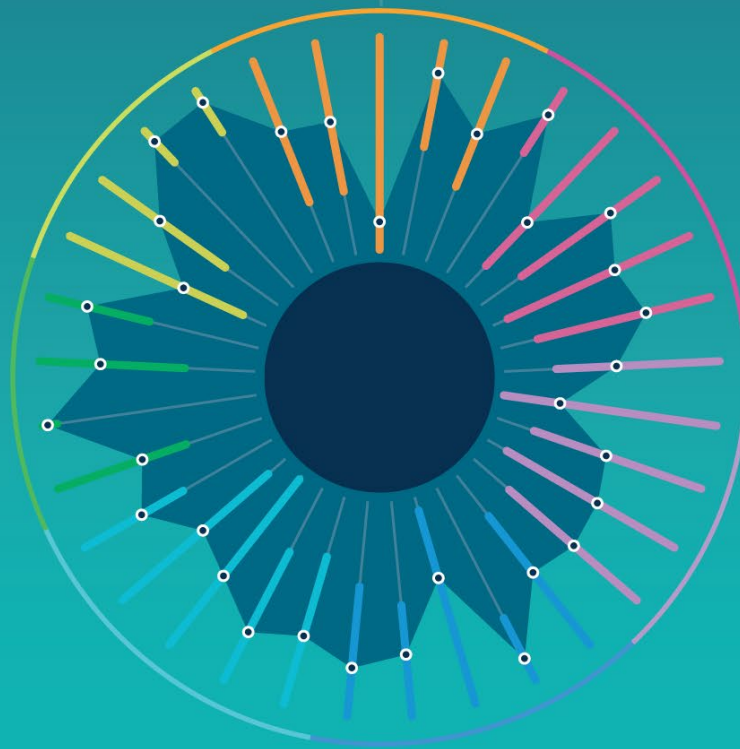


Measuring well-being in the digital age



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Measuring well-being in the digital age

Digital transformation permeates virtually every aspect of people's lives and affects their well-being in ways that are neither strictly positive nor negative. Better measuring the impacts of digital technologies and data on well-being is essential to ensuring a positive and inclusive digital economy and society. This Going Digital Toolkit note identifies the dimensions of different well-being frameworks, including from a digital perspective. The note compares available options for measuring well-being in the digital age before setting out the need to move on from varied and piecemeal national efforts to develop measures that can be used to gain comparisons and insights across countries. In particular, this note calls for a co-ordinated approach to better understanding the linkages between digital technologies and well-being through a standardised module in ICT usage surveys. Examples of survey questions used by various countries are showcased.

Digital transformation permeates virtually every aspect of people's lives and affects their well-being in ways that are neither strictly positive nor negative (OECD, 2019^[2]). For instance, as digital technologies enable connections irrespective of distance, individuals can become more empowered to take part in political discussions, but at the same time be more exposed to extreme views and disinformation (OECD, 2020^[3]). Technological advances can also create or exacerbate inequalities (UNDP, 2019^[4]), due to unequal access to communications infrastructure, income or skills, in particular.

As such, new indicators are needed to monitor well-being in the digital age and guide policy making in creating conditions for inclusive and sustainable development. This need is further reinforced by the consequences of the recent COVID-19 pandemic, which is accelerating the ongoing digital shift (e.g. teleworking, online education).

"Encouraging measurement of the digital transformation's impacts on social goals and people's well-being" was one of the main recommendations made in the Going Digital Measurement Roadmap (OECD, 2019^[1]). In particular "wider implementation of the OECD Model Survey on ICT Access and Usage by Households and Individuals" and the "(...) [development of] subjective well-being questions for inclusion" were put forth as key steps forward.

Well-being is a highly personalised and context-dependent concept, of which the "...features are largely based on values, [and] cannot be assumed to be universal, making them extremely difficult to define, measure and compare" (Gluckman and Allen, 2018^[5]).

Nonetheless, well-being measures have been developed in response to the need for broader metrics of societal progress, taking into account how people feel about and experience their own lives alongside information about material conditions (Stiglitz, Fitoussi and Durand, 2018^[6]; Stiglitz, Sen and Fitoussi, 2009^[7]). Statistical frameworks leverage a combination of data on people's objective life conditions (e.g. health, income, social connections) and subjective assessments of their emotional state or degree of life satisfaction to approximate overall well-being.

There are both practical and conceptual difficulties when it comes to assessing the impacts of digital transformation on well-being. Spanning thousands of technological innovations and simultaneously touching almost every area of people's lives, digital transformation has a myriad of impacts that are at times direct, indirect and very interconnected (OECD, 2019^[2]). At the same time, well-being outcomes vary with countries' respective state of digital development and social preferences. All these factors combined have made coordination around common measures of well-being in the digital age challenging.

That said, well-being measurement frameworks have started to reflect digital transformation in innovative ways. Some well-being dashboards now include

indicators monitoring how digital technologies affect objective conditions for well-being (e.g. the share of online income within total income), while dedicated survey modules collect individuals' self-assessed perceptions of how digital practices affect them. A third way involves co-collecting general well-being data and digital technology usage and access data to enable joint analysis.

The first section of this Toolkit note presents the main approaches to measuring well-being, comparing various frameworks to identify common features in how well-being is conceptualised. The following section reviews the main interactions between digital transformation and well-being. Building on this, the note compares available options for measuring well-being in the digital age before setting out the need to move on from varied and piecemeal national efforts to develop measures that can be used to gain comparisons and insights across countries.

As such, this Toolkit note calls for the inclusion of subjective well-being questions in information and communication technologies (ICT) access and use surveys with a view to leverage joint data collection and correlational analysis to guide the design of common modules targeting specific effects of digital usage patterns on well-being. Potential implementation steps are provided and 0 provides examples of international and national measures of well-being from a digital perspective.

What is well-being? Definition and metrics

Defining well-being

According to the Joint UNECE/Eurostat/OECD Task Force on Measuring Sustainable Development, human well-being is a "broad concept which is not confined to the utility derived from the consumption of goods and services...determined by what people regard as important in their lives" (United Nations Economic Commission for Europe, 2012^[8]). As such, there is little consensus on how to define human well-being, with various competing conceptions, of which the Oxford Handbook of Well-Being and Public Policy (Adler and Fleurbaey, 2016^[9]) provides a comprehensive review:

- **Objective goods theories** hold that some things are good in life regardless of one's attitude to them; as such, knowledge, achievement, and moral virtue are considered good even if one is not in fact attracted to them.
- **Subjective well-being approaches** incorporate irrational human behaviour into economics and rely on expressed preferences rather than on revealed choices. Human well-being should therefore not be restricted to what people choose to consume and how these choices

affect their health, educational level etc., but extend to direct measures of people’s feelings and evaluations of life.

