

Beyond Grades: raising the visibility and impact of PISA data on students' well-being

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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 2015, the Programme for International Student Assessment (PISA) broke new ground by including indicators of student well-being alongside traditional measures of academic performance. Despite ongoing efforts to prioritize this aspect in subsequent cycles, the data on student well-being often remain overshadowed by country and economy scores in mathematics, science, and reading - traditionally considered the primary outputs of PISA.

This paper presents a proposal to increase the visibility and policy impact of PISA indicators on well-being, by organising them in thematic areas and presenting them through data visualisations that respond to the needs of different kinds of users. The proposed PISA dashboard on students' well-being has the potential 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, this paper presents an analytical framework defining nine core dimensions of student well-being for which PISA already collects data. The paper also suggests a methodology to visually present these data at different levels of granularity – from macro views showing how each education system is doing on each dimension, to the most detailed view showing students’ responses to each individual item in the questionnaire.

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 nine well-being dimensions and the associated indicators, describes a possible methodology to aggregate the information these offer into composite scores, and finally discusses limitations in the available data and possible threats to the validity and comparability of the composite indicators. 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.

Related to needing better and more complete information on well-being, a recent publication by OECD's Centre on Well-being, Inclusion, Sustainability and Equal Opportunity (WISE) identified key priorities and gaps related to data on children well-being: the report underlines how, while the availability of data has improved through the years, comparable cross-national data remains scarce. While certain aspects of children lives (e.g., cognitive development, physical well-being) are generally well covered, other ones (e.g., social and emotional well-being) are less so, with measures being limited and coverage partial – despite all of them being equally relevant. Similarly, the report finds that information is scarcer for certain age groups (e.g., early childhood) and that children who are more vulnerable (e.g., children with disabilities, children in homeless families, etc.) are often not easily identifiable, not covered sufficiently, or not present at all in the data. In order for data on well-being to be more complete at the national level and better comparable at the cross-national one – and thus offer a more complete picture of children well-being that can support better informed policymaking – co-ordinated action is required on the part of governments, international organisation and the international policy and statistical communities at large. (OECD, 2021^[21]).

The 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^[22]; Mazrekaj and De Witte, 2023^[23]).

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^[24]) 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^[24]). Contributing to this fragmentation, is also the fact that well-being is studied by researchers in different fields (e.g., psychology, economics, sociology etc.), all of which adopt different perspectives on the construct and adopt differing approaches to studying it (OECD, 2021^[21]).

The multifaceted nature of well-being and the close relationship it shares with the environments the students inhabit can also pose issues when attempting to study the construct. Well-being encompasses several aspects of students' lives (both of objective and subjective nature), meaning that for it to be assessed in a comprehensive manner, researchers should ideally adopt a multi-dimensional approach, identifying several indicators that can reflect each of those aspects properly. It is similarly important to keep track of and to account for the social and environmental influences that are part of students' lives (e.g., the dynamics that take place at school, at home, in one's friend circle; the

relationships established etc.), and to distinguish them, if possible, from the well-being outcomes which they contribute to shaping (OECD, 2021_[21]).

When defining student and adolescent well-being, it is also 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. In trying to define what well-being means for students, it is similarly important to integrate the views and perspectives of children themselves (OECD, 2021_[21]).

Yet another 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. Depending on the age of the respondents, collecting self-reported data from children and adolescents may prove more difficult than for adults also due to challenges in fully expressing oneself (OECD, 2021_[21]). 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.

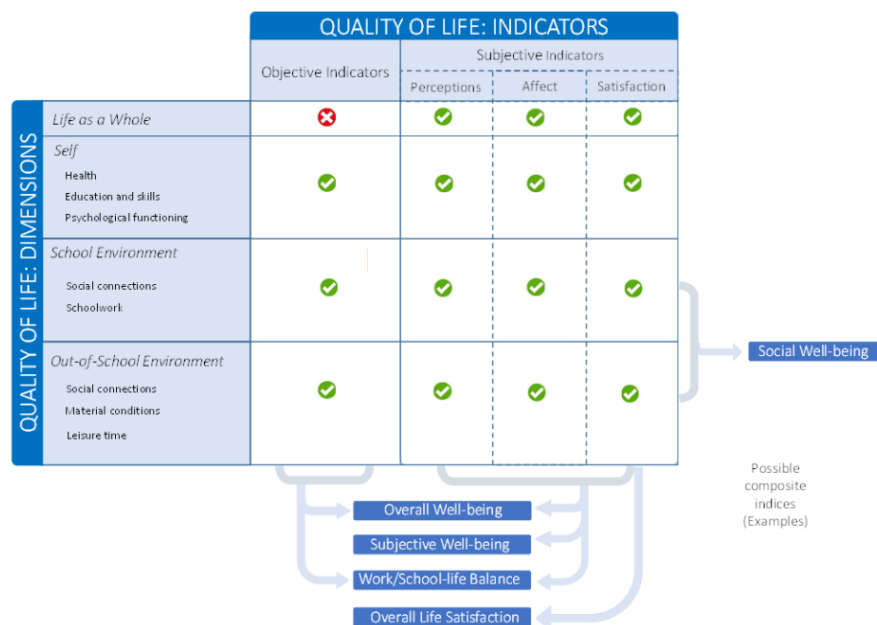
PISA has previously worked on defining and measuring student well-being: the *Framework for the Analysis of Student Wellbeing in PISA 2015* (Borgonovi and Pál, 2016_[25]), for example, considers student well-being as “a dynamic state characterised by students experiencing the ability and opportunity 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_[25]) 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_[25]). 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_[25]).

