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A Framework for the Analysis of Student Well-Being in the PISA 2015 Study: Being 15 In 2015

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A FRAMEWORK FOR THE ANALYSIS OF STUDENT WELL-BEING IN THE PISA 2015 STUDY: BEING 15 IN 2015

Education Working Paper No. 140

By Francesca Borgonovi and Judit Pál

This working paper has been authorised by Andreas Schleicher, Director of the Directorate for Education and Skills, OECD.

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ABSTRACT

In 2015, PISA (the Programme for International Student Assessment) asked students to describe their well-being in addition to collecting information on students' subject-specific skills. This paper provides a comprehensive overview and details the policy relevance of the following five dimensions of well-being covered in PISA 2015: cognitive, psychological, social, physical and material well-being. In addition, the paper outlines the underlying indicators of each dimension and their theoretical and analytical value for education policy. This paper concludes by identifying data gaps within the indicators and exploring how future cycles of PISA could bridge these gaps in order to provide a more comprehensive portrait of students' well-being.

RÉSUMÉ

En 2015, PISA (le Programme international pour le suivi des acquis des élèves) a interrogé les élèves sur leur bien-être, en plus de sa collecte de données sur leurs compétences dans des matières spécifiques. Ce document propose un aperçu complet et une analyse détaillée de la pertinence stratégique des cinq dimensions du bien-être couvertes dans l'enquête PISA 2015 : le bien-être cognitif, psychologique, social, physique et matériel. En outre, il examine les indicateurs sous-tendant chacune de ces dimensions, ainsi que leur valeur théorique et analytique pour les politiques d'éducation. Enfin, il identifie les lacunes dans les données des indicateurs et étudie les possibilités d'y remédier dans les prochains cycles PISA afin de dresser un portrait plus exhaustif du bien-être des élèves.

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A FRAMEWORK FOR THE ANALYSIS OF STUDENT WELL-BEING IN THE PISA 2015 STUDY:

BEING 15 IN 2015

INTRODUCTION: THE IMPORTANCE OF STUDENTS' WELL-BEING FOR EDUCATION POLICY

1. As the world prepared to celebrate a new millennium, all the while fearing the collapse of the digital infrastructure, a cohort of children sat the very first PISA test and the children who would take part in PISA 2015 were born. The first PISA assessment in 2000 represented a milestone. The assessment frameworks in reading, maths and science highlighted the need for students to be able to apply the knowledge that they had acquired in and outside of school in order to solve problems set in new situations.

2. In 2015, PISA went even further than assessing subject-specific problem-solving competencies. It collected information on students' ability to solve financial problems, on their collaborative problem-solving skills and, -- more importantly for the present study -- asked students about their experience as teenagers: the struggles they face, their future expectations, how they relate to their peers, parents and teachers, and their satisfaction with their life as a whole. As such, PISA 2015 provides one of the most comprehensive portraits of students' well-being around the world to date.

3. Over the past decade, there has been growing interest in students' well-being and in comparing countries, not only in terms of how well students fare academically, but also in how well education systems promote students' overall development and quality of life. Research shows that high levels of well-being among students are associated with positive and fulfilling life-experiences, while low levels of well-being are associated with just the opposite (Pollard and Lee, 2003).

4. Children in school spend a considerable amount of time in their classrooms, socialising with classmates and interacting with teachers and other staff members. What happens in school is therefore key to understanding if students enjoy good physical and mental health, how happy and satisfied they are with different aspects of their life, how connected they feel to others and the aspirations and expectations they have for their future (Adamson, 2013; Bradshaw et al., 2007; Currie et al., 2012; OECD, 2009; Rees and Main, 2015). Overall, students who enjoy high levels of well-being are generally less involved in risky behaviours (Currie et al., 2012) and perform better at school (Gutman and Vorhaus, 2012).

5. Even though longitudinal studies suggest that students' scores on PISA are correlated with how well students will do later on in life (OECD, 2012; OECD, 2010), strong performance on standardised assessments can only explain so much of how well they will do later in life (Stankov, 1999; Sternberg, 1998).

6. Monitoring the well-being of 15-year-old students, the target population of PISA, is important as students at this age are in a key transition phase of physical and emotional development; hence, how students feel at this stage may have more long-term consequences than would otherwise be the case

(American Psychological Association, 2002). Feeling well, developing decision-making skills and psychological coping mechanisms lay the foundations for self-awareness and relationship building – key competencies if individuals are to lead meaningful lives.

7. As research on children's well-being in school gains momentum, the term is being used to characterise different aspects of students' lives. In this paper well-being is described 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 puts an emphasis on the multidimensionality of students' well-being, which encompasses both students' states and outcomes at the age of 15, as well developmental processes that may act as risk or protective factors shaping well-being in later life. However, as context dependency comes into play, students' responses on their level of well-being are closely tied with the specific circumstances that 15-year-olds experience at home and at school at the time of the PISA test.

8. The OECD's work on child well-being (OECD, 2015b) identifies two distinct approaches to its conceptualisation and measurement:

- The developmental approach underscores the importance of building human capital and social skills for the future (Bronfenbrenner, 1979); valuing children's well-being today influences adults' well-being tomorrow.

- The children's rights approach recognises children as human beings, focusing on their well-being "here-and-now", and relies on their direct input regarding what aspects are important to them and how they might be measured (Casas, 1997; Ben-Arieh, 2010).

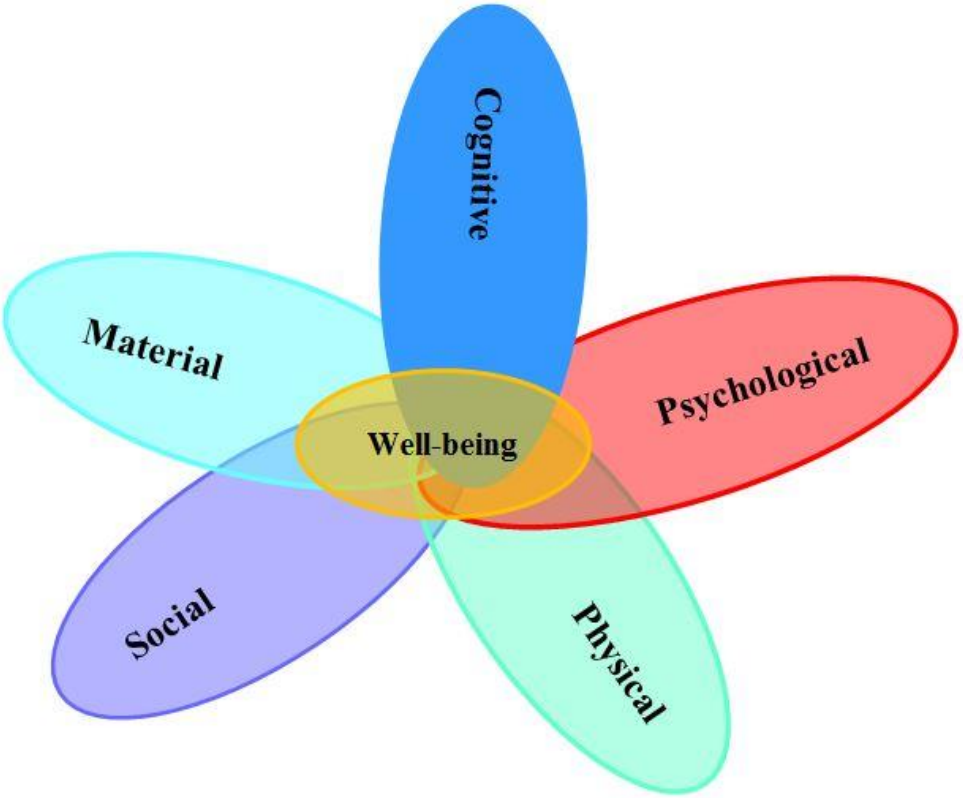
9. PISA has traditionally combined a developmental perspective, highlighting the instrumental value students' skills at the age of 15 have for their future, with a subjective, child-centred view of students' well-being, stressing the importance that information processing skills and social integration have for their everyday life. The number of dimensions of well-being covered by PISA and the depth of such coverage has expanded significantly since the first PISA assessment in 2000. Since its inception, PISA stressed the importance for students to acquire knowledge and develop habits and social skills that can benefit them in the future (Bronfenbrenner, 1979). However, PISA also anchors its very definition of what it means to be proficient in reading, mathematics and science in students' ability to solve problems and situations that 15-year-olds may encounter in their daily lives.

10. The multidimensional definition of students' well-being used by PISA 2015 stresses the role of both objective aspects – material conditions that ensure students' basic human needs and rights -and subjective aspects – i.e. how students evaluate their life, their feelings and emotions (Alatartseva and Barysheva, 2015). This multidimensional approach to students' well-being is well aligned with the one used in the OECD's Better Life Initiative (OECD, 2015b)[1] by bringing together students' academic performance with what they think about the quality of their lives both in and outside school.

11. Figure 1 shows the five domains of well-being identified in PISA 2015 which are distinct but also closely related and contribute to determining students' overall optimal functioning and satisfaction. Each dimension can be considered both as an outcome and as an enabling condition with respect to other dimensions and ultimately with students' overall evaluations of the quality of their lives.

[1] Because the focus of PISA is on students' well-being, the outcomes discussed in this paper differ from those identified by the Sen, Stiglitz and Fitoussi (SSF) and adopted by the OECD in its Better Life Initiative. However, the five dimensions identified map closely onto the SSF.

Figure 1: Well-being dimensions in PISA 2015



12. The five dimensions of students' well-being captured in PISA 2015 are:

- **Cognitive well-being.** The cognitive dimension of students' well-being refers to the skills and foundations students have to participate effectively in today's society, as lifelong learners, effective workers and engaged citizens. It comprises students' proficiency in academic subjects, their ability to collaborate with others to solve problems and their sense of mastery in-school subjects. It incorporates actions and behaviours that may promote the acquisition of knowledge, skills or information that may aid them when they are faced with new, complex ideas and problems (Pollard and Lee, 2003).

- **Psychological well-being.** The psychological dimension of students' well-being includes students' evaluations and views about life, their engagement with school, and the goals and ambitions they have for their future.

- **Physical well-being.** The physical dimension of students' well-being refers to students' health status, engagement in physical exercise and the adoption of healthy eating habits (Statham and Chase, 2010).

- **Social well-being.** The social dimension of students' well-being the quality of their social lives (Rath et al., 2010) including their relationship with their family, their peers and their teachers (positive or negative), and how they perceive their social life in school (positive or negative), and how they perceive their social life in school (Pollard and Lee, 2003).

- **Material well-being.** Material resources make it possible for families to better provide for their children's needs and for schools to support students' learning and healthy development. Households who live in poverty find it difficult to ensure that their children have access to the educational and cultural resources they need to thrive in school and to realise their potential. Children who live in poverty – with poor housing conditions and poor diets – are more likely to have health problems (Aber et al., 1997), perform poorly in school (OECD, 2013a) and earn less as a middle-aged adult (Case et al., 2005).

13. PISA 2015 collected several indicators for each dimension of well-being. All the indicators discussed in this paper – except those for academic performance in the cognitive dimension of well-being, which are based on the PISA assessment – are constructed from information collected through students' (STQ) self-reports in the background PISA questionnaires and from information provided by school principals (SCQ) whose schools participated in PISA. Indicators are also derived from the optional parental questionnaire (PA)[2] and the educational career questionnaires (EC).

14. Many well-being instruments presented are based on students and school principals' self-reports which are, by their very nature, context-dependent, If students in different countries use different response styles or understand questions differently, empirical findings may reflect differences in reporting rather than veritable underlying associations, associations although it is difficult to find robust evidence of a large effect of response styles (Exton et al., 2015). A number of questions based on self-reports in previous editions of PISA can also be used to monitor trends over time. Students' and school principals' reports were designed to measure latent constructs described in this paper. However, the relationship between these measures instruments and the latent constructs can vary through time, which limit the possibility of making temporal comparisons.

[2] 18 countries and economies participated on the parental and 22 on the educational career module in PISA 2015.

15. This paper provides a framework for the analysis of students' well-being in PISA 2015, describing the indicators used and presenting previous empirical and theoretical research on child well-being that is relevant for the analysis of the PISA 2015 data.

16. By monitoring several dimensions of students' well-being among a large sample of students in a large number of education systems, PISA 2015 provides a unique opportunity to assess distributional aspects of students' well-being both across and within-countries. PISA provides answers to questions, such as: (i) Are students in some countries or in some population subgroups more at risk of reporting low levels of well-being in its several dimensions? (ii) Are some factors associated with low and high levels of well-being common across all dimensions of well-being or do they differ by dimension? (iii) Do positive and negative aspects of the five well-being dimensions differ by population subgroups or by the way in which education systems are organised?

17. Although PISA in 2015 contains instruments to measure several dimensions of well-being, it is and remains first and foremost a study of students' learning outcomes. The extent of well-being dimensions covered in PISA 2015 will enable educators, policy makers, students and their families to better understand how the different dimensions of students' well-being are associated with students' ability to successfully solve real-life problems in mathematics, science and reading comprehension and solve problems collaboratively.