- **Preference-based approaches** suggest that a person’s well-being depends exclusively on his or her desires and preferences. This is in contrast to **mental state approaches**, notably hedonism, that identify well-being entirely with “hedonic” states (i.e. pleasure and/or freedom from suffering).
- Finally, a **capabilities approach** (Nussbaum and Sen, 1993^[10]) focuses on the freedom to pursue activities and access situations that people recognise to be important to them, introducing the notion of “functionings” and “capabilities”¹. Functionings can be interpreted as a series of personal attainments (e.g. in education, health) that open up a range of opportunities or capabilities to achieve new functionings. Therefore, it emphasises the importance of freedom in determining people’s range of opportunities and level of well-being.

This plurality of approaches is mirrored in the well-being measurement agenda, which is all-encompassing and inter-related (Stiglitz, Fitoussi and Durand, 2018^[6]) with measures of well-being essentially divided into two domains: objective and subjective well-being¹.

Measuring well-being

Objective measures of well-being focus on the collection of tangible and quantitative indicators judged to be prerequisite for people to live well. These are often conceptualised as essential life “dimensions”. Some of these dimensions can be understood as essential functionings as per Martha Nussbaum’s and Amartya Sen’s terminology (1993^[10]) (e.g. education or health) in that they enable one to freely pursue goals. Other dimensions refer to purely material conditions (e.g. income or housing). Indicators are typically organised around axioms that refer to individuals’ achievements on the various dimensions, but not to individuals’ well-being directly (Adler and Fleurbaey, 2016^[9]). This approach tends to capture a societal rather than an individual perspective on well-being, insofar as the way in which objective factors

¹ In *The Quality of Life*, Amartya Sen and Martha Nussbaum (1993^[10]) propose a theoretical framework measuring and explaining the drivers of human well-being, summarised by the Stanford Encyclopaedia of Philosophy. This approach defines a number of essential *functionings* or a series of personal achievements or states of human beings that are essential for their well-being. These vary from elementary things such as being adequately nourished, being in good health, avoiding escapable morbidity and premature mortality, to more complex achievements such as having a decent and valuable job, not suffering from lack of self-respect, taking active part in the life of the community. *Capabilities* then refer to a person’s real freedoms or opportunities to achieve these functionings and thereby a certain level of well-being.

combine and influence well-being varies extensively from person-to-person (Stiglitz, Sen and Fitoussi, 2009^[7]).

Subjective measures of well-being ask respondents directly to assess their level of well-being by making an internal subjective assessment of their own life as a whole and the extent to which they experience positive emotions, such as joy and pride, or negative emotions, such as pain and worry². Three main ways of measuring subjective well-being are distinguished in a well-established literature (OECD, 2013^[11]):

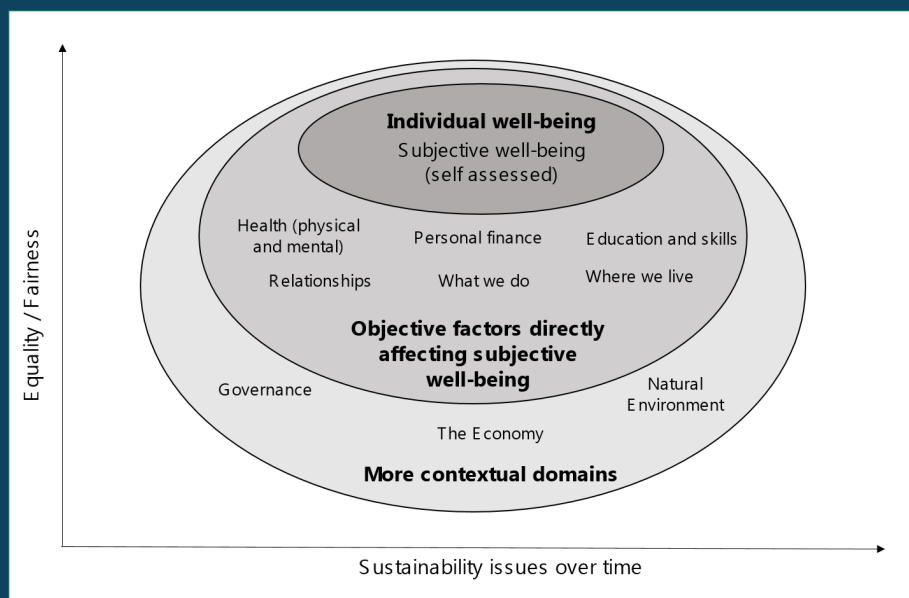
- a **hedonic perspective** quantifying experiences of positive or negative affects such as pleasure or pain over a given period;
- an **evaluative perspective** defining well-being as one's overall satisfaction with life or different domains of life; and
- an **eudemonic perspective**, which focuses on one's personal sense of fulfilment through experiences of purpose and meaning.

Objective and subjective well-being measures are highly complementary (Figure 1). Subjective well-being captures contingent and perception-based effects such as changes in expectations, comparison effects (e.g. a person's view of how their life situation is defined in comparison to others) and other idiosyncratic parameters that are not fully captured by objective measures (OECD, 2019^[2]).

For instance, analysing subjective well-being measures has helped research to flesh out the importance of different social contexts (i.e. social support, freedom to make life choices, generosity and trust) along with well-known objective factors such as income (Helliwell, Huang and Wang, 2017^[12]). Overall, the Joint UNECE/Eurostat/OECD Task Force on Measuring Sustainable Development (2012^[8]) underscores the need to better link objective and subjective well-being measures.

²<https://www.hsph.harvard.edu/health-happiness/research-new/positive-health/measurement-of-well-being/>.

Figure 1. The relationship between objective and subjective measures of well-being



Source: Hicks, Tinkler and Allin (2013^[13]).

Review of existing well-being measurement frameworks

A comparison of the features of well-being dashboards developed through foundational work by academia, national statistics offices and international organisations can be found in Table 1. Overall, nine core objective dimensions of well-being that are broadly consensual across the spectrum are identified.

In contrast, various empirical studies treat subjective well-being as an output variable reflecting the joint impact of objective and intangible factors and quantify the extent to which these objective well-being factors affect subjective well-being (Boarini et al., 2012^[15]; Caunt et al., 2012^[16]; Cooper and Layard, 2005^[17]; Helliwell, Huang and Wang, 2017^[12]). Overall, the core dimensions presented in Table 1 are consistently considered as key factors and the health and social life dimensions tend to have the largest effect, along with major life events such as unemployment (Stiglitz, Fitoussi and Durand, 2018^[6]).

