8. PISA 2018 Well-being Framework

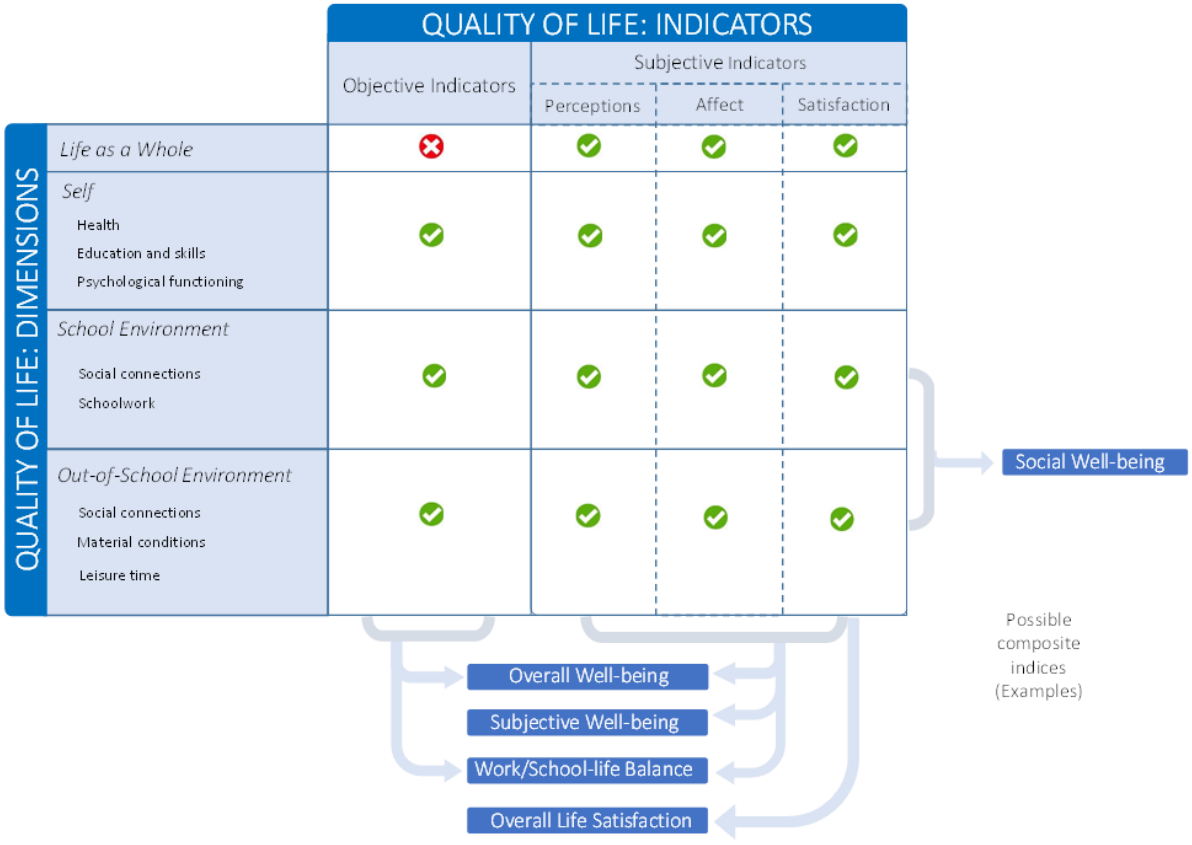
This section presents the theoretical framework for the way in which the 2018 cycle of the Programme for International Student Assessment (PISA) assesses student well-being. PISA was the first large-scale study to examine student well-being in its 2015 cycle. This framework discusses potential objective and subjective indicators of student well-being, grounding them in previous attempts from the literature. It also distinguishes between various dimensions of well-being, including life as a whole, self-related well-being, school-related well-being, and well-being out of school. Potential measurement issues are also presented. Potential composite indicators, combining responses to various questions into a single indicator, are suggested at the end.

Executive summary

Well-being, defined as the quality of people's lives and their standard of living, is of growing interest to policy makers and educators around the world. There seems to be a consensus that well-being is a multi-dimensional construct that comprises both objective, material components and subjective, psychological facets. While there is a growing body of research on the topic, only a few large-scale studies for adolescents have taken a comprehensive view on well-being. Besides PISA, no large-scale assessment directly links students' well-being to their educational achievement, and little has thus been established regarding the relationship between student learning and well-being.

By measuring well-being, PISA can create international benchmarks of student well-being across OECD and partner countries via a database of tremendous utility for educators, researchers, and policy makers. Research into well-being involves a variety of approaches used in public health, education, psychology, and economics. The framework outlined here aims to integrate different perspectives on well-being and to present a comprehensive model that covers different dimensions of well-being with a spectrum of indicators (both objective and subjective).

Figure 8.1. Framework overview



The proposed modular framework (Figure 8.1) distinguishes three main dimensions of well-being in addition to students' perceived quality of life as a whole:

- First, well-being in terms of how fit and healthy students are, the education and skills they have, and how they feel about themselves and their lives (*self*);
- Second, well-being in terms of the environment a student is exposed to at school (*school environment*); and
- Third, well-being in terms of the living environment and circumstances outside of school experienced by a student (*out-of-school environment*).

Several sub-dimensions under each of these broader dimensions can be directly mapped to the dimensions proposed in other frameworks.

Possible measurement approaches are presented and specific indicators are outlined for all framework components. Recommendations are informed by a review of the relevant literature as well as by the pragmatic considerations of space in the questionnaire, student burden, and available survey methods. Special consideration is given to issues of cross-cultural comparability and the age appropriateness of the proposed survey methods. In order to measure well-being in a brief and efficient manner, innovative survey methods drawing on the day reconstruction method are outlined, thereby further extending the approaches successfully implemented in PISA 2015.

The framework is modular in two ways (Figure 8.1). First, the framework can be broken down into modules by dimension (i.e., self, school environment, and out-of-school environment). Second, the framework can be broken down into modules by the type of indicator (i.e., objective well-being indicators and subjective perceptions, affect, and satisfaction). The different cells in the framework, which are themselves indicators, therefore also give rise to potential composite indicators that can be used as robust reporting elements in areas of key policy interest. These include, among others, indices of overall well-being, subjective well-being, social well-being and work/school-life balance.

Introduction

Well-being can be defined as the quality of people's lives and their standard of living. It is often quantified both via objective measures, such as household income, educational resources and health status, and via subjective indicators such as experienced affect (or emotions), perceptions of quality of life and life satisfaction (Casas, 2011[1]).

Economists have proposed several possible alternatives to using only gross domestic product (GDP) as an indicator of nations' well-being (Diener and Seligman, 2004[2]; Kahneman et al., 2004[3]; Stiglitz, Sen and Fitoussi, 2009[4]). For instance, Stiglitz et al. (2009, p. 58[4]) recommended that, "[s]tatistical offices should incorporate questions to capture people's life evaluations, hedonic experiences, and priorities in their own surveys". Several countries have started collecting data and reporting more comprehensive well-being metrics, including measures of subjective well-being (SWB) (Boarini, Kolev and Mcgregor, 2014[5]; Evans, Macrory and Randall, 2015[6]; Federal Interagency Forum on Child and Family Statistics, 2009[7]; The Foundation for Child Development (FCD), 2012[8]; UNICEF, 2007[9]; UNICEF, 2012[10]; Statham and Chase, 2010[11]; The Children's Society, 2015[12]). Numerous studies have identified important determinants for adult subjective well-being, often defined as how desirable people find their lives, following the definition proposed by Diener et al. (1999[13]). Among the most important determinants include health, employment-related factors (e.g. income and unemployment) and social contacts (Dolan, Peasgood and White, 2008[14]; Sacks, Stevenson and Wolfers, 2010[15]; Winkelmann and Winkelmann, 1998[16]; Helliwell, Layard and Sachs, 2015[17]). There is

empirical evidence that SWB and objective measures of health are related to important work-related outcomes, with healthy individuals being more productive and making less use of health care services (Keyes and Grzywacz, 2005[18]). Longitudinal studies have shown that mental health is an important predictor of subsequent work performance (Wright, Bonett and Sweeney, 1993[19]). Diener and Chan (2011[20]) reported that people who are happier tended to report a better health status and have a higher life expectancy than individuals who frequently experience anger, depression or anxiety. Findings pointing to the importance of well-being for general life outcomes and workplace success have also increased interest in well-being among the business community (Beal, Rueda-Sabater and Ling Heng, 2015[21]).