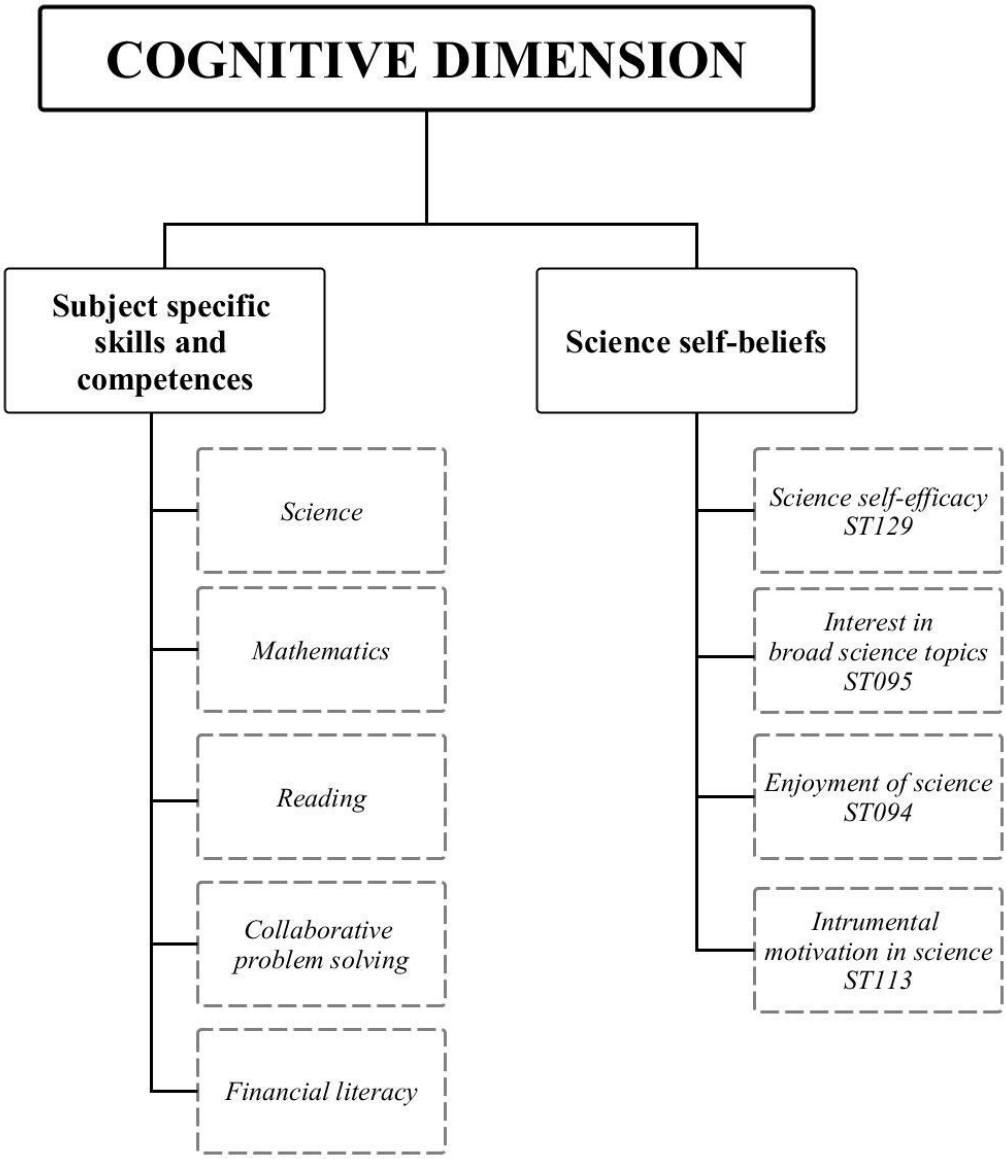
FRAMEWORK FOR THE ANALYSIS OF STUDENTS' WELL-BEING IN PISA 2015

18. This paper maps the different dimensions of students' well-being as well as the instruments used to measure the underlying constructs in the sixth round of PISA. For each dimension it highlights key constructs that were measured in PISA, and details the specific indicators and instruments (question numbers) that were used to assess each construct. This framework maps students' well-being within the broader context of research and policy dialogues on the nature of well-being among teenagers, and highlights how the features that characterise the PISA 2015 round can help policy makers, educators, parents and researchers improve students' lives at school and beyond.

THE COGNITIVE DIMENSION OF STUDENTS' WELL-BEING

19. The cognitive dimension of students' well-being encompasses the level of subject-specific skills students have acquired and their self-beliefs in those subjects. Figure 2 illustrates the different assessment areas covered in PISA 2015.

Figure 2: The cognitive dimension of students' well-being



Subject-specific skills

20. PISA is based on a dynamic and forward-looking model of lifelong learning, exploring the knowledge and skills students need to adapt successfully to a changing world and apply their knowledge and experience to real issues. For example, in order to understand and evaluate scientific advice on nutrition, an adult would not only need to know some basic facts about the composition of nutrients but also to be able to apply that information to real-life contexts. This model reflects changes in the goals and

objectives of participating countries with regards to curricula in schools. Educators focus increasingly on what students can do with what they learn at school (OECD, 2001).

21. PISA also recognises that fifteen-year-olds cannot be expected to have learned everything they will need to know as adults, but in order to continue learning and applying what they learned to different situations they need to understand elementary processes and principles. Thus, PISA assesses the ability to complete tasks relating to real life – depending on a broad understanding of key concepts rather than assessing specific knowledge. The skills students have acquired up to age 15 are the product of a complex inter-relationship of their experience as students in different schools and classes, their life within their close and extended family and their interaction with peers and acquaintances. Competency at age 15 is the result of the sum of the infinite number of experiences that children have accumulated over the years.

22. International experts defined each of the competency domains that were examined in PISA 2015: science, reading, mathematics, collaborative problem solving, and financial literacy[3] and drafted the frameworks for assessing them. Competency is not something that an individual either does or does not have, but is measured on a continuum. There is no precise dividing line between a person who is fully competent and one who is not. However, it is necessary for measurement purposes to define at which level of competencies students are able to participate effectively in society. (In PISA, international experts set the baseline at Level 2 on the PISA proficiency scales.)

23. In addition to assessing competencies in the three core domains of reading, mathematics and science, PISA has progressively examined competencies across disciplines and modes of delivery. For example, in 2003, PISA delivered an assessment of static problem solving, and in 2012, both an assessment of financial literacy and creative problem solving.

24. Until 2006 all PISA assessment instruments were delivered as paper-and-pencil booklets, but, starting in 2006, PISA experimented with the delivery of computer-based assessments. In PISA 2015, the delivery mode of the main assessment has shifted to a computer platform, which enables a better assessment of students' problem-solving strategies and of collaborative problem solving. The shift from a paper to a computer-based assessment platform follows the increasing relevance of digital technologies for learning and the importance that students' capacity to solve problems on line have for their long-term success and integration in the economic and social life of their countries.

25. The repeated cross-national nature of PISA leads to a tension between the willingness to monitor trends in performance across different birth-cohorts and the willingness to adjust the assessment instruments to the evolving nature of what skills are relevant for labour markets, social integration and success. PISA 2015 assesses students' competencies in the following domains (see OECD, 2016 for a detailed description of the PISA assessment frameworks):

26. **Science:** PISA 2015 defines scientific literacy as "the ability to engage with science-related issues, and with the ideas of science, as a reflective citizen" (OECD, 2016, p. 20) A scientifically competent person is willing to engage in reasoned discourse about science and technology which requires the competencies to: explain phenomena scientifically – recognising, offering and evaluating explanations for a range of natural and technological phenomena; evaluate and design scientific enquiry – describing and appraising scientific investigations, and proposing ways to address questions scientifically; and interpret data and evidence scientifically – analysing and evaluating data, claims and arguments in a variety of representations, and drawing appropriate scientific conclusions.

[3] Financial literacy was an international option and 15 countries/economies implemented this option.

27. **Reading:** Reading literacy in PISA 2015 is defined as "understanding, using, reflecting on and engaging with written texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society" (OECD, 2016, p. 49). In the Reading framework for PISA 2009, 'print texts' and 'electronic texts' were aligned with the delivery mode of the assessment. Print texts were delivered on paper and electronic texts were delivered on computers. As computers are the mode of delivery in 2015, this alignment has been breached as all 'print' units are delivered on screen, but retain the main features of texts that were labelled 'print-medium texts'. For PISA 2015, the term 'text display space' is used instead of 'medium' to describe the features of the space - fixed or dynamic - and not the mode in which the text is presented. Fixed texts usually appear on paper in forms such as single sheets, brochures, magazines and books but tend to appear more and more on screen in PDFs and e-readers. Dynamic texts only appear on screens and are synonymous with hypertext: a text or texts with navigation tools and features that allow for and indeed even require non-sequential reading. Each reader constructs a "customised" text from the information encountered at the links he or she follows. In essence, such texts have an unfixed, dynamic existence. In dynamic texts, typically only a fraction of the available text can be seen at any one time, and often the extent of text available is unknown.

28. **Mathematics:** Understanding mathematics is central to a young person's preparedness for life in modern society. A growing proportion of problems and situations encountered in daily life, including professional contexts, require some level of understanding of mathematics, mathematical reasoning and mathematical tools. In PISA 2015, mathematical literacy is defined as "an individual's capacity to formulate, employ, and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individuals to recognise the role that mathematics plays in the world and to make the well-founded judgments and decisions needed by constructive, engaged and reflective citizens" (OECD, 2016, p. 65).

29. **Collaborative problem solving:** Students' proficiency in an innovative domain is also assessed. In 2012 this domain was problem solving, while in 2015, this domain is collaborative problem solving. The framework for the assessment of collaborative problem solving – and the results of that assessment – will be published upon completion of a validation study in 2017.

30. **Financial literacy:** In recent years, developed and emerging countries and economies have become increasingly concerned about the level of financial literacy among their citizens, especially young people (OECD/INFE, 2015). Finance is a part of everyday life for many 15-year-old students: they have bank accounts with access to online transactions, and as they near the end of compulsory education, students will also face complex and challenging financial choices, such as whether to continue with formal education and how to finance their studies. Financial literacy is thus an essential life skill, and high on the global policy agenda (OECD, 2014a). PISA 2012 was the first large-scale international study to assess the financial literacy of young people. The assessment found wide variations in levels of financial literacy within and across countries (OECD, 2014b). The PISA 2015 assessment provides information about trends for countries that participated in this optional assessment in 2012 as well as new data from countries that did not participate in 2012. Financial literacy is defined in PISA as "knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding in order to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life" (OECD, 2016, p. 85).

Instruments

31. In the vast majority of the countries and economies that took part in the PISA 2015 assessment, the cognitive test was administered on a computer platform. The computer-based test was designed to take around 120 minutes to complete and contained a range of new and trend questions in science, in reading and mathematics and, in the majority of countries, collaborative problem solving. The items were organised in clusters in the same subject and each cluster was designed to take 30 minutes to complete. Six clusters of new science questions were developed, three clusters of new collaborative problem-solving material were developed and six clusters of trend material in science, reading and mathematics were administered (more details on the PISA 2015 design and sample questions are available in the PISA 2015 Technical Report (OECD, forthcoming).

Science self-beliefs

32. On top of the core domains assessed through a cognitive test, PISA measures students' self-beliefs which comprise a range of students' attitudes and dispositions towards learning such as subject-specific motivation and self-efficacy using questionnaires. As science is the main domain in PISA 2015, questions regarding students' self-beliefs relate to science. How students think and feel about themselves shapes their behaviour, especially when facing challenging circumstances (Bandura, 1977). Education systems are successful when they equip students with the ability to influence their own lives (Bandura, 2002). Self-beliefs have an impact on learning and performance on several levels: cognitive, motivational, affective and decision-making. They determine how well students motivate themselves and persevere in the face of difficulties, they influence students' emotional life, and they affect the choices students make about coursework, additional classes, and even education and career paths (Bandura, 1997; Wigfield and Eccles, 2000).

33. While students' science self-beliefs are partly the product of students' past performance in biology, physics and chemistry, science self-beliefs influence how students function when confronted with scientific problems. In addition, they have an independent effect on life choices and decisions. Students who perform similarly in science-related classes usually choose different courses, education pathways, and ultimately different careers, partly depending on how they perceive themselves as science learners, the interest they have in science and the importance they feel science has for society (Bong and Skaalvik, 2003; Wang et al., 2013).

34. In 2015, PISA measured the following science-related self-beliefs: science self-efficacy, broad interest in science, interest in broad science topics, and instrumental motivation to lean science.

35. **Science self-efficacy:** Students were asked to report whether they believed they could perform a series of tasks either easily or with a bit of effort. These tasks included explaining why earthquakes occur more frequently in some areas than in others; recognising the science question that underlies a newspaper report on a health issue; interpreting the scientific information provided on packages of food; predicting how changes to an environment will affect the survival of certain species; identifying the science question associated with the disposal of garbage; describing the role of antibiotics in treating disease; identifying the better of two explanations of how acid rain is formed; and discussing how new evidence can lead to a change of understanding about the possibility of life on Mars. Students' responses to questions were used to create an *index of science self-efficacy*, which identifies students' level of self-efficacy in science. The index was standardised to have a mean of 0 and a standard deviation of 1 across OECD countries.

36. **Interest in broad science topics:** Interest in a subject can influence the intensity and continuity of student engagement in learning situations. In turn, strong engagement with a subject deepens students'

understanding of that subject. The way that science is taught can vary in many ways among classes, among schools and among countries. Therefore, in order to measure students' general interest in science subjects PISA 2015 asked students a set of questions on: their level of interest in different subjects, including human biology, astronomy, chemistry, physics, the biology of plants and geology; their general interest in the ways in which scientists design experiments; and their understanding of what is required for scientific explanations.

37. **Enjoyment of science:** Students who enjoy learning science tend to be emotionally attached to learning and perceive learning science as a meaningful activity (Laukenmann et al., 2003). In turn, these students are more likely to regulate their learning and to solve problems creatively (Pekrun et al., 2002).

38. **Instrumental motivation to learn science**: Beyond the general interest in science, how do 15-year-olds assess the relevance of science to their own life and how does external motivation influence their science performance? Instrumental motivation has been found to be an important predictor for course selection, career choice and performance (Eccles, 1994; Eccles and Wigfield 1995; Wigfield et al., 1998). Given the shortage of students following science in higher education in many countries, policy makers should look at whether or not this trend will likely continue.

Instruments

39. Figure 3 summarises the self-reported instruments for measuring science self-beliefs included in the PISA 2015 student questionnaire.