Table 1. How is well-being measured?

Key dimensions of frameworks used to conceptualise and measure well-being

	Well-being Framework (OECD)	What Makes for a Better Life? The Determinants of Subjective Well-being (OECD)	Canadian Index of Wellbeing (CAN)	Eurostat 8+1 Quality of Life Indicators (EU)	INSEE Portrait Social Edition 2019 (FR)	Higher Living Standards Framework (NZ)	ONS Measuring National Well-being Framework (UK)	Sen Stiglitz Fitoussi (2009)
Subjective well-being	✓	Dependent variable	×	✓	✓	✓	✓	✓
Objective dimensions of well-being	10	10	8	8	6	9	10	8
1 Democratic / civic engagement	✓	✓	✓	✓	×	✓	✓	✓
2 Health	✓	✓	✓	✓	×	✓	✓	✓
3 Environment	✓	✓	✓	✓	×	✓	✓	✓
4 Income	✓	✓	✓	✓	✓	✓	✓	✓
5 Job quality / Life balance	✓	✓	×	✓	✓	✓	✓	✓
6 Housing	✓	✓	✓	✓	✓	✓	✓	×
7 Education	✓	✓	✓	✓	×	✓	✓	✓
8 Personal safety / security	✓	✓	×	✓	×	✓	✓	✓
9 Social connections	✓	✓	✓	✓	✓	✓	✓	✓
Other objective dimensions			- Leisure and culture - Time use		- Current life - Leisure time - Free time	- Cultural identity	- The economy - Governance	

Source: OECD.

Most well-being measurement frameworks also include subjective measures of well-being. However, the way in which subjective well-being and objective well-being factors are related to one-another varies. For instance, the OECD Well-being Framework (Box 1) situates subjective well-being as one of the ways in which well-being can be quantified. It is treated in the same way as income or health and not as the result of these factors' joint effects.

Box 1. The OECD Well-being Framework and Better Life Index

The OECD's *How's Life?* series aims to provide comparable statistics on whether life is getting better for people living in OECD and selected partner countries. It draws on the OECD Well-being Framework, which measures well-being along 11 dimensions, chosen in accordance with theory practice and consultation. These cover outcomes at the individual, household and community level including:

- 1) material conditions that shape people's economic options (income and wealth, housing, work and job quality);
- 2) quality-of-life factors that encompass how well people are (and how well they feel they are), what they know and can do, and how healthy and safe their places of living are (health, knowledge and skills, environmental quality, subjective well-being, and safety); and
- 3) how connected and engaged people are, and how and with whom they spend their time (work-life balance, social connections, and civic engagement).

The OECD Better Life Index also draws on the OECD Well-being Framework and gathers one to three indicators for each of the 11 dimensions. The indicators are averaged with equal weights to derive a single metric for each dimension for each country and enable comparison.

Source: OECD (2017^[14]).

Digital transformation changes how people live and experience well-being

Digital transformation (Box 2) affects society through many interrelated channels as digital technologies dramatically change the ways in which individuals, firms and governments interact among and with one another (OECD, 2020^[3]). As a result, although the economic and social implications of digital transformation cannot always be clearly demarcated (United Nations Economic Commission for Europe, 2020^[18]), there is renewed emphasis on the need to measure the social dimension of digital transformation and in particular its impact on well-being (OECD, 2019^[1]; OECD, 2014^[19]). The rise in digital technology uptake induced by the COVID-19 health crisis (OECD, 2020^[20]) further reinforces the need to understand how constant technology exposure affects well-being.

Indeed, digital transformation simultaneously affects what we need to live well and how we can access it (objective well-being), as well as how we feel about ourselves and appreciate what we have (subjective well-being). The former effect has so far received more attention than the latter, in part because it is easier to define and quantify.

Box 2. Defining digital transformation

Digitisation is the conversion of analogue data and processes into a machine-readable format. *Digitalisation* is the use of digital technologies and data as well as their interconnection that result in new activities or in changes to existing ones. *Digital transformation* refers to the economic and societal effects of digitisation and digitalisation.

Source: OECD (2019^[21]).

Indeed, from an objective point of view, digital transformation creates new opportunities and needs that change how objective dimensions of well-being are fulfilled in ways that are ambiguous and create or exacerbate inequalities (OECD, 2019^[21]). For instance, online resources can help people to better understand and manage their health. However, ICTs can also adversely impact physical and mental health in a variety of ways, ranging from encouraging sedentary activities to fuelling feelings of isolation or addiction (OECD, 2019^[1]).

Similarly, Internet access has become central to people's ability to access job opportunities and education (OECD, 2019^[22]), two key dimensions of objective well-being (see Table 1). As such, technology access is now prerequisite for ensuring inclusiveness, itself a condition for productivity growth (OECD, 2018^[23]). At the same time, digital devices pose new risks for students' ability to focus, memorise and develop cognitive abilities that need to be monitored (OECD, 2019^[24]). These well-being impacts of digital transformation on people's objective life conditions partly determine life satisfaction and thus also indirectly affect subjective well-being (Dolan, Peasgood and White, 2008^[25]).

Yet another subjective well-being effect – albeit more diffuse and harder to define – is that of digital transformation on people's conceptions of happiness and propensity to feel satisfied. In particular, digital applications like social networking induce greater interaction and comparison with others which may lead to a softening of the distinction between public and private space (OECD, 2019^[21]). This is thought to profoundly affect the way in which we view ourselves and ascribe value to what we have (Carr, 2010^[26]). Furthermore, because digital technologies have enabled a dramatic increase in the amount of information people share and the pace of global communications, it could be a source of emotional strain, anxiety and lower trust in institutions as individuals feel less able to verify and process information (Pew Research Center, 2018^[27]). At the same time, trust is increasingly thought to be a key factor of subjective well-being (Helliwell, Huang and Wang, 2017^[28]).

Overall, as an all-encompassing technological shift, digital technologies have transformed the way we relate to time and space, form opinions and relationships, but also profoundly changed the nature of politics, culture and lifestyles (UNDP, 2019^[4]). This overarching transformation is summarised by

Manuel Castells (2014^[29]) as the emergence of a “network society”. While potentially significant, these effects are highly specific to different individuals and perception-based in nature, and thus likely under-appreciated. In turn, this motivates further work to develop the types of indicators that can best capture the effects of digital transformation in a holistic way.