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 combined 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_[26]).

The framework presented in this paper builds upon the groundwork laid in PISA 2015 and 2018. Leveraging the latest student questionnaire, it broadens the set of domains (or topics) considered, while largely maintaining continuity with its predecessors.

2.1. Measuring well-being: notable initiatives

Several well-established initiatives measure the well-being of different target populations. Below, we list a selection of those that helped inform this paper.

2.1.1. *Bhutan’s Gross National Happiness Index*

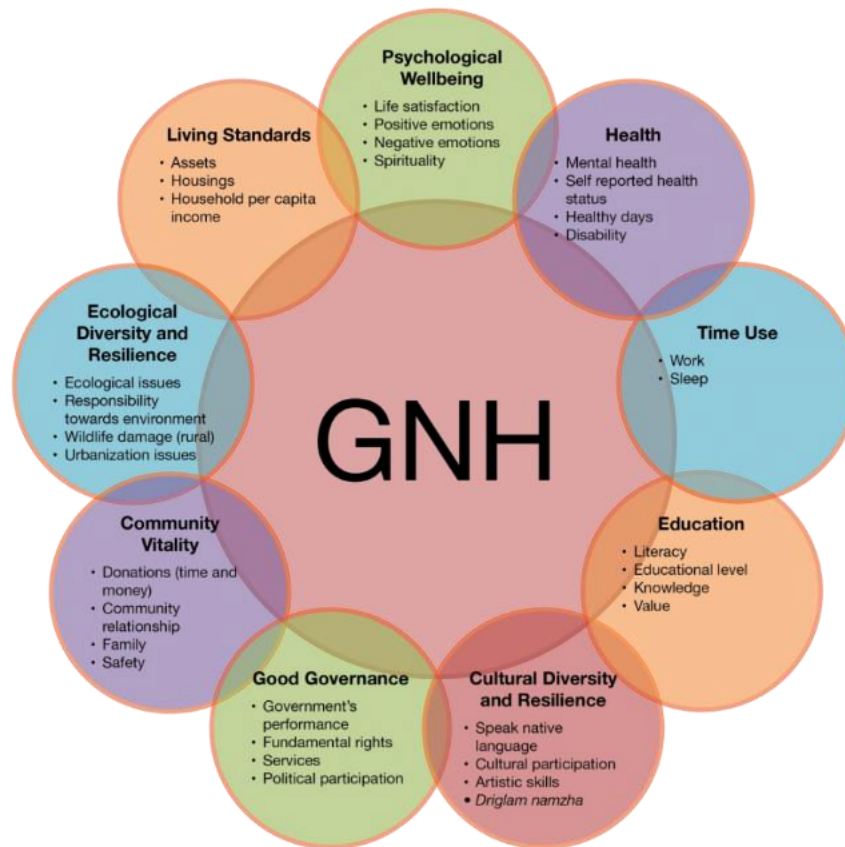
Bhutan is a land-locked country in the Eastern Himalayas with a population of around 727 000 people. In the 1970s, Bhutan was the first country to propose the use of gross national happiness as an alternative for the more traditional measure of gross domestic product (GDP). This concept is rooted in 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^[27]). 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 wellbeing¹. 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^[27])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^[146]), the Combined Quality of Life Indices (CQLI) (Diener, 1995^[147]), and the Human Suffering Index (HSI) (Camp and Speidel, 1987^[148]) (Tilak, 1992^[149]) (Hess, 1989^[150]). Also included in these indexes are United Nations Research Institute for Social Development (UNRISD) Level of Living Index (LLI) (Drewnowski and Scott, 1966^[151]), General Index of Development (GID) (McGranahan et al., 1972^[153]), 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^[27]).

