require adaptation. Additionally, some unique dimensions may need consideration to reflect priorities specific to adolescence and better assess students' satisfaction with life. For instance, attention to students' feelings of connectedness with peers or exploring their relationships with parents/guardians and teachers is essential (The Children's Society, 2015[2]; OECD, 2019[19]). Therefore, a framework for assessing student well-being cannot simply adopt existing models crafted for adults or the general population.

The second challenge involves the measurement process itself, stemming from the inherent difficulty in directly observing well-being. Studies on student well-being often depend on self-reports. While these instruments offer the advantage of being cost-effective for large-scale administration and adaptable to the specific study's well-being definition, they come with potential biases that may compromise the reliability and comparability of the collected information. Notable biases include social desirability (where students respond based on socially acceptable norms), response-style (such as extreme responses, modesty, etc.), and reference group bias (influence from the comparison group). Students may also feel disengaged with the questionnaire and use strategies like straight-lining or rushing through it, resulting in missing or unreliable information. Additionally, cultural differences significantly influence how students perceive themselves and respond to well-being-related questions, given the subjective nature of the topic. This underscores the importance of approaching cross-country comparisons with caution and considering cultural nuances to ensure meaningful interpretations.

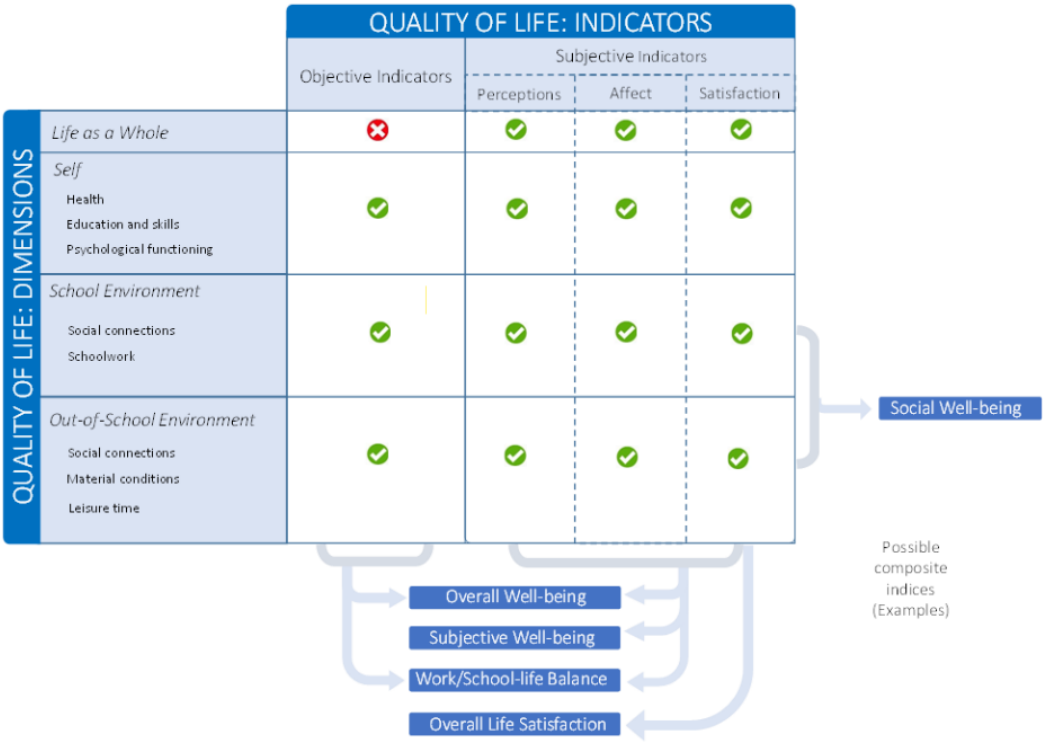
PISA has previously worked on defining and measuring student well-being: the *Framework for the Analysis of Student Wellbeing in PISA 2015* (Borgonovi and Pál, 2016[24]), for example, considers student well-being as "*a dynamic state characterised by students experiencing the ability and opportunity to fulfil their personal and social goals. It encompasses multiple dimensions of students' lives, including: cognitive, psychological, physical, social and material. It can be measured through subjective and objective*

indicators of competencies, perceptions, expectations and life conditions". This definition recognises well-being as a complex and multifaceted construct, identifying five distinct dimensions. Each dimension serves as both an enabling factor for the others and is directly influenced by them.

Borgonovi and Pál (2016) provide detailed explanations of each dimension and suggest indicators for measurement, drawing on information from the main PISA survey and questionnaires (including those completed by students, school principals, and parents, as well as educational career questionnaires). For instance, the cognitive well-being dimension includes not only students' subject-specific academic skills measured in the PISA test but also their self-perceived capacity to learn and their general attitude towards school (Borgonovi and Pál, 2016[24]). In presenting the actual findings of PISA 2015 on student well-being, a slightly simplified version of the framework defines well-being as the '*psychological, cognitive, social, and physical functioning and capabilities that students need to lead a happy and fulfilling life*' (OECD, 2017[18]). While removing the mention of a material dimension of well-being, this definition aligns with Borgonovi and Pál's proposal (2016[24]).

Building on the initial attempt to measure student well-being, PISA 2018 broadened the range of questions related to well-being. This update provides fresh insights into students' happiness regarding both their school and personal lives. The PISA 2018 *Well-Being Framework* (OECD, 2019[19]) maintains a multidimensional perspective on well-being, acknowledging its subjective and objective components. To reflect this, the framework adopts a modular approach that categorises indicators into types (objective and subjective, encompassing perceptions, affect and satisfaction) and main dimensions (self, school environment, out-of-school environment, life as a whole). Each main dimension includes sub-dimensions, as illustrated in Figure 1. The resulting cells generate potential composite indicators for reporting on policy-relevant areas, such as subjective well-being, social well-being, or school-life balance.

Figure 1. The PISA 2018 Well-Being Framework



Source: *PISA 2018 Assessment and Analytical Framework*, Chapter 8 (OECD, 2019[19]).

PISA 2018 incorporated an improved set of questions in the main student questionnaire. Additionally, an optional well-being questionnaire delved into the topic more comprehensively, addressing aspects such as self-evaluation of health, reporting of height and weight, body image, and inquiries about relationships with peers and parents, as well as students' happiness with various activities on their typical day.

In this work, PISA has adopted a comprehensive perspective on student well-being by combining a developmental approach, emphasising the importance of ensuring skill development to influence future opportunities, with a children's right view that emphasises the right of all children to have a happy life "here and now". The evaluation of students' well-being must be sensitive to both their actual states and achievements ("functioning") and the freedom they have ("capabilities") to pursue what they value in life (Sen, 1999[25]).

The HLD builds upon the groundwork laid in PISA 2015 and 2018. Leveraging the latest student questionnaire, it broadens the domains considered within its well-being framework while largely maintaining continuity with its predecessors. The Dashboard consolidates a comprehensive view of student well-being on a single webpage, enhancing accessibility for end users, including teachers, parents and educational policy makers. Section 3 of this paper provides in-depth insights into the framework supporting the HLD, detailing how the information is organised and presented.

2.1. Measuring well-being: notable initiatives

The HLD also borrows inspiration from already-existing initiatives that measure well-being of several target populations.

2.1.1. Bhutan's Gross National Happiness Index

Bhutan is a land-locked country in the Eastern Himalayas with a population of around 727 000 people. In the 1970s, Bhutan was the first country to propose the use of gross national happiness as an alternative for the more traditional measure of gross domestic product (GDP). This concept is rooted in the idea that happiness can be achieved through a holistic approach to life – one that integrates economic development with non-monetary aspects of life, such as spiritual wellbeing, work-life balance, and more (Karma Ura et al., 2022[26]). The country has since promoted the achievement of happiness as a key national policy: in 2010, 2015 and, most recently, 2022, Bhutan measured its progress through the so-called Gross National Happiness Index (GNHI). According to the latest *GNH Index Report*, the index is instrumental to achieving three key purposes: measuring holistic progress, informing decision making and contributing to transparency and accountability.

Bhutan's GNHI conceptualises happiness according to nine key domains which capture the multidimensional nature of wellbeing[1]. Each domain is informed by a series of indicators (33 in total, see Figure 2). Information to compile the GNH Index is collected through a standardised questionnaire, administered to a representative sample through Pen-and-Paper Personal Interviewing or Computer Assisted Personal Interviewing (Karma Ura et al., 2022[26])[2].

1 Several other indexes with a similar design to the Buthan one have been proposed in the last decades. The best known is the UNDP's Human Development Index (HDI) (UNDP 1990–2004). Others include the Physical Quality of Life Index (PQLI) (Morris, 1978[154]), the Combined Quality of Life Indices (CQLI) (Diener, 1995[155]), and the Human Suffering Index (HSI) (Camp and Speidel, 1987[157]) (Tilak, 1992[158]) (Hess, 1989[159]). Also included in these indexes are United Nations Research Institute for Social Development (UNRISD) Level of Living Index (LLI) (Drewnowski and Scott, 1966[160]), General Index of Development (GID) (McGranahan et al., 1972[177]), and Socioeconomic Development Index (SDI) (UNRISD 1970). The designers of these indexes typically emphasise that there is more to well-being enhancement than material enrichment, and therefore often combine what might be loosely termed 'economic' and 'non-economic' well-being indicators. In some instances, the indexes are intended to serve as alternative or competing indexes to traditional income-based measures, and therefore include noneconomic variables only.

2 The index is computed using the Alkire-Foster method, which is usually implemented to assess poverty across multiple dimensions. Each GNHI indicator has an established happiness sufficiency cut-off and is assigned a weight: to construct the index, it is first assessed whether each interviewee can be classified as achieving sufficiency (i.e. being happy, corresponding to a score of 1) or not (score of 0) on each of the 33 indicators. The overall sufficiency score of each person is then calculated by multiplying the sufficiency level with each indicator's weight, and then summing them. Second, it is established whether, overall, each interviewee should be classified as "happy" or "not-yet-happy": this is done based on a cut-off of 66%, i.e. the individual needs to achieve sufficiency in at least six of the nine domains, or in 66% of the 33 weighted indicators. Finally, the GNHI summarises the national level of happiness of the Bhutanese people by summing the incidence of sufficiency (i.e. share of happy people) with the product of the incidence of deprivation (i.e. share on not-yet-happy people) and the average sufficiency score among not-yet-happy individuals: this allows to express the level of national happiness as a value between 0 and 1, with a higher score indicating better wellbeing (Karma Ura et al., 2022[26]).

Figure 2. Bhutan's Gross National Happiness Index

Source: *Bhutan Gross National Happiness Report 2022*, p.9 (Karma Ura et al., 2022[26])

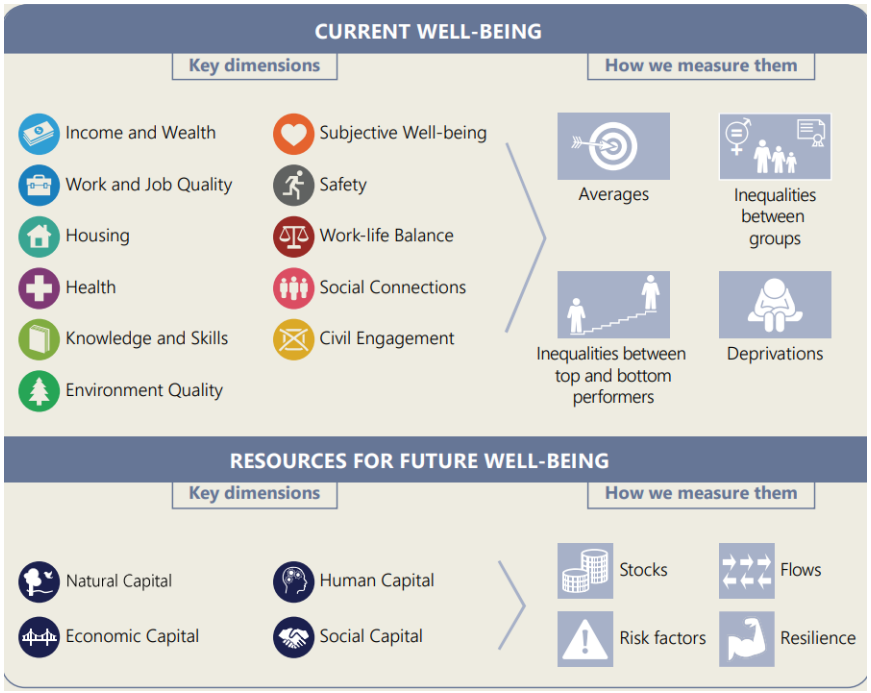
2.1.2. OECD Better Life Initiative: the How's Life framework and the Better Life Index

The Better Life Initiative, curated by the OECD Centre on Well-being Inclusion, Sustainability and Equal Opportunity (WISE), aims to better understand what contributes to well-being, to develop metrics to assess it internationally and to provide analyses that can inform policies to achieve better well-being. The Better Life Initiative produced the *How's Life* framework to measure well-being, and an interactive data visualiser called Better Life Index.

First formulated in 2011, the *How's Life* framework (see the most recent iteration in Figure 3) conceptualises well-being as composed by 11 dimensions, falling under two broad headings, which together serve to measure and describe individual well-being: material conditions (i.e. all of those factors that are related to market transactions, such as wealth and housing), and quality of life (i.e. non-market factors that are important to determine quality of life, such as health status, education or security). Additionally, the framework considers the element of sustainability of well-being in time, which is recognised as tied to four forms of capital – namely, natural, economic, human and social (OECD, 2011[27]). The *How's Life* report is regularly released to provide an updated picture of well-being across the OECD member and partner countries; acknowledging that national averages tend to mask inequalities, the report studies distribution of well-being by taking into account three types of inequality – namely, gaps between population groups, gaps between those at top and bottom of the achievement scale in the dimensions considered, and deprivations.