Options for measuring well-being in the digital age

While recent international and national efforts have significantly improved measures of both the digital transformation (Bukht and Heeks, 2017^[30]) and human well-being (VanderWeele et al., 2020^[31]) separately, the linkages between the two fields have comparatively received less attention. So far, the statistical community has employed three main approaches:

1. introducing new indicators of the objective effects of digital transformation on various dimensions of well-being;
2. surveying people’s subjective perceptions of pre-identified phenomena or trends emerging with digital transformation and likely to affect well-being; and
3. combining data on well-being and technology usage to identify relationships.

Objective well-being indicators

Academia, international organisations and national statistics entities have begun to collect data on the effects of digital transformation on well-being. Systematic examination of the well-being impacts of digital transformation has been proposed by several reports (Box 3). These reports establish the main dimensions of well-being using an objective approach and map indicators of the potential interactions with digital trends. Indicators are based on both survey and administrative data sources (e.g. questions on leisure time spent on social media in Time Use surveys, regulators’ data on Internet access at home, etc.).

The impact of digital transformation on well-being is thus broken down into a set of one-dimensional impacts on objective features of life, of which the relative weights and relations are usually not explicit. This is a general flaw of dashboards noted by Alexandrovna (2005^[32]) and the Report by the Commission on the Measurement of Economic Performance and Social Progress (2009^[7]), among others. In addition, where significant international gaps in data availability remain (OECD, 2019^[2]), the indicators showcased can reflect data availability across countries more than their actual relevance in capturing the effects of digital transformation on well-being.

Box 3. Mapping the well-being impacts of digital transformation

In *How's Life in the Digital Age* (OECD, 2019^[2]), the OECD Well-being Framework provides a foundation to map out digital transformation's well-being effects and encourage further monitoring. For each of the eleven identified dimensions of well-being, potential opportunities and risks associated with digital transformation are identified. Twenty indicators of digital opportunities and thirteen indicators of digital risks are proposed to cover the most important impacts for people's well-being, without claiming to provide a comprehensive picture of the full range of impacts of the digital transformation. For instance, the education dimension looks at both increasing digital skills in students and adults and the adverse effects of technology usage in classrooms.

A more focused analytical approach to assessing digital transformation's impacts can be found in Allen and Gluckmann (2018^[5]). They identify key institutions of the self (e.g. self-worth, self-expression), of social life (e.g. social connections, education, romantic life, values etc.) and of civic life (e.g. media consumption, governance) as well as a set of fundamental technologies driving digital transformation (e.g. artificial intelligence (AI), communication technologies) to identify five priority areas for monitoring and measurement: i) early childhood development; ii) mental health; iii) social inclusion; iv) personal and public safety, and v) governance. For each of these areas, potential indicators for development and new sources of data are suggested.

Building on these recent works, national statistics bodies have started to include indicators related to digital transformation in national well-being dashboards, reflecting greater awareness of the need to measure well-being in digital transformation. For instance, both New Zealand (StatsNZ) and France (INSEE) now track digital skills provision as one indicator of the quality of education that people enjoy.

The online OECD Going Digital Toolkit <https://oecd.org/going-digital-toolkit>, which helps countries assess their state of digital development and develop policies to support an increasingly digital economy and society, includes a range of indicators of well-being from a digital perspective. These cross-country comparable indicators aim to capture the impact of digital transformation on the environment, work life, mental health, skills, privacy and security, and to assess the extent to which digital divides related to geography, income, gender and firm size exist.

Specific subjective well-being impacts of digital transformation

Another approach consists of using a narrower disciplinary framework, with analytical focus on specific and pre-identified well-being outcomes associated with digital transformation (United Nations Economic Commission for Europe, 2020^[18]). For instance, a growing body of literature has investigated the side effects of excessive or uncontrolled digital technology usage on mental health

(Shensa et al., 2017^[33]; Maras et al., 2015^[34]) or social isolation (Primack et al., 2017^[35]) and addictive behaviours. In response to this, several countries have developed specific survey modules to collect information on such pre-identified phenomena.

In this case, the well-being impacts of digital transformation are analysed using self-assessed impact questions, where respondents are asked directly about their experience of a potential risk or benefit in relation to a given feature of digital transformation or digital practice. For example, "during the past 12 months, have you felt that you were a victim of any of any incident on the Internet?" More examples are provided in Box 4.

Box 4. Survey modules on cyber-victimisation and problematic Internet usage (PIU)³

As part of the 2018 edition of the Canadian Internet Use survey¹, Statistics Canada included questions on specific issues that might arise from Internet usage in a module on people's use of the Internet (UI_25; UI_26)⁴, including the following:

1) *During the past 12 months, did you take a break from using the Internet, or decrease your time spent on the Internet, because you felt you were using it too often or for too long?*

2) *During the past 12 months, have you felt that you were a victim of any of the following incidents on the Internet? Select all that apply: Did you experience:*

- *Bullying*
- *Harassment*
- *Discrimination*
- *Stalking*
- *Misuse of personal pictures, videos or other content*
- *Fraudulent use of your identity*
- *Other*

In 2011, the South Korean National Information Society Agency (NIA) developed a Smartphone Addiction Scale (SAS) (later complemented by a Smartphone Addiction Proneness Scale) to investigate the development of addictive behaviours among smartphone owners, especially young people (Kwon et al., 2013^[36]). The scale for

³ The notion of Problematic Internet Use (PIU) is associated in the literature with a variety of terms: Internet addiction (IA), Internet Addiction Disorders, Pathological Internet Use, Compulsive Internet Use, Cyberspace Addiction, High Internet Dependency, and Virtual addiction. According to Yellowlees and Marks (2007^[55]), PIU is the excessive use of the Internet that creates psychological, social or work-related difficulties in a person's life.

⁴ https://www.statcan.gc.ca/eng/statistical-programs/instrument/4432_Q2_V2#a04.

smartphone addiction consisted of 6 factors and 33 items with a six-point Likert scale (1: “strongly disagree” and 6: “strongly agree”) based on self-reporting. The six factors were daily-life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse, and tolerance, as detailed by Kwon et al (2013^[37]). A version of this scale is included in the Korean Children and Youth Panel Survey (KCYPs) and Statistics Korea reported in a recent survey (Box 5) that it has a specific survey on Smartphone Dependency.

Specific subjective surveys or survey modules enable a strong focus on a single area impacted by digital transformation while drawing on respondents’ perceptions directly. However, by nature, such measurement tools will not provide a holistic and multi-faceted view of the impacts digital transformation has on well-being overall. Using this approach to seek such an over-arching view would likely imply developing a myriad of surveys to understand well-being in the digital age in a holistic manner. As such, specific subjective approaches are best used after establishing evidence of a link between digital transformation and well-being in order to gain a more detailed understanding, as discussed in the next section.