Figure 2. Bhutan's Gross National Happiness Index



Source: *Bhutan Gross National Happiness Report 2022*, p.9 (Karma Ura et al., 2022^[27])

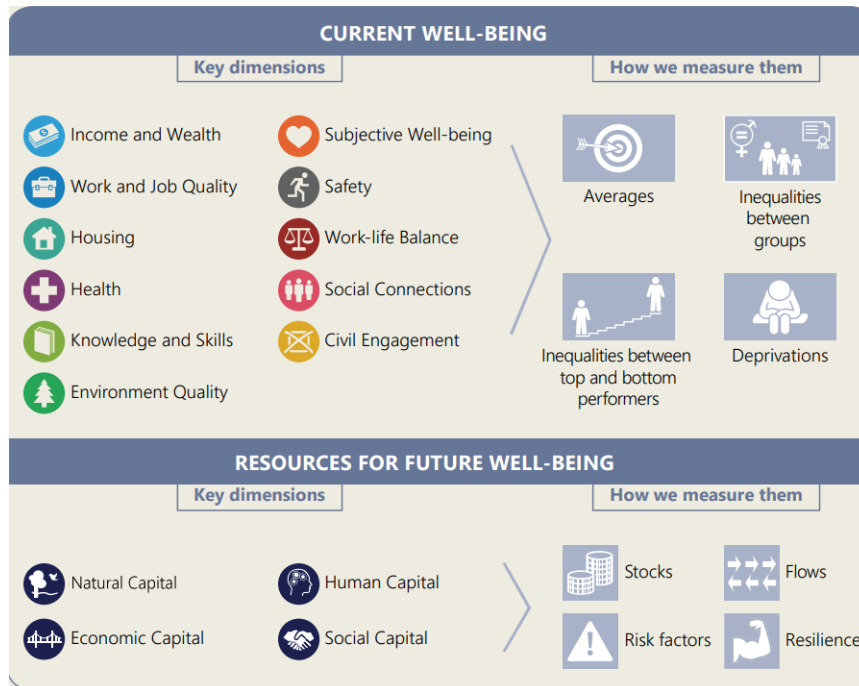
2.1.2. *OECD Better Life Initiative: the How's Life framework and the Better Life Index*

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^[28]). 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_[29])

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 the 11 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](https://www.oecd.org/better-life-index/)

2.1.3. OECD Child Well-Being Data Portal and Dashboard

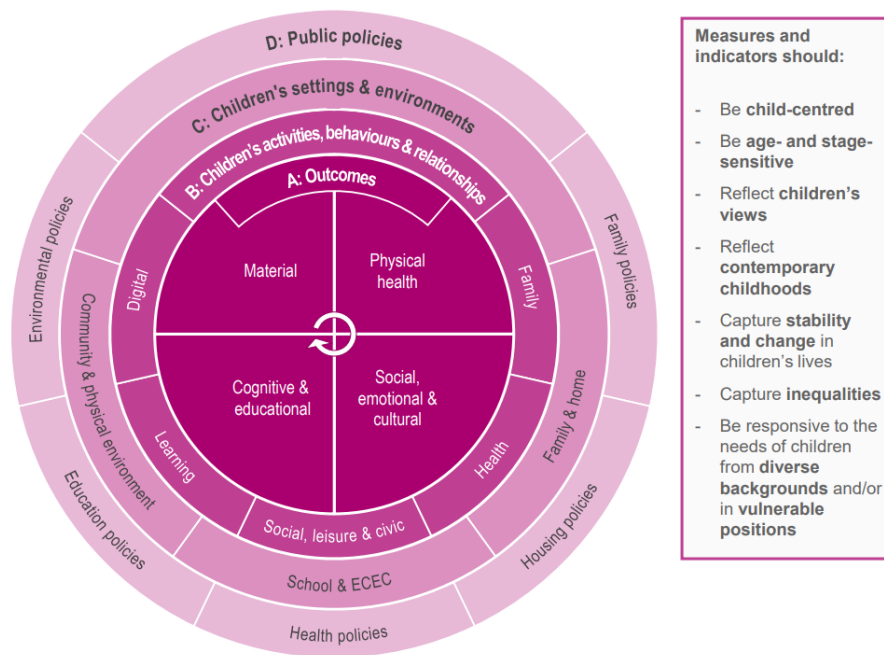
The OECD Child Well-Being (CWB) Data Portal and Dashboard is also the result of research conducted by WISE Centre. However, the scope of this Dashboard is focused on the well-being of children, rather than on the general population of OECD member countries as in the case of the BLI.

