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Ex-ante socio-economic impact assessment for a social science research infrastructure: The case of EuroCohort

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ABSTRACT

The aim of this paper is to present the *ex ante* Socio-Economic Impact Assessment of a European Social Science Research Infrastructure (RI) named EuroCohort that will provide, over the next 34 years, a longitudinal study of the well-being of children and young people across Europe.

KEYWORDS

social science, research infrastructure, socio-economic impact assessment

JEL CLASSIFICATION

D61, D81, O32

1 | INTRODUCTION

The aim of this paper is to present the *ex ante* socio-economic impact assessment of a European Social Science Research Infrastructure (RI),[1] named EuroCohort, an accelerated cohort survey including a sample of new-born babies as well as a sample of school-age children that will provide, over the next 34 years, a longitudinal study of the well-being of children and young people across Europe. EuroCohort is coherent with the European Parliament resolution of 10 February 2021 which states that policies for the next generation, children and young adults, such as education and skills are one of the six pillars to achieve recovery from the pandemic crisis and to enhance the resilience of the Union and of its Member States.

[1] Typical science RI facilities are mainly based on tangible assets, capital intensive, major and long lasting. On the other side, social sciences RI facilities are mainly based on intangible assets, labor intensive, smaller and not so long lasting. See Florio (2019) for a general discussion on this topic.

As the single European birth cohort longitudinal survey, EuroCohort will complement information provided by other existing European longitudinal surveys like the European Social Survey (ESS), the Survey of Health, Ageing and Retirement in Europe (SHARE), and the Generation & Gender Programme (GPP) collecting detailed and accurate life history data from European children and young adults. EuroCohort has already been the topic of the FP7 Measuring Youth Well-Being (MYWeB) project,[2] which has provided the proof of concept for the development of a Europe-wide longitudinal survey of child and youth well-being, and of the Horizon 2020 European Cohort Development Project (ECDP) which has created a specification and business case for this European RI.[3] A new European Project related to the preliminary phase of EuroCohort, the H2020 Coordinate Project, has started in April 2021.

There is a large literature showing the policy relevance of children's well-being for society as a whole. The promotion of children's well-being is important not only for children to enjoy a good childhood, but also since it may increase their future well-being over time. For instance, the accumulation of early skills by children has a direct correlation to the development of more advanced skills (Cunha & Heckman, 2007). In this respect, policy interventions and social investments in this area may also be economically efficient (Heckman & Tim, 2014).

In 2019 the OECD published a Reference Framework for Assessing the Scientific and Socio-Economic Impact of Research Infrastructures (OECD, 2019). This framework draws on the experience of a number of existing research infrastructures, including several that are directly relevant to EuroCohort (among them there were the ESS and the Consortium of European Social Science Data Archives (CESSDA)). Moreover, there is a small but growing literature on the socio-economic impact of research infrastructures (see, for instance, Kounduri et al., 2014; EC, 2019b; Catalano et al., 2021).[4] In this paper, we take stock of these works in order to evaluate the ex-ante socio-economic impact of a social science RI such EuroCohort.

Finally, it is important to specify that the importance of a European Longitudinal survey on the well-being of children and young adults like EuroCohort has been enhanced by the COVID-19 pandemic because the data that it will supply may contribute to the design of evidence-based social policies aimed at reducing the long-term consequences of the pandemic on the well-being of children and young adults. In this regard, it should be stressed that among new and serious challenges faced by for the economies and societies of all high-income countries, "children—as dependants—are among those at greatest risk of seeing their living standards fall and their personal well-being decline" (Richardson et al., 2020).

The remaining part of this paper is organized as follows. The next section contains a short literature review. Section 3 presents a general description of EuroCohort. Section 4 is devoted to the socio-economic impact evaluation of this longitudinal survey. Section 5 presents a risk-assessment exercise. Section 6 concludes.

2 | LITERATURE REVIEW

In this section we are going to present a short literature review of different projects and published works addressing socio-economic evaluations or cost–benefit analysis (CBA) of policies aimed at improving children and young people's well-being. In general, following Vining and Weimer

[2] Further information about this project can be found at https://www.fp7-myweb.eu/. See also Pollock et al. (2018).

[3] Further information about this project can be found at www.eurocohort.eu. In particular, the interested reader may refer to Ecchia et al. (2019).

[4] For a general discussion, see EC (2019a), Deliverable 4.1 Concept note of modular impact assessment framework, RI-PATHS (Research Infrastructures Impact Assessment Pathways) project.

(2010), it is useful to point out that the application of economic evaluation methods to social policy raises a number of issues. Among those, the main ones are: the need for a comprehensive approach (taking account of all valued effects in predicting net benefits) approach to assessing social policies; the need to recognize and explicitly address the great uncertainty in prediction and valuation involved in applying economic evaluations in most social policy areas; the need to consider those behaviors, which occur frequently in social policy, that do not satisfy the assumptions of neoclassical welfare economics, and the application to policies that often have strong distributional goals and consequences.[5]

Aos et al. (2004) provide a literature review on prevention and early intervention programs for youth evaluation conducted, generally in the United States, since 1970. The conclusions are mixed. Some programs gave taxpayers a good return for their money. However, some others failed to generate more benefits than costs. This source evaluates the benefit-cost ratio of a wide set of prevention and early intervention programs for youth and concludes that the value of this indicator ranges from 0 to over 100. It is worth noticing that 23 out of 61 programs examined had a benefit-cost ratio less than 1, while the value of this indicator for all but four of these programs did not exceed 28.

Barnett and Masse (2007) present the results of a CBA conducted for the Abecedarian program, which offered educational experiences of up to 10 h/day (approximately 250 days per year) for children from early in the first year of life until they entered kindergarden. Under this program a group of 111 disadvantaged North Carolina children born between 1972 and 1977 were randomly assigned as infants to either the early educational intervention group or the control group. Those results were obtained from a randomized trial with longitudinal follow-up through to the age of 21. They show that an important benefit of the Abecedarian program was the labor market success of participants' mothers. According to Barnett and Masse (2007), the Internal Rate of Return of the Abecedarian program exceeds 7%.

Karoly (2016) reviews the CBA results for several US preschool programs. Among those programs the one displaying the lowest benefit-cost ratio is the Oklahoma's universal preschool program (Tulsa program) serving children one year before entering kindergarten. The benefit–cost ratios for both the full-day and the part-day programs are presented. Furthermore, for each of the above values of this indicator for children in each of three following income groups (free-lunch students, reduced-price lunch students and full-price lunch students) are provided. These benefit–cost ratios range from 4.08 for part-day free lunch students to 2.82 for full-day full-price lunch students, which represent the lowest value of this indicator among the programs evaluated by this study.

Schweinhart (2016) takes into consideration several US Early Childhood Care and Education (ECCE) programs and, coherently with Aos et al. (2004), concludes that only high-quality ECCE programs display a return of investment which is large enough to allow us to affirm that they are socially desirable from the point of view of the efficient use of the available resources.

Saminder and Gillian (2016) provide some estimates of the monetary value of benefits and costs generated by the services supplied by the Children's Centre Services in England.[6] The services

[5] The Childonomics research project (Gheorghe et al., 2017) defined a different approach to assess the economic return of investment into child services and interventions. The full evaluation methodology that appears to be closest to the aims of Childonomics is Cost Consequence Analysis (CCA). CCA is a form of Cost-Effectiveness Analysis which presents the range of benefits identified alongside with the incurred costs without aggregating them in a single metric (e.g. a cost-effectiveness ratio), leaving instead the decision makers (and users of the methodology, in a broader sense) to incorporate their own considerations when judging the relative merits of the intervention or program.

[6] Children's Centre Services were launched in 2002 to provide integrated multi-agency services at a single point of access for families with young children.

they supply include childcare and early education programs, health services, parenting classes and specialized family support services. According to this source, the benefit-cost ratio of those services ranges from 0.5 to 6.5.

Cannon et al. (2018) consider 115 US early childhood programs related to children or parents of children from the prenatal period to age 5. This study also discusses programs such as home visiting, parent education, government transfers providing cash and in-kind benefits. The findings show that most of the programs considered have positive effects on at least one child outcome and those with an economic evaluation tend to show positive economic returns.