Coupling general subjective well-being and technology usage indicators

A third way to measure the impact of digital transformation on well-being is to examine how reported general subjective well-being measures (e.g. overall life satisfaction) are related to information on how people interact with digital technologies in general. This approach is adopted by Katz and Koutroumpis (2013^[38]), among others. The study correlates well-being data with a digitisation index summarising a range of indicators (e.g. broadband access, 3G penetration, engineers as a percentage of total population). Rather than establishing causal links between the two phenomena, they provide an overview of broad relationships and patterns. Such findings can help to guide more detailed follow-up work, as advocated in the following section.

While, in principle, the relevant data may be available from different survey vehicles (e.g. technology use from ICT surveys and reported well-being from social surveys), it is highly unlikely that the same respondent will have completed both surveys. As such, this approach relies on gathering data on both ICT usage and well-being through the same survey.

This could be achieved by adding questions about technology access and usage to surveys on general well-being or by having modules on well-being in surveys collecting data on technology access and use. Joint collection was advocated by Statistics Canada in a recent paper presented to the UNECE (2020^[18]) and has already been used in several countries, as illustrated in Box 5.

Box 5. Co-collection of well-being and technology usage data

In 2019, the OECD worked with Statistics Canada to conduct a survey of OECD and partner countries to investigate what data they collect on technology-use and well-being. Canada later extended this inquiry to the United Nations Economic Commission for Europe (UNECE) participating countries.

Responses indicate that it is fairly common for ICT usage surveys to include questions related to objective aspects of well-being such as the quality of governance, education, and community bonds. Other dimensions are less well covered. Overall, no country has made a comprehensive effort to collect variables related to all objective well-being dimensions in ICT surveys, likely due to the burden this would pose on respondents due to the volume of questions entailed.

Further, very few countries include questions about perceived impacts of technology on well-being or subjective well-being (positive or negative affect, or life satisfaction) in their dedicated ICT survey. Among those that do, Italy's national statistics office ISTATs (Istituto Nazionale di Statistica) reported including a question on subjective well-being in its household survey on Internet Adoption and Use, where respondents are asked how satisfied they are with life as a whole along various questions on the nature and frequency of ICT usage and access.

The Canadian Internet Use Survey also includes a module collecting data on Further Demographic information (FD_R010; FD_R020; FD_R030). Respondents are asked about the general state of their health, of their mental health as well as their overall satisfaction with their life, which is one of the main measures of subjective well-being.

According to the same Statistics Canada/WPMADE inquiry, other household surveys (i.e. different than dedicated ICT surveys) are not extensively used to collect information on digital transformation and well-being (United Nations Economic Commission for Europe, 2020_[18]). About one-third of participating countries (14 of 40) report that ICT questions and well-being questions are collected jointly on household surveys that are not ICT surveys, and often times these surveys include only one to four dimensions of well-being while only seven countries have questions on subjective well-being.

Source: UNECE (2020_[18]).

Opportunities to advance cross-country measurement of well-being from a digital perspective remain untapped

Measurement has so far approached the issue in three main ways. Countries have mostly started to enhance existing well-being dashboards with new objective indicators and to implement targeted survey modules monitoring emerging phenomena such as cyber-harassment or mental health issues. A third and complementary approach consists of collecting data on well-being and

technology jointly in order to identify potential links between certain technology use behaviours and reported well-being levels.

That said, data comparability and the degree of co-ordination between measurement agendas is still low, not least because reaching common operational definitions of both well-being and digital transformation is challenging. In addition the ways in which digital technologies affects well-being outcomes is largely shaped by national circumstances (United Nations Economic Commission for Europe, 2020^[18]). Data availability is another limitation: the indicators used in well-being frameworks tend to be chosen, at least partly, on being available for a “reasonable” number of countries. This may lead to the promotion of indicators that are not as meaningful as those available for fewer countries. Furthermore, even when indicator selections are guided by data availability, it is unusual for a given indicator to be available for all countries of interest (OECD, 2019^[2]).

As such, opportunities to advance towards more harmonisation and data-driven insights remain untapped. In particular, encouraging countries to use ICT surveys to co-collect general subjective well-being data and technology usage information is proposed as a key step forward toward a more systematic and coordinated investigation of the links between well-being and digital transformation and the design of standard modules investigating those links.

Why focus on ICT surveys?

While co-collecting data could, in principle, be achieved by adding questions on digital technology usage to surveys collecting data on general well-being outcomes (as revealed by survey results described in Box 5), no dedicated survey on well-being has yet been adopted in a generalised manner across countries. Where data on well-being is collected, this is through a myriad of household surveys and the implementation and questions used vary across countries. For instance, Statistics Canada gathers objective and subjective well-being data via a range of different vehicles (e.g. General Social Survey; Labour Force Survey; Canadian Survey of Giving, Volunteering, and Participating; Canadian Election Surveys; and the Canadian Community Health Survey). As a result, there is no single point of entry.

In addition, for the purpose of analysing relationships between digital transformation and well-being, granularity on different profiles of technology users would be needed (i.e. types of technologies used/digital activities undertaken, quality of access, frequency, purpose and intensity of usage, etc.). However, adding all the necessary questions to non-ICT related questionnaires would likely fall foul of the need to limit survey length and be difficult to implement uniformly. A practical approach that could be envisaged is thus the inclusion of a small number of high-level questions on technology use, but these are unlikely to match the relatively detailed understanding of

households' and individuals' digital activities that is achieved through ICT surveys.

Nevertheless, burden also needs to be managed in ICT surveys and it is not feasible to add a large suite of questions on well-being to them. This is where outcome-focused questions in which the respondent reports their overall state of well-being (i.e. reported life satisfaction) and/or general health state can have an advantage (see next section).

Finally, guidance for different surveys is within the purview of different bodies situated in various international organisations. For example, the International Labour Organisation (ILO) takes the lead on methodological guidance for Labour Force Surveys. Effecting and co-ordinating change through these groups would be extremely challenging. Meanwhile, the OECD has responsibility for the OECD Model Survey on ICT Access and Usage by Households and by Individuals (OECD, 2015^[39]) and as such proposals for new modules or other recommendations are within its purview.

Including questions on well-being in ICT usage surveys is therefore likely to be a more viable and insightful way forward. ICT usage surveys appear to be the most relevant vehicle available for jointly collecting data on technology and well-being as they provide a detailed view of individuals' experience of digital transformation and enjoy a high degree of uptake and co-ordination across countries.