Figure 3: Instruments, science self-beliefs

Science self-efficacy

ST129: How easy do you think it would be for you to perform the following tasks on your own? *(Please select on response in each row. I could do this easily; I could do this with a bit of effort; I would struggle to do this on my own; I couldn't do this)*	
Question No.	*Instrument*
ST129Q01TA[4]	Recognise the science question that underlies a newspaper report on a health issue.
ST129Q02TA	Explain why earthquakes occur more frequently in some areas than in others.
ST129Q03TA	Describe the role of antibiotics in the treatment of disease.
ST129Q04TA	Identify the science question associated with the disposal of garbage.
ST129Q05TA	Predict how changes to an environment will affect the survival of certain species.
ST129Q06TA	Interpret the scientific information provided on the labelling of food items.
ST129Q07TA	Discuss how new evidence can lead you to change your understanding about the possibility of life on Mars.
ST129Q08TA	Identify the better of two explanations for the formation of acid rain.

[4] The question number codes, such as "ST129Q01TA", are comprised of four parts. *ST* indicates that the question is from the student background questionnaire; *129* is the set of instruments; *Q01* is the first item in the set; *TA* indicates that it is a trend question (i.e. it appeared at least once before in PISA). Questions that never appeared in previous PISA cycles are denoted by the suffix *NA*.

Interest in broad science topics

ST095: To what extent are you interested in the following <broad science> topics? *(Please select on response in each row. Not interested; Hardly interested; Interested; Highly interested; I don't know what this is)*	
Question No.	*Instrument*
ST095Q04NA	Biosphere (e.g. ecosystem services, sustainability)
ST095Q07NA	Motion and forces (e.g. velocity, friction, magnetic and gravitational forces)
ST095Q08NA	Energy and its transformation (e.g. conservation, chemical reactions)
ST095Q13NA	The Universe and its history
ST095Q15NA	How science can help us prevent disease

Enjoyment of science

ST094: How much do you disagree or agree with the statements about yourself below? *(Please select on response in each row. Strongly disagree; Disagree; Agree; Strongly agree)*	
Question No.	*Instrument*
ST094Q01NA	I generally have fun when I am learning <broad science> topics.
ST094Q02NA	I like reading about <broad science>.
ST094Q03NA	I am happy working on <broad science> topics.
ST094Q04NA	I enjoy acquiring new knowledge in <broad science>.
ST094Q05NA	I am interested in learning about <broad science>.

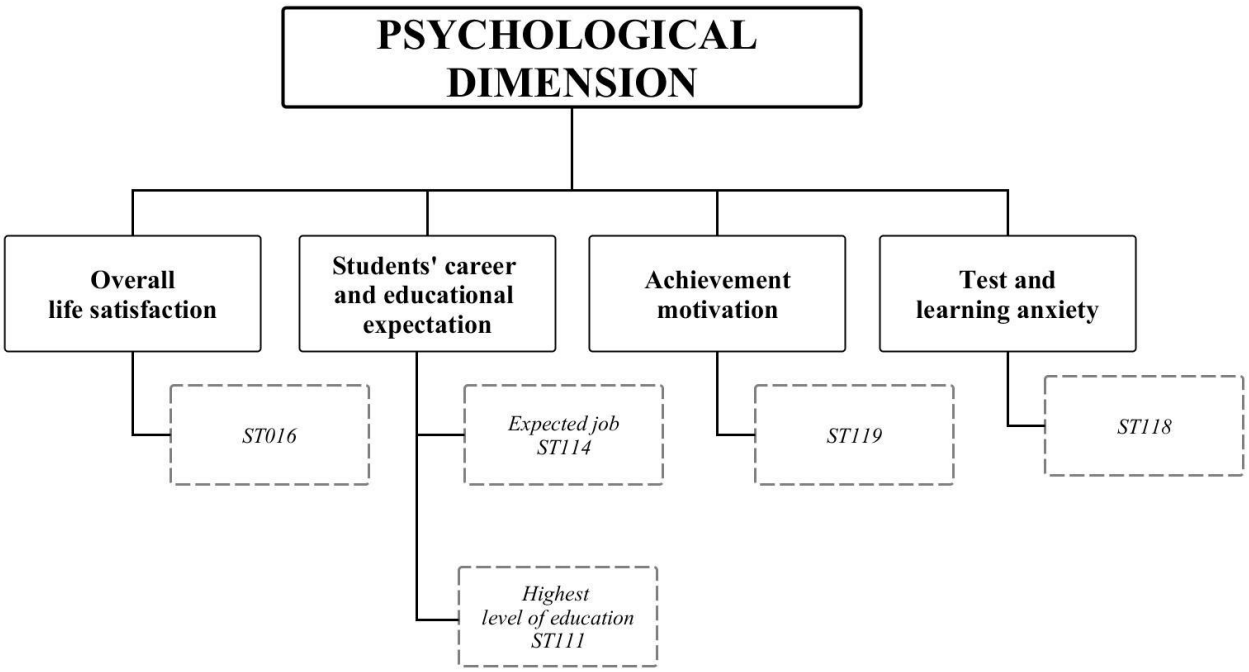
Instrumental motivation in science

ST113: How much do you disagree or agree with the statements about yourself below? *(Please select on response in each row. Strongly agree; Agree; Disagree; Strongly disagree)*	
Question No.	*Instrument*
ST113Q01TA	Making an effort in my <school science> subject(s) is worth it because this will help me in the work I want to do later on.
ST113Q02TA	What I learn in my <school science> subject(s) is important for me because I need this for what I want to do later on.
ST113Q03TA	Studying my <school science> subject(s) is worthwhile for me because what I learn will improve my career prospects.
ST113Q04TA	Many things I learn in my <school science> subject(s) will help me to get a job.

THE PSYCHOLOGICAL DIMENSION OF STUDENTS' WELL-BEING

40. The psychological dimension of students' well-being in PISA 2015 describes students' self-reported psychological functioning, and covers life satisfaction – students' overall evaluation about life in general – and three aspects of education related to psychological functioning. The first is the goal setting and emotions related to *students' career and educational expectations*; the second is *achievement motivation* related to students' appreciation of the educational opportunities they have, an engagement with learning and an interest in acquiring knowledge; and the third one is *test and learning anxiety*. Figure 4 details the four aspects of psychological well-being that are monitored in PISA 2015.

Figure 4: The psychological dimension of students' well-being



Overall life satisfaction

41. Life satisfaction is a subjective aspect of psychological well-being. By definition, global life satisfaction is "an evaluation that an individual makes about his or her perceived quality of life overall according to his or her chosen criteria" (Shin and Johnson, 1978 cited in Neto, 1993, p. 126). Although good health or a stable financial situation may be necessary for being satisfied, individuals might not value them in the same way. Hence, the criteria for satisfaction would be based on personal standards (Neto, 1993), not upon criteria that are important to a select few (Neto, 1993; Diener, 1984).

The evidence suggests that overall life satisfaction is influenced by multiple aspects in individuals' lives, including health status, economic standing, amount of education, environmental quality, social contact, civic participation and governance, and personal security (OECD, 2013b).

42. However, adolescents' life satisfaction is partly different from adults, and is likely to be heavily influenced by experiences and relationships with their family, peers and school (Henry, 1994). Among teenagers, high levels of life satisfaction are associated with positive physical and cognitive development, social and coping skills that lead to more positive outcomes in adulthood (Currie et al., 2012). Bullying and victimisation (Navarro et al., 2013), and psychosocial problems, such as anxiety and depression (Huebner,

2004; Huebner et al., 2000) can cause low levels of life satisfaction and are related to substance abuse, delinquency and engaging in problem behaviour (Sun and Shek, 2009). Supportive family and peers, and strong relationships can help students deal with challenging situations (Currie et al., 2012). The school environment also plays an important role; developing academic skills is a goal for adolescents, which in turn has a strong positive effect on life satisfaction (Suldo et al., 2006).

Instrument

43. Figure 5 highlights how PISA 2015 asked students to report on how satisfied they are with their lives overall. Measures of overall life satisfaction are based on self-reports, and include both single item and multi-item measurement instruments (Huebner and Gilman, 2014; Myers and Diener, 1995). PISA 2015, similarly to the OECD core competency framework (OECD, 2016) below is based on the widely used question, which asks students to rate their current life satisfaction level, from '0' - not all satisfied' to '10' - completely satisfied (see Figure 5).

Figure 5: Instrument, overall life satisfaction

ST016Q01NA: The following question asks how satisfied you feel about your life, on a scale from "0" to "10". Zero means you feel 'not at all satisfied' and "10" means 'completely satisfied'. Overall, how satisfied are you with your life as a whole these days?

(Please move the slider to the appropriate number.)

Students' career and educational expectations

44. As their lives are unfolding before them, teenagers think and plan for their future. The effort they put in to developing their skills, relationships and emotional maturity, the vision they have for themselves and their goals can guide their actions as teenagers. The present is the foundation upon which the future can be built, but the future informs and shapes the present by giving meaning to the learning process and the effort it requires. Therefore, in 2015, PISA asked students to report the expectations they have for their future careers and studies, reflecting academic success and students' skills, and the attitudes that promote academic excellence and skills acquisition. Students who expect to complete a university degree and to work in professional and managerial careers are more likely to choose more demanding courses and invest more time and effort in school than students who expect to complete their studies with lower qualifications or to work in jobs that do not require individuals to be proficient in academic domains. Students' expectations are, in part, self-fulfilling prophecies, as the effort students invest to meet their expectations usually pays off. For example, when comparing students of similar socio-economic backgrounds and academic achievement, students who expect to graduate from university are more likely to complete these degrees than their peers who do not have such high expectations. Conversely, students who expect to drop out of school without qualifications are more likely to do so (Campbell, 1983; Carbonaro et al., 2011; Morgan, 2005; Perna, 2000; Sewell et al., 2003).

45. Education systems have a duty to provide learning opportunities to all students, promote civic values, offer a common knowledge base, and help students to fulfil their full potential. They also play a crucial role in channelling skills and talent into the labour market and helping young people make the transition from adolescence into adulthood. By effectively managing students' education and career aspirations and expectations through the institutional, social and economic conditions that shape them, education systems can ensure that students' skills and interests find a suitable match in the economy. School systems must strike a careful balance between creating high expectations to motivate students and ensuring that students have the skills to meet the demands of an economy that requires an increasingly

skilled workforce. Social and institutional constraints help to explain how and why the expectations of 15-year-old students for their future studies and occupations vary considerably both within and across countries (Buchmann and Dalton 2002; Matějů et al., 2007; Sewell et al., 2003).

46. Looking at students' expectations for their future reveals why some students with great potential fail to continue on with their education or transition successfully into the labour market or, conversely, how and why students with mediocre performance in secondary school become economic and social assets for their communities. By linking expectations and student performance, policy makers can formulate policy and direct resources not only towards developing skills but also towards providing information and incentives so that potential skills are fully realised and effectively used. Policies that provide in-school information campaigns on education and career opportunities can promote the development of students' non-cognitive skills, motivation and attitudes towards learning, and work ethic (Hanson, 1994). Because expectations help motivate students to invest more in learning and in acquiring skills, understanding inequalities in expectations can also reveal some of the inequalities underlying the motivation to learn and to achieve.

Instruments

47. In 2015, PISA monitored students' expectations by asking them what careers they expect to have as young adults through the open question "What occupation do you expect to be working in at the age of 30?" Answers to the question were coded using the ISCO-08 (International Standard of Classification of Occupations) classification of occupations at the 4-digit level. The 4-digit ISCO classification has a level of detail that allows for developing measures of how ambitious students' expectations are, using the ISEI index (Socio-Economic Index of Occupational Status) of occupational prestige (Ganzeboom, 2010; Ganzeboom et al., 1992). It also allows for examining if students expect to work in particular occupations, for example if they expect to work in occupations that are deemed crucial for economic development and long-term prosperity such as STEM (science, technology, engineering, and mathematics) occupations or teaching. Students' career expectations were first asked in PISA 2000 and then again in 2003 and 2006, thus allowing for analyses that map trends in students' occupational expectations and how these relate to students' socio-economic and demographic profiles, as well as their performance in different academic subjects. Students were also asked to report on what level of education they expected to complete. Students were presented national specific courses and educational programmes, which were converted into ISCED-97 (International Standard Classification of Education) classification of educational programmes.

Figure 6: Instruments, students' career and educational expectations

ST114: What kind of job do you expect to have when you are about 30 years old?	
Question No.	*Instrument*
ST114Q01TA	*(Please type in the job title.)*_____
ST111: Which of the following do you expect to complete? *(Please select one response.)*	
Question No.	*Instrument*
ST111Q01TA	<ISCED level 2> <ISCED level 3B or C> <ISCED level 3A> <ISCED level 4> <ISCED level 5B> <ISCED level 5A or 6>

Achievement motivation

48. McClelland's theory of achievement motivation defines the need for achievement as "the goal of individuals to be successful in terms of competition with some standard of excellence" (McClelland, 1958, p.181). Individuals' need for achievement is associated with dominant behaviour and perseverance. The need for affiliation represents the unconscious concern for building and maintaining close personal relationships (Daft, 2008; Lussier and Achua, 2007; McClelland, 1961). People differ in the degree to which their need for power, achievement and affiliation guide their behaviour and the relative balance between fulfilling these three needs (McClelland, 1958), and are the result of people's experiences and interaction with their environment.

49. Individual differences in achievement motivation can predict academic performance, career choice and job performance (McClelland, 1972; McClelland, 1965). People with high levels of motivation are more likely to choose occupations that allow more control over outcomes, offer more direct and immediate performance feedback and are of moderate risk level. Achievement motivation captures both students' desire to outperform others, their desire to work hard to master a task or their desire to perform (Elliot and McGregor, 2001; Elliot and Thrash, 2001; Helmreich et al., 1978).