While the underlying framework is retained across the different editions, new indicators are also added with each release, so that the report can grow more comprehensive and better capture the nuances of life quality. In its most recent edition, the report provided evidence from a set of over 80 indicators.

Figure 3. The How's Life Well-Being Framework



Source: *How's Life? 2020. Measuring well-being* (OECD, 2020[28])

The aim of the Better Life Index is to allow users to easily compare well-being across the 38 OECD member countries according to the 11 key topics identified in the framework. Each topic comprises between one and four specific indicators, for which results can be compared between men and women, as well as by socio-economic status of the respondents. The indicators have been selected based on a series of statistical criteria, data quality and a process of consultation with OECD member countries. The Index uses data from a variety of well-reputed sources, such as the OECD, National Accounts, United Nations Statistics and the Gallup World Poll.

To compute a country's/economy's score on a given topic, the scores on the indicators that make up the topic (between one and four) are normalised, and then averaged with equal weights. Users can customise the overall Index by assigning different weights to each of the11 topics, and thus observe how countries/economies shift in their relative rankings when given topics are highlighted instead of others. Figure 4 illustrates the default settings for the BLI: each flower represents a country/economy. The petals stand for the different topics: their length symbolises the score on the topics, while their width is determined by the weight assigned by the user through the mixer tool on the right-hand side of the interface.

Figure 4. The interactive dashboard of the Better Life Index

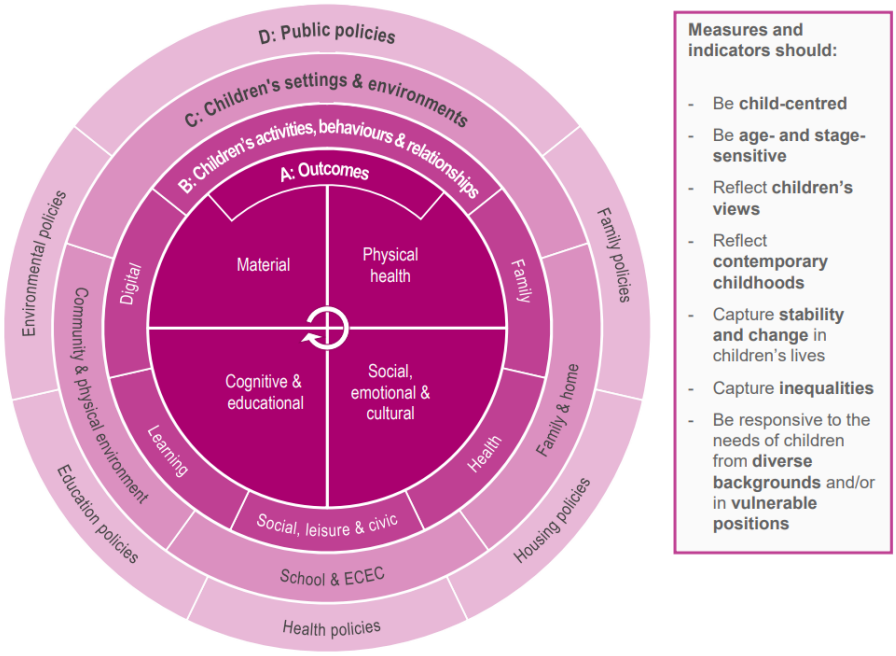
Source: OECD Better Life Index webpage. Available at: OECD Better Life Index

2.1.3. OECD Child Well-Being Dashboard

The OECD Child Well-Being (CWB*)* Dashboard is also the result of research conducted by WISE Centre. However, the scope of this Dashboard is focused on the well-being of children, rather than on the general population of OECD member countries as in the case of the BLI.

The OECD's *Child Well-being Measurement Framework* (OECD, 2021[29]) adopts a multidimensional approach: it measures children well-being outcomes through 20 indicators, organised in four key areas (material outcomes, physical health outcomes, cognitive and educational outcomes, and socio-emotional outcomes). It also includes data on potential drivers of children well-being through other 18 indicators, covering the four areas of home and family life, life at school and in early childhood education and care, social life/life in the community, and online life. Additionally, the Dashboard presents information on public policies for children well-being. The framework emphasises a multilevel structure to clarify potential drivers of well-being, focuses on changes in children's wants, needs, and abilities throughout childhood, and integrates children's thoughts and perspectives into well-being measurement.

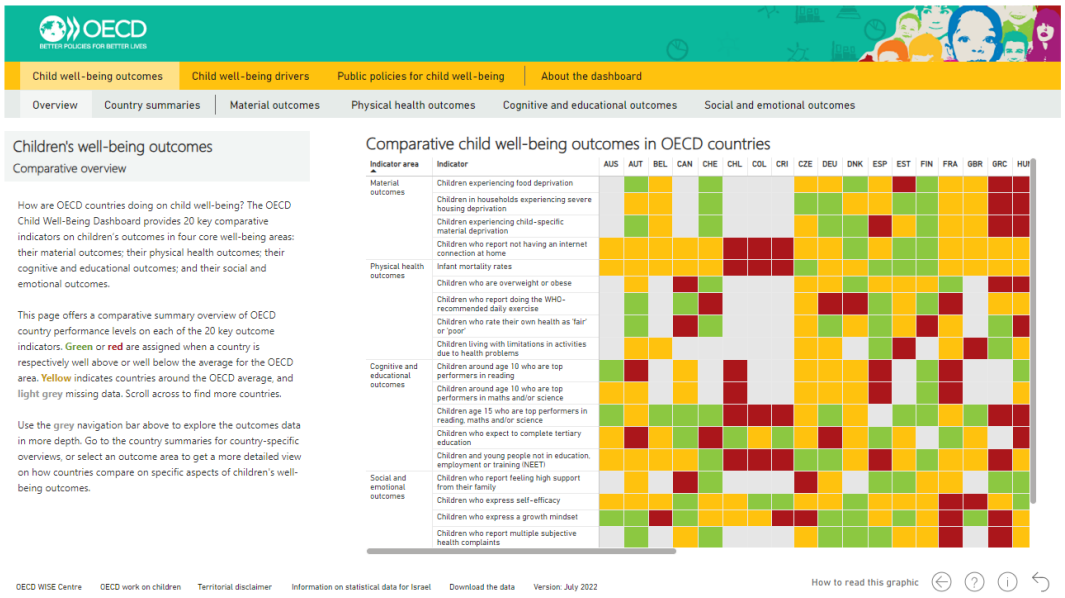
Figure 5. Multi-level Child Well-being Framework



Source: *Measuring What Matters for Child Well-being and Policies*, p. 17 (OECD, 2021[29])

The Dashboard draws its information from several large international surveys, such as PISA and PIRLS, as well as databases curated by the OECD (e.g. the OECD Family Database) and by other international organisations. The collected data is presented in an interactive format: users can explore it by either well-being outcomes or drivers, and can easily understand how a given country/economy performs on each indicator by looking at the colour code it has been assigned (see Figure 6). Light grey indicates missing information; yellow is assigned to countries that align to OECD average; green and red are instead used to signal that a country/economy is well above or well below OECD average respectively.

Figure 6. The Child Well-Being Dashboard



Source: Child Well-Being Dashboard website. Available at: https://www.oecd.org/els/family/child-well-being/data/dashboard/

2.1.4. The Health Behaviour in School-aged Children (HBSC) study

Launched 40 years ago by researchers from England, Finland and Norway and carried out with the support of the World Health Organisation (WHO) Regional Office for Europe, the HBSC study is a yearly cross-national research study that collects data to measure and monitor the health and well-being of adolescents in the now 51 participating countries in Europe and North America. The study collects information through a school-based survey, administered to a representative sample of 11-, 13- and 15-year-olds (around 1 500 students for each age group, in each of the participating countries or regions).

The initiative acknowledges that the way in which adolescents feel is an integral part of their health and should hence be monitored to inform prevention and intervention programs. It also looks at the health of teenagers in connection with their social life, understanding that the people they are around and the larger society influence their habits and overall well-being. This is likely to affect their quality of life as adults later on (HBSC, 2024[30]).

The data collected in each survey cycle is available on the HSBC website, both in raw format and through a data browser. The latter allows easy cross-country comparison, to monitor trends in adolescent health from 2013 onwards and to explore macro-topics of well-being and health (e.g. mental health, obesity and body image, heating behaviours etc.) – each of which comprises a series of relevant measures (e.g. under mental health, data is available for measures such as self-rated health, life satisfaction, loneliness and more). Users can further create custom views by gender, age and socio-economic background of the students, as well as to explore country-specific data.

Results from the 2021/2022 survey are currently available for the topic of mental health and well-being. While life satisfaction and self-rated health have generally decreased between since the 2017/2018 cycle, girls report worse mental health outcomes than boys, and that this gender difference has been observed to increase with age. Gaps in mental health and well-being are also found in all the surveyed countries and regions when

considering the socio-economic background of the respondents, with adolescents from more advantaged households reporting higher levels of life satisfaction and mental well-being (Cosma A. et al., 2023[31]).

2.1.5. 21st Century Children

With the project *21st Century Children*, the OECD Centre for Educational Research and Innovation (CERI) conducts research to help answer questions related to the nature of modern childhood and how schools and parents can help children thrive while still allowing them to be children and learn by making mistakes and taking risks. The project aims to identify gaps in knowledge, implications for education and examples of good practice that can be used to support children in their development.

The initiative mainly reports on four key interrelated themes, among which emotional well-being. The project produced two companion reports investigating the relationship between physical as well as emotional well-being of children and digital technologies (Burns and Gottschalk, 2020[32]; Burns and Gottschalk, 2019[33]). The reports discuss a broad set of topics that are relevant for understanding the challenges that children who live in an increasingly digital, interconnected society might face, and which factors play a significant role in shaping their development. For example, among others, the topic of online and offline relationships with peers is touched upon, alongside that of digital parenting and digital citizenship, as well as of the impact of digital technology use on both the emotional and physical well-being of children; in discussing these issues, the reports also consider the new related policy priorities that might stem from them.

3. The PISA Happy Life Dashboard

3.1. Purpose

The PISA Happy Life Dashboard (HLD) was prepared to present relevant data on student well-being collected through PISA alongside the data on student performance. By bringing together information on different well-being dimensions, the HLD aims to provide a more holistic overview of how students in the PISA-participating countries and economies are doing.

Using data from the PISA 2018 and 2022 cycles, the HLD provides information on nine 'topics' (i.e. dimensions; for example, 'Psychological well-being') of student well-being: each is articulated in three to five indicators (e.g. 'emotion control'), for a total of 38 indicators. Each indicator includes a variable number of questions/statements that students had to report on (e.g. 'I handle stress well'). The HLD allows users to explore well-being data for the 81 countries/economies that participated to PISA 2022 and the 73 that also took part to PISA 2018.

3.2. Methodology and Implementation

3.2.1. Selection of topics and indicators

Albeit differing in the selection of indicators and in their organisation, the HLD broadly aligns with the PISA well-being 2015 and 2018 frameworks, recognising student well-being as multidimensional and using both objective and subjective indicators to measure it. In some cases, a decision was made to classify indicators in a different manner than done in the PISA well-being frameworks. For example, Borgonovi and Pál (2016[24]) suggest to group indicators such as 'life satisfaction' and 'test and learning anxiety' under the same 'Psychological Dimension': the HLD also included those indicators (the second being similar, in content, to 'stress resistance' and 'fear of failure'), but categorised them as indicative of 'Psychological Well-being' and 'Resilience' respectively.

We initially considered only the information in the 2022 wave of PISA. For some of the topics of key relevance, however, the data in PISA 2022 alone was not extensive enough: in these cases, data from PISA 2018 were considered. The PISA 2018 student questionnaire indeed included a specific focus on students' global competences of the students (e.g. how frequently they interact with people of different cultural background, their attitudes towards other cultures, how many foreign languages they study at school etc.), as well as other relevant questions that were not carried over the PISA 2022 edition.

The resulting framework underpinning the HLD includes nine topics of student well-being:

1. Academic performance
2. Psychological well-being
3. Agency and engagement
4. Resilience
5. Engagement with school
6. Social relationships
7. Study-life balance
8. Material and cultural well-being
9. Openness to diversity

It should be noted that the order in which the topics are presented does not reflect any judgment of their relative importance in shaping student well-being; rather, all dimensions are seen as intertwined and relevant.

Section 3.3 explores each of the topics in detail: it discusses their relevance for student well-being and presents the indicators that were selected to assess them. It then provides information on the correlation among the indicators within a topic, and their relationship with students' academic achievements as captured by the PISA 2022 test.