Both the Child Well-Being Data Portal and the Dashboard are based on the measurement framework outlined in the report *Measuring what matters for child well-being and policies* (OECD, 2021^[21]), which conceptualises the different aspects that matter for child well-being (see Figure 5) and sets out a multi-dimensional approach to measuring child well-being. The framework emphasises a multi-level structure to clarify potential drivers of well-being, and the interdependence of outcomes in different domains of life. It also takes account of children's wants, needs, and abilities throughout childhood, and integrates children's activities, behaviours and views into the measurement of what matters for child well-being.

The OECD Child Well-being Data Portal contains over 200 comparative measures on child well-being outcomes and the drivers of well-being stemming from children's environments. It covers four key outcome areas (material well-being, physical health, cognitive and educational outcomes, and socio-emotional outcomes). When possible, the indicators of child outcome indicators are disaggregated based on family circumstances, socio-economic status, parental education level, and migratory background allows us to assess inequalities in outcomes across these factors. The Portal also includes data on child well-being drivers categorised in 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.

A selection of headline indicators from the Data Portal are displayed in the OECD Child Well-being Dashboard to provide policy makers and the public a tool to monitor countries' efforts to promote child well-being.

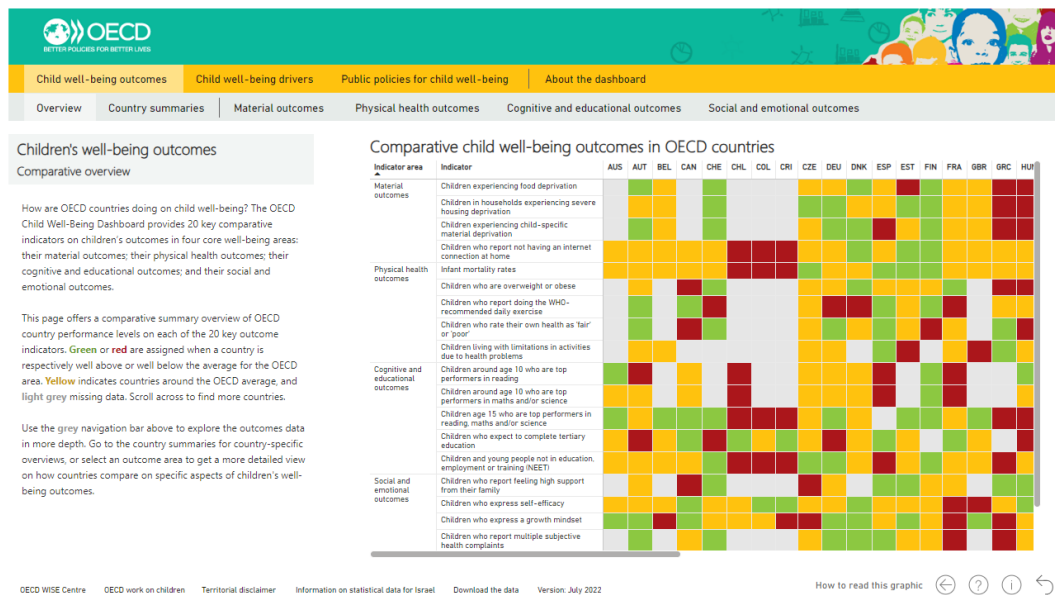
Figure 5. Multi-level Child Well-being Framework



Source: *Measuring What Matters for Child Well-being and Policies*, p. 17 (OECD, 2021^[21])

The OECD Child Well-being Data Portal and 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 the indicators for well-being outcomes, drivers or public policies visualised in interactive, comparative charts. For indicators relating to child well-being outcomes and drivers, users can also access country profiles that display results for a specific country across the available indicators. In addition, the Dashboard provides overview charts for child well-being outcomes and drivers, respectively, which summarise the relative performance of a given country for the different indicators. Users can easily understand how a given country 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 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 HBSC 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. More recently, the project focuses on the importance of giving children voice on all decisions that matter to them.

3. Proposed framework and methodology to derive the indicators

By bringing together information on both cognitive performance and different well-being dimensions, PISA can provide a more holistic overview of how students in the participating countries and economies are doing.