Obviously, the above conclusions about improving the efficiency of the expenditure on children and young people's well-being in the US by switching resources cannot be applied directly to EU member states because of the differences between the US and European countries' social conditions. However, the results presented above, particularly the ones presented by Aos et al. (2004) and Schweinhart (2016) and Cannon et al. (2018) suggest that most likely there is room for improving this efficiency also within the EU. In this respect, Doyle (2020) presents a very interesting analysis of the impact of investment in parenting from pregnancy to formal schooling in a disadvantaged community in Dublin, Ireland. The results of that paper show the positive and substantial impact of investment in parenting from pregnancy to formal schooling on children's cognitive, social and behavioral development and constitute an important benchmark for future research in this area in other European countries.

EuroCohort is a RI that will provide longitudinal survey data to be used for better targeting social policies. In this respect, survey data are of benefit only to the extent that they are used in the policy process and affect change in policy, government expenditure and individual programs that might contribute to children and young people's well-being.[7]

The impact of a longitudinal study on policy may depend upon several variables. One of them is the format in which survey data are presented. Technopolis Group (2017) is a study assessing the policy, academic and teaching impacts that have been achieved through the ESS. According to this source, data presented in formats that are comprehensible and can be easily shared and used will have a higher probability of being used by policymakers than data presented in a less user-friendly form. The preparation of a tabular volume of ESS data for the Austrian ministry of social affairs is an example of translation of ESS data that forms a pipeline to a major use of the data.[8]

Moreover, it is possible to observe that there is no single, straightforward or commonly agreed method for estimating government expenditure on children and young people's well-being. This reflects both the debates on the nature and conceptualization of well-being and the challenges of cross-country comparison of government social spending. It is beyond the remit of this paper to address the methodological and empirical debate in this area. Rather, we draw on the substantive work undertaken by the OECD and on data from the OECD and from Eurostat in this field to provide (see Appendix) an estimate of social expenditure in the 21 EU Member States (Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden and United Kingdom) which were also OECD Member States in 2013.[9] We also use the available data to provide a rough bottom line estimate of total spending on children and young people's well-being for the remaining EU Member States (Bulgaria, Croatia, Cyprus, Latvia, Lithuania, Malta and Romania). This evaluation can provide a benchmark of the scale of the improvement in the effectiveness of this expenditure that EuroCohort could generate.

[7] See O'Leary and Fox (2018).

[8] See Technopolis Group (2017).

[9] As it is well-known, since 2013 two more EU Member States, Latvia (2016) and Lithuania (2018), joined the OECD.

Our literature review shows that it is possible to improve the efficiency of the expenditure on children and young people's well-being by switching resources from lower efficiency to higher efficiency programs. According to the sources quoted above, the benefit-cost ratio of the different child and young adult intervention programs is highly volatile. Therefore, there is plenty of room for potentially improving the efficiency of the expenditure related to children and young people's well-being using evidence-based policies informed by the data provided by Eurocohort.

3 | EUROCOHORT

A short description of the main organizational aspects of EuroCohort is provided below. We consider here that all 28 European countries (27 European Union Member States and the UK) will participate in EuroCohort.

3.1 | The EuroCohort's RI and its longitudinal design

EuroCohort will have a central research hub which will be responsible for and manage the functioning of the survey. This survey hub will be located in a single institution. In addition, EuroCohort will develop an online portal where users can access information including, for instance, survey data, methodological reports and published research.

We also consider that each country will have a national coordinating team. Those 28 national coordinating teams will manage the fieldwork (via data collection agencies) and will co-operate with the central team in other national level issues. In particular, each national team shall guarantee, among others, organizational capabilities such as technical and scientific expertise (for a wider discussion see Wilska & Salmela-Aro, 2019). Moreover, the micro-data collected at the national level from children and young people and their families/carers may to be linked with national administrative datasets to provide further opportunities for researchers and policy makers in different policy areas (e.g., education, health).

Figure 1 illustrates SHARE's governance arrangements which represent a relevant example for the future governance model of EuroCohort.

As for the longitudinal design of this survey, it is planned to follow two cohorts, called respectively Age 8 cohort and Age 0 cohort (see Figure 2).

Age 8 cohort will be interviewed for the first time in 2027 at age 8–9. We consider that a follow-up interview for this cohort will occur every three years. Therefore, age 8 cohort will have follow-up interviews at 11–12, 14–15, 17–18, 20–21 and 23–24.

Age 0 cohort will be interviewed for the first time in in 2029 with follow-up interviews at 2–3, 5–6, 8–9, 11–12, 14–15, 17–18, 20–21 and 23–24.

The whole project's timeline will be the following:

- preparation phase from January 2022 to December 2026 (5 years)
- implementation phase from January 2027 to December 2032 (6 years)
- operation phase from January 2033 to December 2053 (21 years)
- termination phase from January 2054 to December 2055 (2 years).[10]

[10] In point of fact, the real project's timeline starts before 2022 because, as we have already noticed in the introduction, in the last few years EuroCohort has been the object of an extensive design phase. In 2015–16 this survey was already

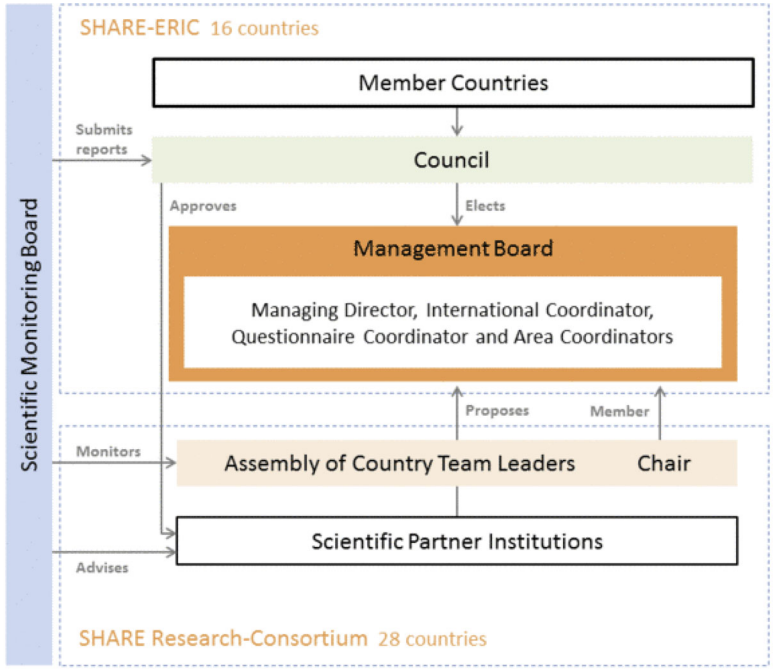

FIGURE 1 Share Governance Arrangements.
Source: http://www.share-project.org/organisation/share-eric.html
[Colour figure can be viewed at wileyonlinelibrary.com]

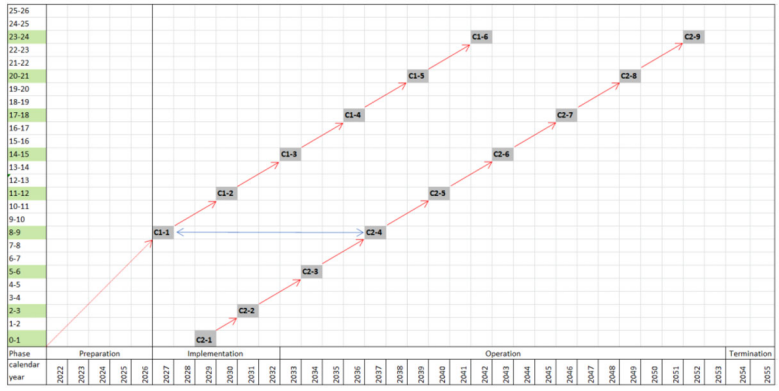

FIGURE 2 Longitudinal design of EuroCohort [Colour figure can be viewed at wileyonlinelibrary.com]

3.2 | Sampling

Following the analysis presented in the ECDP project, we define a large country as a country with a population above 10 million people, and a small country as a country with a population

the topic of the second part of the FP7 MYWeB project, which has provided the proof of concept for the development of a Europe-wide longitudinal survey of child and youth well-being. Furthermore, from January 2018 to December 2019 EuroCohort has also been the topic of the Horizon 2020 European Cohort Development Project (ECDP), which has created a specification and business case for this European RI.

below 10 million people (see the relevant table in the Appendix).[11] Each large country starts with an age 0 cohort effective sample size of 10,000 children (this corresponds to a nominal sample size of 14,300), while each small country starts with an age 0 cohort effective sample size of 5,000 children (7,200 nominal sample size). For the cohort of 8-year-olds, each large country starts with an age 8 cohort effective sample size of 8,000 children (11,400 nominal sample size), while each small country starts with an age 8 cohort effective sample size of 4,000 (5,700 nominal sample size) (Lynn, 2019).[12]

This survey will be based on Computer-Assisted Personal Interviewing (CAPI) at wave 1 for both cohorts. From wave 2 on the survey will be based on a Computer-Assisted Web Interviewing (CAWI)–CAPI mixed-mode for both cohorts. We consider that at wave 2 we will have 50% CAWI and 50% CAPI, while in the next two waves the percentage of CAWI will increase by 10% at each wave until reaching 70%, and it will remain constant thereafter.