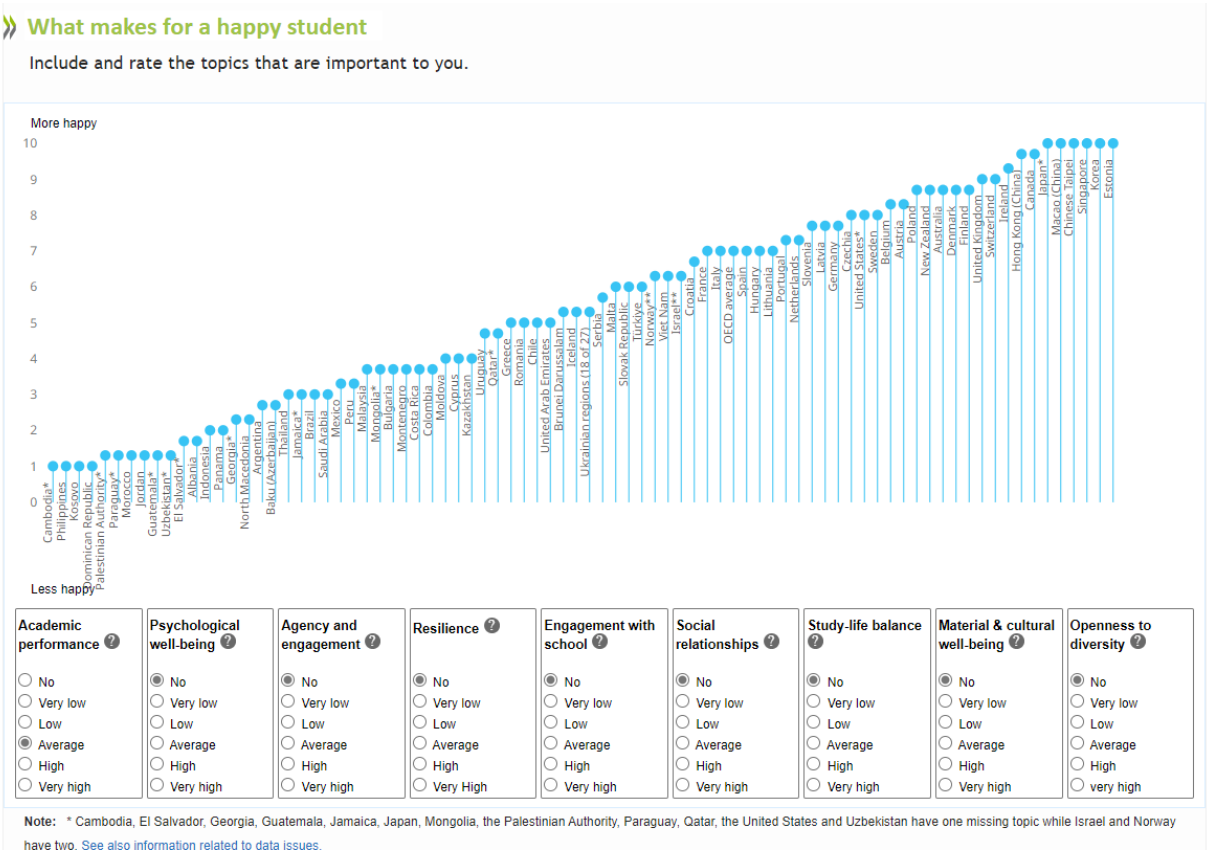
3.2.2. How is the information presented to the users?

When users first visit the HLD webpage, they encounter a customisable graph that arranges countries solely based on their academic performance scores (refer to Figure 7). Similar to the Better Life Index (see 2.1.2), users can assign different weights to the nine topics, reflecting their own assessment of each topic's relevance to determining students' well-being. Weights range from zero (excluding the topic entirely from the overall well-being score computation) to five (signifying high importance to the user). The countries'/economies' relative positions shift based on their overall well-being scores, which are automatically calculated by combining the weights and scores of each country/economy on the selected topics (see 3.2.3 for more details).

The data is initially presented to users in a neutral way to avoid imposing any specific judgment on the importance of different well-being aspects. This design choice also aims to show that the relative ranking of countries/economies on the Dashboard, based solely on cognitive performance, offers only a partial description of education systems' outcomes. For instance, in a country/economy where students score high on PISA tests, they might still lack time for proper rest or to develop their talents and personal growth outside of school. Conversely, countries performing less well on PISA might provide students with a more relaxed school environment that supports learning and personal development beyond what PISA measures.

Recognising that different users have different needs in terms of the data that are useful for them, the data provided on the HLD webpage is available at several levels of granularity – from most aggregated, as in the case of the customisable Dashboard, down to individual graphs for each item. Annex A offers a comprehensive overview of the content and organisation of the HLD webpage.

Figure 7. The customisable Happy Life Dashboard



Source: Happy Life Dashboard webpage. Available at: https://gpseducation-pp.oecd.org/PisaHappyLifeDashboard

3.2.3. Calculating the summary topic index scores and the overall Happy Life Index score

As explained in 3.2.1, the HLD encompasses nine topics, each represented by three to five indicators. For every indicator, a specific score is computed, ranging from one (denoting that a country/economy falls within the bottom 10% of all countries/economies, signifying less favourable student outcomes or reports) to ten (indicating that a country/economy ranks among the top 10% for that indicator). The calculation of indicator scores involves two distinct scenarios:

- **Case 1:** Students' responses to the items within an indicator are summarised into an index. Indicator scores for a country/economy are assigned based on the share of students who have an indicator index above OECD average.

  Example: Emotion control is measured in PISA by asking students whether they agree to a series of 10 statements. Their agreement to the statements is consolidated into one index using item response theory. For example, if Country A has 70% of students with an index higher than the OECD average, which is notably high among all countries/economies, Country A is assigned a top score of 10 for the emotion regulation indicator.

- **Case 2**: When students' responses to the items under an indicator cannot be summarised into an index, typically due to the use of a limited number of selected items from the original scale or the availability of only one item, the indicator

scores for a country/economy are determined based on the proportion of students meeting a specified requirement.

Example: An index is not available for the life satisfaction indicator because it is based on a single question where students rate their life satisfaction on a scale from 0 to 10 (where 0 indicates 'not satisfied at all'). In this instance, the percentage of students in each country/economy reporting a life satisfaction of 7 or higher (considered high satisfaction in previous analyses) is taken into account. Scores are then assigned based on whether a country/economy has a relatively high or low share of students with high life satisfaction compared to others, similar to the methodology applied to case 1 indicators.

The **summary index score** for each topic in a country/economy is calculated by averaging the indicator scores obtained on the topic's indicators. This involves adding up individual indicator scores and dividing the sum by the number of non-missing indicators. Summary index scores range from 1 to 10, where 1 indicates lower well-being performance, and 10 is assigned to countries where students generally experience higher levels of well-being for that topic.

The **overall well-being score** for a country/economy is then computed as the sum of non-missing topic index scores, each multiplied by the user-chosen weight, divided by the sum of weights. Similar to other scores, the overall well-being score is on a scale from 1 to 10, where higher scores indicate better levels of well-being among students.

Example: a user selects all nine dimensions, assigning equal weight to each (i.e. "average" or 3), and a country, let's say Country A, has one missing topic (e.g. 'Psychological well-being'), with scores of 4, 5, 4, 3, 6, 6, 5, and 7 on the remaining eight topics, Country A's overall score would be 5. This is calculated as (4+5+4+3+6+6+5+7)/(3*8).

Detailed information on this methodology is available to users in the 'FAQs' and 'User Guide' sections of the HLD webpage (refer to Annex A), enabling them to better comprehend the displayed data on interactive charts and make meaningful comparisons.

3.3. Exploring the nine topics of the PISA Happy Life Dashboard

This section offers an overview of the nine topics constituting the HLD framework and the corresponding indicators. It includes a concise description and justification for the inclusion of each topic. Likewise, a brief overview of the indicators is presented, with indications of information sourced from PISA 2018 when applicable. Additionally, a brief analysis of the correlations among indicators within each topic and their relationship with performance in the main PISA domains is provided for each topic.

3.3.1. Academic Performance

Definition and relevance for student well-being

Academic performance is the only dimension of the HLD for which data is obtained from the PISA 2022 cognitive test. The indicators in this dimension refer to students' ability to use knowledge to solve problems they might encounter in their daily life. This focus on real-life application reflects changes in the education goals of participating countries, that are increasingly shifting from knowledge-based curricula to competence-based ones.

International experts defined each of the competency domains that are examined in each PISA cycle. The measurement frameworks in the three domains of science, reading, mathematics are also continuously updated to reflect changes in our understanding of these

competences and their applications to the real world. Competency is not something that an individual either does or does not have – rather, it is measured on a continuum. There is no minimum or maximum score in PISA: results are scaled so to fit an approximately normal distribution, with a mean of 500 points and standard deviation of 100. The scale is ordered in six levels. International experts set the baseline for productive participation in society at Level 2 on the PISA proficiency scales.

Longitudinal studies indicate that students' scores on PISA are correlated with how well students will do later on in life (OECD, 2018[34]). This means that PISA results represent valuable information about young people's life prospects, as they capture the ability of students to continue learning throughout their lives by applying what they learn in school to non-school environments, evaluating their choices and making decisions.

Indicators

This topic includes three indicators:

- *Performance on PISA 2022 mathematics*: the *PISA 2022 Mathematics Framework* describes mathematical literacy as the capacity to reason mathematically and to formulate, employ, and interpret mathematics to solve problems in a variety of real-world contexts (OECD, 2023[35]).
- *Performance on PISA 2022 reading*: the latest framework for reading was developed in 2018. Reading literacy is defined as an individual's capacity to understand, use, evaluate, reflect on and engage with texts in order to achieve one's goals, develop one's knowledge and potential, and participate in society.
- *Performance on PISA 2022 science*: according to the *PISA 2025 Science framework*, a scientifically educated person can engage in reasoned discourse about science, sustainability and technology to inform action. This requires the competencies to 1) explain phenomena scientifically, 2) construct and evaluate designs for scientific enquiry and interpret scientific data and evidence critically and 3) research, evaluate and use scientific information for decision making and action.

Each indicator reports the country/economy's average score in the domain.

The table below provides an overview of the correlations among the indicators considered. In line with expectations, the performance on each of the three main PISA domains is quite strongly correlated with performance on the other two.

Table 1. Correlation among indicators of 'Academic performance'

	Mathematics	Reading	Science
Mathematics	1		
Reading	0.83	1	
Science	0.89	0.84	1

Limitations and possible extension

While mathematics, reading and science represent three foundational skills that are predictive of success later in life, students learn other important subjects at schools

and have to acquire a wider set of transversal skills in order to thrive in rapidly changing labour markets and live with others as responsible citizens. Since PISA 2012, the 'innovative domain' assessments have pushed the concept of competency-based assessment beyond the traditional areas of literacy and numeracy. In 2012, PISA assessed creative problem solving, while in 2015 it included an assessment of collaborative problem solving, where students had to interact with digital peers. The innovative domain in PISA 2018 was global competence, a multidimensional construct that involves both the cognitive skills of evaluating information and understanding perspectives, and social and emotional constructs such as appreciating and respecting other cultures. In 2022, PISA assessed creative thinking, defined as the capacity to generate diverse and original ideas to either solve creatively a scientific or social problem, or to produce imaginative written or visual artifacts.

There is in general a robust correlation between performance in the innovative domains and performance in the main domains of mathematics, reading and science. This means that students with solid academic foundations tend to do well also in more general cognitive competences. However, in several countries, performance differences in the innovative domains do not necessarily match those found in mathematics or reading. This finding suggests that these new assessments measure distinct sets of skills with respect to the main PISA domains, and including these additional metrics in the HLD might add value. The main issue lies in the fact that several countries chose not to administer the innovative domain: for example, only 27 countries/economies collected data on the global competence cognitive test in 2018.

This dimension might also be enhanced by including subjective indicators of academic strength. Research has shown that adolescents' perceptions of their school performance and their own competency are correlated with higher perceived well-being (Suldo, Riley and Shaffer, 2006[36]; Ravens-Sieberer, Kökönyei G. and Thomas C., 2004[37]). Competence (feeling one is effective in meeting environmental demands) is one of the three main basic psychological needs identified in self-determination theory (Ryan and Deci, 2000[38]).

3.3.2. Psychological well-being

Definition and relevance for student well-being

This topic focuses on the extent to which students experience positive emotions, their ability to manage their emotional states, and their general satisfaction with life. Psychological well-being is a crucial aspect of students' current quality of life, and there is also a tight connection between psychological health in the adolescent years and in later adult life. For example, research has demonstrated that students who experience depression, anxiety and other psychological issues might also develop problematic behaviours (Huebner, Funk and Gilman, 2000[39]; Huebner, 2004[40]; Sun and Shek, 2009[41]).

Psychological well-being is generally supported by self-esteem, motivation, resilience, self-efficacy, hope and optimism, while it is hindered by anxiety, stress, depression and distorted views of the self and others (OECD, 2017[18]). Difficulties in managing one's own emotional responses (i.e. emotion regulation) has similarly been found to be a predictor for the emergence of depressive symptoms and anxiety (Werner-Seidler et al., 2013[42]). Teenagers, in particular, are at risk of psychological disorders, due to adolescence being a period of intense emotional upheaval (Gilman and Huebner, 2003[43]); adolescence is also the period when emotion regulation capacity develop in a substantial manner (Young, Sandman and Craske, 2019[44]).

In many countries, school strategies to address psychological well-being focus on identifying and supporting students who manifest psychological diseases. While early interventions have been shown to help reduce both ongoing and long-term negative effects (Das et al., 2016[45]), approaches that aim only to address mental health and behavioural problems might not devote enough attention to creating the conditions in which children and adolescents can flourish. Helping students find meaning and purpose in their lives, rather than just responding when students exhibit problematic behaviours, can sustain the psychological, social and cognitive development of all students (Huebner and Hills, 2013[46]; Suldo and Huebner, 2006[47]). Positive and negative affective states have indeed been found to correlate to different outcomes, and to be independent one from the other (Diener and Emmons, 1984[48]).