This paper identifies nine core dimensions or ‘topics’ for student wellbeing. Each dimension (for example, ‘Psychological well-being’) is articulated in three to five indicators (e.g. ‘emotion control’). Each indicator, in turn, includes a variable number of questions/statements that students had to report on (e.g. ‘I handle stress well’). We argue that, in order to increase the impact and use of these data, it is important to develop composite indicators that can succinctly describe how each country and economy does on each of the nine dimensions of students’ well-being. The methodology described below is one first attempt to construct such indicators. Their intended use, as already stated, is to support comparisons of the performance of education systems that are not solely based on performance on the PISA core domains of mathematics, science and reading.

Selection of topics and indicators

Albeit differing in the selection of indicators and in their organisation, this paper’s approach generally 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, it was suggested to classify indicators in a different manner than done in the PISA well-being frameworks. For example, Borgonovi and Pál (2016^[25]) suggest to group indicators such as ‘life satisfaction’ and ‘test and learning anxiety’ under the same ‘Psychological Dimension’: in our proposal, we also include those indicators (the second being similar, in content, to ‘stress resistance’ and ‘fear of failure’), but categorise them as indicative of ‘Psychological Well-being’ and ‘Resilience’ respectively.

Initially, only information in the 2022 wave of PISA was considered. For some well-being topics of key relevance, however, the data in PISA 2022 alone did not appear to be extensive enough: therefore, data from PISA 2018 were also considered when drafting the framework. The PISA 2018 student questionnaire indeed included a specific focus on students’ global competences (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 previously mentioned 2018 optional questionnaire on well-being (see section 2) was instead not taken in consideration, given the very low number of countries that decided to administer it.

The resulting suggested organisation of the identified well-being data includes nine key topics (or dimensions):

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 3.1 explores each of the topics in detail, discussing their relevance for student well-being and presents the indicators that were identified to assess them. The section also offers a discussion of the potential weaknesses of the topics: in particular, it should be noted that, while relevant, two of them ('Study-life balance' and 'Openness to diversity') present, to the authors' judgment, more weaknesses than the others in terms of the available data.

How could the information be presented to the users?

While identifying key indicators of student well-being in the PISA questionnaire and proposing a way to organise them coherently (so that indicators relating to the same or very similar aspects of well-being can be considered together) represents a key step in the process of better highlighting this information, it is not sufficient. In order to ensure that data on well-being can be more easily accessed and explored by a vast and diverse public it is also important for the it to be presented in an intuitive, visual manner. Considering, for example, the approach taken by the Better Life Index (see section 2.1.2) or by the Child Well-Being Dashboard (see section 2.1.3), an interactive online webpage offering tools such as interactive graphs or overview dashboards could be useful to achieve this goal.

It should also be noted that different users are likely to have different data needs: while researchers might want to explore the information in a very granular manner, a more general audience (for example, teachers, parents or headmasters) could be more interested in a broader overview, or to be able to easily understand and compare how well students in different countries/economies fare according to specific facets or dimensions of well-being. One way to achieve this goal is to aggregate the information provided by each indicator to achieve an overall topic score.

To do so, we suggest a two-step method: first, a score is computed for each indicator under a topic; second, the scores for all the indicators in the dimension/topic are averaged for each country to develop a dimension/topic score. The first step requires considering two distinct cases in treating the data: indicators that have a corresponding PISA index (case one), and indicators that do not (case two).

PISA indexes synthesise the information from multiple items that are meant to measure the same construct. For example, for the indicator 'emotion control', students report the degree to which they agree or disagree with several statements on their capacity to keep emotions under control and manage stress and frustration (these are the items making up the scale). To support PISA analyses, the information from these multiple items has been summarised into an overall index of 'emotion control', with the value zero indicating the OECD average. When available, these indexes provide a good basis to assign a score to countries/economies on the construct of interest: in the first operationalisation of this methodology, for example, a score from 1 to 10 was assigned indicating to the share of students who report having 'emotion control' above OECD average. The score of 10 is assigned to those countries/economies with the highest registered share (in the top decile or 10% of countries/economies with respect to this share), while 1 to those that have the lowest share (considering all relevant countries/economies). This way, the indicator scores are not tied to a share that is judged as a "golden standard" to be achieved; rather, they allow to understand the relative standing of the countries/economies considered and identify (with the needed interpretative cautions) those that appear to fare better in each indicator, setting targets that are achievable (because already achieved by at least one tenth of the countries/economies).

For case two indicators (i.e., no associated PISA index), it is first necessary to establish a threshold that indicates “better” well-being: for example, for the indicator ‘life satisfaction’, the PISA standard of considering a score of seven out of ten as indicative of good satisfaction with life was adopted. Then, the share of students that meet the threshold is calculated for each country/economy, and a score assigned as for case one indicators.