As it is customary in these cases, before the beginning of the very first wave of interviews Euro-Cohort will undertake a series of piloting phases from pre-pilot cognitive interviewing through to a full-scale dress rehearsal in each country for each cohort. This will allow for fine-tuning of the functioning of the research instruments and field processes before the start of each cohort fieldwork wave.

With regard to piloting, we consider a 250 interviews per country pilot and a full-scale dress rehearsal before each cohort fieldwork wave. Dress rehearsal size will be equal to 400 interviews in small countries and 600 interviews in large ones. Pilot and dress rehearsal interviews will follow the same rules stated above for the wave they refer to and will take place the year before it (see Babarović et al., 2019). The costs of piloting and dress rehearsal reported in the preparation phase will be reduced during the implementation and operation phases, given that the cognitive interviewing and pilot targeted sample sizes remains the same but the dress rehearsal sample will be subject to attrition.

3.3 | Non-response and attrition rates

Following the analysis presented in the ECDP project, we consider a response rate of 75% for the second wave of each cohort, an attrition rate of 15% for the third wave and 10% for the fourth wave. After the fourth wave we consider a 5% attrition rate between each wave of the survey. Response and attrition rates will vary among countries. At this stage we are not able to credibly estimate these variations. Therefore, we consider here that all countries have the same response rate for the first wave of each cohort and the same attrition rate thereafter.

A way to enhance response rates may be to use monetary incentives. The use of incentives is to be decided at the country level, because both the need for them and their effect may depend upon country-specific factors. Therefore, at this stage we are not in the position to estimate either the amount of these incentives or the extent to which they will be awarded. However, in the analysis

[11] According to this classification, Portugal belongs to the group of large countries, while Hungary, with a population of 9.8 million, should be considered a small country. However, this classification could be refined by considering that the size of the age group 0–24 in Hungary (2,489,938 people) is almost the size of the same age group also in Portugal (2,517,097 people). Therefore, as an exception from the general rule stated above, we decided to also include Hungary into the group of large EU countries.

[12] It seems worth noticing that in a different context EU-SILC longitudinal sampling (2011) uses similar proportions in determining the longitudinal sample size for each European Country.

conducted below we consider to award uniform monetary incentives to all participants across Europe for indicative purposes. The values of these incentives utilized in our analysis should be considered as average values of the real figures. We already know that it may be necessary to monitor the extent to which monetary incentives disproportionately encourage the participation of low-income people and thereby have an effect on the composition of the sample (see Stoop et al., 2016).

4 | EUROCOHORT SOCIO-ECONOMIC IMPACT ANALYSIS

To assess the social desirability of EuroCohort from the point of view of the efficient use of the available resources it is possible to take as a starting point the framework for the evaluation of RIs presented by Florio and Sirtori (2016). However, these authors focus on capital intensive RIs, while surveys like EuroCohort are RIs more labor than capital intensive. Therefore, in this paper we will need to adapt their framework to the socio-economic evaluation of a survey, following, in particular, the recent European funded research projects which have analysed the socio-economic impact of research infrastructures (see, for instance, Kounduri et al., 2014; Beagrie & Houghton, 2016; EC, 2019b).

4.1 | Benefits

4.1.1 | Distribution of benefits

The first step to evaluating the benefits generated by a project is to identify the set of potential beneficiaries. In the case under scrutiny this set includes:

- *scientists and researchers* producing knowledge;
- *young professionals, junior researchers and students* spending time working within the RI;
- *children and young people* receiving a benefit from an improvement in the effectiveness of government expenditure and individual programs that might contribute to improve their well-being. It looks very likely that this group will enjoy a relevant share of the benefits generated by EuroCohort;
- *policymakers* getting the chance to develop more efficient and/or effective policies aimed at improving children and young people's well-being. This can allow them to save scarce public resources for different uses.

Therefore, below we consider that the benefits arising from any actual or possible use of a longitudinal survey RI can be of four main types:

- Use value and efficiency gains for researchers
- Knowledge output
- Human capital accumulation
- Benefits provided to end-users (policy makers, children and young people).

4.1.2 | Use value and efficiency gains for researchers, practitioners and policymakers

To assess the benefits for researchers generated by EuroCohort we can start by noticing that if we consider the market for scientists as perfectly competitive, the opportunity cost of their time can be assumed as being equal to their average hourly compensation.

According to the European Commission (2007) the average yearly salary of an EU researcher in 2006 was almost €38k. That corresponds to about $€_{2018}$ €46.6k. To estimate the average hourly wage of an EU researcher it is possible to divide this yearly salary for 1,720 hours per year of work, obtaining €22.10 per hour, which in 2018 was equivalent to €27.10 per hour.

Pollock et al. (2020) estimates that the number of EU28 potential academic users with an interest in EuroCohort findings is 17,000 using as a starting point the UK's 2014 Research Excellence Framework data on the number of academics in UK institutions whose publications were externally peer reviewed by discipline, weighting each discipline[13] according to the proportion of its academics that will benefit from EuroCohort, and extrapolating the results obtained to the EU28 countries. Taking SHARE as a reference point, they also estimate that each year from 500 to 700 of those potential academic users will actually log in to EuroCohort, with approximatively 2,000 downloads.

The same algorithm also allows Pollock et al. (2020) to estimate that in the UK 43.2% of those academic users will be staff, while the remaining 56.8% will be PhD students. To obtain a conservative estimate of the hourly cost of a PhD student we consider as a floor for this cost the minimum yearly cost of an Italian PhD student, which is set by national law at €18.8k, and divide this cost for the same 1,720 hours per year of work we used to calculate the hourly wage rate for the average EU researcher, obtaining €11 per hour. From the above, assuming that the proportion between staff and PhD students among potential EU28 academic users is equal to the one of the UK calculated above, it is possible to estimate the average hourly opportunity cost of the time of an academic user of EuroCohort as €18, which corresponds to the weighted average of the hourly wages of a researcher and a PhD student.

Following the approach envisaged by Beagrie and Houghton (2016) for the European BioInformatics Institute (EMBL-EBI), the most direct measure of the value of EuroCohort to the academic community (use value) is the time (and therefore cost) users will spend accessing its database (access time) and obtaining the desired data. To quantify the monetary value of the access time of EuroCohort we timed 2,000 accesses per year by an estimated average access time of 1 hour and an average hourly opportunity cost of an academic user of EuroCohort of €18, obtaining a yearly value of the access time of EuroCohort to the academic community of €36k.

A second component of the use value of EuroCohort to the academic community is the amount of time users will spend working with data from EuroCohort (use time). To quantify this use time, following Florio et al. (2016) it is possible to consider that the average EU researcher devotes a 60% share of his or her time, corresponding to around 1,000 hours per year, to research activities. Considering that the average academic user of EuroCohort will spend 1% of his or her research time, corresponding to 10 hours per year, working with EuroCohort data, and an average of 600 academic users of EuroCohort per year, it is possible to obtain an estimated total use time of

[13] To perform this exercise, those disciplines where grouped as follows: (1) Psychology, Psychiatry and Neuroscience (weight: 0.05); (2) Economics and Econometrics (weight: 0.05); (3) Social Work and Social Policy (weight: 0.1); (4) Sociology (weight: 0.1); (5) Education (weight: 0.2); (6) Sports and Exercise Sciences, Leisure and Tourism (weight: 0.01); (7) Communicarion, Cultural and Media Studies, Library and Information Management (weight: 0.01).