Indicators

This topic includes four indicators:

- Emotion control: this corresponds to the ability to manage emotions to achieve goals, complete tasks, or control and direct behaviour (Dawson and Guare, 2016[49]). For this indicator, students report to what extent they agree or disagree with ten statements related to their ability to manage their emotions, and in particular to how well they deal with frustration and upsetting situations. Students' responses are summarised in an index of emotion control.
- Life satisfaction: students who are happier with their current life also tend to display more positive future orientation (Piko, 2023[50]); on the other hand, low levels of life satisfactions can be indicative of other psychological issues, such as depressive symptoms, and of unsatisfactory relationships with others. For this indicator, students report how satisfied they are with their life on a scale that ranges from 0 (not satisfied at all) to 10 (completely satisfied).
- Sense of purpose in life (2018): the capacity to find meaning or purpose in life (eudaemonia) is one of three core components of subjective well-being (OECD, 2013[51]), together with life satisfaction and a positive affect balance. This indicator asks students report the extent to which they agree that their life is meaningful.
- Emotional states (2018): teenage years are characterised by many, volatile and oftentimes intense feelings. One way to measure affect is to ask individuals whether or to what degree they have felt specific emotions during a certain period (Watson, Clark and Tellegen, 1988[52]): in this indicator, students report how frequently they experience a series of positive and negative emotions (e.g. joyful, happy, proud, scare, sad etc). Students' responses on how often they feel 'happy', 'cheerful' and 'joyful' are summarised in the index of emotional states.

The relationship among the indicators of 'Psychological well-being' is generally positive – students who report higher (than OECD average) emotional control over their emotions in situations of stress, for example, are generally satisfied with their life, tend to agree or strongly agree that they find purpose in their life, and experience positive states more frequently than on OECD average.

Table 2. Correlation among indicators of 'Psychological well-being'

	Index of emotion control	Life satisfaction	*Sense of purpose (2018)*	*Index of positive emotional states (2018)*
Index of emotion control	1			
Life satisfaction	0.17	1		
Sense of purpose (2018)	.	.	1	
Index of positive emotional states (2018)	.	.	0.24	1

Note: due to the lack of common observations, it was not possible to compute the correlation between indicators based on 2022 data and those based on 2018 data.

Relationship with academic performance

Students who report high life satisfaction (i.e. 7 out of 10 points or more) also achieve slightly lower results in the PISA test than those who report lower life satisfaction. This is in line with PISA 2018 findings: scores in reading were found to be higher among students who reported being "somewhat" and "moderately satisfied" (i.e. between 5 and 8 points on the life-satisfaction scale) (OECD, 2019[53]). Students who report low life satisfaction (4 or less) are the group with the lowest performance in PISA (the relationship between performance and life satisfaction following an inverse U-shape).

Higher emotional control is positively related to math and science, and negatively related to reading. Following a similar pattern, students who agree and strongly agree that their life has a meaning also seem to perform less well than those who disagree; the same applies for students who experience positive emotions on a relatively higher frequency than OECD average. Collectively, these correlations suggest that high academic achievement, by itself, is not a sufficient indicator of students also experiencing a happy and tranquil life.

Table 3. Relationship between indicators of 'Psychological well-being' and performance on the PISA test

Score point difference in Performance in PISA…	Index of emotion control	Life satisfaction	*Sense of purpose in life (2018)*	*Index of positive emotional states (2018)*
Mathematics	4.3	-0.2	-33.0	-20.6
Reading	-4.4	-8.0	-35.0	-22.6
Science	2.5	-4.9	-35.1	-23.4

Note: due to the lack of common observations, it was not possible to compute the correlation of 2018 indicators with the performance on the PISA 2022 test. For 2018-based indicators, the regression used performance on the PISA 2018 test as the outcome variable.

Limitations and possible extension

The main limitation associated to this topic lies in the fact that comparing levels of subjective well-being across countries is challenging. Variations in students' reports of life satisfaction or happiness across countries might in fact be influenced by cultural

interpretations of what defines a happy life, and by differences in how life experiences are integrated into judgements of life satisfaction (Diener, Oishi and Lucas, 2003[54]; Park, Peterson and Ruch, 2009[55]; Proctor, Linley and Maltby, 2009[56]). Differences in self-presentation can also play an important role in the comparability of the results: in some cultures, for example, it might not be desirable to say that you are happy, while in others it might be highly desirable to say so[3].

Overall life satisfaction summarises students' satisfaction with different aspects of their life, such as their autonomy, feelings and use of time (the "self"), peer relationships, and quality of family and community life. The relative importance of all these aspects in students' overall life satisfaction can differ across cultures. Research has found that for adolescents from Western cultures, such as that in the United States, personal feelings and interests are more important for overall judgements of life satisfaction. On the other hand, in Asian cultures, such as that in Korea, meeting social norms and expectations are the primary sources of life satisfaction for students (Park and Huebner, 2005[57]). The indicator on life satisfaction could be extended by asking students multiple questions about the different aspects of their life they are satisfied or not satisfied with. This multidimensional approach to measuring life satisfaction was already implemented in the 2018 PISA well-being questionnaire, where students had to report their level of satisfaction with ten different aspects of their life.

Another construct that could be included in this dimension, if data become available, is optimism. Optimism is in fact one of the four main facets of psychological functioning described in the literature, together with competence, autonomy and meaning/purpose (OECD, 2013[51]).

It would also be relevant to collect international data on specific sources of psychological distress as well as on sources of daily inspiration and positive feelings. We know, for example, that during adolescence a major source of psychological ill-being is a negative body-image. The PISA well-being questionnaire includes a scale on body image with five items (e.g. "I like my look just the way it is"). Unfortunately, only a very limited number of countries have implemented the well-being questionnaire: hence, those data were not included in the HLD.

3.3.3. Agency and engagement

Definition and relevance for student well-being

This topic delves into two interconnected constructs: "agency", denoting a student's capacity to express opinions, take a stance, and assume leadership, and "engagement", aiming to gauge students' actions in addressing social (including interpersonal relationships at school) and environmental issues. Rooted in socio-cognitive theory, agency embodies individuals' ability to act toward meaningful goals (Semper, 2019[58]). It has been empirically linked to creativity, motivation, and happiness (Welzel and Inglehart, 2010[59]), as well as autonomy and self-fulfilment (Eteläpelto et al., 2013[60]). In contrast, engagement is conceived as a multidimensional phenomenon encompassing behavioural, emotional, and cognitive components (Fredricks, Blumenfeld and Paris, 2004[61]; Fredricks, Filsecker and Lawson, 2016[62]; Wang et al., 2016[63]).

The HLD indicators under this topic focus on whether and how students address both

[3] Tsai et al. (2007[164]), for example, found that American children's picture-book characters had wider smiles than those in Taiwanese books, concluding that Americans value high-activation emotions (e.g. excitement) more than East Asians do.

interpersonal problems within the school context and global issues. Students empowered to act for social justice or engage with global problems are more likely to perceive purpose in their lives and less prone to behavioural and psychological issues.

Taking action is viewed as the culmination of students' acquired knowledge, skills and attitudes. Education systems play a vital role in instilling the belief that students can influence their lives and effect positive change (Bandura, 2002[64]). Targeted interventions can foster a growth mindset in students, influencing academic achievement. Teachers, by providing appropriately challenging tasks and ensuring necessary support, can cultivate students' belief that effort leads to improvement over time.

Schools play a pivotal role in preparing students to address global issues through dedicated pedagogies. Community-based learning allows students to develop effective citizenship attributes by identifying and acting on issues within their communities (Milfont and Sibley, 2012[65]). Such engagement not only equips students with essential knowledge and skills but also imbues their educational journey with meaning and purpose. The societal impact of these efforts is evident: fostering students' agency for sustainability is crucial for advancing global ecological balance. Students viewing themselves as connected to and responsible for the world community are likely to become adults committed to finding solutions to global poverty and inequality (OECD, 2020[66]; Mirzaei Rafe et al., 2019[67]; Feder et al., 2019[68]; Boix Mansilla, 2016[69]).

Indicators

This topic includes five indicators:

- Leadership: for this indicator, students report the extent to which they agree or disagree with ten statements on their capability to take a leadership role in different situations – for example, whether they are comfortable with leading others and enjoy it, or whether instead they prefer waiting for others to take that role up. Students' responses are summarised in the index of leadership.
- Engagement with global issues (2018): Through eight statements, students report how often they take action to address issues of global significance (e.g. reducing energy use, signing environmental or social petitions, buying sustainable products) in their day-to-day life. Students' responses are summarised in the index of engagement with global issues.
- Global mindedness (2018): Students respond to six statements and report whether they feel they are citizens of the world, with commitments and obligations toward the planet and other people in local or distant communities. Students' responses are summarised in the index of engagement with global issues.
- Beliefs about bullying (2018): Students respond to five statements describing how they behave when they witness as bystanders to an act of bullying – for example, whether they feel irritated when no one intervenes to defend bullied peers, and whether they think bullying is wrong. Students' responses were summarised in the index of belief about bullying.
- Growth mindset: Students report whether they agree or disagree with three statements about the possibility to improve one's general intelligence and one's performance in mathematics and their native language classes. Students' responses were summarised in the index of growth mindset.

The correlations among the indicators are in the expected positive direction, even if not all are strong: students who believe in their leadership skills similarly have a stronger growth mindset; similarly, students who engage with global issues are also more likely to report being more global-minded.

Table 4. Correlation among indicators of 'Agency and engagement'

	Index of leadership	Index of growth mindset	*Index of engagement with global issues (2018)*	*Index of global mindedness (2018)*	*Index of beliefs about bullying (2018)*
Index of leadership	1				
Index of growth mindset	0.08	1			
Index of engagement with global issues (2018)	.	.	1		
Index of global mindedness (2018)	.	.	0.21	1	
Index of belief about bullying (2018)	.	.	0.03	0.19	1

Note: due to the lack of common observations, it was not possible to compute the correlation between indicators based on 2022 data and those based on 2018 data.

Relationship with academic performance

Indicators of agency and engagement are generally positively related to performance in PISA 2022 mathematics, reading and science, with students who report confidence in their leading skills and global mindedness performing better than those with lower values on the indicators. Similarly, students who believe more strongly in the possibility of improving one's intelligence (i.e. have stronger growth mindset with respect to OECD average) and who report more positive attitudes to stop bullying also perform better across all three domains. The only exception can be found in the indicator of global engagement, which appears to be negatively correlated to academic performance.

Table 5. Relationship between indicators of 'Agency and engagement' and performance on the PISA test

Score point difference in Performance in PISA…	Index of leadership	Index of growth mindset	Index of global engagement (2018)	*Index of global mindedness (2018)*	*Index of beliefs about bullying (2018)*
Mathematics	30.8	22.7	-36.4	11.4	41.8
Reading	34.3	22.1	-41.8	13.6	59.0
Science	31.4	24.1	-36.2	11.9	46.4

Note: due to the lack of common observations, it was not possible to compute the regression of 2018 indicators with the performance on the PISA 2022 test. For 2018-based indicators, the regression was therefore conducted using performance on the PISA 2018 test as the outcome variable.

Limitations and possible extension

The indicators selected for this dimension cover different aspects of the multidimensional constructs of agency, social and global engagement. Individual agency, for example, is well represented by the growth mindset indicator, while social or interpersonal agency is captured through the indicator measuring students' beliefs about bullying.

This dimension could be strengthened by integrating more questionnaire scales. For example, the PISA 2018 questionnaire included other constructs such as 'self-efficacy with global issues' that measure to what extent students feel they can discuss about and engage with problems like climate change or global poverty. PISA 2018 also includes different questions on the opportunities students are given at school to learn about intercultural differences or global problems. For the indicator of 'leadership', the scale could be strengthened by adding items that investigate whether the students take leadership also outside the classroom, for example in the context of collective sports. In a similar way, 'growth mindset' could also investigate beliefs related to one's ability to perform well in other contexts than just the academic ones.

Some of the measures could be modified and improved in the next administrations of PISA. For example, 'beliefs about bullying' focuses on how students feel about bullying but does not ask them whether they would take action to confront a bully or to support an offended person.

3.3.4. Resilience

Definition and relevance for student well-being

This topic explores resilience as a vital aspect of students' ability to effectively handle stress, showcasing resourcefulness and autonomy. Despite varied definitions, resilience universally involves encountering adversity or stress and achieving positive outcomes (Luthar, Cicchetti and Becker, 2000[70]). It is crucial to perceive resilience not as a static trait but as a dynamic, context-dependent process evolving throughout an individual's lifespan.

Students often grapple with anxiety related to academic tasks and tests, particularly those with low confidence or who tie their worth to outperforming peers (Zeidner, 2007[71]). This anxiety is linked to poor academic performance, frequent absenteeism and school dropout (Ramirez and Beilock, 2011[72]; Cortina, 2008[73]). Excessive anxiety can impede

social and emotional development, trigger substance use to alleviate stress, and lead to exhaustion (Salend, 2012[74]; Zeidner, 1998[75]). Nurturing resilience becomes paramount for students to navigate challenges successfully (Compas et al., 2001[76]; Kim and Kim, 2016[77]).