Instruments

50. In PISA 2015, five questions using a 4-point Likert scale were administered to students to monitor their level of achievement motivation. These items measure general motivation and school-related motivation, by looking at if students are motivated because they want to achieve their academic goals or they have other aims in life that motivate them. Figure 7 summarises these items.

Figure 7: Instruments, achievement motivation

ST119: To what extent do you disagree or agree with the following statements about yourself? *(Please select one response in each row. Strongly disagree; Disagree; Agree; Strongly agree)*		
Question No.	*Instruments*	*Type*
ST119Q01NA	I want top grades in most or all of my courses.	School related
ST119Q02NA	I want to be able to select from among the best opportunities available when I graduate.	School related
ST119Q03NA	I want to be the best, whatever I do.	General
ST119Q04NA	I see myself as an ambitious person.	General
ST119Q05NA	I want to be one of the best students in my class.	School related

Test and learning anxiety

51. Anxiety towards assessment and test taking in school refers to "phenomenological, physiological and behavioural responses" (Zeidner, 2007, p. 166). It is a subjective emotional state experienced before or during tests as a result of the very act of undergoing the test. It leads to uneasiness, worry, apprehension, distress or depression (McDonald, 2001). It has two components characterising the different cognitive and physiological symptoms among anxious individuals: worry and emotionality (Cassady and Johnson, 2002; Spielberger and Vagg, 1995). Worry is the cognitive component of anxiety at school reflecting the debilitating thoughts and concerns that learners experience before or during a test. The emotionality component refers to the heightened stress and associated physiological and affective responses that accompany evaluations in schools.

52. Anxiety can create significant barriers to learning and performance because when students are anxious about tests, they cannot focus on solving tasks but, rather, are occupied worrying about such tasks. Highly anxious students tend to perform lower academically (when performance is measured in test situations) than their peers who do not suffer from anxiety (Ackerman and Heggestad, 1997; Hembree, 1988; Seipp, 1991). In addition to work conducted in educational settings, negative correlations between anxiety towards evaluations and test performance have also been shown in real and simulated employee selection contexts (Fletcher et al., 1997; McCarthy and Goffin, 2005; Schmit and Ryan, 1992) which suggests that anxiety towards evaluations can have important long-term consequences for individuals beyond their effect on selection and evaluation mechanisms in school settings. Anxiety towards evaluations can also have broader consequences, negatively affecting a student's social, emotional and behavioural development, and their feelings about themselves and school.

53. Studies that assess the frequency and the severity of anxiety towards evaluations in school have followed two approaches: 1) comparing the anxiety students experience when taking tests and other potentially stressful events; and 2) examining the proportion of students who, on measures of test anxiety, experience levels of anxiety above a certain threshold (McDonald, 2001).

54. In many countries the frequency of and the consequences testing has on students increases as children move through the school system, leading to greater pressure from parents and schools to perform well. Parental and peer pressure is associated with greater worry, test irrelevant thoughts, and more intense physical symptoms related to test anxiety (Putwain and Best, 2011; Putwain et al., 2010).

55. Low-achieving students may fear tests because they are compared with their peers. High-achieving students may fear "losing" their status as a top-performing student by failing a test. Anxiety towards evaluations in schools may ultimately affect students whose grades drop because they did not perform well on one test, and in consequence will no longer be given the same opportunities.

56. In general, girls appear to be more susceptible to test anxiety than boys (Araki, 1992; Di Maria and Di Nuovo, 1990). This finding matches the higher likelihood that women suffer from anxiety disorders than men. Children from more disadvantaged socio-economic backgrounds and students whose mother tongue is not the language of the assessment appear to experience higher levels of test anxiety than other students (Hodge et al., 1997). This could be because students from more disadvantaged socio-economic backgrounds, particularly those whose parents have low educational attainment, have little support at home regarding how to behave in test-like situations and how to successfully negotiate good outcomes in case they fail their exams. Students who feel that their language skills are not as strong as others may also fear that language problems may jeopardise their performance on the test, for example because they may not be able to understand directions or the test terms.

Instruments

57. In PISA 2015, feeling anxious about sitting a test, fear of failing, and level of worry and apprehension when studying were measured using a 4-point Likert scale. These indicators refer to anxiety towards three types of school-related evaluation processes (the formal test, the out-of-school independent problem-solving experience and the in-school problem-solving experience). The three aspects of evaluation anxiety measured in PISA may differ with respect to the stakes that are associated with performance in these three settings and the level of public exposure of performance among a group of peers (see

Figure 8).

Figure 8: Instruments, test and learning anxiety

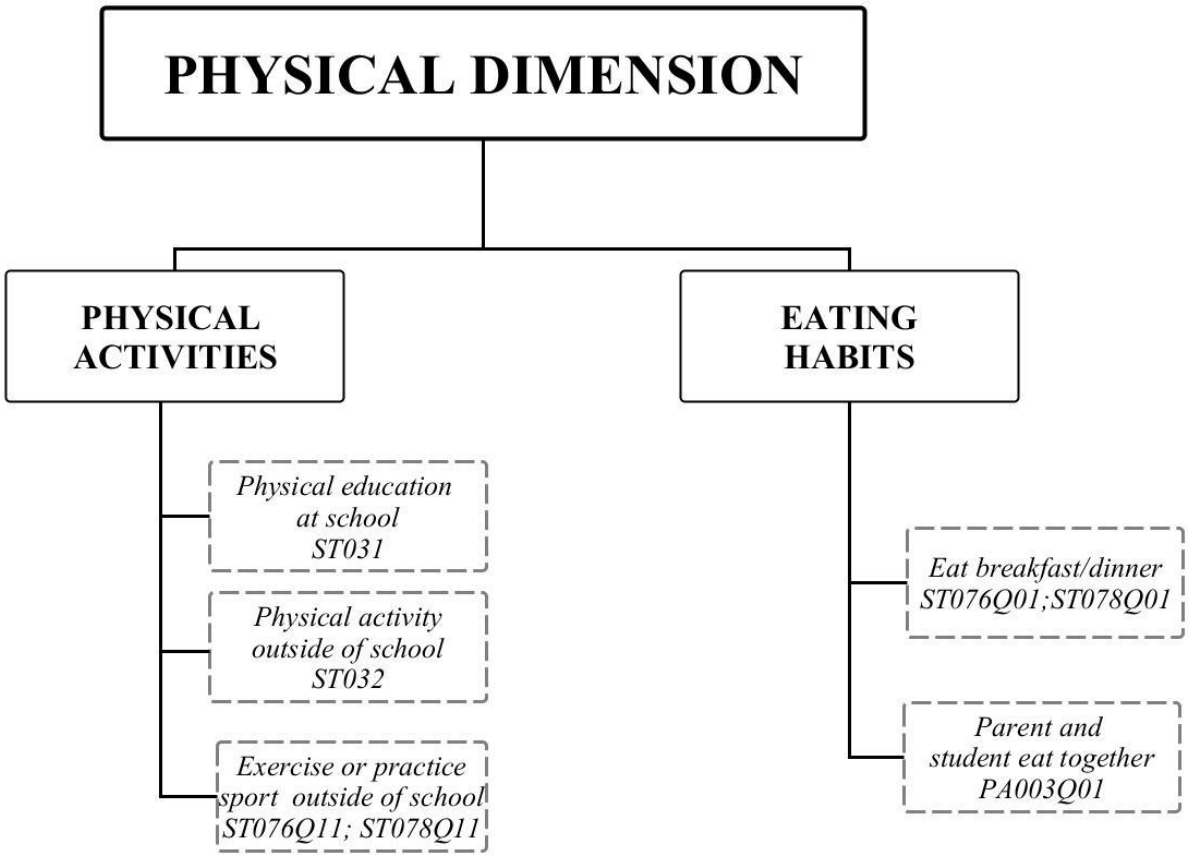
ST118: To what extent do you disagree or agree with the following statements about yourself? *(Please select one response in each row. Strongly disagree; Disagree; Agree; Strongly agree)*	
Question No.	*Instruments*
ST118Q01NA	I often worry that it will be difficult for me taking a test.
ST118Q02NA	I worry that I will get poor <grades> at school.
ST118Q03NA	Even if I am well prepared for a test I feel very anxious.
ST118Q04NA	I get very tense when I study.
ST118Q05NA	I get nervous when I don't know how to solve a task at school.

THE PHYSICAL DIMENSION OF STUDENTS' WELL-BEING

58. The Latins emphasised the importance of a harmonious development of both cognitive and physical skills with the saying *mens sana in corpore sano*. And a holistic approach to schooling and education stems from the same idea –that a sound mind inhabits a sound body. The teenage years mark an important developmental stage. Students must be allowed to understand their bodies in order to fully develop. The adoption of healthy practices and lifestyles is as much of a pre-requisite as acquiring academic knowledge and skills for positive economic and social outcomes. Moreover, students' overall physical fitness is also a pre-requisite for academic achievement and being socially and emotionally stable. Therefore, it is important for policy makers to monitor and understand the physical conditions of 15-year-olds. Students' health and fitness levels also depend on their socio-economic background and schooling just as much as students' academic achievement does. Schools' facilities and the activities local communities offer play an important role in students' physical well-being.

59. The PISA 2015 student questionnaire covers two aspects of students' lifestyles. First, students were asked to report how much and the level of physical activity they engage in, both in and outside of school. Secondly, PISA asked students to report if they eat breakfast and dinner and asked parents if they eat at least one meal together with their children in order to monitor students' general eating habits. These indicators shed light on 15 years-old students' lifestyles even if PISA does not measure health status as such. Figure 9 illustrates two aspects of the physical domain of students' well-being that can be analysed using the PISA 2015 assessment.

Figure 9: The physical dimension of students' well-being



Physical activities

60. Physical activity is described as any movement that requires expending energy (Centers for Disease Control and Prevention, n.d.) and can be categorised by the amount of effort required to move the body (or parts of) (WHO, n.d.). Physical activities such as walking and cycling can be considered *moderate* if they raise individuals' heart rate and break into a sweat (WHO, n.d.). Hiking, jogging, playing tennis or football are considered *vigorous* if breathing becomes hard and fast, and the heart rate increases rapidly (Centers for Disease Control and Prevention, n.d.). Engaging in moderate and vigorous physical activity is beneficial for people's general health. According to specialists, 14-18 year old students should practice at least 60 minutes of moderate to vigorous physical activity per day (Strong et al., 2005), and at least three days of vigorous physical activity per week to strengthen their muscles and bones (Janssen and LeBlanc, 2010).

61. Fifteen-year-old students engage in moderate and vigorous physical activity through physical education (P.E.) classes at school and sports activities practiced outside of school. Just as schools' mathematics curriculum promote students' mathematics skills and their ability and willingness to engage with problems requiring numeracy in the future, physical education aims at developing and promoting students' physical competencies, healthy lifestyles, and students' ability to transfer such skills and knowledge to perform in a range of physical activities (Bailey, 2006). Healthy habits developed during adolescence often carry through to adulthood (Bailey, 2006). Therefore, physical education comprises *behavioural components* (practicing different activities) and *knowledge components* (acquiring and internalising the rules and principles governing the practice of different sports, understanding the effects of active lifestyles and eating habits and the risks associated with consuming artificial stimulants such as drugs, alcohol and tobacco).

62. Effective physical education programmes require schools to have infrastructures like gyms or partnerships with local facilities. This allows students to choose from a variety of activities and sports, and use different parts of the body and the brain in team or individual sports that focus more on endurance or speed, tactic or body strength, or even different muscles.

63. űEducation policy makers, practitioners, students and their families also need to recognise that physical education is not in competition with academic classes, but are complementary. In some countries, parents, students and teachers worry that physical education in school take away time and energy from students, resulting in lower academic performance (Bailey, 2006). However, a comprehensive review by Bailey (2006) shows that physical education, and individual and collective sports are associated with better physical, emotional, social, cognitive and healthy development overall.

64. Individuals who regularly exercise are less likely to suffer from diabetes, cardiovascular diseases and obesity (Haskell et al., 2007) and to be in better overall health (Penedo and Dahn, 2005). There is strong evidence that participating in physical activities reduces depression and anxiety disorders, and raises self-esteem, at least for a short term (Biddle and Asare, 2011); regular physical activity also appears to increase memory retention, perseverance and self-regulation (Biddle and Asare, 2011).

65. Moreover, P.E. classes and extracurricular sports activities such as tournaments and training sessions organised by schools and/or networks of schools, allow students from different socio-economic backgrounds and academic abilities to interact and to develop feelings of trust and respect for each other, and a strong sense of belonging to their school community (Bailey, 2005; Moody, 2001). Cross-national evidence on 15-year-old students' engagement in moderate to vigorous physical activity suggests that boys and socio-economically advantaged students are more likely to report engaging in physical activity and to practice sports than girls and socio-economically disadvantaged students (Currie et al., 2012).

Instruments

66. PISA 2015 monitors the frequency of physical activity in or outside of school. The first instrument examines how education systems introduce physical education into the curricula by measuring the amount of P.E. lessons that students have at school. The second instrument monitors how many days a week students participate in moderate or vigorous physical activity outside of school, perhaps reflecting the number of community-wide resources available to students. Figure 10 summarises the survey questions reflecting these two types of physical activity.