Once a score has been calculated for all indicators under a given topic, an average score for the topic can be computed (excluding missing indicators, if any): each country could thus have up to nine topic scores, providing a more synthetic insight than the one offered the responses to each item of each indicator. This is only one possible method to aggregate the data; further research is warranted to identify the best way to combine the information offered by the indicators’ items in a simple yet valid manner.

In terms of visual presentation, both the more granular information about how students responded to each item of an indicator and each of the overall topic scores can be presented through dedicated, interactive graphs: these allow users to highlight countries/economies of interest and see where they fall with respect to each other or to the OECD average, for example. Taking the visualisation and data aggregation one step further, and drawing from the BLI’s example (see section 2.1.2), the information on all topic scores could be brought together into a single, customisable dashboard view, which could help users examine the relationship between performance in PISA and other important dimensions of educational success. In this customisable view, users can select the dimensions of well-being they want to compare students on, and assign different weights to the different dimensions so that they contribute or more to the overall well-being score.

Finally, another visualisation option, in line with that adopted by the Child Well-Being Dashboard (see section 2.1.3), could also be implemented, showing for each country/economy whether, for each indicator, students report values of well-being that is above, in line with or below OECD average.

3.1. Exploring the nine proposed topics of well-being

This section offers an overview of the nine topics of well-being that were identified based on the information in PISA 2022 and 2018 questionnaires, and the initial set of indicators that have been identified and computed for each dimension. 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. Data for all the indicators, as well as composite indexes of the indicators in each dimension, are available in an online annex (see link included in Annex A).

3.1.1. *Academic Performance*

Definition and relevance for student well-being

Academic performance is the only dimension of the proposed framework for which data would be 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/economies, 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

For this topic, we have selected 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.

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/economies, 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 might add value. The main issue lies in the fact that several countries/economies 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]).

3.1.2. *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

For this, we have selected 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.
- **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).

Limitations and possible extension

The main limitation associated to this topic lies in the fact that comparing levels of subjective well-being across countries/economies is challenging. Variations in students' reports of life satisfaction or happiness across countries/economies 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^[53]; Park, Peterson and Ruch, 2009^[54]; Proctor, Linley and Maltby, 2009^[55]). 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 so³.

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^[56]).

³ Tsai et al. (2007^[152]), 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.

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”); the main challenge to incorporating this additional piece of information is represented by the fact that only a very limited number of countries/economies implemented the well-being questionnaire in past PISA cycles.

3.1.3. *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^[57]). It has been empirically linked to creativity, motivation, and happiness (Welzel and Inglehart, 2010^[58]), as well as autonomy and self-fulfilment (Eteläpelto et al., 2013^[59]). In contrast, engagement is conceived as a multidimensional phenomenon encompassing behavioural, emotional, and cognitive components (Fredricks, Blumenfeld and Paris, 2004^[60]; Fredricks, Filsecker and Lawson, 2016^[61]; Wang et al., 2016^[62]).

The indicators under this topic focus on whether and how students address both 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^[63]). 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^[64]). 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^[65]; Mirzaei Rafe et al., 2019^[66];

Feder et al., 2019^[67]; Boix Mansilla, 2016^[68]).

Indicators

This topic currently 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.
- **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.
- **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.
- **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.
- **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.

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.

3.1.4. *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_[69]). 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_[70]). This anxiety is linked to poor academic performance, frequent absenteeism and school dropout (Ramirez and Beilock, 2011_[71]; Cortina, 2008_[72]). Excessive anxiety can impede social and emotional development, trigger substance use to alleviate stress, and lead to exhaustion (Salend, 2012_[73]; Zeidner, 1998_[74]). Nurturing resilience becomes paramount for students to navigate challenges successfully (Compas et al., 2001_[75]; Kim and Kim, 2016_[76]).

Quality student-teacher relations and a supportive classroom environment significantly contribute to students' resilience, motivation and confidence (den Brok, Brekelmans and Wubbels, 2004_[77]; von der Embse et al., 2016_[78]). 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_[79]). 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_[80]; Cohen and Wills, 1985_[81]). Parents can contribute positively by instilling trust in their children's abilities while avoiding excessive pressure and unrealistic expectations (Putwain, Woods and Symes, 2010_[82]; Gherasim and Butnaru, 2012_[83]).

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_[84]). 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.
- **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.
- **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.

- 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.

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^[85]). 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^[86]; Luthar, Doernberger and Zigler, 1993^[87]): 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 present proposal for this topic 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 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^[88]) 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^[89]; Yeh and Huang, 1996^[90]). 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 Tumaming, 2012^[91]). Thus, individuals from collectivist cultures, including students, may tend to report higher levels of fear of failure than individuals from individualist cultures.