EuroCohort data of 6,000 hours per year. Timing these 6,000 hours of EuroCohort use time per year by the average hourly opportunity cost of an academic user of EuroCohort of €18 it is possible to obtain a yearly use time value of EuroCohort of €108k.

Following once again the approach envisaged by Beagrie and Houghton (2016), we can consider that the availability of EuroCohort data will enable researchers to reduce the amount of time spent working with children and young people's well-being data by 50% with respect to what would be required in order to perform the same task using administrative data. To quantify this efficiency gain in monetary terms, we consider that without EuroCohort, 300 academic users would have allocated 20 hours per year working with children and young people's well-being data reaching the same productivity that they are able to reach working 10 hours per year with EuroCohort data. Therefore, the existence of EuroCohort data enables those researchers to save 3,000 hours per year of their working time and to use that time to do additional research which brings additional returns. Timing these 3,000 hours of saved research time by the average hourly opportunity cost of an academic user of EuroCohort of €18 we obtained a yearly efficiency gain generated by EuroCohort of €54k.

Pollock et al. (2020) estimate that the number of EU28 individual policymakers with an interest in EuroCohort findings is 6,300 by extrapolating from the estimated number of UK's people with a direct interest in policy who are also potential beneficiaries of EuroCohort findings.[14] Following the same approach we have just used for researchers, we can consider that the availability of EuroCohort data will enable these policymakers to reduce the amount of time spent working with children and young people's well-being data by 50% with respect to what would be required in order to perform the same activity using administrative data. To quantify this efficiency gain in monetary terms, we consider that without EuroCohort these 6,300 policymakers would have allocated 10 hours per year of their time to work with children and young people's well-being data, and, by doing so, they would be able to reach the same productivity that they are able to reach working 5 hours per year with EuroCohort data. Therefore, the existence of EuroCohort data enables those policymakers to save cumulatively 31.5k hours per year of their working time and to use that time to do additional work which brings additional returns.

Quantifying in monetary terms the value of this time is a task beyond our means.[15] To overcome this problem, we decided to use as a proxy for the cost of policymakers the cost of senior researchers (€150k per year in high-cost countries, €75k in medium-cost and €37.5 in low-cost ones).[16] Dividing these amounts for 1,720 hours per year of work it is possible to obtain a labor cost for policymakers equal to €87.2 per hour in high-cost countries, €43.6 in medium-cost ones and €21.8 in low-cost ones. Timing these amounts by the estimated number of hours of work saved by policymakers in each country will give a total value of the efficiency gain by policymakers generated by EuroCohort equal to €1.7m.

Finally, Pollock et al. (2020) identify at the European level around 390 child advocacy organizations that may utilize the EuroCohort data. Considering an average of 3 people for each organization using EuroCohort data, that will result in 1,170 child advocacy organization staff members.

[14] This source defines a large country as one with a 2018 population larger than 9 million people and a small country as one with a population smaller that this threshold. Moreover, it estimates that 300 individual policymakers will have a direct interest in EuroCohort data in any large country and 150 in any small country.

[15] In 2011 the Italian Parliament appointed a task-force, led by Enrico Giovannini, the then president of the Italian National Institute of Statistics, to find out the cost of politicians across Europe. However, this task proved to be unfeasible, and this task-force resigned just after publishing an Intermediate Report in March 2012.

[16] See below for details.

Following the same approach we have just used for policymakers, we can consider that the availability of EuroCohort data will enable these child advocacy organization staff members to reduce the amount of time spent working with children and young people's well-being data by 50% with respect to what would be required in order to perform the same activity using administrative data. To quantify this efficiency gain in monetary terms, we consider that without EuroCohort, these 1,170 child advocacy organization staff members would have allocated 20 hours per year of their time to work with children and young people's well-being data, and, by doing so, they would be able to reach the same productivity that they are able to reach working 10 hours per year with EuroCohort data. Therefore, the existence of EuroCohort data enables those child advocacy organization staff members to save cumulatively 11,700 hours per year of their working time and to use that time to do additional work which brings additional returns. To quantify in monetary terms the value of this time, we decided to use as a proxy for the cost of child advocacy organization staff members the median EU hourly net earnings for a single person without children in 2015 calculated from the data reported in the Appendix and inflated to 2018 (€9.82). Multiplying this amount by the estimated number of hours of work saved by child advocacy organization staff members in each country will give a total value of the efficiency gain by this group generated by EuroCohort equal to €115k.

4.1.3 | Knowledge output

A very imperfect measure of knowledge output is given by publications and presentations at conferences. The value of a publication VP can be calculated as

$$VP = VNI + VI$$

where VNI = social value of producing new information; VI = social value of the degree of influence of this publication on the scientific community.

If we consider the opportunity cost of the time of researchers as being equal to their average hourly compensation, a reasonable proxy of VNI is its marginal production cost. Following Florio et al. (2016), it is possible to assume that the average EU researcher devotes a 60% share of his or her time to research activities with an average yearly productivity of three papers per year. Under these assumptions, and considering, as detailed above, an average salary of this EU researcher equal to €46.6k, the marginal production cost of an academic paper can be roughly estimated at €9k.

Pollock et al. (2020) indicate that the average annual number of publications generated by SHARE results is around 120. According to this source, because of the analogies existing between SHARE and EuroCohort we can take this number as a reasonable predictor for the average number of publications which will be generated by the availability of the results of EuroCohort.

The results of a survey conducted among the users of the European BioInformatics Institute database (2016) show that 45% of respondents declared that they could not have obtained the last EMBL-EBI data they used elsewhere, nor could have they created or collected themselves. Furthermore, they also show that the majority of respondents experienced efficiency time savings by working with these data. Based on these results, below we consider that 50% of the above publications (60 papers) could not have been produced without EuroCohort, because the data they use could not have been created or collected elsewhere by their authors. We also assume that the remaining 50% of those publications (60 papers) would have been produced even without

EuroCohort. However, without the availability of EuroCohort data their production costs would have been twice as high because of the loss of efficiency involved in the use of data created or collected elsewhere.

Therefore, here we consider those 60 publications per year which will be produced thanks to EuroCohort as additional research, so their value can be considered as a net benefit generated by EuroCohort itself. Timing those 60 publications by the €9k social value of each publication estimated above we obtained a monetary evaluation of this net benefit being equal to €540k.

The number of citations a paper will obtain can be used as a proxy for its degree of influence on the scientific community. The shadow price of a citation could be estimated as the opportunity cost of the time employed by a scientist to read and understand somebody else's paper and to decide to quote it. After a mutual cancellation of RI scientists' papers and scientific labor costs, we can conclude that the benefit generated by the knowledge output can be measured by the sum of the value of citations that RI scientists' papers receive and the value of the subsequent waves of citations.

According to Times Higher Education data quoted by Florio and Sirtori (2016) the average number of citations for a Social Sciences journal article is 4.67.[17] According to Florio et al. (2016) the average time needed to evaluate someone else's paper and to decide to cite it is one hour. Timing the above figure by the additional 60 publications per year which will be produced thanks to EuroCohort results it is possible to estimate the social value of the degree of influence of those publications in about 280 hours of research work. Taking into consideration once again the €27.1 average hourly wage of an EU researcher estimated above, it is possible to obtain a monetary evaluation of the degree of influence of EuroCohort additionally produced output on the scientific community at an amount close to €8k.

4.1.4 | Human capital accumulation

EuroCohort will contribute to human capital accumulation in several different ways. On the one hand, students and young scientists who will spend a period working within EuroCohort will accumulate higher human capital relative to their peers. This human capital will take the form of both technical and scientific abilities (hard skills) and personal ones, like communication, negotiating and organizational capabilities (soft skills). On the other hand, the EuroCohort database will supply an important resource to the academic community both because it will be used for creating new teaching materials and because it will be used directly for guided learning and independent dissertation work. Both uses will generate further human capital accumulation by students who will use these materials for their classes, and doctoral candidates who will use the EuroCohort database for dissertation-related purposes.