Why focus on subjective well-being?

Promoting a subjective well-being approach aligns well with the overall move towards measures going beyond GDP and a better understanding of what drives human well-being, a key objective reiterated by Stiglitz, Fitoussi and Durand (2018^[6]), who also stress the need to "improve data availability on subjective well-being". The same report encourages National Statistics Organisations "to add subjective well-being questions to existing surveys", a comparatively "low cost way of doing so".

While subjective well-being questions also have limitations, not least because different people may interpret response scales differently (Boarini et al., 2012^[15]), they present important advantages compared to the alternative option of using modules on all objective factors of well-being (e.g. income, education, health etc.) in ICT surveys to act as a proxy for respondents' overall well-being. Indeed, adding questions on all of these to ICT surveys would lead to an untenable respondent burden and is an approach that is unlikely to gain traction.

In contrast, adding even one question – or preferably a small number of complementary questions – on subjective well-being, can open up a whole wealth of new opportunities for analysis in which reported well-being is

compared between non-users and users of digital technologies, or among users of different intensities of the same technology or sets of technologies, among others.

Furthermore, established wording for such questions already exists and can be used to facilitate implementation (see Box 6). Identifying wording to be used across countries would likely be less demanding than agreeing on what objective dimensions of well-being should be investigated under an alternative approach, as well as their prioritisation and question wording.

Importantly, and despite what one may assume to the contrary, questions on subjective well-being appear relatively easy for respondents to answer. Rässler and Riphahn (2006^[40]) find lower non-response rates than questions on seemingly more “straightforward” and objective factors such as income.

Another conceptual advantage is that subjective well-being measures capture both the effects of objective well-being factors – being in part driven by the latter (Dolan, Peasgood and White, 2008^[25]; Powdthavee, Burkhauser and De Neve, 2017^[41]; Kahneman and Deaton, 2010^[42]) – and intangible perception-based effects. As such, it is an approach well-suited for grasping a complex phenomenon like the well-being impacts of digital transformation – which affects many life aspects at the same time – in a holistic way to help identify important linkages between digital technology use and declared well-being outcomes.

That said, more detailed and contextual information will be needed to fully investigate these relationships and understand their dynamics. It is for this reason that the approach outlined takes subjective well-being measures as a first step from which to identify key digital-well-being relationships and envisages following-up the most policy-relevant items with specific and detailed survey modules using an appropriate range of objective and subjective well-being questions.

Practical steps to advance the measurement of well-being in the digital age across countries

When it comes to designing subjective well-being questions, useful precedent could be leveraged to enable fast implementation, as several OECD countries already collect subjective well-being data. In addition, the OECD has published the *OECD Guidelines on Measuring Subjective Well-being* (OECD, 2013^[11]) that provide ready-made wording for subjective well-being questions that could be deployed in ICT surveys, in particular the core set of prototype questions is a natural starting point (Box 6). Alternatively, the World Health Organisation (WHO) has developed a short, self-administered questionnaire (see Box 6), referred to as the “WHO-5”, covering five aspects of subjective well-being. It is

considered a useful tool to assess respondents' emotional balance and efficient in detecting depression risk (Topp et al., 2015^[43]).

Relevant to the overarching objective to incentivise adoption by minimising respondent burden, VanderWeele et. al. (2020^[31]) recommend assessing evaluative well-being (i.e. life satisfaction) where only a single question can be included. That said, questions on emotional balance (hedonistic approach) or personal fulfilment and sense of purpose (eudemonic approach) could also be envisaged.

As set out, having data on digital transformation and subjective well-being for the same cohort would enable correlational analyses of how different technology usage patterns (e.g. frequency, intensity, types and bundles of technologies used, purpose of usage etc.) correlate with different self-reported states of well-being (e.g. high or low life satisfaction).

Box 6. Designing subjective well-being questions

The *OECD Guidelines on Measuring Subjective Well-being* (OECD, 2013^[11]) aim to improve the quality of subjective well-being measures as well as their comparability across countries and the usefulness of the collected data. The guidelines mainly provide methodological guidance and best practice in the measurement of subjective well-being as well as for the analysis and reporting of subjective well-being measures.

Model questions are set out for the three main approaches to measuring subjective well-being – life satisfaction, hedonistic and eudemonic. These questions are based on tried-and-tested approaches used in several OECD countries.

The following question asks how satisfied you feel, on a scale from 0 to 10. Zero means you feel "not at all satisfied" and 10 means you feel "completely satisfied".

A1. Overall, how satisfied are you with life as a whole these days? [0-10]

The following question asks how worthwhile you feel the things you do in your life are, on a scale from 0 to 10. Zero means you feel the things you do in your life are "not at all worthwhile", and 10 means "completely worthwhile".

A2. Overall, to what extent do you feel the things you do in your life are worthwhile?[0-10]

The following questions ask about how you felt yesterday on a scale from 0 to 10. Zero means you did not experience the feeling "at all" yesterday while 10 means you experienced the feeling "all of the time" yesterday. I will now read out a list of ways you might have felt yesterday.

A3. How about happy? [0-10]

A4. How about worried? [0-10]

A5. How about depressed? [0-10]

A large-scale application of subjective well-being questions can be found in the Gallup World Poll (GWP), a survey that is representative of about 98% of the world's population. GWP includes an item on how people evaluate the quality of their lives as well as other dimensions of subjective well-being. Life satisfaction measured with the question:

"Please imagine a ladder, with steps numbered from 0 at the bottom to 10 at the top. The top of the ladder represents the best possible life for you and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?"

Answers take values from 0 to 10 (also "don't know" and "refused to reply") at the individual level. The indicator at the regional (country) level is the weighted average of individuals who gave a response (from 0 to 10) in a given region (country).

As an alternative, the wording in use by the UK Office for National Statistics (ONS) for over 10 years could be considered. In recognition of the lack of a large-scale official UK survey measuring subjective well-being, and as an important component of National Well-being, the ONS included four subjective well-being questions on the Annual Population Survey (APS) from April 2011 covering evaluative, eudemonic, and experience measures of subjective well-being:

- 1) Overall, how satisfied are you with your life nowadays? (reflective)
- 2) Overall, to what extent do you feel the things you do in your life are worthwhile? (eudemonic)
- 3) Overall, how happy did you feel yesterday? (positive affect)
- 4) Overall, how anxious did you feel yesterday? (negative affect)

All questions use a 0–10 scale where 0 = 'not at all' and 10 is 'completely'.