Figure 10: Instruments, physical activities

Physical education at school

ST031: This school year, on average, how many days do you attend physical education classes each week? (*Please select from the drop-down menu to answer the question. 1-5 days*)

Physical activity outside of school

ST032: Outside of school, during the past 7 days, how many days did you engage in the following? *(Please select one response from the drop-down menus to answer the questions. 0-7 days.)*	
Question No.	*Instrument*
ST032Q01NA	Moderate physical activities for a total of at least 60 minutes per day (e.g. walking, climbing stairs, riding a bike to school, <country-specific>)
ST032Q02NA	Vigorous physical activities for at least 20 minutes per day that made you sweat and breathe hard (e.g. running, cycling, aerobics, soccer, skating, <country-specific>)

Exercise or practice sport outside of school

ST076-78: On the most recent day you attended school; did you do any of the following before going to school/after leaving school? *(Please select one response in each row. Yes; No)*	
Question No.	*Instrument*
ST076Q11NA	Exercise or practice sport before going to school
ST078Q11NA	Exercise or practice sport after leaving school

Eating habits

67. Eating habits play an important role in students' physical well-being, psychological well-being, cognitive function and academic performance (Cooper et al., 2011). Research shows that eating patterns affect teenagers' quality of life in three ways: first, they promote a healthy lifestyle; second, they promote healthy growth and cognitive development (Birch et al., 2007); and third, eating habits formed during adolescence carry through to adulthood, influencing health and emotional well-being later on (Kemm, 1987; Nicklas et al., 1988; Videon and Manning, 2003). For example, the prevalence of type II diabetes among children and teenagers, as well as other conditions associated with obesity have increased over the past 40 years due to changes in eating habits and lifestyles (Cavadini et al., 2000).

68. An appropriate diet for teenagers is defined as the overall intake of the amount of energy and the type and variety of nutrients. People's diets are largely determined by cultural habits and traditions, as well as health concerns. But they also can be influenced by internal and external factors such as family and peer influences, body weight perception, food preferences and availability (Videon and Manning, 2003). During the transition from childhood into adolescence, eating habits can change dramatically. First, teenagers become conscious of their own body and how it is perceived by others. As a result they modify their diet and eating habits in order to meet peers' expectations and their social environment. Moreover, adolescents are allowed more and more autonomy (Neumark-Sztainer et al., 1999). They can decide how much time they want to spend eating, when to eat and what to eat. (Neumark-Sztainer et al., 1999). Many teenagers skip breakfast, some because they want to sleep longer in the morning, others as a way to limit their calorie intake.

69. Adolescents' eating patterns show a large socio-demographic variation. A study, which uses the Add Health Data, The National Longitudinal Study of Adolescents Health from the U.S., shows that as many as one in five students from the U. S. skips their breakfast (Videon and Manning, 2003). Another study from HSBC shows that daily breakfast consumption from age 11 to 15 declined significantly among boys and girls in almost all examined countries and regions (Currie et al., 2012). Teenage girls are more likely to skip breakfast than boys, which may reflect preoccupations with body image. Adolescents with affluent socio-demographic background were significantly more likely to report eating breakfast (Currie et al., 2012).

70. Evidence suggests that teenagers who regularly eat breakfast in the morning are more likely to have a more balanced and nutritious diet containing fruits and vegetables, and are at a lower risk of being overweight (Morgan et al., 1986; Shaw, 1998; Videon and Manning, 2003). Moreover students who eat breakfast have a higher cognitive function, positively reflected in improved memory, higher test grades, and more regular school attendance (Rampersaud et al., 2005). Teenagers who repeatedly skip breakfast do not tend to prioritise healthy eating habits (Shaw, 1998; Morgan et al., 1986; Videon and Manning, 2003).

71. As parents do not have a lot of influence on *what* and *when* adolescents eat during the day, the evening family meal can ensure that teenagers get enough fruits, vegetables and dairy products as well as reduce the likelihood of skipping breakfast (Videon and Manning, 2003) – essential for maintaining and developing healthy nutrition intake. Findings also suggest that in households where families eat dinner together, teenagers tend to enjoy better physical and emotional well-being, possibly because dinner is a time for informal discussions and parents can promote healthy eating habits (Videon and Manning, 2003).

Instruments

72. PISA 2015 monitors two aspects of teenage eating habits: whether students eat breakfast and whether they eat dinner. While the PISA 2015 questionnaires does not provide any information about the specific diet students might follow nor about parental presence at meals, the literature suggests that these two meals are associated with more balanced eating habits and improved physical and emotional well-being. Regular eating habits are also identified by looking at the parental questionnaire, which asks parents to report on how often they eat together with their children. Figure 11 summarises these survey questions.

Figure 11: Instruments, eating habits

ST076-78: On the most recent day you attended school; did you do any of the following before going to school/after leaving school? *(Please select one response in each row. Yes; No)*	
Question No.	*Instrument*
ST076Q01NA	Eat breakfast before going to school
ST078Q01NA	Eat dinner after leaving school
PA003: How often do you or someone else in your home do the following things with your child? *(Please tick only one box in each row. Never or hardly ever; Once or twice a year; Once or twice in a month; Once or twice a week; Every day or almost every day)*	
Question No.	*Instrument*
PA003Q02TA	Eat <the main meal> with my child around a table.

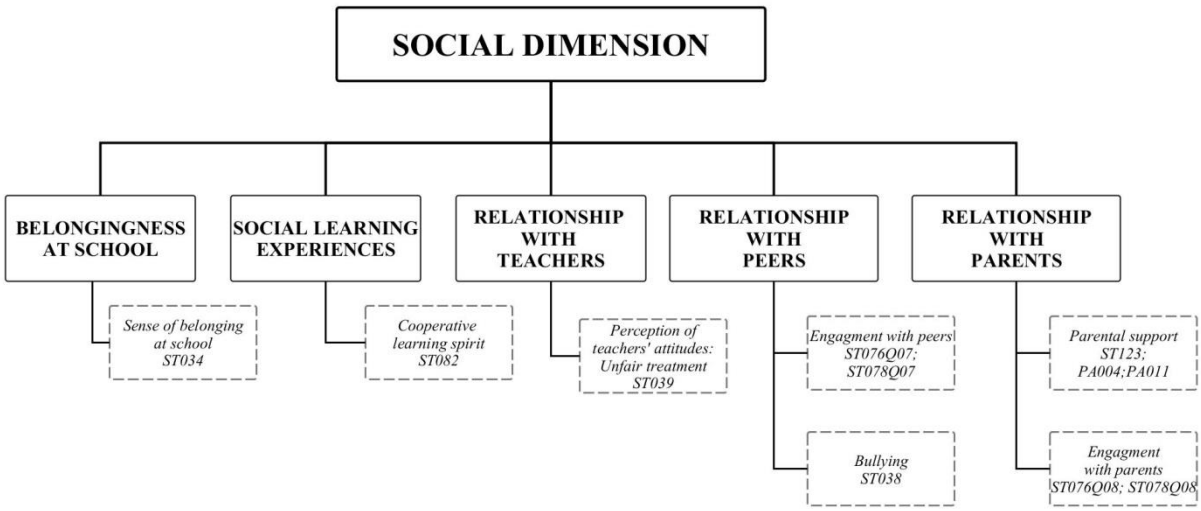
THE SOCIAL DIMENSION OF STUDENTS' WELL-BEING

73. Students' well-being is not just about feeling happy and achieving good grades in school, but also about being engaged with life and with other people (Gale et al., 2013). The social aspect of students' well-being captures both the quantity and the quality of students' social networks (Helliwell, and Putnam, 2004). People with trustworthy connections – a valuable social support network – can be protected from loneliness, and physical and mental health problems.

74. The teenage years represent a period of intense social exploration for children. They are discovering their own identity but at the same time are looking for acceptance and validation from their peers and community. Teenagers place great importance on the relationships they form; thus, the quality and type of relationships are extremely important indicators of their well-being (Armsden and Greenberg, 1987; Lippman et al., 2011).

75. PISA 2015 measures five areas of social well-being: students' sense of belonging at school; their social learning experiences; their relationship with their teachers, their peers and their parents. Figure 12 shows these six aspects of students' social well-being.

Figure 12: The social dimension of students' well-being



Belongingness at school: Sense of belonging

76. A sense of belonging is defined as feeling accepted and liked by the rest of the group, feeling connected to others and feeling like a member of a community (Baumeister and Leary, 1995; Maslow, 1943). Human beings in general, and teenagers in particular, desire strong social ties and quality relationships.

77. Fifteen-year-old students spend most of their time at school. Thus, students who feel that they are part of and are accepted by a school community report that their life has more meaning (Juvonen, 2006). They are more likely to be healthy (Lippman, et al., 2011), to perform higher academically and to be more motivated in school (Cohen et al., 2009; Goodenow, 1993; Katja et al.,

2002; Sánchez et al., 2005). They are also less likely to engage in risky behaviours such as substance abuse and truancy (Currie et al., 2012; Resnick et al., 1997; Schulenberg et al., 1994).

78. Fifteen-year-old students participating in PISA are, in many countries, transitioning from lower to upper secondary school. And approximately half of the students, during this transition period, feel disengaged from school (West et al., 2010). Those students who feel seriously disengaged are more likely to drop out of school and never return (Lee and Burkam, 2003). This might explain why being positively connected to school is particularly important for adolescents.

Instruments

79. In PISA 2015 students were asked to report their feelings about social bonding and isolation, loneliness and belonging to the school community on a 4 point Likert scale ranging from 1 "strongly agree" to 4 "strongly disagree". Positive social bonding refers to students' perception that they positively connect with others; social isolation refers to students' feelings of loneliness at being separated from their social group; regard refers to peer perceptions and belonging (or lack of) refers to students' general sense of engagement (or lack of) in their school community. Figure 13 summarises the six instruments of students' sense of belonging. The same set of instruments of students' sense of belonging were asked in PISA 2000, PISA 2003 and PISA 2012 enabling education systems to monitor the quality of students' engagement with their school community and the ties students forge at school in addition to academic performance.

Figure 13: Instruments, sense of belonging at school

ST034: Thinking about your school: to what extent do you agree with the following statement? *Please select one response in each row. Strongly agree; Agree; Disagree; Strongly disagree)*	
Question No.	*Instrument*
ST034Q01TA	I feel like an outsider (or left out of things) at school.
ST034Q02TA	I make friends easily at school.
ST034Q03TA	I feel like I belong to school.
ST034Q04TA	I feel awkward and out of place in my school.
ST034Q05TA	Other students seem to like me.
ST034Q06TA	I feel lonely at school.

Social learning interactions at school: Cooperative learning spirit

80. How students interact with each other and how much they value such interaction is an important aspect of their social well-being. A willingness to work with others is a pre-requisite for successful teamwork, together with levels of content-specific knowledge and skills, the capacity to manage relations and to communicate effectively. These abilities – working well together with peers, being able to listen to others and celebrating classmates' success – are not innate, but must be developed.

81. Education systems can influence how students approach learning. Roger and Johnson (1988) identify three learning approaches students can adopt: the competitive, the individualistic and the cooperative approach. Competitive learning involves students *competing* with each other and where grades are assigned to students based on their position in the overall distribution of performance – i.e. relative rather than absolute performance standards. Individualistic learning occurs when students set and attempt to achieve their own learning goals. Students work by themselves and performance is

evaluated based on whether individuals meet given standards and objectives. Peer learning occurs when students work together to achieve shared goals using both *cooperative* and *collaborative* learning strategies. In cooperative learning situations students work together in order to maximise their own and each other's learning. In collaborative learning situations, peers perceive each other as equals and share common goals (Gokhale, 1995).

82. Peer learning has dramatically transformed students' learning experiences over the past 20 years. Studies show that peer learning can promote a positive school climate, encourage student relationships and positive feelings (Ghaith, 2002; Topping, 2005). However, while small teams and shared tasks can improve students' attitudes towards school, foster achievement, develop thinking skills, and promote interpersonal and intergroup relations, creating successful small group work is not simply a matter of putting students together (Ghaith, 2002; Topping, 2005). As students do not automatically become involved when working together, the peer learning effect of group work depends on how the group is organised and the nature of the tasks that the group has to perform (Roger and Johnson, 1994). How well group work can promote students' learning and well-being depends on the ability of teachers to guide students and group dynamics (Roger and Johnson, 1994). Overall, peer learning strategies appear to be particularly suited to integrate diverse student populations, such as minorities and students from disadvantaged backgrounds (Sharan, 1980).

Instruments

83. PISA 2015 does not attempt to monitor learning strategies in the classroom by observing the behaviour of students or teaching methods. Instead, PISA asks students what kind of learning strategies they use when they study together with their classmates. It monitors how students perceive their motivational strategies and how they perceive their own behaviour when they are working together with their peers. Students were also asked to describe their behaviour in class. Through eight statements, PISA 2015 identifies whether students are cooperative, follow collaborative strategies and enjoy seeing their classmates succeed in different education systems. Figure 14 gives an outline for the indicators measuring cooperative learning spirit.

Figure 14: Instruments, cooperative learning spirit

ST082: To what extent do you disagree or agree with the following statements about yourself? *(Please select one response in each row. Strongly disagree; Disagree; Agree; Strongly agree)*	
Question No.	*Instrument*
ST082Q01NA	I prefer working as part of a team to working alone.
ST082Q02NA	I am a good listener.
ST082Q03NA	I enjoy seeing my classmates be successful.
ST082Q08NA	I take into account what others are interested in.
ST082Q09NA	I find that teams make better decisions than individuals.
ST082Q12NA	I enjoy considering different perspectives.
ST082Q13NA	I find that teamwork raises my own efficiency.
ST082Q14NA	I enjoy cooperating with peers.

Relationship with teachers: Students' perception of their teachers' attitudes

84. Teachers play an important role in student's overall school experience because they have a unique opportunity to monitor both students' academic outcomes and socio-emotional development. Research over the past decades has examined teacher - student relationships, especially teachers' roles

in preparing students' for adult life (Muller, 2001). *Teacher-student relationships (TSRs)* are positively linked to students feeling safe and secure at school, and academic achievement (Roorda et al., 2011).

85. *TSRs* are shown through *person-centred* variables, such as empathy and warmth, and *instructional variables*, such as the extent to which teachers encourage higher-order learning among their students (Cornelius-White, 2007; Roorda et al., 2011).

86. Roda and colleagues (2011) show that affective aspects in teacher-student relationships are more strongly correlated with students' academic and school engagement than specific pedagogical approaches that teachers use. Students who report that their teachers care about them, are at a lower risk of dropping out of school (Muller, 2001) and are less likely to have low academic achievement (Wentzel, 1998).