Policy makers now increasingly call for information on their citizens' and workforce's well-being in addition to indicators of their knowledge and skills. Large international health surveys, such as the World Health Survey, Health Behavior in School-aged Children, WHO-5 (Topp et al., 2015[22]) and KIDSCREEN (Ravens-Sieberer et al., 2014[23]), and adult household surveys, such as the Gallup World Poll (Boarini et al., 2012[24]) already include measures of well-being. However, most international well-being assessments have so far focused on adult populations. Indeed, the 2015 Good Childhood Report states that, "[p]eople's subjective well-being has become a topic of widespread – and growing – interest. However, discussion of children's subjective well-being has been notable by its absence" (The Children's Society, 2015, p. 9[12]). While more studies that specifically focus on adolescent and child well-being now exist (Ben-Arieh, 2008[25]; Cummins and Lau, 2005[26]; Lippman, Moore and McIntosh, 2011[27]; Pollard and Lee, 2003[28]; Huebner, 2001[29]; Bradshaw et al., 2011[30]; Gilman and Huebner, 2003[31]; Huebner and Dew, 1996[32]; Saha et al., 2010[33]), many of these studies focus on specific subgroups rather than on the general child and adolescent population (Casas, 2011[1]).

As the first international large-scale assessment of students' well-being, the 2015 *Programme for International Student Assessment* (PISA) included a few questions on students' subjective well-being to its student questionnaire (OECD, 2017[34]). For the first time, indicators of students' well-being have been directly related to students' achievement across a large number of education systems (OECD., 2017[35]). However, the set of questions included in PISA 2015, and therefore the conclusions that could be drawn from these questions, were limited in scope. That might be changed in PISA 2018. A separate well-being questionnaire encompassing questions covering the entire well-being construct could be a building block for international benchmarks on adolescent well-being. The OECD has already established guidelines for the measurement of adult well-being through its *Better Life Initiative* (OECD, 2015[36]), and it now has the chance to do the same for adolescents.

It is important to monitor adolescent well-being as today's adolescents are tomorrow's workforce: how they fare today is directly related to how their countries will fare in an increasingly globalised and competitive economy. Media reports about extremely long school hours and rising suicide rates in some high-performing countries, or findings that large proportions of students report disliking school and show diminished school engagement (McGill et al., 2012[37]) and report high levels of anxiety and stress regarding school (Natsuaki, Biehl and Ge, 2009[38]) raise questions about the trade-offs between different educational and societal objectives. As Helliwell, Layard and Sachs (2015, p. 11[17]) remarked in the 2015 World Happiness Report, "if schools do not measure the well-being of their children, but do measure their intellectual development, the latter will always take precedence".

Schleicher (2015[39]) described three ways in which well-being is of direct policy relevance to PISA. First, adolescent well-being is intrinsically important as it is a part of governments' efforts to ensure all of their citizens' and residents' well-being. Second, adolescent well-being is an important determinant of adult well-being. Finally, adolescent well-being is a substantial driver of educational outcomes in the school system. Educators and policy makers are in need of valid and reliable information on student well-being so that they can evaluate the efficacy of policy interventions targeting child well-being, such as bullying prevention programs.

An initial step in defining well-being measures for adolescents is determining how the construct differs between adolescents and adults, the group for which the majority of research has so far been conducted. Some of the key components of adult well-being, such as job satisfaction, earnings or work-life balance, are conceptually rooted in adult life and must be adapted for younger populations. Also, adolescent well-being must take into account adolescents' priorities, their opportunities to spend leisure time and time with friends, and their relationships with parents, teachers and adults in general (The Children's Society, 2015[12]). Peer relationships, in particular, become more important in adolescence (Hardy, Bukowski and Sippola, 2002[40]; Way and Greene, 2006[41]; McGill et al., 2012[37]; Wang and Eccles, 2012[42]; Way, Reddy and Rhodes, 2007[43]). Indeed, when a large sample of 14 and 15-year-olds were asked about what having a good life meant to them, five of the six concepts they most commonly discussed were "friends", "family", "bullying", "parents", and "school"[1] (The Children's Society, 2015[12]). All of these are related to their relationships, not to material conditions.

The framework proposed herein for measuring well-being in PISA is based on other such frameworks that have been proposed, for both children and adults, and it integrates aspects that have so far often been separately treated. It aims especially to accomplish the following:

1. To recognise that well-being is a multi-dimensional construct and that its measurement requires covering different domains, not just overall life satisfaction;
2. To distinguish between overall well-being and subjective well-being. More specifically, the framework distinguishes between objective and subjective indicators of student well-being;
3. To focus on adolescent well-being, therefore placing special emphasis on the life environment of school-aged children. Indicators specific to adolescent well-being are included in addition to those used for adults that also apply to adolescents;
4. To focus on *individual* well-being, as that can be measured by PISA through the main student questionnaire or a supplementary well-being questionnaire. Indicators that might be collected at the system level are briefly mentioned but not elaborated on in detail. Such system-level indicators of well-being include aspects of environmental quality, crime or employment statistics, which might be inferred from available other data sources based on a school's location;
5. To consider measurement challenges such as the age-appropriateness of items and item formats, cross-cultural comparability and respondent burden. The framework will also propose solutions to addressing such challenges, including multi-method assessment strategies involving self-reported biodata and behaviours, subjective self-reports, and elements of the *day reconstruction method* or *event reconstruction method* (Kahneman and Krueger, 2006[44]);

6. To lay out the foundations of a well-being assessment plan for PISA 2018 that specifies which components of the framework are already covered by previous PISA questionnaires, and which components would need to be added.

Well-being as a multi-dimensional construct

Adolescent well-being, defined as the quality of students' lives and their standard of living, is of growing interest to policy makers and educators around the world. There seems to be a consensus that well-being is a multi-dimensional construct that comprises both objective, material components and subjective, psychological facets. While there is a growing body of research on the topic, only a few large-scale studies for adolescents have taken a comprehensive view on well-being. Some studies have focussed mainly on material well-being and health outcomes (e.g., Health Behaviour in School-Aged Children [HBSC]) and other studies have focussed more on subjective well-being (e.g., Children's Worlds and the Gallup Student Poll). However, none of these studies have directly linked well-being to students' educational achievement.

Despite sometimes being used interchangeably, it is important to differentiate between well-being and subjective well-being. Well-being is a multifaceted construct that includes subjective well-being but also objective well-being. Subjective well-being can be defined as "people's evaluations of their lives—the degree to which their thoughtful appraisals and affective reactions indicate that their lives are desirable and proceeding well" (Diener, Oishi and Lucas, 2015[45]). It includes both an affective component – both positive and negative emotions – and a cognitive component – one's judgment of one's overall life satisfaction or satisfaction with specific domains of one's life. This framework presents a comprehensive model that defines different dimensions of well-being and a variety of both objective and subjective indicators available for each dimension.

Figure 8.1 presents a graphical depiction of the overall framework. In addition to overall well-being, three main dimensions of well-being have been identified: well-being in term of how fit and healthy students are and how they feel about themselves and their lives (*self*); well-being in the school environment a student is exposed to (*school environment*); and well-being in the student's living environment and circumstances outside of school (*out-of-school environment*). Under each of these broader dimensions, several sub-dimensions (e.g., social connections or health) can be directly mapped to the 11 dimensions of the quality of life proposed by the OECD Better Life Initiative (OECD, 2013[46]), as well as to dimensions of other key frameworks described in the literature (Table 8.1).