The present value of human capital accumulation private benefits produced by the RI is the sum of the expected increase in lifelong salary that each of the above beneficiaries will earn over her career compared with the without-the-project scenario. To get an understanding of the magnitude of this benefit from the above it is possible to estimate the number of PhD students which will use the EuroCohort database in 350 units per year, corresponding to the 58% of the 600 projected average academic users of EuroCohort (Pollock et al., 2020).

To supply a very rough estimate of the expected increase in the salaries of those PhD students due to their involvement in EuroCohort, it is possible to consider that Catalano et al. (2021a, b)

[17] Reference period: 2000–10.

TABLE 1 Yearly benefits generated by EuroCohort

Benefit	Amount (€)
Child advocacy organizations staff members' time	115k
Policymakers' time	1.7m
Researchers' access time	8k
Researchers' use time	54k
Social value of producing new information	540k
Social value of the degree of influence of this publication on the scientific community	8k
Human Capital Accumulation	400k
TOTAL	2.8m

estimate that performing research and acquiring skills at CERN could lead to a salary premium effect which can vary between 5% and 13% more than the normal return to education in the relevant field. Taking into account that EuroCohort will be a social science, non-material RI, to err on the side of caution, we can halve the lower limit of this interval and assume that performing research and acquiring skills within the EuroCohort framework will lead to a salary premium of 2.5% more than the normal return to education.[18]

As reported above, we can consider the average yearly salary of an EU researcher equal to €46.6k, so we can quantify the yearly salary premium that each of the 350 PhD students involved with EuroCohort will command in €1.17k. Timing this amount by the 350 PhD students involved with EuroCohort each year it is possible to estimate the total value of the human capital accumulation generated by EuroCohort in €400k per year.

From the previous analysis, it is then possible to conclude that the projected benefits of EuroCohort can be considered as corresponding to €2.8m per year. The table below summarizes our findings.

However, we need to consider that there will be a lag between the timing of the survey's costs and the benefits. This lag will arise because EuroCohort will start generating costs from the very beginning of its operations, while benefits will not materialize for several years. The reasons for the latter are twofold:

- The information content of a longitudinal survey grows with each wave of interviews. Therefore, it may need several years to reach the threshold level at which it will be able to start being used by the scientific community in a significant way and to influence the decision-making process.
- The decision-making process can have a relevant inside lag. Once EuroCohort has reached the information threshold level necessary to influence the decision-making process, it may take time until actual decisions informed by this longitudinal survey will be taken.

In order to account for the above, we consider a lag of six years between the beginning of EuroCohort's fieldwork and the time when its benefits will start to materialize (that is from 2033 onwards).

[18] Human capital accumulation will be favored by services like webinair, master classes, Summer schools, policy briefs (as consultants), and new research EuroCohort expects to be able to offer to interested users, like PhD students.

4.2 | Costs

4.2.1 | General remarks

To be able to provide more realistic estimates of the costs in each country, we have divided the 28 countries into high, medium and low-cost states. The results of this exercise can be found in the Appendix. This categorization was primarily based on Eurostat data about annual net earnings for a single person without children across Europe. However, PPP adjusted GDP per capita was also included in our algorithm. Considering the unweighted country average of annual net earnings for a single person without children it is possible to see that the value of this indicator for medium-cost countries is about 50% lower than that for high-cost states, and, in turn, the value of the same indicator for low-cost states is 50% lower than that for medium-cost states. Therefore, our national level cost estimates will follow these proportionate reductions and we consider that, in medium-cost states, costs will be 50% lower than in high-cost states, and, in turn, costs in low-cost states will be 50% lower than in medium-cost states. The complete description of this categorization algorithm can be found in the Appendix.

4.2.2 | Research infrastructure

Pilot, interviews and incentives

To estimate the average cost of a CAPI interview in a high-cost country we started from the distribution of the average costs per interview in the ESS's third wave of interviews (ESS3) contained in Stoop et al. (2010). Based on this source, we obtained an ESS3 average cost of a CAPI interview in a high-cost country equal to €220. Then we converted this figure in $€_{2018}$ using the Harmonized Index of Consumer Prices provided by Eurostat for the EU28 countries, obtaining a $€_{2018}$ value of the average cost of a CAPI interview in a high-cost country of about €247.

We also consider that since 2010 the real unit cost of an interview has increased by €50. As a result, below we consider that in a high-cost country the cost of each CAPI interview with a parent is €300, and that the cost of interviewing a child under 16 is €150. We consider that the cost of interviewing young people over 16 rises to €300.

As for national team costs, we consider a 50% reduction in interviews cost per sample member in medium-cost states and a further 50% reduction in cost in low-cost ones.

For the different waves we consider the following:

- Waves 1-2-3 age 0 cohort: an interview with one parent. The cost per sample member is €300.
- Waves 4-5-6 age 0 cohort: interviews with one parent and the child so we will have two interviews per child per wave. The cost per sample member is €450.
- Waves 7-8-9 age 0 cohort: interviews with the young person so we will have one interview per young person per wave. The cost per sample member is €300.

Similarly:

- Waves 1-2-3 age 8 cohort (children aged 8–9 to 14–15): interviews with one parent and the child so we will have two interviews per child per wave. The cost per sample member is €450.

- Waves 4-5-6 age 8 cohort (young people aged 17–18 to 23–24): interviews with the young person so we will have one interview per young person per wave. The cost per sample member is €300.

On the basis of the discussion contained in Villar and Fitzgerald (2017) and taking a precautionary approach, at this stage we decided to quantify the average cost of a CAWI interview as being 50% of the cost of a CAPI one.

With regards to monetary incentives we assume that in every country a €10 cash incentive will be awarded to parents (both for a two-parent or a single-parent household) which will be sampled for participating in the survey until the child reaches 8 years old. This will include the first three waves for the age 0 cohort. In the next three waves of both cohorts, thus until the child will be 14–15 years old, a €10 cash incentive will be awarded to parents and a further €5 one directly to the child. In the last three waves, so when the young adult will be 17–18 and older, a €10 cash incentive will be given directly to him. The above figures are to be considered as average incentives. Most likely, the actual incentives which will be awarded to sample members will be differentiated among countries and maybe also among sample members according to a scheme which at this stage has not been envisaged yet.

Implementation and operation phases

The best available way to estimate the cost of the EuroCohort central team is probably to consider the costs related to a similar European accelerated longitudinal survey. In that respect, SHARE central team costs approximately €3m per year for international coordination.[19] However, these costs are rising (in 2015 they were about €2.4m).[20] Therefore, we will consider here that during the implementation and the operation phases the EuroCohort Central Hub will cost €4m per year, due also to the greater complexity of sampling of EuroCohort.

Taking as a starting point SHARE's financial data, we consider that in the sampling years of the implementation phase the national team will cost around €1.15m per year in high-cost states. This amount will cover both the National Node costs[21] (€250k) and the fixed costs of the national agency (€900k.)

We also consider that the cost of national agencies in a sampling year of the operation phase will be reduced to 70% of the full cost starting in the first year of the operation phase with further reductions of 5% every five years (that is 65%, 60%, 55% and 50% of the full cost).

This reduction in the costs of national agencies is plausibly justified in relation to ongoing work which examines the ways in which the collection of survey data can be made more sustainable through a combination of the use of new technologies and changing patterns of human behavior (Coupar et al., 2018) as well as increasing levels of cooperation between international survey Research Infrastructures (Emery et al., 2019). Specifically, these cost reductions will be linked to:

a. the benefits of learning economies, starting from the end of the implementation phase;
b. the likely increase in the competitiveness of the market of European agencies in the aftermath of the COVID-19 pandemic;
c. the introduction of 5G technology and its applications in the functioning (sampling etc.) of longitudinal surveys and their management. This allows us to think that most likely we will

[19] See Share-Eric (2018).

[20] See Share-Eric (2016).

[21] We consider that each national coordination team will include 1.5 full-time equivalent senior researchers.

be able to negotiate, in the Preparatory phase of EuroCohort, a significant reduction of the yearly fixed cost of national agencies with respect to what we budgeted in the design phase of EuroCohort.

In the years when there is no sampling we consider a cost of national agencies of 10% of the full cost, whereas in the years when we have piloting or dress rehearsal we consider a 30% of the full cost, across both the implementation and operation phases.