3.1.5. Engagement with school

It takes engagement and motivation to learn (Christenson, Reschly and Wylie, 2012^[92]; Wigfield, 2006^[93]). 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^[60]; Jimerson, Campos and Greif, 2003^[94]). 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^[95]). 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^[96]; Brooks, Brooks and Goldstein, 2012^[97]). 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^[98]; Baker, Sigmon and Nugent, 2001^[99]; Lee and Burkam, 2003^[100]; McCluskey, Bynum and Patchin, 2004^[101]).

Teachers also benefit from a positive school climate, reporting higher job satisfaction and less burnout in disciplined and supportive schools (Aldridge and Fraser, 2015^[102]; Berg and Cornell, 2016^[103]; Mostafa and Pál, 2018^[104]). 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^[105]). 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^[105]). Given its significance, this topic should explore 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 would combine 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.
- **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.

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.

3.1.6. *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_[106]). Adolescence is indeed a time when social acceptance, particularly by peers, can have a powerful influence on behaviour (Baumeister and Leary, 1995_[106]; Rubin, Bukowski and Parker, 2006_[107]): 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_[108]; Harter, 1999_[109]). 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_[110]). On the other hand, rejection by peers can undermine students' motivation and determination and be a hurtful experience (Eisenberger, Lieberman and Williams, 2003_[111]; Kross et al., 2011_[112]).

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_[113]; Olweus, 1991_[114]) – has received increasing policy attention by both policy makers and researchers (Farrington and Ttofi, 2011_[115]). 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_[116]). 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_[117]), and reduced stress related to school (Torsheim, Aaroe and Wold, 2001_[118]). 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_[119]; Reddy, Rhodes and Mulhall, 2003_[120]; Roeser, Eccles and Sameroff, 1998_[121]). Furthermore, students who perceive teacher support are better equipped to cope with stress within the school context (Malecki and Demaray, 2006_[122]).

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.
- **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.
- **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.
- **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.

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.

3.1.7. *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_[123]).

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_[124]). 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_[125]) and long-term negative physical and mental health outcomes (Hallal et al., 2006_[126]; Sibley B.A. and Etnier, 2003_[127]): participation in sports has indeed been shown, for example, to reduce anxiety (Appelqvist-Schmidlechner et al., 2017_[128]).

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_[129]).

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.
- 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.
- 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.

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.

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^[130]; Schwarz, Kahneman and Xu, 2009^[131]).

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.

3.1.8. *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^[132]; Case, Lubotsky and Paxson, 2002^[132]).

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^[133]).

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^[134])), 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, this proposal only includes the first one, 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 conducive 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.
- **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 is 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 exposed 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 would draw from students' report about whether and how often they missed school due to four income-related reasons.

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_[135]) the ESCS index been subject to criticism, calling for revisions of the index or development of more comparable 'regional' indexes (Rutkowski and Rutkowski, 2013_[136]; Pokropek, Borgonovi and McCormick, 2017_[137]). 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_[136]). Less-than-optimal-quality items have a meaningful impact on subpopulation achievement estimation (Rutkowski, 2011_[138]), 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_[134]). Criticism relates to the fact that family wealth/household income are only measured through home possessions (Lee

and von Davier, 2020^[139]) – 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^[140]). 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^[141]; Yang and Gustafsson, 2004^[142]; Falkingham and Namazie, 2002^[143]).

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/economies 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.

3.1.9. *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^[144]). 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.
- 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 conducive 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.

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 would imply that data would be entirely missing for a number of countries/economies (see section 3.2), plus some additional missing information due to countries/economies not administering some of the indicators – making it more difficult to objectively compare countries and economies based on these 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; alternatively, the topic could be cut out from the proposed framework.

The indicators already included in 'Openness to diversity' could also 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/economies, 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 alter their habits if they were to live abroad for a period of time. As a single question, 'language learning' might penalise countries/economies where English is the official language – although, on the flip side, it could also help highlight how native English speakers might be given less chances to learn a foreign language by their educational system. Learning a language is in fact a powerful way to understand better other cultures, and this is valuable also for students

who speak English as a native language. The current language learning indicator could be complemented by question related to whether students do listen to foreign music, or if they have access to shows in foreign languages and choose to consume them.

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/economies the number of immigrant students is rather low, and so the indicators might suffer from reliability issues.

3.2. Limitations of the suggested approach, and possibility for improvement

This paper suggests an approach to gather and organise key PISA data on student well-being, so to cater to users who wish to know more about how well students are doing in their life, alongside how well they perform academically; nevertheless, there are some limitations that should be kept in mind when evaluating this proposal. visualisation and exploration tool.