Table 8.1. Dimensions of well-being in other frameworks

Framework	Dimensions of well-being as defined in each framework
Lippman et al. (2011)	- Self (physical health, development and safety; cognitive development and education; psychological/emotional development; social development and behaviour) - Relationships on different levels (family, peers, school, community and macrosystem) - Contexts (family, peers, school, community and macrosystem).
Adamson (2007)	- Material well-being, health and safety, educational well-being, interpersonal relationships, behaviour and risks, and subjective well-being
Land, Lamb and Mustillo (2001)	- Material well-being (poverty, employment and income) - Health (mortality rate and personal health) - Social relationships - Safety/behavioural concerns (e.g., smoking) - Educational attainment - One's place in the community (including enrolment and engagement) - Emotional well-being
Bradshaw, Hoelscher and Richardson (2007)	- Material situation (poverty, deprivation and parental joblessness) - Housing (overcrowding, quality of the local environment, housing problems) - Health (health at birth, immunization, health behaviour) - Subjective well-being (self-defined health, personal well-being and well-being at school) - Education (educational attainment, educational participation, youth labour market outcomes from education) - Relationships (family structure, relationships with parents, relationships with peers) - Civic participation (participation in civic activities, political interest) - Risk and safety (child mortality, risky behaviour, experiences of violence)
Moore et al. (2008)	- Child health and safety - Educational achievement and cognitive development - Social and emotional development - Family processes - Family demographics Also distinguishes between: • Child well-being (physical health, psychological health, social health and educational/intellectual development) • Contextual well-being (family, community and socio-demographic factors)

Unlike most of the frameworks in the literature, this framework intersects subjective well-being with all other dimensions of well-being rather than setting it apart as a separate independent dimension. Moreover, as Casas et al. (2012[47]) pointed out, assessing quality of life involves measuring both the material and non-material characteristics of life in large populations, and subjective measures should be utilized to add to objective measures rather than replace them. Indeed, early literature on well-being already investigated its subjective components: a paper from over four decades ago defined non-material quality of life as peoples' "perceptions, evaluations, and aspirations concerning their own lives and life conditions" (Campbell, Converse and Rodgers, 1976[48]).

The framework is modular in two ways. First, the framework can be broken down by dimension (i.e., life as a whole, self, school environment, and out-of-school environment). Second, the framework can be broken down into modules by the type of indicator (i.e., objective well-being indicators, subjective perceptions, affect, and satisfaction). The different cells in the framework therefore give rise to potential composite indicators that can be used as robust reporting elements in areas of key policy interest. In addition to the proposed composite indicators of overall well-being and subjective well-being, composite indicators of emotional well-being, social well-being, life satisfaction and work/life balance (school/life balance) are suggested for further consideration. A school/life balance index could, for instance, serve as a benchmark for how well students in different countries are

able to integrate curricular demands and school life with time for personal activities, leisure and maintenance of a healthy lifestyle. These broader composite indices directly address the policy need for a smaller set of robust reporting elements following the model of PISA's index of economic, social, and cultural status (ESCS). Several authors have emphasised the value of creating composite well-being indices, particularly to facilitate the measurement of trends and the comparison of trends across sub-groups or regions (Ben-Arieh, 2008[25]; Fernandes, Mendes and Teixeira, 2012[49]; Land et al., 2007[50]).

Before describing each of the components of the framework in detail, the next section discusses important measurement challenges and methodological considerations.

Addressing measurement challenges

There are several challenges in measuring psychological, subjective, or non-cognitive constructs in PISA: robust measurement approaches are required yet student burden must remain low; questionnaire and survey items cannot be perceived as being too intrusive; and cross-national and cross-cultural comparability of the recorded responses must be maintained. This section presents five recommendations that directly address these measurement challenges and that provide a basis for the selection of the proposed measures.

Balance single-item measures with multi-item indices

Previous studies that measure well-being have often relied on single-item indicators or on a set of very few questions. While this approach is easy to administer, it is conceptually unsatisfactory and potentially invalid and unreliable for several reasons:

- There is no consensus in the literature as to the best single question for measuring well-being, and research evidence on the equivalence of approaches is insufficient;
- A single question or a small set of single-item indicators will overemphasise certain aspects of well-being while underrepresenting others and thereby fail to capture the construct in its entirety;
- Some well-being questions are likely to be more sensitive to cross-cultural norms and response styles than others. Creating a valid international well-being indicator requires sampling a larger number of questions and field-testing them in order to select the most appropriate questions for operational use; and
- Reporting elements based on one or a very few number of questions are less reliable when used as well-being indicators in cross-country comparisons.

Hence, in order to robustly measure well-being across nations and economies, it is crucial to rely on multiple indicators and a multi-item measurement approach for the construct at hand. These recommendations are consistent with Casas et al. (2012, p. 26[47]), who state that future research for cross-country comparability should collect data using more than one scale in a given area and that "we need much more data and from more countries to analyze in any real depth the qualities and possible weaknesses of each scale for the international comparison of adolescent populations."

At the same time, some components of the overall well-being construct require fewer questions than others to ensure valid and reliable measurement. In particular, some objective indicators might be captured directly as observable variables. However, not all variables of interest can be directly measured, therefore requiring the use of one or several proxies for a variable of interest. Creating multi-item indicators would be consistent with

current practice in PISA and other large-scale testing programs. For example, TIMSS and PIRLS currently use a multi-item index approach and NAEP has recently moved to an index approach for more robust reporting (Bertling, 2014[51]).

Use a meaningful number of scale points and clearly differentiated scale labels

Most established well-being instruments have been developed and validated for adult populations and must be adapted to PISA's 15-year-old student population. These instruments tend to use response formats with substantially more response scale points (such as a 0-10 or a 1-10 scale where only the scale endpoints are labelled with a description) than current PISA practice (generally four to five scale points; see below). However, the observed frequency distributions for such instruments with ten or more scale points are highly skewed with large proportions of responses far above the scale mid-point. Given the very sparse frequencies on the lower end of the response scale, it is uncertain whether all scale points are conceptually meaningful and practically useful. Indeed, it may be that scales with fewer scale points might be equally or even more valid. This problem appears to be even more severe for younger respondents than for adults. For example, data from the 2015 Children's Worlds Survey show that across 15 countries, more than 80% of all student responses fell into categories 9 and 10 on a zero to 10 scale (Rees and Main, 2015[52]). Researchers have recommended using scales with fully-labelled response options whenever possible (Dillman, Smyth and Christian, 2014[53]; Gehlbach, 2015[54]; Krosnick and Fabrigar, 1997[55]). Furthermore, reducing the number of scale points below 11 could potentially improve the validity of PISA questionnaire and survey items.

However, the dominant question format in the PISA student questionnaires might be subject to the opposite problem: too few scale points. Most PISA items currently use a four-point Likert-type response format with the verbal anchors "strongly disagree", "disagree", "agree" and "strongly disagree". Several researchers have criticised both the low number of scale points and the nature of the written descriptions of the degree of agreement (Gehlbach, 2015[54]).

It is therefore essential to find the right balance between fewer versus more scale points and fully-labelled versus unlabelled response scales. The need to translate the survey into a large number of languages poses a further challenge to extending response scales beyond four scale points. If feasible, alternative versions of questionnaire items (such as fully labelled versus incompletely labelled response options) should be tested and compared in future PISA field trials.