Preparation phase

Across the preparation phase, the cost of the Central Hub will rise from 5% of its €4m full cost at the start of the phase until 25% of its €4m full cost at the end of the phase. In the first year of the preparation phase (2022) we estimate the Central Hub costing 5% of the above amount (€200k) which will support a central team to coordinate the project infrastructure. This will rise from the second to the fourth year (2023 until 2025 included) to 10% (€400k) to give more intensive support to national fund raising and to testing in five countries, then to 25% (€1m) in the final year (2026) when the pilot and dress rehearsal will take place in each of the 28 countries. Based on these estimates, the total cost of the Central Hub in the preparation phase will be €2.4m.

In the last year of the preparation phase when the piloting and dress rehearsals take place, the National Nodes will cost 25% of their full operating costs, that is €62,500 in high-cost countries, €31,250 in medium-cost countries, and €15,625 in low-cost countries. In the first year (2022), those costs will be reduced to 5% of the full operating costs (12.5k, 6.25k, and 3.125k respectively). During the following three years (from 2023 to 2025 included) those costs will be reduced to 10% of the full operating costs (25k, 12.5k, and 6.2k respectively).

During the preparation phase the project is also scheduled to conduct cognitive interviewing in five countries: Croatia, Finland, France, Ireland and the United Kingdom. As for the above definition of the level of costs, Croatia is a low-cost country, while Finland, France, Ireland and United Kingdom are high-cost countries. We consider that in each of these five countries the project will stage 60 pre-pilot cognitive CAPI interviews during the second year of the preparation phase (2023).

4.2.3 | Termination costs

The termination costs of EuroCohort will materialize in 2054 and 2055. During this phase there will be no interview costs. During the termination phase, we assume that the Central Hub cost will reduce by 50% (€2m) in the first year (2054) and by a further 50% (€1m) in the second year (2055), before the project ends (adding to a total of €3m). Moreover, the National Nodes cost will reduce to 10% of their operating costs, to assist with the national decommissioning of the project. The total cost is estimated to be €850k. Adding these two figures, the total cost of the termination phase is estimated to be €3.85m which when discounted at 4%, corresponds in present value terms to €1.4m in 2021.

4.2.4 | The total cost of EuroCohort

The financial total cost of EuroCohort during its whole 34 years projected lifespan, obtained as detailed above, is summarized in the table below. Here we added to the above the assumption

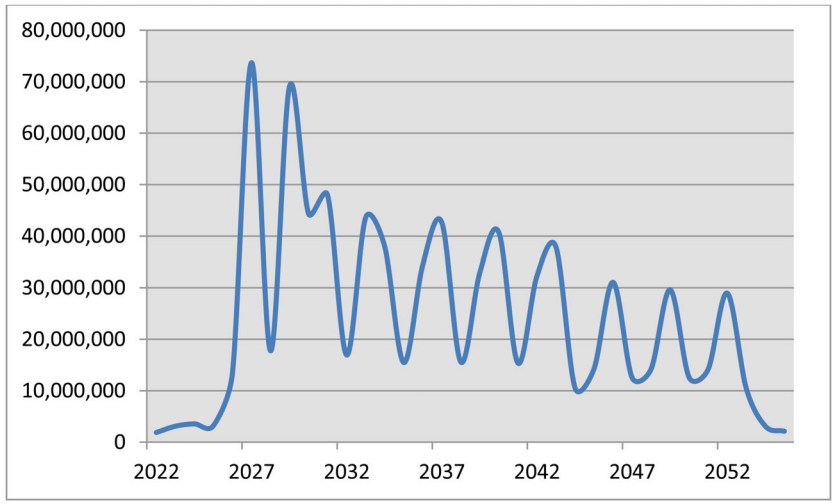

FIGURE 3 Annual undiscounted costs of EuroCohort [Colour figure can be viewed at wileyonlinelibrary.com]

that 80% of the whole cost of EuroCohort will be met by public funds while the remaining 20% will be met by private ones. Under this assumption EuroCohort would need to raise about €160m of private funds over its 34 years life span. For the sake of completeness we need to notice that raising €160m of private funds will generate fundraising costs that, according to Rodriguez (2018), could amount to €24m.

The figures displayed below are undiscounted values expressed in $€_{2018}$ (Table 2).

TABLE 2 Projected undiscounted financial total cost of EuroCohort

	Cost (€)
Interviews	303,312,440
Incentives (interviews)	21,881,851
Cognitive interviews	1625250
Pilots	16,989,375
Incentives (pilots)	1,278,750
Dress Rehearsal (DR)	21,945,192
Incentives (DR)	1,605,153
Fixed costs of national agencies	203,445,000
National coordinating teams	118,150,000
International hub	113,400,000
Fundraising costs	24,000,000
TOTAL (Undiscounted)	827,633,011

Figure 3 shows the curve of the undiscounted cost of EuroCohort throughout its lifecycle. It is common for research infrastructures such as surveys to build up slowly in the beginning, then arriving at the highest levels of investment costs during implementation phase. The shape of the curve over time reflects the annual variations in costs due to the years in which there is intensive fieldwork taking place, producing this typical wave-like structure.

TABLE 3 Percentage effect of a ±1% variation in the most relevant cost variables on the total cost of EuroCohort

Variable	%
cost of a CAPI interview in a high cost country;	±0.42
fixed cost of the national agency in the sampling years of the implementation phase in high cost countries;	±0.19
full operating costs of the national nodes in high cost countries;	±0.14
cost of the Central Hub during the implementation and operation phases	±0.14

Besides the Central Team's financial total cost of €113.4m, we have produced Member State level financial cost estimates, which are displayed in the Appendix, where it is also possible to find Member State level yearly financial cost estimates during the operation of EuroCohort.

4.3 | Results

The evaluation of benefits for users and beneficiaries and the analysis of the costs of the RI (following the methodologies presented in StRESFRI (ESFRI, 2019) conducted in the previous sections supports the idea that EuroCohort is a socially desirable RI from the point of view of the efficient use of the available resources. To summarize, improvements in the effectiveness of European countries' expenditure related to children and young people well-being (due to the availability of new longitudinal survey data provided by EuroCohort) of a measure of around 1 over 15,000 would be sufficient for the benefits of such a survey to outweigh its costs.

As we have already seen in our literature review, the conclusions of Aos et al. (2004), Schweinhart (2016) and Cannon et al. (2018) show that in the US the efficiency of expenditure on children and young people's well-being could be improved by switching resources from low-return to high-return well-being expenditure programs. Obviously, the above conclusions about improving the efficiency of the expenditure on children and young people's well-being in the US by switching resources between projects cannot be applied directly to European countries because of the differences between the US and the 28 European countries' social conditions. However, the recent work by Doyle (2020) is a very interesting example of important results obtained by social policies targeted to children's well-being.

To complete this discussion, it should also be remembered that, according to StRESFRI (2019), two economic effects of a RI are decommissioning costs and its residual value. In the case of EuroCohort, decommissioning costs will relate to the need to archive the huge dataset that will be produced by this survey, while its residual value will be the value that this dataset will still have for the decision makers, the scientific community and the general public. We have not considered these effects in our work, leaving them for further research.

Finally, it is worth noticing that the social expenditures considered above in the OECD database will have effects on the health of their beneficiaries, because child well-being outcomes are clearly interconnected, and this aspect is of the utmost relevance in consideration of the long-term consequences of the Covid-19 pandemic. For instance, education and personal health are clearly correlated. As Barnett and Masse (2007) assessment of the Abecedarian program puts it:

> Better-educated individuals can make more informed and better decisions regarding their personal health. Education increases the ability to be an effective consumer

of health care services and producer of personal health. Education also increases income, allowing one to buy higher quality and quantity of health services and to establish healthier living conditions.

According to the same Barnett and Masse (2007), a proof of this ability to make better personal health decisions can be found in the fact that a follow-up regarding the program participants at age 21 showed that the rates of smoking for the control group and the early educational intervention group were 55% and 39%, respectively.

Campbell et al. (2014) confirm the interconnection between education and personal health showing that according to biomedical data, children randomly assigned to the Abecedarian program intervention group had significantly lower prevalence of risk factors for cardiovascular and metabolic diseases once they reach their mid-30s compared to the ones assigned to the control group.