Quality student-teacher relations and a supportive classroom environment significantly contribute to students' resilience, motivation and confidence (den Brok, Brekelmans and Wubbels, 2004[78]; von der Embse et al., 2016[79]). Teachers play a pivotal role by fostering self-efficacy and self-confidence, setting realistic learning goals, and encouraging a positive perspective on mistakes (Ormrod, 2014[80]). Cognitive-activation strategies, such as presenting challenging problems, enhance students' perseverance (OECD, 2013[7]). Positive parent relationships also serve as a form of social support in coping with stress (Baumrind, 1991[81]; Cohen and Wills, 1985[82]). Parents can contribute positively by instilling trust in their children's abilities while avoiding excessive pressure and unrealistic expectations (Putwain, Woods and Symes, 2010[83]; Gherasim and Butnaru, 2012[84]).

Moreover, developing autonomous learning skills has gained prominence, especially in the context of the COVID-19 pandemic, where students faced challenges without full teacher support. Being a proficient self-regulated learner involves monitoring and controlling metacognitive, cognitive, behavioural, motivational, and affective processes during learning (Panadero, 2017[85]). This skill becomes particularly crucial when navigating digital environments efficiently, where students must sift through vast information and potential distractions.

Indicators

This topic includes four indicators:

- Stress resistance: students report whether they agree or disagree with ten statements about their capacity to generally remain calm and manage stress. For example, students are asked to evaluate whether they think of themselves as more relaxed than people they know, whether they get nervous before school tests, and whether they get easily stressed or instead handle pressure well and can be efficient even when stressed. Students' responses are aggregated in the index of stress resistance.
- Fear of failure (2018): students report whether they agree or disagree with three statements describing behaviours that are associated with fear of failure, such as worrying of what others might think. Students' responses are aggregated in the index of fear of failure.
- Learning autonomy: students report whether they feel confident or not to carry out six actions that are related to self-managed learning, such as completing school assignments or finding online resources on their own. Students' responses are aggregated in an index of learning autonomy.
- Belief in self (2018): Students report whether they agree or disagree with five statements about their (self-perceived) ability to handle difficult situations or solve complex issues. Students' responses are aggregated in the index of belief in oneself.

The correlations among indicators that could be computed are in the expected direction: higher stress resilience is positively (albeit weakly) correlated to learning autonomy; at the same time, stronger fear of failure appears to negatively correlate to a stronger sense of belief in self.

Table 6. Correlation among indicators of 'Resilience'

	Index of stress resistance	Index of learning autonomy	*Index of fear of failure (2018)*	*Index of belief in self (2018)*
Index of stress resistance	1			
Index of learning autonomy	0.08	1		
Index of fear of failure (2018)	.	.	1	
Index of belief in self (2018)	.	.	-0.10	1

Note: due to the lack of common observations, it was not possible to compute the correlation between indicators based on 2022 data and those based on 2018 data.

Relationship with academic performance

Higher values (than OECD average) on both the index of 'learning autonomy' and of 'fear of failure' are associated to better performance in the PISA domains. Being better able to regulate one's own learning can indeed help deal with tests in a more effective manner, for example by better managing the allocated time and realising and correcting mistakes that were made. As for the index of 'fear of failure', this is relatively high in countries/economies that generally perform well in PISA. On the flip side, students who report higher values (than to OECD average) on the indexes of stress resistance and self-belief display lower performances on the PISA test.

Table 7. Relationship between indicators of 'Resilience' and performance on the PISA test

Score point difference in Performance in PISA…	Index of stress resistance	Index of learning autonomy	*Index of fear of failure (2018)*	*Index of belief in self (2018)*
Mathematics	-10.1	15.9	7.7	-7.1
Reading	-25.9	19.1	13.4	-4.1
Science	-15.0	16.1	9.0	-6.2

Note: due to the lack of common observations, it was not possible to compute the regression of 2018 indicators with the performance on the PISA 2022 test. For 2018-based indicators, the regression was therefore conducted using performance on the PISA 2018 test as the outcome variable.

Limitations and possible extension

The concept of resilience has attracted a lot of attention from both policy makers and researchers in the last decade. A recent paper reviews 58 validated scales of resilience, highlighting how there is still no consensus on the different aspects of resilience and on the most appropriate scales for students and adolescents (Terrana and Al-Delaimy, 2023[86]). Research findings indicate that resilience is a multi-dimensional construct, and that resilience in one domain does not automatically confer resilience in other domains (Cicchetti and Garmezy, 1993[87]; Luthar, Doernberger and Zigler, 1993[88]): it would thus be valuable to develop and collect data on scales that cover different dimensions of resilience, such as students' capacity to cope with adversity related to school learning, family or peer relationships, and community environments.

The current version of the HLD includes an indicator on 'learning autonomy'. Autonomy is closely related to resilience, as one has to be resourceful and independent in order to

overcome difficulties. Ultimately however, the two constructs are distinct, and autonomy might be further developed into a separate HLD dimension. The PISA 2025 Learning in the Digital World test and questionnaire will develop several measures of self-regulated learning, that can be used to populate this dimension.

As for other topics, resilience is influenced by cultural traits: the comparability of the measure might thus be challenged in a cross-national context. For example, in a research on trauma survivors with a multinational sample, Ragavan and Sandanapitchai (2020[89]) observe that Asian participants scored significantly higher on resilience scales and endorsed higher levels of spiritually focused coping than other subgroups. Collectivist, and particularly Asian, cultures also tend to emphasise shame as a motivating negative emotion (Sue and Sue, 2003[90]; Yeh and Huang, 1996[91]). Shame tends to be a collectivist motivator, because when individuals fail, they not only bring shame to the self, but to the entire family (Mio, Barker and Tumambing, 2012[92]). Thus, individuals from collectivist cultures, including students, may tend to report higher levels of fear of failure than individuals from individualist cultures.

3.3.5. Engagement with school

It takes engagement and motivation to learn (Christenson, Reschly and Wylie, 2012[93]; Wigfield, 2006[94]). Regardless of intelligence, teacher efforts, or educational resources, the absence of engagement and motivation hinders skill development (OECD, 2013[7]).

Student engagement, a multidimensional construct, encompasses cognitive, emotional and behavioural components (Fredricks, Blumenfeld and Paris, 2004[61]; Jimerson, Campos and Greif, 2003[95]). The cognitive facet reflects students' effort in interacting with learning material, the emotional aspect captures affective reactions towards school, and the behavioural dimension includes positive conduct and participation in school activities. Additional conceptualisations introduce components like an agentic role (Reeve and Tseng, 2011[96]). Engagement significantly influences academic achievements, intertwined with skills like resilience and motivation, essential for effective learning amid challenges.

Early engagement patterns often persist and predict future achievements, forming a reciprocal relationship where engagement influences achievement and vice versa. Consequently, helping students manage their engagement is critical to prevent a detrimental cycle of disengagement and declining performance. Schools, recognising the malleable nature of engagement, must provide positive environments that fulfil students' needs for relatedness, competence, and autonomy from the outset, mitigating feelings of alienation or detachment (Skinner et al., 2008[97]; Brooks, Brooks and Goldstein, 2012[98]). Issues like regular absenteeism not only deny learning opportunities but also disrupt the learning environment for classmates. Disruptive behaviour and negative dispositions towards school similarly correlate with low academic performance and contribute to adverse outcomes such as low emotional well-being, school dropout, delinquency, and drug abuse (Valeski and Stipek, 2001[99]; Baker, Sigmon and Nugent, 2001[100]; Lee and Burkam, 2003[101]; McCluskey, Bynum and Patchin, 2004[102]).

Teachers also benefit from a positive school climate, reporting higher job satisfaction and less burnout in disciplined and supportive schools (Aldridge and Fraser, 2015[103]; Berg and Cornell, 2016[104]; Mostafa and Pál, 2018[105]). Ultimately, strong engagement with school, coupled with a belief in achieving high levels and the ability to overcome challenges, not only shapes academic mastery but also equips students with valuable attributes for leading fulfilling lives (Schunk and Mullen, 2013[106]). Student engagement stands as a necessary condition for deep learning, emphasising the importance of a safe, supportive, and collaborative school environment (Schunk and Mullen, 2013[106]). Given

its significance, this HLD topic explores various aspects of engagement, coupled with an examination of the classroom climate.

Indicators

This topic includes four indicators:

- Skipping classes or days of school: while school attendance might be mandatory up to a certain age, students might not always attend school on a regular basis. This indicator combines the information reported by students on whether and how frequently they have skipped some classes or whole days of school in the two weeks preceding the PISA 2022 test.
- Perseverance: persevering in the face of difficulty is an important life skill for students to develop. For this indicator, students report if they agree or disagree with ten statements about their self-perceived ability and willingness to persevere in completing tasks, even when difficult or boring. Students' responses are summarised in an index of perseverance.
- Motivation to do well: students report whether they agree or disagree with three statements about the value they assign to performing well in their mathematics, language and science classes.
- Disciplinary climate in mathematics: the presence or absence of a positive classroom environment can impact students' learning outcomes. For this indicator, students report how frequently seven types of disruptive behaviours occur in their mathematics class – such as how often the students appear not to listen to the teacher, or whether there is noise, and the teacher has to wait long for students to quiet down before they can start the class. Students' responses are summarised in an index of disciplinary climate in mathematics classes.

All correlations among these indicators are in the expected direction, with higher values on any indicator generally correlating positively with the others – it should be noted that the indicator of 'skipping school/classes' assumes higher value when the student reports not skipping any schooldays or classes prior to the PISA test.

For example, higher than average perseverance is associated to stronger motivation to do well across subjects. Weaker relationships exist between students' truancy, the index of perseverance, and the motivation to do well.

Table 8. Correlation among indicators of 'Engagement with school'

	Skipping school/classes (absence of)	Index of perseverance	Motivation to do well	Index of disciplinary climate (math classes)
Skipping school/classes (absence of)	1			
Index of perseverance	0.09	1		
Desire to do well	0.09	0.13	1	
Index of disciplinary climate (math classes)	0.12	0.11	0.12	1

Relationship with academic performance

In line with expectations, indicators for the 'Engagement with school' topic are also positively related to performance on all three PISA 2022 domains. Among these, 'motivation to do well' stands out: students with a self-reported will to perform well in at least two out of the three subjects they were asked about in the questionnaire also appear to score between 68 and 85 points higher than their peers who report lower motivation to do well (i.e. did not agree they are motivated to do well in any of the subjects proposed or only agreed to one statement). Whether or not a student has skipped classes in the two weeks prior to PISA also appears to be particularly strongly related with better performance on the test.

Table 9. Relationship between indicators of 'Engagement with school' and performance on the PISA test

Score point difference in performance in PISA 2022…	Skipping school/classes (absence of)	Index of perseverance	Motivation to do well	Index of disciplinary climate (math classes)
Mathematics	45.9	24.4	68.5	31.3
Reading	42.6	28.9	85.8	34.2
Science	45.6	26.6	74.9	31.4

Note: all indicators under this topic are from PISA 2022. All regressions were therefore performed using PISA 2022 performance as the outcome variable.

Limitations and possible extension

Both the indicator 'motivation to do well' and 'disciplinary climate in mathematics' have the limitation of focusing only on what happens during mathematics classes (the core domain of PISA 2022). The indicators could therefore benefit from including additional

items/statements inquiring about students' motivation and attitudes towards studying more in general, and by investigating the typical learning atmosphere in other classes.

Engagement is a multidimensional construct. Currently, the indicators mostly cover behavioural engagement and cognitive engagement; it would therefore be beneficial to add other indicators that could capture the emotional side of engagement, for example, by asking students how they feel about attending school.

3.3.6. Social relationships

Students are not alone in the classroom: the relationships that students build with their peers and teachers impacts their day-to-day life. Similarly, parents also play an important role in shaping the development of their children.

Family usually represents the centre of children's social and emotional world, at least at a young age: this can, however, change during adolescence, when young people begin to look elsewhere for support and acceptance (Baumeister and Leary, 1995[107]). Adolescence is indeed a time when social acceptance, particularly by peers, can have a powerful influence on behaviour (Baumeister and Leary, 1995[107]; Rubin, Bukowski and Parker, 2006[108]): achieving said acceptance or not can, for example, influence one's sense of self-worth, as well as support better academic performance (Wentzel, Jablansky and Scalise, 2021[109]; Harter, 1999[110]). Peers can in fact encourage and support students in their drive to achieve; positive experiences with peers can also help learners in developing skills such as empathy and collaboration (Pepler and Bierman, 2018[111]). On the other hand, rejection by peers can undermine students' motivation and determination and be a hurtful experience (Eisenberger, Lieberman and Williams, 2003[112]; Kross et al., 2011[113]).

Interpersonal relationships in childhood and adolescence might not be always positive in nature. In particular, the issue of bullying – understood as negative physical or verbal actions that have hostile intent, cause distress to victims, are repeated and involve a power differential between perpetrators and victims (Craig, Pepler and Atlas, 2000[114]; Olweus, 1991[115]) – has received increasing policy attention by both policy makers and researchers (Farrington and Ttofi, 2011[116]). PISA data show that many students experience bullying at school. This experience can have severe negative consequences, also in the long term: awareness of bullying issues within a school, prompt interventions to stop said issues and initiatives to sensitise students on the topic are all necessary steps to ensure that all students can enjoy positive learning and social experiences in the classroom.