Select measures that maximise cross-cultural comparability

Another challenge is developing well-being questions that allow for the comparison of the resulting data across cultural and national borders and across subgroups within a country – a challenge that has been well documented for PISA and other international surveys (Kyllonen and Bertling, 2014[56]). Classical measurement approaches based on self-reports often suffer from limited inter-individual comparability due to individual- or group-specific response styles. There is ample evidence that responses to even seemingly objective questions can often not be interpreted as objective indicators and display only limited comparability across countries, before accounting for differences in response style (Kim, Schimmack and Oishi, 2012[57]). For example, anchoring vignettes, or brief descriptions or anecdotes that define various points on a scale, have been successfully applied to increase consistency across respondents (Angelini et al., 2014[58]; Kristensen and Johansson, 2008[59]; Kyllonen P. C. and Bertling J. P., 2014[60]; Salomon, Tandon and Murray, 2004[61];

van Soest et al., 2011[62]). However, alternative survey methods to increase cross-country and inter-individual comparability (which also include situational judgment tests and forced choice) might be less valuable for well-being as many components of this construct explicitly involve a subjective component that, by definition, is influenced by cultural norms and the respondent's personality. (White, 2007[63]) identified 'culture' as a key influence on the way one's perception of well-being is constructed and therefore suggested that well-being should be understood as a process grounded in a specific time and place. Thus, although the well-being construct proposed herein will capture culture-specific aspects of student responses, PISA can maximize cross-cultural comparability by choosing clear, translatable, and where possible quantifiable response formats and, particularly when using anchoring vignettes, by including short definitions as part of the item stem whenever a question involves certain reference points that might limit cross-cultural comparability.

Consider item formats beyond traditional self-reports

Measuring well-being more comprehensively requires a survey approach that goes beyond the self-report questionnaires traditionally used in large-scale assessments. One such protocol is the day reconstruction method and event reconstruction method, which assesses how students spend their time (especially time outside of school) and which samples their experienced well-being during various activities. The proposed questions build upon a time use module proposed for PISA 2015 (Bertling and Kyllonen, 2012[64]), which was partly implemented in the 2015 main survey, as well as on methods and question formats recommended by the authors of the original day reconstruction and event reconstruction methods (Grube et al., 2008[65]; Kahneman et al., 2004[3]; Schwarz, Kahneman and Xu, 2009[66]).

Consider alternative questionnaire designs to reduce respondent burden

The large sample sizes in large-scale assessments make viable the use of matrix sampling approaches to reduce respondent burden within the constraints of overall testing time while maintaining content coverage across relevant areas. These approaches provide different respondents with different sets of items. This is already standard practice for subject-area tests in large-scale educational assessments (Comber and Keeves, 1973[67]; OECD, 2016[68]) and has more recently been proposed as a potentially viable alternative to fixed questionnaires, where all students receive the same items. A three-form matrix sampling design was applied to the student questionnaire in PISA 2012, allowing the questionnaire content to increase by 33 percent (Klieme and Kuger, 2014[69]). Similarly, a design with ten partly overlapping questionnaire booklets was implemented in the 2013 pilot of the 2015 NAEP Technology and Engineering Learning (TEL) assessment (Almonte et al., 2014[70]). NAEP now routinely uses matrix sample questionnaire designs for their large-scale pilots. New research related to PISA 2021 further compared the feasibility of different possible matrix sampling approaches for operational administration (Bertling and Weeks, 2018[71]). New analytical approaches will be required to analyse the incomplete data from these approaches.

Unfortunately, research findings to date are inconclusive regarding the risks and benefits of questionnaire matrix sampling in practical scenarios: while many researchers reported substantial increases in content coverage with a very small to negligible impact on the overall measurement model (Adams, Lietz and Berezner, 2013[72]; Almonte et al., 2014[70]; Kaplan and Wu, 2014[73]; Monseur and Bertling, 2014[74]), others have raised methodological concerns about possible biases (von Davier, 2014[75]). Application of mass imputation for all questions that were not administered to a given student might address

these issues by creating full datasets (albeit with large proportions of imputed data). This approach has been explored in research contexts (Kaplan and Wu, 2014[73]) but has so far not yet been implemented in any large-scale assessment. As argued in Bertling, Borgovoni and Almonte (2016[76]), it would be beneficial to explore a matrix sampling design for survey questionnaires, and in particular, the well-being questionnaire. This could allow for the exploration of a larger number of facets of the well-being construct (e.g., a larger set of affective states in the experienced well-being questionnaire) without increasing individual student burden.

Suggested quality of life indicators

Quality of Life as a Whole

Well-being with regard to life as a whole, or overall life satisfaction, is often used as a single indicator for individual subjective well-being. Despite the importance of including overall life satisfaction as an important yardstick in any well-being instrument, it does not sufficiently capture the more specific dimensions of one's quality of life (e.g., the quality of relationships). Unfortunately, no direct objective indicators for well-being with regard to life as a whole are available; all of the indicators below are subjective.

Life Evaluation and Life Satisfaction

Life satisfaction, an evaluation of an individual's quality of life, is an important aspect of well-being (Diener et al., 1999[13]). Classical approaches of assessing subjective well-being rely mostly on unanchored self-report ratings: respondents are asked something similar to "Overall, how satisfied are you with life as a whole these days?" and must answer on a scale from 0 to 10 with zero indicating "not at all satisfied" and 10 indicating "completely satisfied". The questionnaire can also ask respondents to evaluate their satisfaction with specific domains of their lives (e.g., health, personal relationships and security) (Figure 8.1). Scores in these domains can then be treated as stand-alone scores or aggregated into an overall index representing overall satisfaction across all domains.

Two alternative approaches, sometimes considered to be equivalent or interchangeable, are widely used in the well-being literature. One approach is the Cantril ladder (Cantril, 1965[77]), used in major international surveys such as the Gallup World Poll and the Gallup Student Poll. By asking respondents to indicate where, on a ladder with steps from 1 ("the worst possible life") to 10 ("the best possible life"), they see themselves at the current point in time, the question targets the *evaluative* aspect of well-being, or how individuals perceive or evaluate their life. The alternative approach focusses on *satisfaction* instead of evaluation by asking a question similar to "How satisfied are you with your life overall these days?". This is one of the core well-being questions recommended by the OECD guidelines on measuring subjective well-being (OECD, 2013[46]).

Empirical findings are somewhat inconclusive about the comparative validity of the two distinct yet related approaches, particularly for adolescents (Casas et al., 2012[47]). Indeed, there are so far no large-scale studies that systematically compare the nuanced differences between the life evaluation and life satisfaction approaches. However, several large studies have observed that the life evaluation approach tends to create data that varies more within samples and produces average scores closer to the midpoint on the scale. On the other hand, the direct life satisfaction approach elicits skewed score distributions with a mean noticeably above the midpoint of the scale. The PISA 2015 field trial, which tested both questions in all participating countries, confirmed these findings. No clear advantages of

the life evaluation approach over the life satisfaction approach were found, apart from slightly better differentiation across the scale. Moreover, the two questions correlate strongly.

In the end, the OECD has recommended using the 11-point life satisfaction scale as part of the core well-being module in its guidelines on measuring well-being (OECD, 2013[46]) for several reasons. First, the question is shorter and therefore requires less time to answer. Second, the question is easier to understand because of its lower cognitive burden and reduced reading load. Lastly, the life satisfaction question is less intrusive then the life evaluation question because it does not explicitly introduce the concept of social rank or potentially imply comparison with other individuals, which might elicit negative emotions in some respondents. The 11-point satisfaction question was introduced for the first time in the 2015 PISA student questionnaire. It is therefore recommended that the 0-10 life satisfaction question be included as a core question in the PISA 2018 well-being questionnaire. If space allows, posing the life evaluation question could further increase the robustness of the measure.

While several multi-item scales for overall subjective well-being have been proposed (Adelman, Taylor and Nelson, 1989[78]; Huebner, 2001[29]; Rees and Main, 2015[52]), their incremental value over the single-item indicators described above is unclear. Given space and cognitive burden constraints, it is therefore recommended that no multi-item scale on students' overall life evaluation or satisfaction be included in the well-being questionnaire. Rather, aggregating satisfaction ratings across multiple domains into a potential composite life satisfaction index would maintain an acceptable questionnaire length while covering all of the important facets of the well-being construct. Indeed, well-being research has also moved from studying overall subjective well-being to domain-specific subjective well-being (Elmore and Huebner, 2010[79]; Gilman and Huebner, 2000[80]; Long et al., 2012[81]; Tian, Wang and Huebner, 2015[82]). Empirical findings show that adolescents' domain-based reports on aspects of well-being and satisfaction (such as family and school) show greater validity than global life satisfaction reports (Haranin, Huebner and Suldo, 2007[83]).