Finally, the 5-item World Health Organization Well-Being Index (WHO-5) is among the most widely used questionnaires for assessing subjective psychological well-being. Respondents are asked to consider five statements describing feelings or mental states to evaluate the degree of frequency at which they have experienced these states over a certain period (e.g. over the two weeks prior to being surveyed):

- 1) I felt good and in a good mood
- 2) I felt calm and quiet
- 3) I felt energetic and vigorous
- 4) I woke up feeling fresh and available
- 5) My daily life has been full of interesting things

For each of these, respondents select their answer from the following scale: "All the time"; "Most of time", "Half of the time", "Less than half of the time", "From time to time" and "Never". Each answer corresponds to a value ranging from 5 ("All

of the time") to 0 ("Never"), which can then be summed up to obtain an overall score describing the person's mental state. These results can then be analysed for correlations with other characteristics such as digital technology use.

This on its own would already offer new insights, notwithstanding the fact that causality can run both ways. Nevertheless, the relationships identified could provide a data-driven basis to inform the design of follow-on survey modules investigating specific relationships between digital practices and well-being in detail. Guided by the findings of correlational analysis, follow-on modules could focus either on a given technology (e.g. social media; teleworking) or on a specific user experience (e.g. online fraud, cyber bullying, social connections).

For instance, if correlational analyses were to reveal higher occurrence of low life satisfaction for intensive social media users with low digital skills, a specific module on social media asking respondents to describe subjective states and objective events related to their usage of particular digital applications could be developed. Box 7 provides examples based on existing surveys.

Box 7. Monitoring exposure to disinformation and addictive behaviours online

The European Community Survey on ICT usage in households and by individuals has included a module on respondents' perceived identification of disinformation and behaviour checking truthfulness of online information. Questions include:

1) Have you seen information or content (e.g. videos, images) that you considered untrue or doubtful on Internet news sites or social media (e.g. Facebook, Instagram, YouTube, Twitter) in the last 3 months?

2) Have you checked the truthfulness of the information or content you found on Internet news sites or social media in the last 3 months and if so, how did check truthfulness of the information or content found on the Internet?

In the Netherlands, the Annual Perception Survey is conducted by Statistics Netherlands (CBS) to gain an understanding of views and sentiments in Dutch society based on people's perceptions and opinions, with survey topics varying from year to year. The 2017 survey included questions related to social media, which quantified:

1) The amount of time spent on social media.

2) The importance of social media in the respondents' life measured by the occurrence of feelings such as "restless checking of messages" or "fear of missing out on things".

3) The impact of social media on objective factors of well-being such as sleep, academic performance and social interactions.

Sources: Eurostat; Netherlands Statistics.

The following steps can be taken by National Statistics Organisations in order to facilitate the implementation of subjective well-being questions and harmonisation:

1. Agree on question(s) to be implemented to evaluate subjective well-being leveraging on existing guidelines and best practice sharing (Box 6).
2. Implement the agreed modules in ICT access and use surveys.
3. Run basic correlational analysis between reported well-being outcomes and digital technologies used (e.g. social media, e-commerce) as well as frequency and intensity of technology usage (where possible) and contextual information provided by the ICT survey (e.g. level of digital skills, quality of Internet access, etc.).
4. Refine analysis by establishing technology user profiles based on the clusters of digital technologies used, purpose and intensity of usage, and personal characteristics to see how those affect well-being outcomes.
5. Based on the patterns identified, develop follow-on modules to investigate specific relationships in more detail (including using objective questions).
6. Review surveys in a timely manner in order to keep up with rapid innovation cycles and adapt follow-on modules to emerging themes (e.g. tele-working and well-being in the context of the COVID-19 pandemic).

Such a two-phase process would echo the approach of Gluckman and Allen (2018^[5]), which pre-identified “a limited number of constituent elements of well-being that merit particular attention and which are not well accounted for in existing frameworks” (detailed in Box 3 and Annex A) in order to frame discussion and maximise the impact of their recommendations. Longer term, devices such as dashboards or indices could potentially be compiled to summarise the overall effect of digital transformation on well-being.

Further developments also could include the extension of such analysis to younger cohorts to investigate the well-being impacts of digital technology usage on children, whose cognitive and emotional development is thought to be particularly affected (Burns and Gottschalk, 2019^[44])

Annex. A selection of initiatives to measure well-being in the digital age

Objective measures of well-being factors from a digital perspective

The International Network for Government Science Advice (INGSA) Analytical Tool for understanding well-being in digital transformation

Responsible entity: INGSA, OECD

Description: The International Network for Government Science Advice (2018^[5]) developed an analytical tool that reviews the main dimensions of human happiness and how these are affected by a typology of four foundational technologies: i) monitoring and information technologies; ii) automation technologies; iii) AI and related technologies; and iv) communication technologies. Using this analytical tool, they define five priority areas in the context of the digital transformation: i) early childhood development ii) mental health iii) social inclusion, iv) personal and public safety, and v) governance. For each of these dimensions of well-being, a range of indicators and measurement steps are proposed to better capture the effects of digital transformation.

Read more: <https://www.ingsa.org/wp-content/uploads/2018/10/INGSA-Digital-Wellbeing-Sept18.pdf>.

OECD Digital Well-being Wheel

Responsible entity: OECD

Description: The OECD has created a “digital well-being wheel” that compares 36 countries on their performance in harnessing the opportunities and reducing the risks associated with digital transformation. It uses the OECD’s Well-being and Progress framework (OECD, 2017^[14]) as a foundation to map out well-being effects of digital transformation. The digital well-being wheel includes 33 indicators across 11 dimensions that span factors such as ICT use and skill level, the impact of ICTs on employment and earnings, social connections, digital government, and subjective well-being. These indicators are derived from multiple data sources, including the OECD Programme for the International Assessment of Adult Competencies (PIAAC) and the Programme for International Student Assessment (PISA). The available indicators of opportunities and risks of digital transformation allow for a detailed analysis

of OECD countries' relative strengths and weaknesses as well as an assessment of the way that digital transformation impacts well-being in OECD countries.

Read more: <https://doi.org/10.1787/9789264311800-en>.

OECD Going Digital Toolkit

Responsible entity: OECD

Description: The Going Digital Toolkit is structured along the lines of the Going Digital Integrated Policy Framework (OECD, 2020^[31]). It includes indicators which help countries assess their state of digital development and develop policies to support an increasingly digital economy and society. The Toolkit includes a range of indicators that link digital aspects of the digital transformation to aspects of well-being. These aim to represent the impact of digital transformation on the environment, work life, mental health, skills, privacy and security, and to assess the extent to which digital divides related to geography, income, gender and firm size exist.

Read more: <https://oecd.org/going-digital-toolkit>.