Teachers also wield significant influence in the lives of children (UNESCO, 2016[117]). Fostering a positive classroom atmosphere, where students' efforts are acknowledged and rewarded, and where they feel accepted and supported by teachers irrespective of their intellectual and temperamental differences, is often linked to more favourable responses to academic challenges (Huebner et al., 2004[118]), and reduced stress related to school (Torsheim, Aaroe and Wold, 2001[119]). Even the most vulnerable students possess the potential for positive experiences in the school environment, and highlighting these positive aspects can enhance autonomy, motivation, and resilience – essential qualities for success both within and beyond the school setting. Teachers also play a crucial role in shaping the conditions for students' psychological well-being at school. Happier students commonly report positive relationships with their teachers (Hoge, Smit and Hanson, 1990[120]; Reddy, Rhodes and Mulhall, 2003[121]; Roeser, Eccles and Sameroff, 1998[122]). Furthermore, students who perceive teacher support are better equipped to cope with stress within the school context (Malecki and Demaray, 2006[123]).

Indicators

This topic includes four indicators:

- Quality of student-teacher relationships: this indicator reflects to what extent students feel supported by their teachers. Students report whether they agree or disagree with eight statements about their relationship with teachers at school, such as whether their teachers are respectful and friendly towards them, or instead are mean and intimidating. Students' responses are summarised in an index of quality of student-teacher relationship.
- Sense of belonging: a sense of belonging reflects how connected students feel with their school and peers. For this indicator, students report whether they agree or disagree with six statements about their feeling of belonging at school and their dynamics with school peers – for example, how easily they make friends, or whether they are lonely and awkward at school. Students' responses are summarised in an index of belonging.
- Being bullied: For this indicator, students report how frequently they have experienced nine instances of bullying or negative interactions with their peers in the 12 months prior to PISA 2022 – for example, whether they have been left out on purpose or made fun of by other students. Students' responses are summarised in an index, where higher values indicate more frequent exposure to these bullying situations.
- Family support: having a good relationship with one's family helps students in their development. For this indicator, students report how frequently they experience nine instances of positive interactions (e.g. eating meals together, spend time together to talk, etc.) and discussion about school-related topics with their parents/guardians and family. Students' responses are summarised in an index of family support, with higher values indicating a stronger, positive bond with one's family.

All relationships between these indicators are in the expected direction. For example, students who report being bullied more frequently have lower feeling of belonging at school, and less favourable relationships with teachers and parents.

Table 10. Correlation among indicators of 'Social relationships'

	Index of teacher-student relationship	Index of belonging	Index of exposure to bullying	Index of family Support
Index of teacher-student relationship	1			
Index of belonging	0.20	1		
Index of exposure to bullying	-0.14	-0.19	1	
Index of family support	0.14	0.13	-0.09	1

Relationship with academic performance

All indicators have the expected relationship with performance in the PISA 2022 test. In particular, greater exposure to bullying is strongly negatively related with performance. Among the indicators positively associated with PISA performance, the index

of teacher-student relationship appears to be the stronger one: students who report enjoying good relationships with their teachers score between 13 and 19 points better than peers who report a lesser positive one. The connection appears instead to be weaker between sense of belonging and performance in the three domains.

Table 11. Relationship between indicators of 'Social relationships' and performance on the PISA test

Score point difference in Performance in PISA 2022…	Index of teacher-student relationship	Index of belonging	Index of exposure to bullying	Index of family support
Mathematics	13.4	7.4	-20.0	5.1
Reading	19.4	3.7	-20.9	16.0
Science	16.6	3.9	-19.0	8.2

Note: all indicators under this topic are from PISA 2022. All regressions were therefore performed using PISA 2022 performance as the outcome variable.

Limitations and possible extension

The indicators selected allow to report on 'Social relationships' in a relatively comprehensive manner, covering all the major actors with whom students normally interact – i.e. teachers, peers and family. Nevertheless, the indicators would benefit from a more comprehensive set of items to investigate each aspect of 'Social relationships' in more detail.

The 'being bullied' indicator could delve into the realm of online harassment. Despite 'family support' encompassing a broad spectrum of parent-child interactions, it fails to inquire about active parental support in a student's academic pursuits or in navigating their aspirations. It also overlooks whether students feel pressured by parents to excel academically or discouraged from pursuing certain hobbies or careers deemed less esteemed (as the indicator only assesses whether parents 'encourage getting good grades' in a positive light). Furthermore, the survey items could explore the dynamics between students and their siblings.

3.3.7. Study-life balance

Study is important, but students also need time to rest and to cultivate their own passions and talents. Achieving a good study-life balance is just as important as an equilibrated work-life balance is for adults: being able to disconnect from school-related work and engage in leisure activities can positively impact students' quality of life, for example by reducing stress (Shin and You, 2013[124]).

Evidence from past PISA cycles seems to point to the fact that the relationship between time spent in class and/or on homework and learning is not as straightforward as it might initially appear: in PISA 2018 it was indeed found that additional learning time does not always translate to better academic performances. In reading for example, results suggested that performance improved with each additional hour of language-of-instruction study, but only up to three hours per week – beyond that amount of time, performance weakened. A similar inverted-U shaped relationship between learning time and performance was also observed, on average across OECD countries, for the domains of mathematics and science.

Similarly, PISA results also support the importance of ensuring that students have the time and are provided the opportunity to explore other activities beyond learning: PISA 2018 indeed also showed how, on average across OECD countries, the reading performance was better for students enrolled in schools offering more creative extracurricular activities; at the system level, more equity in student performance was similarly observed in those countries and economies where schools offered creative extracurricular activities (OECD, 2020[125]). Students should be encouraged to engage both in hobbies more traditionally seen as "intellectual", such as reading, and physical activities, such as playing a sport. Physical exercise, indeed, does not only contribute positively to student health, but also protects against excessive body image concerns (Monteiro Gaspar et al., 2011[126]) and long-term negative physical and mental health outcomes (Hallal et al., 2006[127]; Sibley B.A. and Etnier, 2003[128]): participation in sports has indeed been shown, for example, to reduce anxiety (Appelqvist-Schmidlechner et al., 2017[129]).

Over past decades, technology has entered almost every aspect of people's lives, from searching for information online, to chatting with friends, to sharing bits of day-to-day life on social media. The classroom is no exception: learning now happens on tablets and computers just as much as (if not more in some cases) it does on books. Students thus are spending more and more time on digital devices – both in the classroom, and outside of it. Technology use comes with both benefits and possible drawbacks. If well implemented and harnessed, technology has the potential to make learning a more interactive, engaging and personalised experience; through the collection of process data, digital learning tasks can support teachers and learners alike in understanding areas of strength and growth, and ease the feedback process, making it more relevant and punctual for students. On the other hand, as in the case of additional learning hours, spending an excessive amount of time on digital devices might not always imply better learning. Past iterations of PISA have generally found an inverted-U shape relationship between frequency of use of digital devices at school and performance – i.e. those students who reported that they used technology for a lower or higher than OECD average amount of hours also performed less well than their peers who reported moderate use instead. A similar relationship has been found between use of computers for both schoolwork and leisure outside of school and performance (OECD, 2015[130]).

Indicators

This topic includes four indicators:

- Time spent on classwork: students typically devote a good portion of their time to either learning in the classroom, or to completing homework and studying. This indicator combines the information that students report on how many hours they spend learning in class and doing homework during a typical school-week. A decision was made to consider spending 40 or more hours per week on schoolwork as unbalanced, as it arguably leaves little time for students to explore their own passions, spend time resting or socialising with their peers outside the classroom.
- Time spent on digital resources: student report how many hours they spend on digital devices for leisure or learning purposes during the week, either at school or at home. A decision was made to consider spending 40 or more hours per week on digital devices as excessive.
- Doing sports: For this indicator, students report how many times per week they do sports, either before or after school.
- Time spent reading for enjoyment (2018): students report how much time they dedicate to reading for fun each day during the week.

The table below shows the correlation among the indicators in the 'Study-life balance' topic. All correlations are weak.

Table 12. Correlation among indicators of 'Study-life balance'

	Time spent on schoolwork	Time spent on digital resources	Doing sports	Time spent reading for enjoyment (2018)
Time spent on schoolwork	1			
Time spent on digital resources	0.06	1		
Doing sports	-0.01	0.01	1	
Time spent reading for enjoyment (2018)	.	.	.	1

Note: due to the lack of common observations, it was not possible to compute the correlation between indicators based on 2022 data and those based on 2018 data.

Relationship with academic performance

Most indicators under the topic appear to have positive correlation to performance on the PISA test. Students who report spending 40 or more hours per week on schoolwork (i.e. learning in class and doing homework) score between 23 and 25 points more than peers who spend less than that amount of time on schoolwork; similarly, students who spend 40 or more hours on digital devices also score higher across all domains. This relationship is mostly explained by the higher performance of students who spend up to one hour per day learning on digital devices with respect to students who spend no time at all (possibly, disadvantaged students who don't have access to other learning resources). Student who read for at least one hour per day also score better than peers who don't, and particularly so (by almost 17 points) in reading. Practicing sports at least once a week has an unclear impact on academic performance.

Table 13. Relationship between indicators of 'Study-life balance' and performance on the PISA test

Score point difference in performance in PISA 2022…	Time spent on schoolwork	Time spent on digital resources	Practicing sport	Reading for fun (2018)
Mathematics	23.5	27.4	2.0	2.3
Reading	25.2	28.4	-6.2	17.0
Science	23.7	27.8	-1.6	10.0

Note: due to the lack of common observations, it was not possible to compute the regression of 2018 indicators with the performance on the PISA 2022 test. For 2018-based indicators, the regression was therefore conducted using performance on the PISA 2018 test as the outcome variable.

Limitations and possible extension

PISA provides only limited information on how students use their time, and on how much they find pleasure and satisfaction in their daily activities. This dimension is probably the one that could be most improved in the future.

Other surveys have used more sophisticated methods to collect information on how people spend their time. A widely used instrument is the day reconstruction method (DRM). In this method, respondents are asked to revisit a previous day and report in detail on their activities as well as the emotional states they experienced. The original DRM is not viable for inclusion in PISA given its time and scoring requirements. However, the PISA well-being questionnaire included an interesting approximation of this approach, asking students to report on the emotional states experienced during events of interest to PISA, such as specific classes, time spent doing homework, leisure activities with friends or time spent with parents or guardians (Kahneman et al., 2004[131]; Schwarz, Kahneman and Xu, 2009[132]).

The set of existing indicators could also be refined. For example, while the indicator inquiring about time spent on digital resources differentiates between uses for fun and uses for learning (as well as whether digital tools are used during the week or the weekend), additional items exploring more in detail what students do with the devices would allow for more informative insights. The questionnaire for the 2025 edition of the PISA test will delve more into different uses of digital technology.

Similarly, adding items that more explicitly inquire about whether students also take extra, private lessons or attend a cram school (and for many hours per week) would allow to gain additional insight into students' life-study balance.

3.3.8. Material and cultural well-being

Students' background also plays a non-negligible role in their educational path and overall quality of life. Students from more advantaged backgrounds have indeed access to more or better-quality resources than less advantaged peers – which affects their health and learning opportunities alike. Low income and cultural capital indeed adversely affects parents' ability to nurture and provide for their children's needs, so that socio-economic disadvantage during childhood and adolescence is often associated with slower cognitive development (Case, Lubotsky and Paxson, 2002[133]; Case, Lubotsky and Paxson, 2002[133])

The index of economic, cultural and social status (ESCS) has been included since the first cycle of PISA and presents a key variable in PISA reporting and for secondary analysis. This index allows to contextualise results of the student assessment and address relevant questions about educational opportunity and inequalities in learning outcomes. The analysis from multiple rounds of PISA show that there are large differences across countries in the strength of the relationship between socio-economic advantage and students' academic performance, attitudes towards learning or well-being outcomes, suggesting that policies and school practices can help level the playing field and increase education and social mobility (OECD, 2019[134]).

While the measurement of the socio-economic background and the computation of the index have slightly changed across PISA cycles (for an overview, see Avvisati (2020[135])), the three constituting components have remained constant: parental education, parental occupation, and home possessions, with the latter serving as a proxy for household income and/or family wealth. Given the strong correlation between parental education and occupation, in the HLD only the first one has been included, alongside home possessions.

Indicators

This topic includes five indicators:

- House possessions: the kind of commodities that students have access to at home can be considered as a proxy of financial well-being; student who have access to more and better amenities typically enjoy better living conditions which are conductive to learning. In this indicator, students report whether they have access to five commodities (e.g. a room of their own, a computer etc.) in their home. Students' responses are summarised in an index of home possessions.
- Books at home: the presence of books in a home can be considered as an indicator of students' access to cultural stimuli at home, and of the parents' cultural capital. For this indicator, students are asked to provide an estimate of the number of books they have at home.
- Parents' education: More educated parents typically encourage their children to also pursue high levels of education, and are better equipped to support their offspring with their studies, as well. This indicator was constructed by using the information provided by students about the highest level of education attained by their parents or guardians.
- Food deprivation: good nutrition is necessary for students to have the energy to get through a full day of school; malnourished kids are more exposes to developmental problems, both physical and mental. For this indicator, students report if and how frequently, in the 30 days prior to the PISA test, they have not eaten due to lack of financial resources to buy food.
- Poverty-related absence from school: students from less well-off families might need to help their family by either working themselves, or by assisting in some other way; this means, however, that they can allocate less time to both studying and to hanging out with their peers or exploring their own passions. This indicator draws from students' report about whether and how often they missed school due to four income-related reasons.

The table below shows the correlation among the indicators in the 'Material and cultural well-being' topic. All correlations are found to be positive – it should be noted that higher values on the indicators of 'food deprivation' and 'poverty related absence from school' indicate, respectively, that students never or rarely find themselves without a meal, and that they never skipped school due to poverty-related reasons.