Affect/Emotional Well-being

Several subjective indicators for emotional well-being are proposed, drawing on (a) both positive and negative affect as indicators of emotional well-being and (b) experienced well-being questions with regard either to very specific activities or to emotional states experienced over extended periods of time.

One way to measure affect is to ask individuals whether or to what degree they have felt specific emotions during a certain period, through questions such as "Overall, how happy did you feel yesterday?" or "Overall, how angry did you feel yesterday?". This corresponds to Watson's positive and negative affect schedule (PANAS) (Watson, Clark and Tellegen, 1988[84]), which has been used extensively in psychological research. Hedonic balance, defined as the difference between positive and negative affect, has been proposed as a measure of overall emotional well-being (Watson, Clark and Tellegen, 1988[84]; Schimmack, Diener and Oishi, 2002[85]); however, there is no agreement as to the specific emotions that need to be sampled. Laurent et al. (1999[86]) presented a version of the Positive and Negative Affect Scale for children (PANAS-C). However, there is not yet sufficient research that shows that a PANAS-type measure works well in an international comparison of students.

Instead, the KIDSCREEN-10 measure could be adapted for use in PISA (Ravens-Sieberer et al., 2014[23]). KIDSCREEN conceptualises quality of life as a multidimensional construct

with physical, emotional, mental, social and behavioural components. The short ten-item measure is Rasch-scalable (Ravens-Sieberer et al., 2010[87]) and has been used by the HBSC survey since 2005 (Currie et al., 2009[88]). If space in the questionnaire allows, the WHO-5, a short 5-item affective well-being measure widely used and well-established in clinical research, might be an additional benchmark to link PISA with other surveys (see (Topp et al., 2015[22]) for a recent literature review). In direct comparison, however, the KIDSCREEN-10 should be given priority given its prior international use with students and its less clinical and diagnostic focus.

The cardinal method for measuring experienced well-being with regard to specific events or behaviours is the day reconstruction method, or the DRM (Kahneman et al., 2004[3]). In this method, respondents are asked to revisit a previous day and report in detail on their activities as well as the emotional states they experienced. The original DRM is not viable for inclusion in PISA given its time and scoring requirements. However, a PISA well-being questionnaire can ask students to report on the emotional states experienced during events of interest to PISA, such as specific classes, time spent doing homework, leisure activities with friends or time spent with parents or guardians. (This is similar to the event reconstruction method (Grube et al., 2008[65]), which itself is based on the day reconstruction method.) Affective states can then be related to specific before-school, at-school, and after-school activities. New questions might also be developed through the psychological concept of flourishing (Seligman, 2012[89]), or engagement and flow-related emotional states, because they relate more directly to academic achievement; indeed, such emotional states include the feelings of being challenged or inspired.

The specific proposed event reconstruction questions targeted at measuring experienced well-being are referenced in the following sections based on their classification under one of the well-being dimensions (self, school environment or out-of-school environment).

Self-Related Well-Being

The first broad domain of quality of life as a whole is quality of life in regards to the student as an individual, with the three sub-dimensions of health, education and skills, and psychological functioning.

Health

To capture the overall health construct, data should be collected on a set of key objective and subjective indicators,[2] some of which have already been introduced in the PISA 2015 student questionnaires or been field trialled (Bertling and Kyllonen, 2012[64]).

Objective Indicators

Quetelet's index, defined as Weight/Height^2 and better known as the *body mass index* BMI (Garrow J. S. and Webster J., 1985[90]), is a key health indicator and is widely used in international studies in both adult and youth populations. The BMI is an indicator of being either overweight or obese, growing health problems among adolescents in many countries (Lobstein, Baur and Uauy, 2004[91]; Haug et al., 2009[92]; Rokholm, Baker and Sørensen, 2010[93]; WHO, 2010[94]). Previous research has shown that being overweight is correlated with behaviours associated with health risks (such as skipping breakfast, being less physically active or watching more television), a lower overall quality of life (Haug et al., 2009[92]; Must and Tybor, 2005[95]; Williams et al., 2005[96]) and being a victim of bullying (Janssen et al., 2004[97]). Research among adolescents further suggests that dieting and unhealthy weight control behaviours are related to significant weight gain over time

(Neumark-Sztainer et al., 2012[98]). The BMI may be used as a screening tool to identify potential weight problems in individuals and to track the degree to which populations are overweight or obese. However, it should not be used as a single diagnostic tool for body fat or overall student health (Nihiser et al., 2007[99]), and interpretations of the BMI need to account for potential differences across racial or ethnic groups (James, Chen and Inoue, 2002[100]) or genders (Dupuy et al., 2011[101]). To better account for potential inaccuracies in student-provided weight and height information, the two qualifying questions "When did you last weigh yourself?" and "When did you last measure your height?" can be added. Both of these questions are currently used in the HBSC survey.

Participation in physical exercise does not only contribute positively to student health but also protects against excessive body image concerns (Gaspar et al., 2011[102]) and long-term negative physical and mental health outcomes, particularly as habits established in adolescence are likely to be carried through into adulthood (Malina, 1991[103]; Hallal et al., 2006[104]; Iannotti et al., 2009[105]; McMurray et al., 2008[106]; Sibley and Etnier, 2003[107]). Children who play sports or exercise more frequently report higher levels of subjective well-being (Abdallah et al., 2014[108]). Moreover, research indicate that physical activity may also improve cognitive performance (Martínez-Gómez et al., 2011[109]; Sibley and Etnier, 2003[107]). The World Health Organization recommends that children participate in at least 60 minutes of moderate-to-vigorous physical activity daily (Strong et al., 2005[110]). A small set of questions about students' physical exercise habits were introduced in PISA 2015, covering both moderate and vigorous exercise, participation in physical education classes, and the physical exercise performed the previous day. These questions are also valuable to the PISA well-being questionnaire. In addition, information regarding a student's typical duration of sleep and his or her behaviours associated with health risks might be collected via a brief day reconstruction checklist.

Subjective Indicators

Subjective indicators provide important information about the overall health construct beyond the objective indicators discussed above. PISA should measure such subjective indicators through instruments that have been validated in other contexts, if possible. These subjective indicators include one's perception of and satisfaction with one's body image (Rudd and Lennon, 2000[111]), satisfaction with one's sleep, perceived overall health, psychosomatic complaints and satisfaction with one's overall health.

Research indicates that girls report greater dissatisfaction with their body image than boys (Marcotte et al., 2002[112]) and being overweight increases the likelihood that adolescents engage in unhealthy weight-reduction activities and report substance abuse, risky sexual behaviour and poor mental health (Kaufman and Augustson, 2008[113]; Kvalem et al., 2011[114]; Verplanken and Velsvik, 2008[115]; Ojala et al., 2007[116]; Currie et al., 2012[117]).

The HBSC includes a short checklist of symptoms that can be used as a non-clinical measure of mental health. This checklist includes both psychological complaints (e.g., nervousness or irritability) and somatic complaints (e.g., headaches or backaches), both of which are strongly related to each other (Petersen et al., 1997[118]; Brosschot, 2002[119]) and to important facets of the overall well-being construct (Petersen et al., 1997[118]; Vingilis, Wade and Seeley, 2002[120]; Hetland, Torsheim and Aarø, 2002[121]; Ravens-Sieberer et al., 2008[122]).

Education and Skills

A student's education and skills, his or her self-perceptions of his or her ability to perform specific academic tasks, and his or her general confidence in his or her own capabilities are important aspects of the overall well-being construct.