United Nations E-Government Development Index (EDGI)

Responsible entity: United Nations Department of Economic and Social Affairs (UN DESA)

Description: The UN-DESA has developed the E-Government Development Index (EDGI) and the Measurement and Evaluation Tool for Citizen Engagement and E-Participation (METEP). While not a holistic approach to digital transformation effects on well-being, it looks at how the former interacts with two of its key dimensions i.e. governance and community engagement (see Table 1). The EDGI is a composite index that results from the aggregation of an online services index, telecommunication infrastructure index, and human capital index. The UN has conducted this biannual survey since 2001 that assesses the e-government status of UN member states. The 2018 survey examines the trend toward higher levels of online government services and the impact of digitalisation on the public sector and the implications for inclusion. The METEP is an analytical framework and tool for measuring and evaluating aspects of the state of e-participation readiness of government institutions.

Read more: <https://publicadministration.un.org/egovkb/en-us/About/Overview/-E-Government-Development-Index>.

Subjective measures of well-being from a digital perspective

Canadian module on cyber bullying and cyber stalking among Internet users

Responsible entity: Statistics Canada

Description: Statistics Canada's General Social Survey on Canadian's Safety, is filed every five years in order to better understand how Canadians perceive crime and the justice system and to capture information on their experiences of victimisation. Since 2014 it includes a module on cyber bullying or cyber stalking (CBU respondent module). Respondents were asked to report occurrences of these new forms of victimisation over the five years preceding the survey, which focused on the young adult population aged 15 to 29. A follow on study conducted by Statistics Canada (Darcy, 2016^[45]) used the data to identify the characteristics of the victims of cyber bullying/cyber stalking in descriptive and multivariate analyses.

Read more: <https://www23.statcan.gc.ca/imdb/p3Instr.pl?Function=assembleInstr&lang=en&Item.Id=1236284#qb1238831>.

Netherlands Perceptions Survey

Responsible entity: Statistics Netherlands (CBS)

Description: The Perceptions Survey is an annual survey conducted by Statistics Netherlands (CBS) aimed at gaining an understanding of the views and sentiments in Dutch society based on people's perceptions and opinions on various survey topics that change from year to year. The 2017 survey included questions related to social media, which quantified both objective and subjective phenomena in relation to that digital practice. These were: i) the amount of time spent on social media; ii) the importance of social media in the respondents' life measured by the occurrence of feelings such as "restless checking of messages" or "fear of missing out on things"; and iii) the impact of social media on objective factors of well-being such as sleep, academic performance and social interactions.

Read more: <https://www.cbs.nl/en-gb/news/2018/20/more-and-more-young-adults-addicted-to-social-media>.

French Medical surveillance survey of employee exposure to occupational risks Sumer Survey

Responsible entity: French Labour Ministry, Department for Research, Studies and Statistics (Dares) in co-operation with the Department for Public Service and Public Administration (DGAFP).

Description: The fourth edition of the Sumer survey, conducted in 2017, maps out employee exposure to the main occupational risks in France, to define priority prevention actions. While the survey is mainly administered by occupational health doctors, a self-assessed module is included and filled before consultation. It inquires about subjective phenomena such as tension at work (job strain), which is thought to be predictive of depression, cardiovascular disorders and other diseases. Relevant to this note and as part of the self-assessed module, the 2017 edition of Sumer survey inquired teleworking practices, their frequency and self-evaluations of its benefits for work-life balance or integration in the work environment.

Read more: https://dares.travail-emploi.gouv.fr/IMG/pdf/dares_analyses_evolution_expositions_professionnelles_salaries_sumer_2017.pdf.

South Korean Smartphone Addiction Scale in the Survey on Smartphone Dependency and the Korean Children and Youth Panel Survey

Responsible Entity: South Korea's National Information Society Agency (NIA); Korea Internet and Security Agency

Description: In a recent survey filed to UNECE participating countries (see **Box 5**) Statistics Korea reported having a dedicated "Survey on Smartphone dependency". Further, papers investigating the theme (Kim and Chun, 2018^[46]) note that the Korean Children and Youth Panel Survey (KCYPs) included a version of the Smartphone Addiction Scale (SAS). The latter was created to investigate the development of addictive behaviour among smartphone users, especially young people (Kwon et al., 2013^[36]). The scale for smartphone addiction consisted of 6 factors and 33 items with a six-point Likert scale (1: "strongly disagree" and 6: "strongly agree") based on self-reporting. The six factors were daily-life disturbance, positive anticipation, withdrawal, cyberspace-oriented relationship, overuse, and tolerance, as detailed by Kwon et al (2013^[37]).

Read more: <http://kostat.go.kr/portal/eng/pressReleases/13/3/index.board?bmode=download&bSeq=&aSeq=369035&ord=2>.

Joint collection of data on general well-being and technology usage

Canadian module on health and well-being in the Internet Use Survey

Responsible entity: Statistics Canada

Description: The Canadian Internet Use Survey includes a module collecting data on Further Demographic Information (FD_R010; FD_020; FD_030). Respondents are asked about the general state of their health, of their mental health as well as their overall satisfaction with their life, which is one of the main measures of subjective well-being. This data is collected alongside detailed data on respondents' access and use of digital technologies to compare well-being outcomes between different types of users.

Read more: <https://doi.org/10.25318/2210011401-eng>.

Eurostat EU-SILC Survey ad hoc module on well-being

Responsible entity: Eurostat

Description: The European Statistics on Income and Living Conditions (EU-SILC) instrument contains detailed data on living conditions in participating European countries. The 2013 survey included an ad-hoc Well-being Module consisting in a set of self-reported well-being questions. These were thus collected alongside a question on Internet access. Similar to other large survey vehicles, the Internet-related question contained by the EU-SILC survey is not very detailed and in this case does not specify whether the individual uses the Internet, let alone the frequency of use. In *How's Life in the Digital Age* (OECD, 2019^[2]), these data were used punctually to assess the impact of Internet use on subjective well-being and Internet access was considered a proxy for Internet use.

Read more: <https://ec.europa.eu/eurostat/documents/1012329/1012401/2013+Module+assessment.pdf>.

Italian module on subjective well-being in ICT use surveys

Responsible entity: ISTAT (Istituto Nazionale di Statistica)

Description: Responding to a survey regarding data collection on technology-use and well-being that was sent to National Statistical Offices in UNECE countries, Italy reported including a question of subjective well-being in its household survey on Internet Adoption and Use. Respondents are asked how satisfied they are with life as a whole (**Box 5**).

Read more: <https://www.istat.it/en/archivio/177152>.

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