87. Research shows that TSRs have stronger influence on younger children than older, especially when children transition from primary to middle school (Baker, 2006). As for gender differences, other research suggests that girls are more likely to have close relationships with their teachers than boys, because greater intimacy – associated with closeness – is expected from girls (this phenomena is also labelled as the *gender role socialisation perspective*) (Roorda et al., 2011). However, other findings show that TSRs can have a greater influence on boys; as boys are more at a risk of failure than girls, they tend to form stronger attachments with their teachers (Roorda et al., 2011).

Instruments

88. PISA 2015 measures students' perception of their teachers' attitudes towards them through six questions on perceived victimisation. Figure 15 summarises the instruments used to characterise teachers' attitudes towards students and their different dimensions.

Figure 15: Instruments, students' perception of their teachers' attitudes

ST039: During the past 12 months, how often did you have the following experiences at school? *(Please select one response in each row. Never or almost never; A few times a year; A few times a month; Once a week or more)*	
Question No.	*Instrument*
ST039Q01NA	Teachers called on me less often than they called on other students.
ST039Q02NA	Teachers graded me harder than they graded other students.
ST039Q03NA	Teachers gave me the impression that I am less smart than I really am.
ST039Q04NA	Teacher's disciplined me more harshly than other students.
ST039Q05NA	Teachers ridiculed me in front of others.
ST039Q06NA	Teachers said something insulting to me in front of others.

Relationship with peers: Engagement with friends

89. As students spend more time with their peers when entering secondary school, making friends matters for their social development (Bollmer et al., 2005; Hartup, 1993). Friendships may also have a long-term effect on students' social development, as they allow students to discover their own identity and group identity (McNelles and Connolly, 1999). Frequent interactions with friends may facilitate sense of belonging, promote happiness, self-esteem and help students to adjust to the school environment (Goodenow and Grady, 1993). Friendships also provide a venue for communicating

shared interests and activities. Those who do not have, meet and talk to friends, have low perceptions of self-worth and life satisfaction, and are more frequently depressed (Parker and Asher, 1993); they are also more likely to be bullied.

90. When friendship provides social support, based on mutual trust, cooperation and common interest, it can facilitate students' social development, academic motivation and performance. Those who have learning difficulties are more likely to perform better academically if they have friends who are motivated to learn. However, peers can also hinder each other's social development, when peer dynamics lead to the adoption and mutual reinforcement of attitudes such as lack of interest in school and low levels of achievement motivation (Berndt, 1999), when peers encourage each other to drink, smoke, use drugs, vandalise and steal (Bauman and Ennett, 1994; Ennett and Bauman, 1994).

91. At the age of 15, friendships tend to be somewhat segregated across gender lines. Boys tend to meet their friends more often than girls do, while girls report that they talk to their friends more often than boys. Studies also show that immigrant students are more likely to have friends from the same cultural background (Kao and Joyner, 2004). Cross-country comparisons revealed that in some countries family relations mattered more to adolescents than friendship ties, but in other countries, such as Canada, 15-year-old students reported having deeper interactions with their friends than with their parents (Carrie et al., 2012).

Instruments

92. PISA 2015 measures students' engagement with their peers. It does not capture the number of friends, or whether friends are the same or different gender and the types of interactions students have with their friends. Figure 16 presents the PISA questions related to students' communication with friends.

Figure 16: Instruments, engagement with friends

ST076-78: On the most recent day you attended school; did you do any of the following before going to school/after leaving school? *(Please select on response in each row. Yes; No)*	
Question No.	*Instrument*
ST076Q07NA	Meet friends or talk to friends on the phone before going to school
ST078Q07NA	Meet friends or talk to friends on the phone after leaving school

Relationship with peers: Bullying

93. In recent years, bullying has become the focus of concern among policy makers (Rigby, 2007; Saluja, 2004), because evidence has shown the harmful effects bullying has on individuals, their families and the school communities (Giovazolias et al., 2010; Drydakis, 2014). Individuals, who are bullied by one or several peers, are repeatedly and continually distressed, socially and emotionally. Bullying is characterised by a systematic abuse of power and can be identified by three key aspects: repetition, intention to harm, and an unequal power between the bully and the victim (Woods and Wolke, 2004). The prevalence of bullying has been shown to vary significantly across countries (Analitis et al., 2009; Craig et al., 2009; Saluja, 2004).

94. Students can also experience the double role of being a bully and a victim (Olweus, 1993; Salmivalli et al., 1996). Studies that look at bullying episodes indicate that most children who are not involved in bullying (as a bully or as a victim) either take a neutral stance, or are bystanders who support and reinforce bullying or defend the victim (Salmivalli et al., 1996; Huitsing and Veenstra, 2012).

95. Bullying is a phenomenon that cannot be understood without investigating group dynamics and power relations between interrelated social groups. It depends on the context in which individuals operate and the limits, boundaries and checks that are imposed on peer-to-peer interactions (Card and Hodges, 2006; Faris and Ennett, 2012; Hawkins et al., 2001; Salmivalli et al., 1996).

96. Bullying can take different forms: *physical*, *verbal* and *relational* (Olweus, 1993). *Physical* (hitting, punching or kicking) and *verbal* (name-calling or mocking) bullying refers to direct forms of abuse (Smith and Sharp, 1994). *Relational bullying* refers to the social exclusion phenomena, where some children are ignored, excluded from games or parties, rejected by peers, the victim of gossip and other forms of public humiliation and shaming (Woods and Wolke, 2004). As teenagers use ICT (information communication technologies) tools more and more, *cyber bullying* has become a new form of bullying: a type of aggression that "occurs via on line (e.g. e-mail, instant messaging and social networks) or mobile phones (e.g. text messaging)" (Wang et al., 2010, p. 369).

97. Bullying has long-lasting mental, health and economic consequences for both the bully and the victim (Hugh-Jones and Smith, 1999; Rivers, 2000). Victims are more likely to experience depression, anxiety, low self-esteem, feelings of loneliness, changing eating patterns, and a loss of interest in activities (Kochel et al., 2012; Rigby and Cox 1996; Striegel-Moore et al., 2002). Research suggest that those who were bullied or were the bully-victim, were more likely to skip classes, drop out of school, and perform lower academically than peers who had no conflictual relationships with their peers (Konishi et al., 2010; Townsend, 2008). A recent study also suggests that bully victims suffer long-term consequences as measured by labour force participation, employment rates and hourly wages (Drydakis, 2014).

98. Physical characteristics, such as age, physical appearance, gender and ethnicity are often associated with a higher likelihood of becoming the victim or the bully. For instance, students who are overweight and obese are more likely to become the victims and bullies than their normal-weight counterparts (Griffiths et al., 2006; Janssen et al., 2004; Puhl and Latner, 2007). Research also shows higher rates of victimisation among adolescents who are physically less developed, unhappy with their appearance, or socially isolated (Faris and Felmlee, 2014).

99. In terms of gender differences boys are usually more often bullies than girls (Camodeca et al., 2002). Boys are also more likely to become victims of bullying when they have no or very few friends, or they are disliked by other peers; when they are either socially withdrawn or impulsive, have low level of self-regulation and have few psychological coping skills (Berger 2007; Olweus 1994; Shields et al., 2001; Veenstra et al., 2005; Wolke and Skew, 2011). Relational aggression occurs to an equal extent among girls and boys (Baldry and Farrington 1999; Crick and Grotpeter 1995; Rivers and Smith, 1994). And while boys are less like to spread gossip than girls, they are more likely to be physically violent towards each other (Rivers and Smith, 1994).

100. Adolescents who experience violence or aggression at home or are influenced by negative parental relationships are more likely to bully (Wolke and Skew, 2011). The literature suggests that low socio-economic status, low parental educational attainment and living in single-parent households is associated with a higher likelihood that children will be involved in bullying, either as a bully, a victim, or as a bully-victim (Jansen et al., 2012; Tippett and Wolke, 2014).

Instruments

101. PISA 2015 contains measures that identify the three forms of bullying using self-reports from the victim's perspective: verbal, physical and relational bullying. Figure 17 summarises the eight indicators of bullying and identifies the dimensions they represent.

Figure 17: Instruments, bullying from the victim perspective

ST038: During the past 12 months, how often have you had the following experiences in school? *(Please select one response in each row. Never or almost never; A few times a year; A few times a month; Once a week or more)*		
Question No.	*Instrument*	*Dimensions of bullying*
ST038Q01NA	I got called names by other students.	Verbal bullying
ST038Q02NA	I got picked on by other students.	Verbal bullying
ST038Q03NA	Other students left me out of things on purpose.	Relational bullying
ST038Q04NA	Other students made fun of me.	Verbal bullying
ST038Q05NA	I was threatened by other students.	Verbal/physical bullying
ST038Q06NA	Other students took away or destroyed things that belong to me.	Physical bullying
ST038Q07NA	I got hit or pushed around by other students.	Physical bullying
ST038Q08NA	Other students spread nasty rumours about me.	Relational bullying

Relationship with parents: Parental support

102. Social and emotional support is essential for adolescents' social development. It is defined as being cared for, receiving assistance and help from significant others (Cohen and Wills, 1985) and/or being helped while coping with difficult circumstances (Thoits, 1986). Understanding social and emotional support is particularly important, as in some countries, such as the Netherlands, 20% of young people experience serious emotional problems, including depression, loneliness, low self-esteem and social isolation (Helsen et al., 2000). As shown earlier, those students who continuously receive strong social support, are more likely to feel good about themselves and perform better at school than those who do not receive the same amount of support.

103. In childhood and early adolescence the central position of students' social network is occupied by parents. However, by age 15, the social network of students changes dramatically. Relationships with teachers and peers have a greater influence on students' social and emotional life, while the relationship with parents changes – transforming into a more adult, equal relationship (Cauce et al., 1990; Furman and Buhrmester, 1985; Helsen et al., 2000).

104. Research on changes in adolescents' social network and psychological well-being shows that caring and emotionally supportive parents are a better social indicator of positive development than peer support (Cauce et al., 1990; Furman and Buhrmester, 1985; Helsen et al., 2000). Good relationships with parents are found to be significant for social skills, general well-being and positive self-esteem; (Cauce et al., 1990; Furman and Buhrmester, 1985; Helsen et al., 2000).

105. Studies show that girls perceive that they receive more support from their parents and friends than boys do (Bokhorst et al., 2010). In addition, a study from Norway shows that adolescents with migrant status experience higher level of psychological distress and lower social supports than their non-migrant peers. Moreover, immigrant boys reported to have higher level of problems, mainly anxiety and depression (Oppedal and Røysamb, 2004).

Instruments

106. PISA 2015 monitors parental support using items from both the parent and student questionnaires in order to obtain both perspectives. The instruments help to identify whether parents are interested in their students' academic activities or provide emotional support.

Figure 18: Instruments, parental support

ST123: Thinking about <the last academic year>, to what extent do you agree with the following statements? *(Please tick only one box in each row. Strongly disagree; Disagree; Agree; Strongly agree)*	
Question No.	*Instruments from the student perspective*
ST123Q01NA	My parents are interested in my school activities.
ST123Q02NA	My parents support my educational efforts and achievements.
ST123Q03NA	My parents support me when I am facing difficulties at school.
ST123Q04NA	My parents encourage me to be confident.
	Instruments from the parent perspective
PA004: Thinking about <the last academic year>, to what extent do you agree with the following statements? *(Please tick only one box in each row. Strongly disagree; Disagree; Agree; Strongly agree)*	
PA004Q01NA	I am interested in my child's school activities.
PA004Q02NA	I am supportive of my child's efforts at school and his/her achievements.
PA004Q03NA	I support my child when he/she is facing difficulties at school.
PA004Q04NA	I encourage my child to be confident.
PA011: We are interested in parents' interaction with the child's school friends. *(Please tick only one box in each row. 0; 1-2; 3-5; 6 or more)*	
PA011Q01NA	How many parents of your child's friends at this school do you know?
PA011Q02NA	How many friends of your child at school do you know by name?

Relationship with parents: Engagement with parents and guardians

107. Communication between parents and adolescents is important as families can help young people to deal with stressful situations, and protect them from serious mental and health problems. Young people who report frequently communicating with their parents in a caring and effective manner are more likely not to smoke, to feel that they are healthier and are more satisfied with life (Currie et al., 2012). Effective parent-child communication may also influence students' sexual behaviour (Rosenthal and Feldman, 1999). Students who are not afraid of being judged when raising personal issues with their parents develop better socially.

108. The HSBC study does not reveal large differences in the extent to which mothers and fathers communicate with boys and girls but it suggests that communication is higher in socio-economically advantaged households and in Eastern and Northern Europe than in Western Europe and the United States (Currie et al., 2012).

Instruments

109. PISA 2015 measures the perception of communication with parents, without distinguishing between fathers and mothers; it also does not measure the length and the subject of communication. Of

course, parents may use different strategies to communicate with their children. For instance, they may talk to their kids in the morning if they know that their kids do not want to share their experiences with their parents' right after the school. But, monitoring students' communication with their parents might help to describe family relations and how it ties in with other aspects of the social domain of students' well-being. Figure 19 summarises the PISA survey questions related to parent-student communication which asks if students talk to their parents before or after school.