5 | RISK ASSESSMENT

Undoubtedly, the ex-ante socio-economic evaluation of a project that will be running until 2055, like EuroCohort, involves a significant amount of uncertainty. To deal with this uncertainty, the last part of our work presents a risk assessment. The first step of this assessment was to identify the critical variables of the project, defined as those variables which would have the largest impact on the project's costs. On the cost side, this identification was achieved through a sensitivity analysis.

The variables we considered in our sensitivity analysis were:

- the cost of a CAPI interview in a high-cost country;
- the fixed costs of the national agency in the sampling years of the implementation phase in high-cost countries;
- the full operating costs of the National Nodes in high-cost countries;
- the cost of the Central Hub during the implementation and operation phases.

The reason for our choice was that almost all of the other monetary variables contained in our analysis were expressed as a percentage of these ones.

For each of the above variables we tested the effect of a variation of ±1% of the value adopted in the base case on the projected undiscounted total cost of EuroCohort. As is possible to see in the table below, our results show that the variation on the above parameters generated by a variation of ±1% of the cost of a CAPI interview in a high-cost country is about twice as much as that generated by an equal percentage variation of the fixed costs of the national agency in the sampling years of the implementation phase in high-cost countries. In turn, the latter is about 25% higher than the variation of the same parameters of the project generated by a ±1% variation of the full operating costs of the National Nodes in high-cost countries or by the same percentage variation of the cost of the Central Hub during the implementation and operation phases (Table 3).

Based on the results of our sensitivity analysis, we conducted a probabilistic risk analysis running a 10,000 run Monte Carlo simulation considering as critical variables for EuroCohort only the cost of a CAPI interview in a high-cost country and the fixed costs of the national agency in the sampling years of the implementation phase in high-cost countries. For each run, values of the two parameters were stochastically drawn from the probability distributions described below.

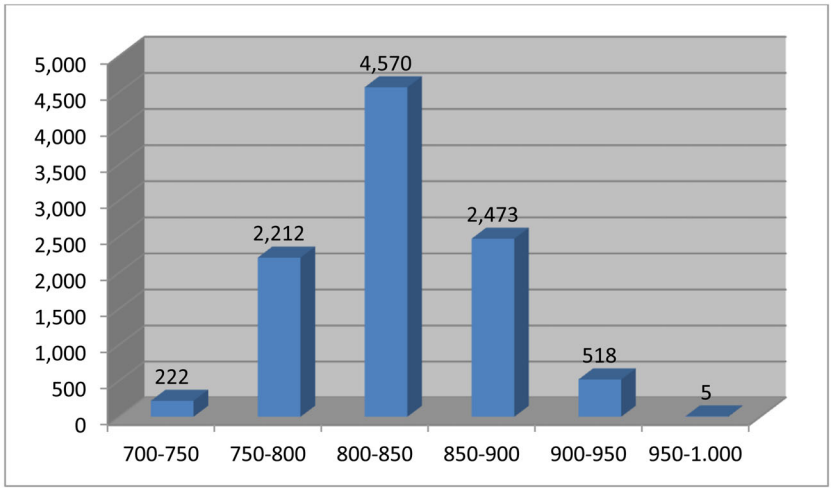

FIGURE 4 Distribution of the undiscounted total cost of EuroCohort according to the Monte Carlo analysis (million €) [Colour figure can be viewed at wileyonlinelibrary.com]

For our exercise we considered the financial cost of a CAPI interview in a high-cost country as being normally distributed with a mean equal to €300 and a standard deviation equal to €30, and the fixed costs of the national agency in the sampling years of the implementation phase in high-cost countries as being normally distributed with a mean equal to €900k and a standard deviation equal to €90k.

Our results show that the undiscounted total cost of EuroCohort will be between €710m and €954m, with an average value of €839.7m. The probability distribution of this indicator resulting from our Monte Carlo simulation is displayed in the figure below. This distribution suggests that the probability that the undiscounted total cost of EuroCohort, calculated as specified above, will be between €700m and €750m is 2.2%, while the probability that it will be between €750m and €800m is 22.1%, the probability that it will be between €800m and €850m is 45.7%, the probability that it will be between €850m and €900m is 24.7%, the probability that it will be between €900m and €950m is 5.2%, and the probability that it will be between €950m and €1.000m is 0.1%. Moreover, the probability that the undiscounted total cost of EuroCohort will be higher than €850m (29.9%) is higher than the probability that it will be lower than €800m (24.3%) (Figures 4 and 5).

The cumulative distribution of our results shows that their distribution is skewed to the right. Therefore, conditionally on the realisation of uncertainty, it is possible that the total cost of the project will be higher than the value calculated above.

As we did for the costs, we conducted a second probabilistic risk analysis for the benefits generated by EuroCohort running another 10,000 run Monte Carlo simulation considering as variables the cost of policymakers in a high-cost country and the number of additional publications produced thanks to EuroCohort. For each run, values of the two parameters were stochastically drawn from the probability distributions described below.

For our exercise we considered the value of time of policymakers in a high-cost country as being normally distributed with a mean equal to €150,000 and a standard deviation equal to €15,000, and the number of additional publications produced thanks to EuroCohort as being also normally distributed with a mean equal to 60 and a standard deviation equal to 10.

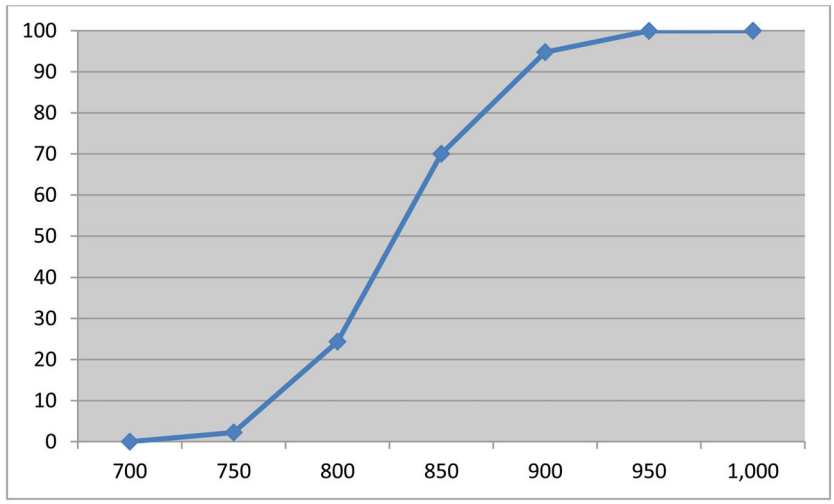

FIGURE 5 Cumulative distribution of the undiscounted total cost of EuroCohort according to the Monte Carlo analysis (million €) [Colour figure can be viewed at wileyonlinelibrary.com]

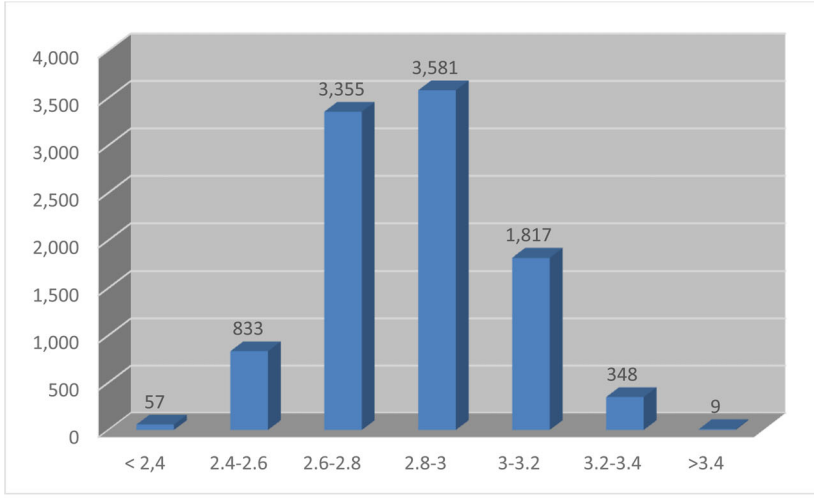

FIGURE 6 Distribution of yearly benefits generated by EuroCohort according to the Monte Carlo analysis (million €) [Colour figure can be viewed at wileyonlinelibrary.com]

Our results show that yearly benefits of EuroCohort (as defined in Table 1) will be between €2.2m and €2.5m, with an average value of €2,847,021. The probability distribution of this indicator resulting from our Monte Carlo simulation is displayed in the figure below. This distribution suggests that the probability that the projected yearly benefits of EuroCohort, calculated as specified above, will be lower than €2.4m is 0.6%, while the probability that they will be between €2.4m and €2.6m is 8.3%, the probability that they will be between €2.6m and €2.8m is 33.6%, the probability that they will be between €2.8m and €3m is 35.8%, the probability that they will be between €3m and €3.2m is 18.2%, and the probability that they will be between €3.2m and €3.4m is 3.5%. Moreover, from the above it is possible to see that the probability that the projected yearly

benefits of EuroCohort will be higher than €3m (21.7%) widely exceeds the probability that they will be lower than €2.6m (8.9%).