The strongest correlations are generally observed between the index of home possession (i.e. whether the student reports higher-than-average values on the home possession index), the number of books at home (i.e. whether the student reports they have more than 100) and parents' education (i.e. both parents having completed ISCED 3 at least). Absence of food deprivation and the student reporting not missing any school days due to poverty reasons are also strongly correlated. In contrast, barely any correlation is observed between these two indicators and having more than 100 books at home.

Table 14. Correlation among indicators of 'Material and cultural well-being'

	Index of home possessions	Books at home	Parents' education	Food Deprivation (absence of)	Poverty-related absence from school (absence of)
Index of home possessions	1				
Books at home	0.16	1			
Parents' education	0.20	0.16	1		
Food Deprivation (absence of)	0.16	0.05	0.02	1	
Poverty-related absence from school (absence of)	0.14	0.07	0.00	0.31	1

Relationship with academic performance

All indicators of 'Material and cultural well-being' are positively related to performance on the PISA 2022 test. Students who report having more than 100 books in their home, for example, tend to score around 76 points more than fellow students who report having less than that amount; whether or not students experienced food deprivation in the 30 days prior to the PISA test and whether they had to skip school due to poverty-related causes also appears to have a strong impact on performance. Students who never or only rarely experienced skipping meals, for example, scored between almost 76 and 82 points more than those who did; similarly, students who never had to skip school to support their family by working or taking care or a relative also scored between almost 69 and 78 points more than those who did.

Table 15. Relationship between indicators of 'Material and cultural well-being' and performance on the PISA test

Score point difference in performance in PISA 2022…	Index of home possessions	Books at home	Parents' education	Food deprivation (absence of)	Poverty-related absence from school (absence of)
Mathematics	54.8	76.4	71	75.8	68.6
Reading	55.7	76.7	67.1	82.6	77.9
Science	53.2	76.7	67.8	77.7	70.8

Note: all indicators under this topic are from PISA 2022. All regressions were therefore performed using PISA 2022 performance as the outcome variable.

Limitations and possible extension

The indicators under this topic only cover a limited set of aspects of students' sociocultural and economic backgrounds: the reporting done on 'Economic and Social well-being' could, therefore, made more relevant by improving both the indicators currently included, and by expanding the set of indicators used.

While being well-established and representing the most prominent topic of secondary research based on PISA data (Hopfenbeck et al., 2017[136]) the ESCS index been subject to criticism, calling for revisions of the index or development of more comparable 'regional' indexes (Rutkowski and Rutkowski, 2013[137]; Pokropek, Borgonovi and McCormick, 2017[138]). Analysts have indeed found evidence of variable reliability by country, poor model-to-data consistency on a number of subscales, and limited cultural comparability (Rutkowski and Rutkowski, 2013[137]). Less-than-optimal-quality items have a meaningful impact on subpopulation achievement estimation (Rutkowski, 2011[139]), possibly leading to questionable inferences when making comparisons across levels of socioeconomic background.

Of the three components of ESCS, the 'household possessions' component has particularly been subject to scrutiny by researchers (Avvisati, 2020[135]). Criticism relates to the fact that family wealth/household income are only measured through home possessions (Lee and von Davier, 2020[140]) – although there are good reasons for doing so: information on home possessions (e.g. the presence of a car, a quiet room to study, or the number of books in the home) is indeed more easily accessible for 15-year old students, and is more suitable to ask in a standardised survey (Tourangeau and Yan, 2007[141]). However, the criticism is that family wealth/household income may only be approximated through a short set of home possession items: the ownership of an item does not, in fact, convey information about the quality of the item that is owned, how accessible the item is in a country/economy due to economic and logistical reasons, or how valued it is due to socio-cultural reasons (Brese and Mirazchiyski, 2013[142]; Yang and Gustafsson, 2004[143]; Falkingham and Namazie, 2002[144]).

An ongoing PISA Research, Development and Innovation (RDI) project is developing more precise, informative and comparable measures of students' living conditions by adding new items to the international questionnaire. The project developed an international set of "optional" items from which countries can choose, and which will be administered together with a "default" set of international items.

Finally, most of the indicators currently included under the topic cover aspects of material well-being; the information on cultural well-being could be expanded through new items investigating, for example, students' participation in and appreciation of cultural and artistic events, such as visits to art galleries and similar activities, and whether they engage in these on their own or with their family.

3.3.9. Openness to diversity

Multicultural societies have become prevalent worldwide due to increased human mobility in pursuit of education and employment opportunities. This movement has led to a redefinition of local identities and cultures within communities. In the context of these complex, multifaceted forms of citizenship at various levels (national, regional, municipal, and local), students are likely to engage with individuals from different cultural backgrounds. Positive handling of such interactions is crucial, fostering an expanded worldview, cultivating appreciation for cultural diversity, and contributing to mutual respect.

The future cohesion of societies hinges on how students navigate these intercultural encounters. Therefore, it is essential to assess the extent of students' exposure to cultural differences, their approach to other cultures, and their perceived adaptability to new contexts. While education alone cannot eliminate racism and discrimination, it plays a pivotal role in raising awareness of the pluralism in modern living. Education can empower students to challenge cultural biases and stereotypes in multicultural

environments. Developing students' intercultural communication skills enables them to express opinions responsibly, both in face-to-face and online interactions.

Schools can facilitate this process by offering language learning opportunities, as languages are intricately linked to history and culture. Acquiring a foreign language enhances cultural understanding, enabling students to grasp the perspectives and behaviours of others in social settings. Language learning also fosters cognitive flexibility, creativity, and may contribute to delaying the onset of dementia later in life (Fox, Corretjer and Webb, 2019[145]). Additionally, schools can organise intercultural events to provide students with firsthand experiences, promoting an understanding of cultural differences within and beyond their school community.

Indicators

This topic includes five indicators:

- Cultural adaptability (2018): students report how much they think they are able to adapt to different cultures and overcoming difficulties due to cultural differences.
- Intercultural communication (2018): students report whether they agree or disagree with seven statements about communicating with people of different cultural and linguistic backgrounds. Students' responses are summarised in an index of intercultural communication.
- Contact with people from other countries (2018): students report whether or not they typically have occasion to interact with people of different background in four different contexts, including their own family and friends' circle.
- Intercultural education (2018): as mentioned, schools play a role in educating students to learn about, understand and respect other cultures. For this indicator, students report how frequently they have the occasion to engage in four situations that are conductive to that goal while at school (e.g. events that celebrate cultural differences or classes where they are taught about other cultures).
- Language learning (2018): students report how many foreign languages they are learning at school.

The table below shows the correlation among the indicators in the 'Openness to diversity' topic. All correlations are positive: students who report greater cultural adaptability, in particular, tend to have better intercultural communication skills.

The weakest correlation is the one between the learning of at least one foreign language at school and the other indicators: this can be attributed to the fact that although students may be required to learn at least one foreign language during their school years, such a mandate does not necessarily ensure additional opportunities for them to explore diverse cultures or engage frequently with individuals from various backgrounds.

Table 16. Correlation among indicators of 'Openness to diversity'

	Cultural adaptability (2018)	*Index of intercultural communication (2018)*	*Contact with people from other cultures (2018)*	*Intercultural education (2018)*	*Language learning (2018)*
Cultural adaptability (2018)	1				
Index of intercultural communication (2018)	0.204	1			
Contact with people from other cultures (2018)	0.102	0.047	1		
Intercultural education (2018)	0.115	0.076	0.118	1	
Language learning (2018)	0.021	0.032	0.003	0.011	1

Relationship with academic performance

Most indicators of 'Openness to diversity' positively contribute to performance on the PISA 2018 test. Students who report higher-than-OECD-average values on the index of intercultural communication score around 53 points more in the reading domain; learning at least one foreign language similarly contributes to scoring almost 23 points more on reading, and almost 25 more on mathematics (as compared to students who do not study any foreign languages). Students who report more frequent contact with people from other cultures and who have more access to intercultural education opportunities, instead, score slightly lower than peers who have less exposure to said circumstances.

Table 17. Relationship between indicators of 'Openness to diversity' and performance on the PISA test

Score point difference in performance in PISA 2018…	*Cultural adaptability (2018)*	*Index of intercultural communication (2018)*	*Contact with people from other cultures (2018)*	*Intercultural education (2018)*	*Language learning (2018)*
Mathematics	17.4	39.6	-4.9	-6.1	24.6
Reading	23.1	53.3	-8.4	-5.6	22.5
Science	19.7	44.9	-8.8	-5.8	19.5

Note: all indicators under this topic are from PISA 2018. All regressions were therefore performed using PISA 2018 performance as the outcome variable.

Limitations and possible extension

The topic of 'Openness to diversity' is extremely important in the context of increasingly interconnected, multicultural societies. The PISA 2022 student questionnaire did not, however, include items that could help gauge students' exposure to cultural diversity, nor assess topics such as the perceived level of integration and acceptance experienced by students with an immigrant background. For this topic, it was therefore necessary to draw

all information from the PISA 2018 student questionnaire: while, as mentioned, that specific edition provided a rather informative set of data related 'Openness to diversity', this choice meant that data would be entirely missing for a number of countries/economies (see section 3.4), plus some additional missing information due to countries/economies not administering some of the indicators. One way to improve the information provided by this topic would be, therefore, to ensure that at least some of the relevant items are re-integrated into the future iterations of the PISA student questionnaire.

Additionally, the indicators already included in 'Openness to diversity' could benefit from additional items to explore the topic further. For example, 'contact with people from other cultures' mostly reflect the diversity of the students' social network, rather than explicit choices made by the students to connect with different cultures. In the future, it would be interesting to investigate whether students have online interactions with peers from other countries, too (e.g. by playing online collaborative games, through social media, via messaging apps, etc.). The indicator could also ask students to report about how frequent these interactions are. 'Cultural adaptability' would similarly benefit from more specific questions about the students' ability to adapt to new cultures, for example by asking them whether they would be willing to they would be willing to alter their habits if they were to live abroad for a period of time.

Finally, it should be noted that the set of information collected on students with immigrant backgrounds is rather limited, as the PISA questionnaire only investigates whether students are native or instead first or second generation, and which languages they typically speak at home with their parents – given the limited amount of insight that such general questions provide, a decision was made not to include them among the indicators. The topic could therefore benefit from the inclusion of additional questions related to immigration and integration: for example, students who report having an immigrant background, could be asked follow-up questions investigating the extent to which they feel accepted and well-integrated in the classroom, and/or whether they have been victim of discrimination due to them being non-natives (and if so, how frequently, and whether adults intervened to solve the situation and took follow-up actions). This perspective could also be complemented by asking native students what their own perceptions and attitudes are towards peers of different nationality, and/or on topics such as immigration. One limitation of further extending comparative information on immigrant integration with PISA is related to sample size issues: in some countries the number of immigrant students is rather low, and so the indicators might suffer from reliability issues.

3.4. Limitations of the Dashboard and expected improvements

The HLD aims to be a useful tool for those who wish to know more about how well students are doing in their life, alongside how well they perform academically; nevertheless, some limitations should be kept in mind when exploring the information the Dashboard offers.

First, the framework used by the HLD, while rooted in prior, well-established examples (i.e. the Bhutan National Gross Happiness Index, the PISA Frameworks on Well-Being) and informed by research, could be further refined to better represent the complex, multidimensional concept of student well-being. As previously mentioned, it was sometimes not possible to report at all on relevant aspects of student well-being, due to the limitations of information available in the PISA student questionnaire. An important missing dimension is, for example, that of students' physical health: the current PISA student questionnaire, in fact, only includes some information on students' sports habits, and on whether they eat breakfast and dinner. This information could be extended by asking students to report on their perception of their overall health, their body image, or on the frequency of headaches, stomach pains and other physical disorders. These questions

are already included in the PISA well-being questionnaire – however, as mentioned, only a very limited number of PISA-participating countries/economies have opted to administer it, which limits the international insights that can be gained from it. Other surveys, such as the HBSC, provide validated examples of questions on students' health that are not necessarily very sensitive. Additionally, as acknowledged in exploring the different topics and related indicators (see section 3.3), there is scope for extending the set of information provided by each indicator by improving the contents of the PISA questionnaire in future iterations.

Second, missing data remains an issue to be kept in mind when comparing countries and economies. The presence of such missing information is always signalled as clearly as possible through dedicated symbols (asterisks, white columns). Some indicators and topics are more affected than others by missing information, partly due to the decision of drawing information from the PISA 2018 questionnaire: Cambodia, El Salvador, Guatemala, Jamaica, Mongolia, Paraguay and Uzbekistan did not, in fact, participate to PISA 2018, and therefore miss data for the topic of 'Openness to diversity' (which entirely relies on 2018 data), as well as for any other 2018-based indicator. Academic performance is the sole topic where no missing data is observed. In contrast, the topics of 'Openness to diversity', 'Agency and engagement' and 'Psychological well-being' present the highest number of missing information – i.e. data is missing for several countries/economies across the indicators. For the topic of 'Openness to diversity', it can for example be observed that data is missing for 18 to 20 countries/economies on the indicators of 'cultural adaptability', 'intercultural communication', 'contact with people from other countries' and 'intercultural education'; for 'language learning', information is instead not available for 12 countries/economies. Overall, 12 countries/economies entirely miss information for this dimension, the highest number across all topics. In the case of 'Psychological well-being', between 7 and 13 countries/economies miss information for any of the four indicators included; two of these have no information available to report on this topic.