First, while rooted in prior, well-established examples (i.e. the Bhutan Gross National Happiness Index, the PISA Frameworks on Well-Being) and informed by research, the framework suggested could be further refined to better represent the complex, multidimensional concept of student well-being, and to better distinguish between well-being outcomes and drivers of well-being. As previously mentioned, it was judged that, due to the limitations of information available in the PISA student questionnaire, it might not be possible to report at all on certain relevant aspects of student well-being. 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, only a very limited number of PISA-participating countries/economies have opted to administer it thus far, which limits the international insights that can be gained from it. Other surveys, such as the HBSC (see section 2.1.4), 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 3.1), there is scope for extending the set of information provided by each indicator (especially those relying on information from a single item) by improving the contents of the PISA questionnaire in future iterations.

Second, missing data pose an issue to be kept in mind: if not addressed, it can indeed compromise meaningful and informed comparison of countries and economies. According to the research done for computing the indicators, some indicators and topics are more affected than others by missing information, especially if data from the PISA 2018

questionnaire is considered, as suggested, to gather information to support some of the topics. 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’ would be the sole topic where no missing data is observed. In contrast, the topics of ‘Openness to diversity’, ‘Agency and engagement’ and ‘Psychological well-being’ would present the highest number of missing information – i.e. data could be missing for several countries/economies across the indicators. For the topic of ‘Openness to diversity’, it was for example observed that data would be 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 would instead not be available for 12 countries/economies. Overall, 12 countries/economies would entirely miss information for this dimension. In the case of ‘Psychological well-being’, between 7 and 13 countries/economies would miss information for any of the four indicators included; two of these would have no information available to report on this topic. One way to manage the issue of missing data is to clearly signal their presence to the users (e.g., through dedicated symbols), as well as inform them properly and in a clear manner about the implications in terms of interpretation of data. Another – possibly complementary – approach would be to establish a threshold of missing data, beyond which no information is reported on countries/economies for the affected indicator(s) and/or topic(s). For example, it can be decided that no composite topic score is computed for countries/economies with missing data on at least one indicator; this solution has the obvious drawback that users will not have access to topic scores on some dimensions for several countries/economies.

Third, in a similar manner to missing data, including indicators from different cycles of PISA under the same topics might generate challenges: while the constructs measured by the indicators are unlikely to change significantly in the span of time between each PISA cycle, it should also be acknowledged that PISA 2022 was held in a period of global health crisis, which had a significant impact on all aspects of students’ lives – including well-being. Data from 2018 and 2022 might not, therefore, be as comparable as assumed in carrying out the exercise of identifying and grouping indicators.

Fourth, cultural differences in response style, lifestyle or habits, and in how individuals tend to describe themselves will also affect the comparability of the indicators. 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, for constructing a more nuanced picture, it would be important to consider exploring the data by student background information, such as gender. Similarly, it might be relevant to consider reporting at the sub-national level too, so to not only highlight across-country variations in well-being, but within country ones, too. For indicators that are included in multiple rounds of PISA, it might also be interesting to consider if any trends emerge from the data – keeping in consideration how certain major world events, such as the COVID-19 crisis, might affect said trends.

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 conducive 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 paper proposed a framework that could help summarise relevant information collected by PISA on student well-being: the data could be organised in nine possible topics of well-being, each measured through selected key indicators.

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. An interactive website presenting the PISA data on well-being could thus prove useful to make these data more easily accessible and more relevant to the users: it could indeed allow to gather the most relevant information on well-being in a single space, and could make it easy for users to consider these important data together with information on cognitive performance. As acknowledged, different users have different needs, and not all of them might be interested in detailed comparisons at the level of each indicator, preferring instead to have a more summary picture of how their education system is performing at the more aggregate level of each topic. Creating composite indexes would allow to respond to this demand for summary information: at the same time, constructing them is not straightforward, and no universal method exists for to do so. Any composite index involves a series of subjective judgments, as well as dealing with uncertainties and value presuppositions (Mazziotta and Pareto, 2013_[145]).

The approach proposed in this paper to organise PISA data on well-being is not without limitation – the most important ones being missing information for several countries/economies on certain indicators and topics, the consequent difficulty in making meaningful and balanced comparisons, the absence of data on aspects of well-being that would be relevant to report on, and the sometimes limited information offered by some of the indicators identified. Nevertheless, increasing the ease of access to these important data as suggested, as well as aggregating the data so to offer less granular insights, could prove a useful approach 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.

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Annex A. Indicator tables

All the indicator tables can be found [here](#).