Figure 19: Instruments, parental communication

ST076-78: On the most recent day you attended school; did you do any of the following before going to school/after leaving school? *(Please select one response in each row. Yes; No)*	
Question No.	*Instrument*
ST076Q08NA	Talk to your parents before going to school
ST078Q08NA	Talk to your parents after leaving school

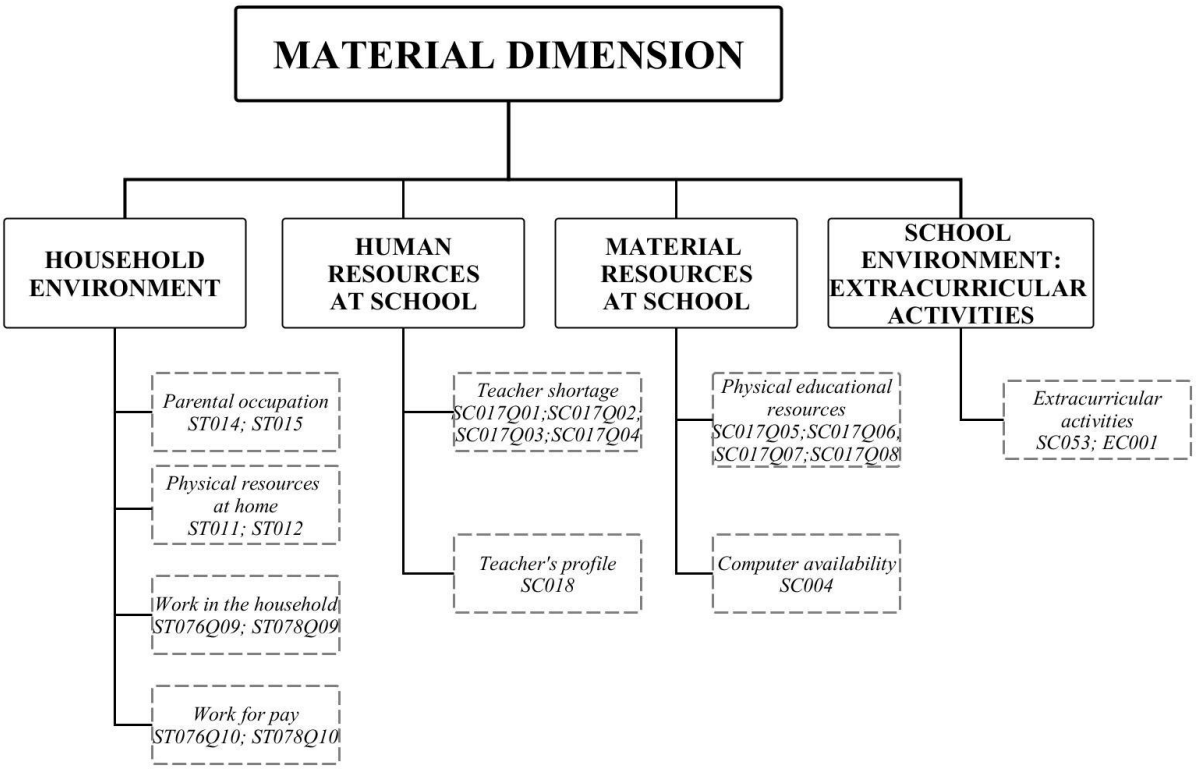
THE MATERIAL DIMENSION OF STUDENTS' WELL-BEING

110. Many of the students that took part in PISA 2015 live in countries where families were severely affected by the economic crisis in 2008. Many parents lost their jobs or had to take up poor-paying jobs; many education systems faced budgetary cuts and many welfare agencies cut down on services to at-risk groups. High rates of child poverty remain a concern in several countries as PISA has consistently shown that students' socio-economic background is one of the factors that is most strongly associated with students' proficiency levels. Research shows a strong link between material well-being in childhood and different dimensions of well-being in adulthood. Providing adequate resources to children is important not only because it is a pre-requisite for successful development but also because teenagers in poverty do not have adequate living and learning conditions to fulfil their personal goals.

111. PISA examines the outcomes of students in school at age 15, at Grade 7 or above. Therefore, it is not possible in the context of PISA to examine the material conditions of those children who are most at-risk of suffering from poor material conditions, given that poverty is associated with a higher likelihood of dropping out of school. However, PISA can be a useful tool to complement information from other surveys on child outcomes in order to examine the inter-relationship between material well-being and other dimensions of well-being.

112. The information provided in PISA on students' material conditions at home is not as detailed and informative as in other studies that map the income and wealth of families with children. However, PISA contains a rich set of information on the types of resources students have at home and, most importantly, at school. As students spend a considerable amount of time at school, the quality of their school environment is key for evaluating their well-being. Figure 20 summarises the areas of the material dimension.

Figure 20: The material dimension of students' well-being



The household environment

113. In light of the post-2015 framework, the international education community strives to go beyond measuring access in education and look towards achievement-related measures, including equity-related outcome indicators. Socio-economic disparities in academic achievement have attracted the attention of researchers and policy makers since the 1960s (see, for example, Coleman et al., 1966; Jencks, 1972; Peaker, 1971; and comprehensive reviews such as Buchmann, 2002; McLoyd, 1998; Sirin, 2005; White, 1982). The emergence of large-scale international assessments, such as PISA, has drawn attention to the between-country differences in socio-economic disparities and academic performance.

114. Studies examining the material well-being of children typically contain measures of wealth and disposable income, as a higher income and more assets enable families to better provide for their children's material needs such as: items necessary for school, suitable housing and a well-balanced diet. Poverty during childhood has been linked to poor health and academic performance, and to lower earnings as an adult (e.g. Case et al., 2005; Currie et al., 2012). Governments committed to the United Nations Convention on the Right of the Child (UNCRC) must ensure that children have an adequate standard of living including access to educational resources that are important for their development, such as children's books.

115. In PISA, students are asked to report their parents' occupation to gauge the household's socio-economic status. However, PISA also takes a direct approach, measuring certain aspects of material well-being by asking students to report on the availability of a number of household items in their homes, used to gauge the economic, social and cultural status (ESCS) of the participant's

household. Some educational researchers maintain that the availability of home possessions is a more important measure of socio-economic status than either parental education or parental occupation (Buchmann, 2002). However, while very extensive research exists on reliable cross-country indicators regarding parental occupation and educational attainment, there is not as much information regarding cross-country comparisons on household possessions (Filmer and Pritchett, 1999).

116. In PISA 2015, students were also asked for the first time to report on whether they did chores at home, took care of other family members or worked outside their home. Many families living in poverty who do not receive enough help from the state to effectively provide for the family's needs, may rely on their children to work within or outside the home to get by. While child labour legislations in many countries prevent 15-year-olds to work for pay, it is difficult to prevent children working at home. Despite the negative long-term effects working at home can have on children's ability to fully benefit from the resources offered by the education system, in the absence of alternatives, it may be necessary for households to survive.

Instruments

117. In PISA 2015, information on parental occupation was gathered through students' self-reports on their mother's and father's occupation. Students were asked to describe their parents' last or current job title and responsibilities (in case they were not in the labour force at the time of the PISA test). Information from these open-ended questions was coded using the ISCO-08 classification of occupations at the 4-digit level, which was used to calculate the ISEI index of occupational prestige (Ganzeboom, 2010; Ganzeboom, et al., 1992). In PISA, information from the mother and father is combined by considering the highest between maternal and paternal ISEI. Students have been asked about their parents' occupation since the first PISA assessment in 2000.

Figure 21: Instruments, parental occupation

ST014	**The following two questions concern your mother's job:** *(If she is not working now, please tell us her last main job.)*
Question No.	*Instrument*
ST014Q01TA	What is your mother's main job? (e.g. school teacher, kitchen-hand, sales manager) *Please type in the job title.*_____
ST014Q02TA	What does your mother do in her main job? (e.g. teaches high school students, helps the cook prepare meals in a restaurant, manages a sales team) *Please use a sentence to describe the kind of work she does or did in that job.*
ST015	**The following two questions concern your father's job:** *(If he is not working now, please tell us her last main job.)*
Question No.	*Instrument*
ST015Q01TA	What is your father's main job? (e.g. school teacher, kitchen-hand, sales manager) *Please type in the job title.*_____
ST015Q02TA	What does your father do in her main job? (e.g. teaches high school students, helps the cook prepare meals in a restaurant, manages a sales team) *Please use a sentence to describe the kind of work he does or did in that job.*

118. The PISA indicator of students' household possessions uses items that are common across participating countries and a set of items that were country-specific. Students were first asked to report if a set of 16 items were available in their home (13 common items and 3 nation-specific items) using a yes or no response format. They were then asked to report the number of items available from a list of further 8 items using a "none", "one", "two", or "three or more" scale. Finally, they were asked to

provide information on the number of books that are available in their home, excluding magazines, newspapers, and schoolbooks. Students were advised that 1 metre in a bookshelf contains around 40 books. Response categories comprised “0-10”, “11-25”, “26-100”, “101-200”, “201-500”, and “more than 500”.

Figure 22: Instruments, students’ home possession

ST011: Which of the following are in your home? *(Please select one response in each row. Yes; No)*	
Question No.	*Instruments*
ST011Q01TA	A desk to study at 1 2
ST011Q02TA	A room of my own
ST011Q03TA	A quiet place to study
ST011Q04TA	A computer you can use for school work
ST011Q05TA	Educational software
ST011Q06TA	A link to the Internet
ST011Q07TA	Classic literature (e.g. <Shakespeare>)
ST011Q08TA	Books of poetry
ST011Q09TA	Works of art (e.g. paintings)
ST011Q10TA	Books to help with your school work
ST011Q11TA	<Technical reference books>
ST011Q12TA	A dictionary
ST011Q16NA	Books on art, music, or design
ST011Q17TA	<Country-specific wealth item 1>
ST011Q18TA	<Country-specific wealth item 2>
ST011Q19TA	<Country-specific wealth item 3>
ST012: How many of these are there at your home? *(Please select one response in each row. None; One; Two; Three or more)*	
Question No.	*Instrument*
ST012Q01TA	Televisions
ST012Q02TA	Cars
ST012Q03TA	Rooms with bath and shower
ST012Q05NA	<Cell phones> with Internet access (e.g. smartphones)
ST012Q06NA	Computers (desktop computer,portable laptop, or notebook)
ST012Q07NA	<Tablet computers> (e.g. <iPad®>, <BlackBerry®, PlayBookTM>)
ST012Q08NA	E-book readers (e.g. <KindleTM>, <Kobo>, <Bookeen>)
ST012Q09NA	Musical instruments (e.g. guitar, piano)

119. Information on paid and unpaid work within or outside the household was gathered by asking students to report if, on the most recent day they attended school, they worked within the household, took care of household members or worked for pay either before or after going to school. PISA 2015 did not collect information on the number of hours spent working per week or the reasons why they work within the household or for pay. Figure 23 details the exact phrasing of the Yes/No questions that were used to gather information on students' work for pay.

Figure 23: Instruments, work in the household/work for pay

ST076-78: On the most recent day you attended school; did you do any of the following before going to school? *(Please select one answer in each row. Yes; No)*	
Question No.	*Instrument*
ST076Q09NA	Work in the household or take care of other family members before going to school
ST078Q09NA	Work in the household or take care of other family members after leaving school
ST076-78: On the most recent day you attended school; did you do any of the following after leaving school? *(Please select one answer in each row. Yes; No)*	
Question No.	*Instrument*
ST076Q10NA	Work for pay before going to school
ST078Q10NA	Work for pay after leaving school

School resources: Human resources

120. The motto "no education system can exceed the quality of its teachers" highlights the importance of quality human resources in education. And, teacher quality is more important than any other aspect of schooling in predicting student academic outcomes (Rivikin et al., 2005). However, in recent years, some countries have experienced a high-quality teacher shortage, particularly in specific subject areas such as science and mathematics, and in schools serving disadvantaged populations (Schleicher, 2012). Education policy makers are focusing on how best to attract high-achieving and motivated candidates into teacher education programmes.

121. There is evidence that students who enter teacher education institutions and the teaching profession may not have content-specific qualifications (Corcoran et al., 2004; OECD, 2005). In some countries, it has been argued that the teaching profession may have lost much of its capacity to attract high-achieving candidates because the teaching profession is not valued in society due to poor working conditions and relatively low salaries (for example, Dolton, 1990; Elfers et al., 2008; European Commision, 2013).

122. Teacher productivity and effectiveness is only partially shaped by their content knowledge, ability and training experience. Students' openness to learning – determined by students' own abilities, peer relationships, expectations and attitudes, and school climate and ethos – enables or hinders teachers from effectively supporting students' learning.

123. Even though not all low-qualified teachers are poor teachers and not all highly qualified teachers are good teachers, teacher qualifications are generally associated with better academic achievement, especially in mathematics (Akiba et al., 2007). Moreover, teachers who have greater

content knowledge tend to have a positive effect on students' subject-specific self-beliefs, such as their sense of mastery and self-efficacy (Blazar and Kraft, 2015).[5]

Instruments

124. PISA 2015 monitors human resources by asking school principals whether there is any teaching or assistant staff shortages and how adequate teachers' qualifications are. PISA also collects data on the number of teachers by their qualifications. Figure 24 and Figure 25 summarises these measures.

Figure 24: Instruments, teacher shortage

SC017: Is your school's capacity to provide instruction hindered by any of the following issues? *(Please select one response in each row. Not at all; Very little; To some extent; A lot)*		
Question No.	*Instrument*	*Type of education/teaching shortage*
SC017Q01NA	A lack of teaching staff.	Staff shortage
SC017Q02NA	Inadequate or poorly qualified teaching staff.	Educational shortage
SC017Q03NA	A lack of assisting staff.	Staff shortage
SC017Q04NA	Inadequate or poorly qualified assisting staff.	Educational shortage

Figure 25: Instruments, teacher's qualification

SC018: How many of the following teachers are on the staff of your school? Include both full-time and part-time teachers. *A full-time teacher is employed at least 90% of the time as a teacher for the full school year. All other teachers should be considered part-time. Regarding the qualification level, please refer only to the teacher's* ***highest qualification level.*** *(Please enter a number in each space provided. Enter "0" (zero) if there are none all. Full-time; Part-time)*	
Question No.	*Instrument*
SC018Q01TA	Teachers in TOTAL
SC018Q02TA	Teachers <fully certified> by <the appropriate authority>
SC018Q05NA	Teachers with an <ISCED Level 5A Bachelor degree> qualification
SC018Q06NA	Teachers with an <ISCED Level 5A Master's degree> qualification
SC018Q07NA	Teachers with an <ISCED Level 6> qualification

Material resources at school: Physical infrastructure and learning resources

125. The quality and safety of school buildings, and school materials contribute to students' experience at school and their ability to learn effectively. Good quality physical school infrastructure in the 21st century implies modern buildings that that supports teaching and learning, are safe and healthy places to be, spacious, and easy to navigate; with classrooms and other learning spaces that are comfortable with good acoustics, lighting, ventilation and control over heating and cooling, and furniture that is appropriate, comfortable and easy to rearrange to create different learning settings (Barrett et al., 2015). Schools also need high-quality basic learning resources, such as: whiteboards,

[5] It is important to note that this is not covered in PISA 2015.

textbooks, teaching support materials, student workbooks, supplementary learning aids and resources for research including well-integrated ICT (information and communication tools).