Objective Indicators

Objective indicators for students' knowledge and skills come from the cognitive assessments in PISA and not further elaborated upon here.

Subjective Indicators

Questions about students' beliefs in their own competency or their academic self-efficacy (Bandura, 1997[123]) directly address competence, one of the three main basic psychological needs identified in self-determination theory (Ryan and Deci, 2000[124]). Research has shown that adolescents' perceptions of their school performance and their own competency are correlated with higher perceived health and well-being (Suldo, Riley and Shaffer, 2006[125]; Ravens-Sieberer, Kökönyei and Thomas, 2004[126]), higher life satisfaction (Suldo and Huebner, 2006[127]), and lower rates of bullying (Nansel et al., 2001[128]). Qualitative studies further point to positive attitudes (Edwards and Lopez, 2006[129]), personal strengths (Shikako-Thomas et al., 2009[130]), and a positive self-image (Helseth and Misvær, 2010[131]) as important determinants of student well-being. The PISA academic self-efficacy questions included in the student questionnaire might provide data on students' perceptions of their competency. Questions about students' satisfaction with their own knowledge and skills and their self-confidence are proposed as part of a question set focusing on this domain.

Psychological Functioning

Psychological functioning, also referred to as "eudaimonic well-being" or "flourishing", has been proposed as an additional component of the subjective self-related well-being construct (Seligman, 2012[89]). Psychological functioning is concerned with people's sense of meaning, purpose and engagement. It is related to "flow", defined as a gratifying experiential state that can "make life worth living" (Csikszentmihalyi, 1975[132]; Csikszentmihalyi and Csikszentmihalyi, 2006[133]), and is concerned with personal growth, self-expression and the pursuit of meaningful goals (Ryan and Deci, 2001[134]).

Some researchers consider psychological functioning to be part of the overall subjective well-being construct (Seligman, 2012[89]; Kern et al., 2015[135]), while others do not (The Children's Society, 2015[12]). Furthermore, while there is large consensus on two of the key building blocks of the subjective well-being construct (life satisfaction and affect), there is less consensus on the nature and role of psychological well-being. This might be partly due to the overlap of the psychological well-being construct with other aspects of well-being: for instance, questions targeting psychological well-being (e.g., "I like being the way I am") are very similar to questions measuring overall subjective well-being (e.g., "My life is just right") (Huebner, 1991[136]). Indeed, some authors have conceptualised psychological functioning as a higher-level construct that includes both positive and negative affect.

Four main facets of psychological functioning described in the literature are competence, autonomy, meaning/purpose and optimism (OECD, 2013[46]). This framework includes psychological functioning as part of the self-related dimension of well-being and not as a measure of overall (life as a whole) well-being, as psychological functioning focuses

explicitly on the self and does not encompass environmental factors; the variables described as potential indicators of overall well-being did not have that level of specificity. Large-scale data gathered through PISA might provide empirical evidence as to whether psychological functioning variables relate more strongly to overall or to self-related well-being.

Several questionnaires for the assessment of psychological functioning have been proposed, similar to those that assess concepts such as personality, self-concept, locus of control and attribution (Huppert et al., 2009[137]; Kern et al., 2015[135]). Respondents are asked questions such as "I am always optimistic about my future" or "I am free to decide for myself how to live my life". Ryff (1995[138]) proposed six dimensions of psychological functioning: self-acceptance, positive relations with others, personal growth, purpose in life, environmental mastery (the ability to control the environment around oneself or to create a context suitable to one's needs) and autonomy. These dimensions overlap considerably with various components of the proposed well-being framework as well as with many of the currently-used attitudinal and self-related questions in the PISA student questionnaire. For instance, the PISA 2012 and PISA 2015 questions on perseverance and openness to problem solving overlap with the psychological well-being dimensions of personal growth and autonomy. Openness to new experiences is a particularly good predictor of psychological functioning among adolescents (Bassi et al., 2014[139]).

Psychological functioning is an important additional facet of well-being. However, it could be measured via a potential composite index instead of through a separate unidimensional psychological well-being scale based on a unique set of questions. This index could be created from questionnaire items that capture various subjective perceptions, such as perceptions of competence, knowledge and skills; autonomy, personal freedom and opportunities; meaning and purpose; and relationships.

School-Related Well-Being

Students spend a large proportion of their time at school. Their experiences and relationships at school have an important impact on their perceived quality of life; indeed, schools not only nurture academic achievement but also promote students' health and well-being (Jourdan et al., 2008[140]). A positive school climate is associated not only with higher academic achievement but also with better self-reported student health, well-being and health behaviours (Cohen et al., 2009[141]; Jia et al., 2009[142]), lower perceived stress (Torsheim and Wold, 2001[143]) and more positive student reactions to demands at school (such as better stress management) (Huebner et al., 2004[144]). Although researchers have called for specialised measures of subjective well-being in school to account for potential differences between well-being at school and overall well-being (Huebner et al., 2005[145]), only a few studies have so far explicitly focused on examining students' subjective well-being at school (Huebner, 2001[29]; Epstein and McPartland, 1976[146]; Karatzias, Power and Swanson, 2001[147]; Tian, Wang and Huebner, 2015[82]).

Two main sub-dimensions are proposed for school well-being: social connections and schoolwork. A few additional potential indicators are also outlined. Most proposed indicators are subjective as they concern student perceptions of their school life and their school environment rather than objective circumstances. The questionnaire should especially focus on students' social connections and workload instead of on school infrastructure and security as other indicators might be available for this area (e.g., school records).

Social Connections at School

Social connections are students' social relationships with teachers and with other students and, more generally, general patterns of student interactions and the school climate. These factors might foster a sense of belonging to school – the feeling of being accepted, respected, included and socially supported in the school environment (Goodenow, 1993[148]) – or a sense of discrimination and loneliness. PISA has included a sense of belonging at school scale in its main student questionnaire for several assessment cycles. The sense of belonging at school correlates with measures of life satisfaction as well as experienced emotional well-being (Gilman and Anderman, 2006[149]; Millings et al., 2012[150]). Moreover, prior research has also found that student-teacher relationships and classmate support are important predictors of student adjustment and adolescent life satisfaction (Reddy, Rhodes and Mulhall, 2003[151]; Suldo et al., 2009[152]).

Findings from the HBSC show that students who perceive their school as supportive more frequently report positive health behaviours and health and well-being outcomes (Ravens-Sieberer, Kökönyei and Thomas, 2004[126]; Due et al., 2003[153]; Freeman et al., 2009[154]; Vieno et al., 2007[155]). Students who indicate that they like school are less likely to be victims of bullying (Harel-Fisch et al., 2011[156]), take fewer sexual risks (Dias, Matos and Gonçalves, 2005[157]) and less frequently report drug use (Fletcher, Bonell and Hargreaves, 2008[158]). In contrast, disliking school is related to an increased risk of dropping out (Archambault et al., 2009[159]) and a higher prevalence of health problems (Shochet et al., 2006[160]).

Bullying, defined as negative physical or verbal actions that have hostile intent, cause distress to victims, are repeated and involve a power differential between perpetrators and victims (Craig, Pepler and Atlas, 2000[161]; Mahady Wilton, Craig and Pepler, 2000[162]; Olweus, 1991[163]), has received increasing policy attention in recent years (Farrington et al., 2011[164]). Victims of physical or mental bullying, for example, are more likely to exhibit poor school performance or to drop out of the education system (Moore et al., 2008[165]; Currie et al., 2012[117]; Olweus, 1991[163]; Glew et al., 2008[166]; Olweus, 1994[167]) to experience depression, anxiety, loneliness and a range of psychosomatic symptoms (Olweus, 1991[163]; Craig, 1998[168]; Nansel et al., 2001[128]; Due et al., 2005[169]); and to abuse drugs and alcohol (Molcho, Harel and Dina, 2004[170]). Adolescents who have recently been bullied tend to report levels of subjective well-being substantially below the population average and research suggests that the effects of bullying on well-being are far stronger than the effects of other many contextual factors (The Children's Society, 2015[12]).