Third, cultural differences in response style and in how individuals tend to describe themselves affect the comparability of the indicators. This issue is not unique to the HLD, given that the Dashboard presents the same scale that are presented in the PISA reports. However, more research will be important to identify those scales and items that are less likely to meet measurement invariance criteria, and then develop alternative measures that are less sensitive to response style and other sources of bias.

Lastly, new visualisations allowing for more nuanced exploration of data could be added. For example, the HLD does not, currently, include any information on trends in well-being, as it only considers non-overlapping information from two PISA cycles: future versions of the Dashboards could, therefore, include visualisations of trends for all indicators included in multiple rounds of PISA. Another useful addition would be to allow users to explore data by student background information, such as gender.

4. Conclusions

There is more to students' lives than just grades: while academic success is a useful predictor of how well schools are preparing learners for their future, a more holistic view of the student is necessary in order to gain the full picture of how they are doing. School is more than just a place where children and adolescents learn: it is also a place of interaction and self-discovery. What happens within the school walls on a day-to-day basis can impact several aspects of students' well-being and their personal development. With research highlighting the close, reciprocal relationship among well-being, academic performance and later quality of life, it is therefore key to find reliable and comprehensive ways to measure this multifaced construct and make use of this information to promote positive learning spaces that are conductive to a happy life and equilibrated growth.

This paper has provided examples of prior initiatives that aimed at defining and measuring well-being (in students as well as in larger target populations). Taking inspiration from these established initiatives, the HLD aims at summarising relevant information on student well-being that has been collected through PISA: the data is organised in nine key topics of well-being, each measured through several indicators, and presented to the users in an interactive manner.

The volume and complexity of PISA data keeps increasing: it is thus essential to support users by creating dissemination products that are at the same time easy to use and transparent in the presentation of data issues. The primary purpose of the Dashboard is thus to make wellbeing indicators and scales more accessible and more used by different education stakeholders. Different users will have, however, different needs: not all of them are interested in detailed comparisons at the level of each indicator, and prefer instead to have a more summary picture of how their education system is performing at the more aggregate level of each topic. Composite indexes respond to this demand for summary information: constructing them is not, however, straightforward, and no universal method exists for to do so. Any index involves a series of subjective judgments, as well as dealing with uncertainties and value presuppositions (Mazziotta and Pareto, 2013[146]). The HLD currently uses the simplest possible method to aggregate information (arithmetic means) and allows its users to navigate well-being data at different levels of granularity. Future iterations of the Dashboard could experiment with alternative methods, such as assigning weights according to the variability of the indicator.

While acknowledging its current limitations – among which the most important ones are missing information for several countries on certain indicators and topics, and the absence of data on aspects of well-being that would be relevant to report on – the Dashboard is presented as a useful tool to promote a more balanced and more complete understanding of how well 15-year-olds all around the world are faring – both as learners, and as people who are living a delicate period of their lives in which they need care and support.

Annex A. Structure of the PISA Happy Life Dashboard website

The HLD webpage is organised in two main data tabs, in addition to two sections containing useful information to guide the user. These are:

- Create your happy life index – which corresponds to the landing section of the webpage
- Topics by country/economy
- User Guide
- Frequently Asked Questions (FAQs)

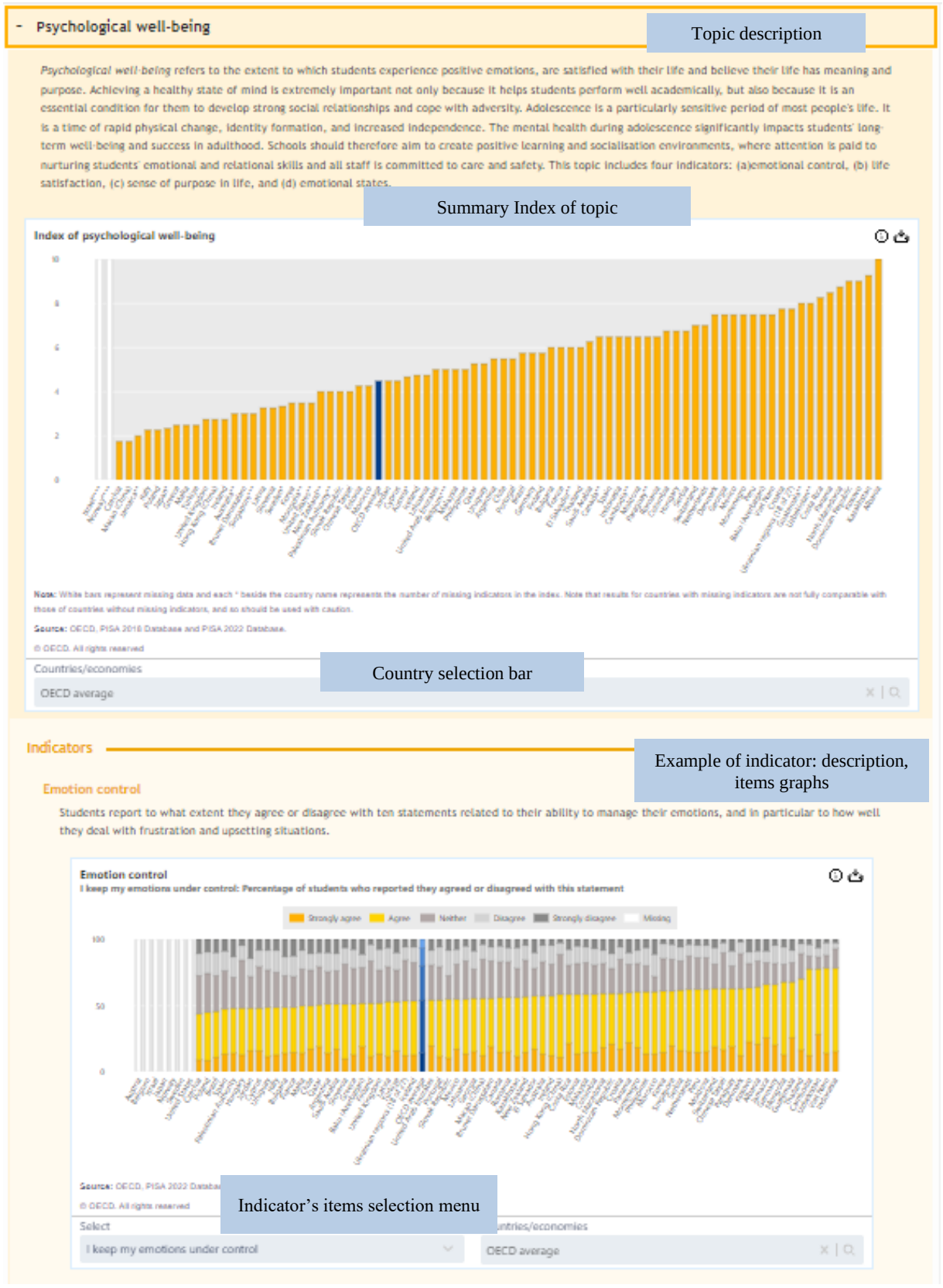
The content of each is detailed in the paragraphs below.

Create your Happy Life Index

In addition to the customisable HLD presented in section 3.2.2, the landing page also offers information on student well-being broken down into the nine topics of the framework. Each topic's data is contained in a coloured, expandible tab under the "Explore the topics" section of the page: as shown in Figure A 1, users can then visualise the graph presenting the overall topic index score of each country/economy, as well as more detailed information about the responses provided by students on each indicator included under the topic. Countries and economies are ordered so that those where students enjoy better well-being (in a specific topic or indicator within the topic) are found on the right-hand side of the graph, while those where students enjoy lower levels of well-being are on the left-hand side. Countries that miss information entirely for a given indicator and/or for the overall topic (i.e. no information is available for any of the indicators) are represented by a white column, and are positioned on the left-hand side of the graphs. For countries that have some missing indicator, these are signalled by a corresponding number of asterisks next to the country/economy name.

By default, only the OECD average is highlighted on the graphs – users can, however, easily search and highlight additional countries of interest by using a dedicated search bar. In addition to the data, the tabs also include a short description of each topic, including the rationale behind their inclusion in the framework underpinning the HLD. Information on how the scores are calculated is also provided in hover-over text format. In the indicators section, users can read a brief overview of what each indicator captures, and visualise the graph for each item included in a given indicator through the dropdown menu underneath the graph. Users can further download the graphs as a PNG or SVG image, and/or the data behind it in CVS format.

Figure A 1. Explore the topics: expanded tab example view



Source: Happy Life Dashboard website. Available at: gpseducation-pp.oecd.org/PisaHappyLifeDashboard

Topics by Country/Economy

The "Topics by country/economy" allows users to select a country/economy they wish to focus on and explore their data on students' well-being. Each country/economy's page includes three main data visualisations.

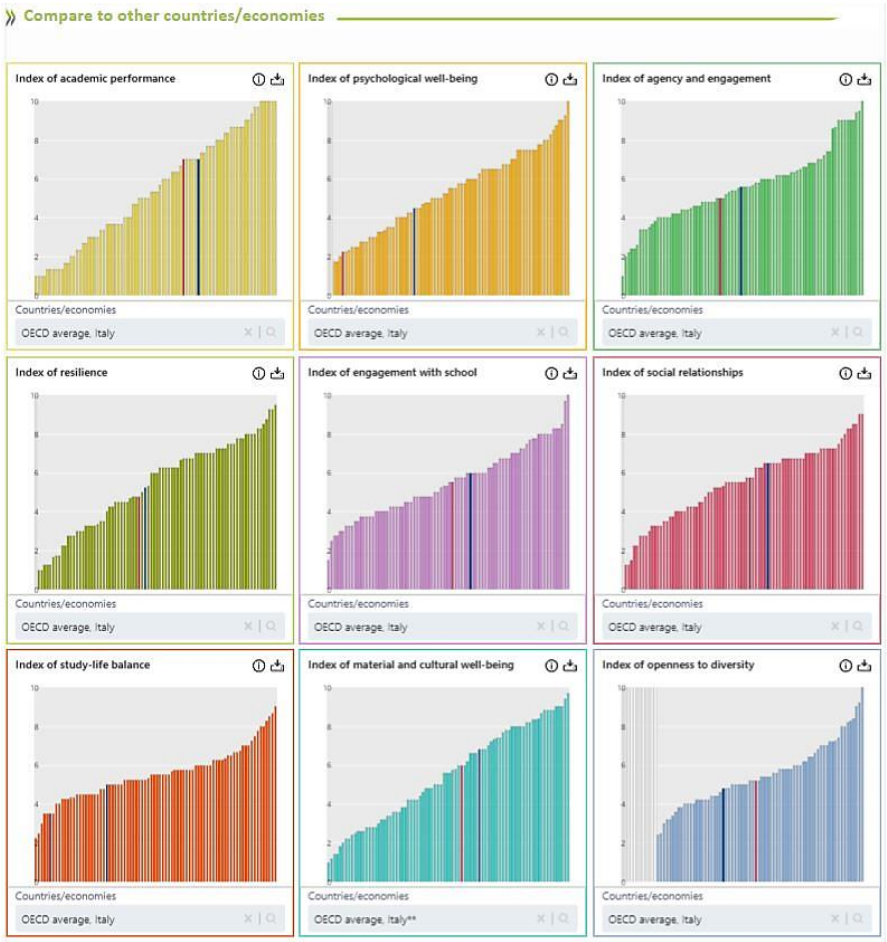
First, a section displaying the country/economy's score on each of the nine topic indexes, as compared to the OECD average. This view allows to gain a quick grasp of each country/economy's areas of strengths and those where they could improve in terms of students' well-being. Figure A 2, for an example, shows the overall topic index scores for Italy: it can be seen how the country/economy performs around the average on the PISA test, while scoring higher than the OECD average in terms of 'Openness to diversity'. It however scores below the OECD average on the remaining six dimensions of student well-being, indicating several areas for improvement – 'Psychological well-being' and 'School-life balance' in particular.

Figure A 2. Overview of the country/economy performance across the nine topics

Source: Happy Life Dashboard website: Italy's overall topic index scores. Available at: gpseducation-pp.oecd.org/PisaHappyLifeDashboard?country=ITA

Second, a section allowing to get an at-a-glance understanding of how well the selected country/economy is performing in the nine well-being topics as compared to the other countries/economies included, in addition to the OECD average (see Figure A 3 for an example: Italy is identified by a red bar, while the OECD average as a blue bar). Users can compare the selected country/economy with others of interest by using the country/economy selection bar: additional countries/economies are highlighted each with a different colour.

Figure A 3. At-a-glance comparison view



Source: Happy Life Dashboard website: at-a-glance comparison view of Italy's topic index scores (Available at: gpseducation-pp.oecd.org/PisaHappyLifeDashboard?country=ITA

By default, in addition to the OECD average, the country/economy of interest is also highlighted across graphs; users can similarly highlight additional countries/economies they wish to compare information about by using the selection bar underneath each graph.

User resources: User Guide and FAQs

The 'User guide' and 'FAQs' pages were included to support users in navigating the webpage and understanding the data presented while keeping in mind comparability and other relevant issues. The content of both pages is organised in expandible tabs.

In particular, the User Guide provides an organised overview of the webpage's structure (similar to the contents of this Annex), as well as definitions for the key terms used and a short explanation of how the relevant scores are calculated.

As the name suggests, the FAQ page instead compiles and answers relevant questions that users might have in relation to the HLD – from its purpose, to how the topics and related indicators were selected, to the methodology and more. Users can download a series of useful resources from the FAQ page, including the full dataset behind the webpage and the complete list of dimensions and indicators.

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