126. Schools may differ in the extent to which they are able to ensure appropriate quantity and high quality infrastructure for their students because they lack financial resources to purchase, transport or install high quality infrastructure; lack of human resources to develop high quality infrastructure; or because of geographical location that make delivery untimely or impossible (Educate a Child, n.d.).

127. Good quality school infrastructure appears to be positively associated with student's psychological well-being (Cuyvers et al., 2011). For instance, a case study in Flemish schools shows that students' satisfaction level and school attendance were associated with good quality infrastructure, especially green spaces and well-integrated ICT areas, as compared with those in schools with poor infrastructure (Cuyvers et al., 2011). Consequently, poor school infrastructure and low-quality learning materials may have negative consequences for students' long-term social and cognitive well-being. An inadequate school environment does not motivate students to attend school regularly and may instead incite students to drop out (Branham, 2004).

Instruments

The following set of items from the PISA school questionnaire can be used to measure school's material resources: lack of physical infrastructure and the level of learning materials and ICT resources provided by the school. School principals reported on the quality and quantity of their school's physical infrastructure. They also reported on the students/computer ratio at their school, and the number of PCs, laptops portable laptops, interactive projectors their schools had. Figure 26 and

Figure 27 summarise these instruments.

Figure 26: Instruments, physical infrastructure and educational resources

SC017: Is your school's capacity to provide instruction hindered by any of the following issues? *(Please select one response in each row. Not at all; Very little; To some extent; A lot)*		
Question No.	*Instrument*	*Dimension of education/teaching shortage*
SC017Q05NA	A lack of educational material (e.g textbooks, IT equipment, library or laboratory material).	Physical infrastructure
SC017Q06NA	Inadequate or poor quality educational material (e.g. textbooks, IT equipment, library or laboratory material).	Educational resources
SC017Q07NA	A lack of physical infrastructure (e.g. building, grounds, heating/cooling, lighting and acoustic systems).	Physical infrastructure
SC017Q08NA	Inadequate or poor quality physical infrastructure (e.g. building, grounds, heating/cooling, lighting and acoustic systems)	Educational resources

Figure 27: Instruments, computer availability

SC004: The goal of the following set of questions is to gather information about the student-computer ratio for students in the <national modal grade for 15-year-olds> at your school. *(Please enter a number for each response. Enter "0" (zero) if there is none.)*	
Question No.	*Instrument*
SC004Q01TA	At your school, what is the total number of students in <national modal grade for 15-year-olds>?
SC004Q02TA	Approximately, how many computers are available for these students for educational purposes?
SC004Q03TA	Approximately, how many computers are connected to the Internet / World Wide Web?
SC004Q04NA	Approximately, how many of these computers are portable (e.g. laptop, tablet)?
SC004Q05NA	Approximately how many interactive whiteboards are available in the school altogether?
SC004Q06NA	Approximately how many data projectors are available in your school altogether?
SC004Q07NA	Approximately how many computers with internet connection are available **for teachers** in your school?

School environment: Extracurricular activities

128. Adolescents spend half of their waking time in school, and the other half engaged in leisure activities (Larson and Verma, 1999 cited in Eccles et al., 2003, p. 866). For many of them, these activities either take the form of unstructured and unsupervised peer activities or passive, solitary, unfocused time spent watching television (Larson and Verma, 1999). Online video-gaming has blurred this distinction in recent years, and many adolescents who would have casually met up with peers in the past in an unstructured environment, now communicate on line with no face-to-face interactions. However, adolescents can also spend their leisure time in an organised way, mostly by participating in extracurricular activities before or after school.

129. There are five types of extracurricular activities: prosocial activities (volunteer and community service types of activities); performance activities (school band; drama and dance); team sports; school involvement (student government; school newspaper) or academic clubs (mathematics or chess clubs, science fair or tutoring in academic subjects) (Eccles et al., 2003).

130. Developmental scientists argue that a good use of adolescents' leisure time contributes to positive development. Organised and structured activities enable students to pursue a range of interests and develop constructive social, physical, and intellectual skills outside of academic curricula, which in turn help them transition into adulthood (Eccles et al., 2003; Mahoney, 2000). Participation in extracurricular activities and service learning activities is also positively associated with interpersonal competencies, self-concept, education aspirations, higher educational achievement, better jobs, more active participation in the political process and other types of volunteer activities, continuing sports activities and better mental health (Mahoney et al., 2005). These long-term positive effects are coupled with short-term benefits such as greater school engagement, lower drop-out rates, higher academic performance and supportive social networks (Mahoney and Cairns, 1997). Interestingly, engagement in different types of extracurricular activities may be associated with different outcomes for different student groups. For example, participation in some extracurricular activities (such as team sports) has been shown to be associated with increased likelihood of engaging in risky behaviour, such as alcohol use (Eccles et al., 2003).

131. As schools need financial, infrastructural, human and time resources in order to provide high quality extracurricular programs, there might be large differences between schools in terms of the availability of programs that match the interests of students, and the support families need to ensure

students can participate. Moreover, while socio-economically disadvantaged students rely on schools to offer extracurricular activities; their advantaged peers can participate in activities outside of school.

132. While extracurricular activities have mainly positive benefits for every student, they can provide more for students with learning disabilities and from lower socio/economic background, such as taking on leadership roles and demonstrate talents that may not be apparent in traditional classroom settings. As research also suggests, extracurricular activities may also allow students to make friends from different cultural and socio-economic backgrounds (Moody, 2001).

Instruments

133. PISA 2015 monitors all five types of extracurricular activities by asking school principals what types of activities are provided by the school. The education career questionnaire [6] in PISA 2015 also contains items that ask students to report on the number of hours they spend in various activities in addition to mandatory school classes. Compared with school principal reports on extracurricular activities, the student reports are limited in that academic activities could be interpreted as either remedial or extra classes to prepare students e.g. for an exam or a competition.

[6] The education career questionnaire (EC) was an optional questionnaire in PISA 2015 that was implemented by 22 countries and economies.

Figure 28: Instruments, extracurricular activities

SC053: <This academic year>, which of the following activities does your school offer to students in the <national modal grade for 15-year-olds>? *(Please, select one response in each row. Yes; No)*		
Question No.	*Instrument*	*Type of extracurricular activities*
SC053Q01TA	Band, orchestra or choir	Performance activities
SC053Q02TA	School play or school musical	Performance activities
SC053Q03TA	School yearbook, newspaper or magazine	School involvement
SC053Q04TA	Volunteering or service activities, e.g. <national examples>	Prosocial activities
SC053Q05NA	Science club	Academic activities
SC053Q06NA	Science competitions, e.g. <national examples>	Academic activities
SC053Q07TA	Chess club	Academic activities
SC053Q08TA	Club with a focus on computers/ Information and Communication Technology	Academic activities
SC053Q09TA	Art club or art activities	Performance activities
SC053Q10TA	Sporting team or sporting activities	Sport activities
SC053Q11TA	<country-specific item>	
EC001: In this school year, approximately how many hours per week do you attend additional instruction in the following domains in addition to mandatory school lessons? *(An hour here refers to 60 minutes, not to a class period.)* *(Please move the slider to the number of hours you attend, move it to "0" (zero) if you don't attend any additional instruction.)*		
Question No.	*Instrument*	*Type of extracurricular activities*
EC001Q01NA	<School science> or <broad science>	Academic activities
EC001Q02NA	Mathematics	Academic activities
EC001Q03NA	<Test language>	Academic activities
EC001Q04NA	<Foreign languages>	Academic activities
EC001Q05NA	Social sciences (e.g. history, sociology, politics)	Academic activities
EC001Q06NA	Music (e.g. musical instrument, choir, composition)	Performance activities
EC001Q07NA	Sports (e.g. in clubs, lessons, team)	Sport activities
EC001Q08NA	Performing arts (e.g. dancing, acting)	Performance activities
EC001Q09NA	Visual arts (e.g. photography, drawing, sculpting)	Performance activities
EC001Q10NA	Other	-

A ROADMAP FOR FUTURE DEVELOPMENTS OF WELL-BEING MEASURES

134. This paper presented a comprehensive framework to guide the analysis of students' well-being in the PISA 2015 study. The framework illustrated the five key dimensions of students' well-being examined in PISA and the instruments available in PISA 2015 to measure them.

135. The 2015 cycle of PISA provides the richest set of indicators of students' well-being to date. However, this framework also identified clear data gaps if PISA is to be used to more adequately measure students' well-being in future cycles.

136. The PISA 2015 questionnaire design is limited for two reasons. First, while indicators of *inputs and well-being outcomes* indicators are interrelated, there was no attempt to clearly articulate and identify *input* and *outcome indicators* for the five well-being dimensions, such that some dimensions focus only on well-being inputs others on outcomes, without an integrated measurement approach. In PISA, the emphasis shifts from inputs to outcomes depending on how the question is framed and how indicators are constructed. Future cycles of PISA could strengthen the policy relevance and analytical potential of any future well-being module by developing a conceptual map for the questionnaire, in order to identify specific inputs and outcomes of students' well-being.

137. A clear conceptual maps relating students' characteristics, input factors and well-being outcomes would help policy makers to identify what interventions promote better student academic and non-academic outcomes. In addition, this map would help to identify which strategies should take priority in future PISA cycles when developing new questionnaire instruments, and whether fewer domains should be covered in depth in order to examine relevant input factors and outcomes, or to monitor those aspects of well-being which are closely tied to students' academic development. The PISA background questionnaires are the result of delicate trade-offs to cover dimensions with strong theoretical underpinnings and responding to clear policy objectives in the context of stringent constraints on the use of questionnaire time.

138. Suggestions for improvements in the measurement of the five dimensions of well-being in PISA include:

- *Psychological dimension.* The paper by Ryff (1989) defines the psychological domain of well-being as optimal psychological functioning, which entails "combination of feeling good and functioning effectively" (Huppert, 2009, p. 137 cited in Winefield et al., 2012). Therefore, subjective indicators may be collected relating to these six areas: 1) self-acceptance; 2) the establishment of positive, quality relations; 3) the sense of autonomy; 4) the sense and competency to cope with complex environments; 5) the pursuit of meaningful goals and a sense of purpose in life; and 6) a sense of personal growth and development as a person (Ryff, 1989; Ryff and Keyes, 1995; Seifert, 2005). These indicators may be considered as input and output instruments, but also as influential drivers of other dimensions of students' well-being. More school level and classroom level indicators could be developed such as: whether students are encouraged by their peers and teachers in the classrooms, and how they perceive the school culture and the peer-group dynamics within the classroom and the school. While collecting data on the objective measures of psychological well-being raises sensitive issues, information on reported psychological problems is seen as an important driver r for other well-being dimensions of students.
- *Physical dimension*. Research suggests collecting indicators on height and weight as objective indicators, and on body image as a subjective indicator. Information on lifestyles including eating and sleeping habits, engagement in physical exercise and substance use could also be used as indicators of inputs and processes in a developmental perspective.

- *Social dimension.* More detailed information could be collected on the quality and the quantity of students' relationships through objective indicators such as how much time students spend with their peers and parents, and subjective indicators measuring the content and perceived quality of these relations. More information could also be collected on the context in which social relationships occur (for example, where students meet with peers and where social relationships are formed, if at school, club, sports centre etc…), and to describe social relationships as either positive or negative. For example, in 2015, PISA measured students' victimisation and experience of bullying. However, information on bullying could also be collected from the bully and the bystander. The nature of relationships may also be extended beyond peers, parents and teachers, to include other influential individuals in adolescents' lives such as brothers or sisters or romantic partners. In addition, some terminology, such as the term "friend" varies a lot across cultures: a more precise definition on friendship and acquaintances would increase the consistency of measures across cultures.
- *Cognitive dimension.* PISA has considerably expanded the range of cognitive skills examined to incorporate innovative domains such as problem solving, financial literacy and collaborative problem solving. PISA should continue to reflect on what skills help students thrive, aiming to equip students with strong foundations to succeed in their future. Investing in developing valid, robust and innovative assessment instruments will help PISA to adequately reflect such skills in the direct assessment component of the study.
- *Material dimensions*. Material conditions in PISA are primarily measured through the indicator of household possessions. New measures will have to be developed in the future to reflect the growing diversity of countries participating in PISA and changes in how adequately different possessions indicate socio-economic condition.

139. Finally, any extension to the well-being module in PISA in the future should look at how students time use and experiences well-being. Time use data provides extensive information on the cognitive, physical, psychological and social well-being of students. For example, it can link time spent working outside school hours to cognitive outcomes in core PISA assessments of reading, mathematics and science. Beyond time use information, however, the large sample size of PISA would make possible the implementation of the Day Reconstruction Method (Kahneman et. al., 2004) that links time use information to high quality measures of how respondents experience episodes of time. This would make possible the analysis of how mental states, such as boredom, engagement, sadness, or anxiety are associated with particular daily student activities and how those associations in turn influence core PISA cognitive outcomes.

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