School-based bullying prevention programmes are very often successful (Currie et al., 2012[117]). Results from major well-being and health studies further suggest that reducing and preventing bullying could be strongly linked to improving students' well-being not only in adolescence but also in adulthood (Bond et al., 2001[171]; Clapper et al., 1995[172]; Ttofi et al., 2011[173]).

The HBSC also recommends that cyberbullying, or bullying involving modern digital communication technologies, be investigated (Ahlfors, 2010[174]). Furthermore, the perspective of the bullied can be supplemented by the perspectives of perpetrators and bystanders; questions to these groups could also be included in a well-being module (Rigby and Slee, 1991[175]; Veenstra et al., 2005[176]). Indeed, perpetrator behaviours are also associated with a range of negative health, social and academic behaviours (Glew et al., 2008[166]; Nansel et al., 2001[128]; Harel, 1999[177]; Olweus, 2011[178]; Farrington et al., 2011[164]).

Objective Indicators

Questions in the PISA survey on students' experiences with bullying, introduced in the 2015 cycle, are objective indicators of negative or dysfunctional social relationships and the lack of social integration. These questions are objective because students are asked to state in which of the listed specific, clearly described and quantifiable behaviours they have engaged. Other instruments that measure bullying have been described in the literature (Olweus, 1996[179]) and used in large-scale surveys (e.g. the HBSC).

Subjective Indicators

PISA student questionnaire items on student-student and student-teacher relationships, sense of discrimination and sense of belonging are key subjective indicators of students' connections at school. Students' sense of belonging and social connectedness at school are positively correlated to relatedness, one of the three main basic psychological needs in self-determination theory (Ryan and Deci, 2000[124]). Perceived discrimination, on the other hand, can have detrimental effects on student well-being (Schmitt et al., 2014[180]).

Schoolwork

Research among adults shows that well-being and health suffer when individuals are subjected to extreme working conditions. There are not yet any comprehensive findings for adolescents, but it is expected that extreme hours of school might have negative consequences (Karasek and Theorell, 1992[181]). Feeling pressured or stressed by schoolwork may lead to more frequent health-compromising behaviours such as smoking, drinking alcohol and drunkenness; more frequent health complaints such as headache, abdominal pain and backache; psychological problems such as feeling sad, tense or nervous (Torsheim and Wold, 2001[143]; Simetin et al., 2011[182]); and lower overall life satisfaction (Ravens-Sieberer, Kökönyei and Thomas, 2004[126]). However, students may prefer different subjects and activities, making it imperative to consider an entire day or week instead of simply one moment in time when examining well-being related to schoolwork. Students' workload and time spent at school is one part of the proposed school/life-balance composite index.

Objective Indicators

Objective indicators of student well-being related to schoolwork include the time spent on school-related activities: hours spent at school, spent on the way to and from school, and spent on homework and studying for school. The main student questionnaire already asks about some of these variables; additional questions can be asked to fill the remaining gaps.

Subjective Indicators

The subjective indicator of student well-being related to schoolwork proposed by this framework is students' self-reported emotions experienced during selected episodes associated with schoolwork.[3] For instance, students who report negative emotions in school more frequently are more likely to withdraw from school, to show antisocial behaviour, and to abuse drugs (Roeser, 2001[183]). Affective states that are especially relevant to the school environment should be prioritised. In particular, students can be asked about their emotions during mathematics, language of instruction and art/creativity classes (chosen because they represent a broad range of contents and classroom practices) and while doing homework or studying for school. For reasons of practicality, affective states are limited to

a short set of both positive and negative affective states. Matrix sampling approaches would allow a larger set of events and affective states to be sampled in the future.

Other Potential Indicators

Students' perceptions of their safety at school and on their way to school, as well as their satisfaction with their safety and the general infrastructure of the school are further facets of student well-being at school. Information on these facets could come from subject-specific survey questions, school records of reported incidents and police/safety statistics of the area around the school. In addition, aggregate measures of the prevalence of bullying or other disciplinary problems in the school could be aspects of this sub-dimension.

Well-Being Outside of School

Students' experiences in their out-of-school environment constitute the third broad well-being dimension identified in this framework. Key sub-dimensions of out-of-school well-being are students' social connections outside of school (including their friendships and their relationships with parents), their material living conditions and their leisure-time activities.

Social Connections Outside of School

In addition to students' social connections at school, relationships with parents and other family members and friendships that take place outside of school are important factors for students' well-being. Research shows that having high-quality peer relationships has positive effects on adolescent health (Barker and Galambos, 2003[184]; Zambon et al., 2009[185]). On the other hand, having fewer friends in adolescence result in a lack of opportunities to learn social skills (Gifford-Smith and Brownell, 2003[186]; Sullivan, 1953[187]), potentially leading to lowered life satisfaction and more frequently experienced negative affect and bullying experiences (Larson and Richards, 1991[188]). Other findings point to the importance of family relationships and friendships as two main factors that determine self-satisfaction (Edwards and Lopez, 2006[129]; Suldo et al., 2013[189]). Indeed, research indicates that self-reported ease of communication with one's parents is associated with a range of positive health outcomes (Currie et al., 2012[117]) and that children who report talking more frequently to family members about things that matter to them also tend to report higher levels of subjective well-being (Abdallah et al., 2014[108]).

Social connections outside of school also include student's sense of and identification with their community (Davidson and Cotter, 1991[190]; Farrell, Aubry and Coulombe, 2003[191]; Prezza et al., 2001[192]; Prezza and Costantini, 1998[193]).

Objective Indicators

Time spent on activities with friends and parents may serve as objective indicators of student's social connections outside of school. This information can be collected via a short day/event reconstruction protocol focusing on selected key events, such as having dinner with one's parents and spending time with friends outside of school. These questions about a specific day can be complemented by a short set of questions from the HBSC survey. These questions inquire about the number of days per week students spend time with friends right after school and in the evenings, or the number of days they communicate via electronic media; the timespan of one week reduces the risk that a single outlier day might bias results. A final objective indicator of students' social connections outside of school is

where they met these connections, whether at their current school, a previous school, in the neighbourhood or through their family.

Subjective Indicators

In order to capture students' subjective perceptions about their social connections, and their affect and satisfaction regarding these relationships, PISA can include a series of questions based on those already used to similar effect in the HBSC and KIDSCREEN-10 surveys and, as a complement to these, it can measure experienced well-being with a short set of event reconstruction questions.

Proposed questions on friendships cover the number of perceived close female and male friends (HBSC),[4] students' satisfaction with the number of friends they have, the degree to which students felt they had fun with their friends over the past week (KIDSCREEN-10), the perceived ease with which students talk to their best friend about things that bother them (HBSC), and students' experienced affect while spending time outside the home with their friends (newly developed for PISA following the event reconstruction approach). Capturing information beyond the mere number of friends is important as the quality of relationships is a stronger predictor of well-being than their quantity (The Children's Society, 2015[12]).

Proposed questions on the subjective quality of relationships with parents, guardians or other family members include the degree to which students felt they were treated fairly by their parents over the past week (KIDSCREEN-10); the degree to which students think their friends are accepted by their parents (HBSC); the perceived ease of talking to their parents, stepparents or elder siblings about things that bother them (HBSC); students' perceptions of their parents' or guardians' general behaviour and attitude towards them (HBSC); and students' experienced affect while having dinner at home with their parents (newly developed for PISA following the event reconstruction approach).

Material Living Conditions

A student's material living conditions, as measured by his or her family's socio-economic status (SES Expert Panel, 2012[194]), constitute an important determinant of overall well-being with small but robust positive associations between household income and adolescent subjective well-being (Rees, Pople and Goswami, 2011[195]). Children from highly affluent families also tend to report better health (Torsheim et al., 2004[196]; Richter et al., 2009[197]), and students' basic needs and desires are more likely to be met when they live in rich nations (Tay and Diener, 2011[198]; Diener et al., 2010[199]). Moreover, the literature indicates that poverty, and particularly perceived poverty, is a crucial limiting factor for students' well-being (Goswami, 2014[200]). Research indicates that child-reported material deprivation explained a larger proportion of the variation in children's subjective well-being than overall family socio-economic status did and that children "tend to talk about money and possessions in relative terms – e.g., having 'enough' or 'the same amount' as rather than 'more' than – others so that they fit in and are not excluded from things that others can do" (The Children's Society, 2015[12]). These findings point to the importance of subjective socio-economic status (Diemer et al., 2012[201]; Quon and McGrath, 2014[202]), which has not received as much attention as its objective counterpart.

Objective Indicators

PISA measures students' objective material living conditions through a composite *index of economic, cultural and social status* (ESCS) derived from questions about general wealth

(based on several proxy variables including home possessions), parental education and parental occupation. Although no changes to the ESCS are currently envisaged, a number of additional indicators, currently used in other surveys, could add substantial value to the current ESCS indicator and could be included in the future. These include whether students receive pocket money (used in the HBSC), whether they have been on a vacation with their family (used in the HBSC and Children's Worlds), and whether they have had to go to bed hungry (used in the HBSC). The broader concept of unmet needs could further inform the measurement of poverty and deprivation as risk factors for student well-being (Diemer et al., 2012[201]).

Subjective Indicators

An indicator of subjective material living conditions would capture students' subjective perceptions of their economic standing. It would focus on perceptions of the adequacy of one's standard of living (Conger, Conger and Martin, 2010[203]; Mistry and Lowe, 2006[204]) as well as the psychological experiences of material deprivation and hardship (Iceland, 2003[205]; Mayer and Jencks, 1989[206]; Gershoff et al., 2007[207]). Research on poverty and aspirations (Dalton, Ghosal and Mani, 2015[208]; Ray, 2006[209]) suggests that poverty and the inability to aspire to change one's life for the better may lead to the underutilisation of available resources, and that subjective perceptions of poverty might play an equally important or maybe an even larger role in this than actual poverty (The Children's Society, 2015[12]). Moreover, the perception of financial constraints is strongly associated with adolescent health outcomes (Quon and McGrath, 2014[202]).

These findings underline the importance of paying attention to the subjective "experience" of poverty in addition to objective measures of socioeconomic status. Questions on how well off students believe their family to be and whether they worry about their family's financial situation could also be informative; the latter is already implemented in Children's Worlds.

Leisure Time

An individual's well-being depends on his or her ability to pursue activities that he or she enjoys and to spend time with his or her family and friends (Rees, Goswami and Bradshaw, 2010[210]; Abdallah et al., 2014[108]). This takes place during leisure time, which can be defined for students as the time awake not spent in school, on schoolwork, on the commute to school,[5] or on other obligations. Indicators of leisure time use and emotions experienced during this time are therefore important elements of overall well-being.

Objective Indicators

Both the total time available for leisure as well as how students use this time are objective indicators of students' leisure time. A proxy of the former can be derived as the difference between the hours awake minus hours spent at school, spent on the way to and from school, and spent on homework and studying for school. The main student questionnaire already asks about some of these variables; additional questions on hours awake, hours spent at school, and hours spent on the commute to school will fill the remaining gaps. A short day reconstruction protocol focusing on selected activities, such as watching television or videos, reading a book, browsing/reading on the Internet, spending time on chat/social networks/e-mail, playing video games, meeting friends, talking to parents, eating or practicing a sport, can provide information on how students use their leisure time. These activities were included in an abbreviated time-use protocol introduced to PISA 2015

(Bertling and Kyllonen, 2012[64]) and by other studies concerned with student time use (e.g. Children's Worlds and the American Time Use Survey) (Rees and Main, 2015[52]; Bureau of Labor Statistics, 2015[211]; Carson, Staiano and Katzmarzyk, 2015[212]; Larson and Verma, 1999[213]).

The use of social media should be included as a separate activity in the time use protocol, given its increasing part in the lives of adolescents. Research suggests that excessive use of social media may lead to poorer health, sleeping habits, loneliness and greater engagement in risky behaviours (Prezza, Pacilli and Dinelli, 2004[214]; Punamäki et al., 2007[215]; Koivusilta, Lintonen and Rimpelä, 2005[216]). Moreover, spending more than two hours per day on social networking sites was associated with reporting poorer mental health and higher levels of psychological distress among adolescents (Sampasa-Kanyinga and Lewis, 2015[217]).

Subjective Indicators

A combination of event reconstruction questions and a set of questions asking students to report on how they perceive and how satisfied they are with their use of time (in general) and leisure time (in particular) will provide subjective indicators of the quality of students' leisure time.

Event reconstruction questions could examine students' experienced well-being during breaks between classes at school or time spent outside of their home with friends. A short set of both positive and negative affective states would cover key emotions while keeping student burden low. Matrix sampling approaches for questionnaires would allow a larger set of events and affective states to be investigated; unfortunately, such matrix sampling will not be implemented for the 2018 PISA well-being questionnaire. Students can also be asked about their overall satisfaction with their use of time and what they do in their free time; their satisfaction with specific activities engaged in on the previous day (as part of the day reconstruction protocol); and their evaluation of the amount of time they have for themselves (already done in KIDSCREEN-10).

Other Potential Indicators

Students' perception of and satisfaction with their safety at home, safety in their neighbourhood and opportunities in their neighbourhood are also relevant to their out-of-school well-being. Unfortunately, due to space constraints, additional questions covering these themes must be prioritised. Additional information on this framework component might be drawn from other sources, such as records about the local area or geographical region a student is living in, if available.

Possible Composite Indicators

In addition to the proposed indicators representing individual cells of the framework, composite indices covering multiple cells of the framework might be of policy interest. Aggregating indicators into composite indices risks increased opaqueness as to which are the most critical areas of well-being (UNICEF, 2007[9]). However, a number of previous studies have proposed composite well-being indicators that are already widely used in applied contexts (Bradshaw, Hoelscher and Richardson, 2007[218]; Land, Lamb and Mustillo, 2001[219]; Land et al., 2007[50]; Moore et al., 2008[165]; Bradshaw et al., 2009[220]), and creating such indicators in addition to more specific indices may facilitate measuring progress over time and comparisons across sub-groups (Ben-Arieh, 2008[25]). Some

potential composite indicators that are seen as especially promising for policy and practice include:

- An index of the overall quality of life;
- An index of overall subjective well-being;
- An index of overall emotional well-being, created by aggregating the subjective indicators of affective well-being across all content dimensions;
- An index of work/school-life balance, created by aggregating the well-being related to schoolwork and to leisure time;
- An index of overall social well-being, created by aggregating the well-being related to social connections at school and outside of school.

Notes

[1] The other word that the 14- and 15-year-olds discussed was "do", as in "things to do", "something to do", or "nothing to do"; this word came in as the fourth-most commonly discussed.

[2] Note, PISA will have to rely on student self-reported data for both sets of indicators. The key difference is that objective indicators are clearly quantifiable and behavioural indicators that require minimal judgment or interpretation on the part of the respondent (for example, a student does not need to provide an interpretation of his/her weight when providing his/her weight in kilograms).

[3] However, please note that this section discusses subjective indicators of well-being with reference to school in general, not schoolwork in particular. The indicators described here may also be examined in relation to just schoolwork.

[4] These questions are considered to be subjective as individuals might differ in their perception of how close "close friends" are (Keller, 2004[221]). A short qualifying statement about the definition of "close friends" should be given at the beginning of the question to maximize the comparability of the question across individuals and cultures.

[5] There is overwhelming evidence that long and difficult commutes for adults are typically perceived as unpleasant and are associated with reduced subjective well-being (Kahneman et al., 2004[3]; Office for National Statistics, 2014[222]).

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