6 | CONCLUSIONS

In a nutshell, the economic evaluation which is presented in this paper suggests that improvements in the effectiveness of European countries' expenditure related to children and young people well-being (due to the availability of new longitudinal survey data provided by EuroCohort) of a measure of around 1 over 15,000 would be sufficient for the benefits of such a survey to outweigh its costs.

The above result emphasises the importance of investing resources (private and public) in order to achieve a better understanding of children and young adults' well-being as a reference for policy makers and various stakeholders (academic, practitioners and so forth), both at the European and national level.

Two concluding comments related to this result. First, the improvements in effectiveness of expenditure related to children and young people well-being can be related to a better targeting of beneficiaries of public programs. The relevance of heterogeneity of beneficiaries of these programs for the design and evaluation of public policies has been discussed, for example, by Kristensen et al. (2017) and Doyle (2020). Second, the impact of Covid-19 on future social policies across Europe is obviously still very difficult to ascertain (see Thunström et al., 2020 for a preliminary analysis).

However, the importance of data about children and young adults' well-being to design better health policies represent one additional element of potential benefits which has not been formally addressed in our paper (see also Richardson et al., 2020).

Finally, two additional directions for further research with regard to the socio-economic impact of Eurocohort. First, it would be useful to complete a full user survey to elicit willingness to pay for EuroCohort (see, for instance, Catalano et al., 2018). Second, the human capital accumulation and existence value benefits generated by a capital intensive, physical RI have been examined by a growing literature (see Florio, 2019). However, to our knowledge the above effects generated by a labor-intensive social science RI have never been investigated. Therefore, to complement the analysis presented in this paper, further research is needed to quantify the human capital accumulation and existence value benefits generated by a social science RI like EuroCohort.

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REFERENCES

Academy of Social Sciences (2013). Making the case for the social sciences *(No. 8 Longitudinal Studies)*. Academy of Social Sciences/Sage. Retrieved from https://www.acss.org.uk/wp-content/uploads/2013/11/mtc8_longitudinalstudies.pdf

Aos, S., Lieb, R., Mayfield, J., Miller, M., & Pennucci, A. (2004). *Benefits and costs of prevention and early intervention programs for youth*. Washington State Institute for Public Policy. Retrieved from http://www.wsipp.wa.gov/ReportFile/881/Wsipp_Benefits-and-Costs-of-Prevention-and-Early-Intervention-Programs-for-Youth_Summary-Report.pdf

Babarović, T., & Serracant, P. (2019). *EuroCohort pilot framework. Deliverable 9.1 of the European Cohort Development Project, Horizon 2020*, European Commission, Research Executive Agency, Brussels.

Barnett, W. S., & Masse, L. N. (2007). Comparative benefit-cost analysis of the Abecedarian program and its policy implications. *Economics of Education Review*, *26*, 113–125.

Beagrie, N., & Houghton, J. (2016). *The value and impact of the European bioinformatics institute*. Project Report. Charles Beagrie. https://vuir.vu.edu.au/33707/1/EBI-impact-report.pdf

Campbell, F., & Brown, R. (2003). *Benefit-cost analysis. Financial and economic appraisal using spreadsheets*. Cambridge University Press.

Campbell, F., Conti, G., Heckman, J. J., Moon, S. H., Pinto, R., Pungello, E., & Pan, Y. (2014). Early childhood investments substantially boost adult health. *Science*, *343*, 1478–1485.

Cannon, J. ., Kilburn, M. R., Karoly, L. A., Mattox, T., Muchow, A. N., & Maya Buenaventura (2018). Taking stock of outcomes and economic returns from early childhood programs. *Rand Health Quarterly*, *7*, 6.

Catalano, G., Florio, M., & Giffoni, F. (2018). Should governments fund basic science? Evidence from a willingness-to-pay experiment in five universities. *Journal of Economic Policy Reform*, *1*, 1–18.

Catalano, G., Giffoni, F., & Morretta, V. (2021a). Human and social capital accumulation within research infrastructures: The case of CERN. *Annals of Public and Cooperative Economics*, 1–24.

Catalano, G., López, G. G., Sánchez, A., & Vignetti, S. (2021b). From scientific experiments to innovation: Impact pathways of a Synchrotron Light Facility. *Annals of Public and Cooperative Economics*, 1–26.

Coupar, M. P., Gremel, G., Axinn, W., Guyer, H., Wagner, J., & West, B. T. (2018). New options for national population surveys: The implications of internet and smartphone coverage. *Social Science Research*, *73*, 221–235.

Cunha, F., & Heckman, J. J. (2007). The technology of skill formation. *American Economic Review*, *97*, 31–47.

Doyle, O., Colm, H., Heckman, J. J., & Tremblay, R. (2009). Investing in early human development: Timing and economic efficiency. *Economics and Human Biology*, *7*, 1–6.

Doyle, O. (2020). The first 2,000 days and child skills. *Journal of Political Economy*, *128*, 2067–2122.

Ecchia, G., Monfardini, G., & O'Leary, C. (2019). *Report on costs, cost-benefit analysis and case studies. Deliverable 3.1 of the European Cohort Development Project, Horizon 2020*, European Commission, Research Executive Agency, Brussels.

EC (2019a). Deliverable 4.1 Concept note of modular impact assessment framework, RI-PATHS (Research Infrastructures Impact Assessment Pathways) project. Available from https://ri-paths.eu/wp-content/uploads/2018/03/D4.1_Concept-note-of-modular-IA-framework.pdf

EC (2019b). Deliverable 6.1, Cost benefit analysis and socioeconomic impact assessment European Research Infrastructure for Heritage Science—Preparatory Phase European Research Infrastructure for Heritage Science—Vignetti, S. et al, CSIL, Centre for Industrial Studies. Retrieved from https://e-rihs.europa.eu/

Emery, T., Pollock, G., & Scherpenzeel, A. (2019). Securing high-quality data on populations: Why we need EuroCohort, GGP and SHARE in Europe. Population & Policy Compact 23. Max Planck Society/Population Europe. https://www.population-europe.eu/policy-brief/securing-high-quality-data-populations

European Commission (2007). Remuneration of researchers in the public and private sectors. Retrieved from https://www.eui.eu/Documents/MWP/AcademicCareers/SalaryComparisonEUreport2007.pdf

European Commission (2014). Guide to cost-benefit of investment projects. Economic appraisal tool for Cohesion Policy 2014–2020, European Commission, December 2014. Retrieved from https://ec.europa.eu/inea/sites/inea/files/cba_guide_cohesion_policy.pdf

European Parliament legislative resolution of 10 February 2021 on the proposal for a regulation of the European Parliament and of the Council establishing a Recovery and Resilience Facility (COM(2020)0408–C9-0150/2020–2020/0104(COD)) Retrieved from https://www.europarl.europa.eu/doceo/document/TA-9-2021-0038_EN.html

ESFRI (2019). *Guidelines on cost estimation of research infrastructures*. Report developed for StR-ESFRI (Support to Reinforce the European Strategy Forum on Research Infrastructures) by Centre of Industrial Studies in Milan (CSIL).

Florio, M., & Sirtori, E. (2016). Social benefits and costs of large research infrastuctures. *Tecnological Forecasting and Social Change*, *112*, 38–53.

Florio, M., Pancotti, C., Sirtori, E., Vignetti, S., & Forte, S. (2016). *Exploring cost-benefit analysis of research, development and innovation infrastructures: An evaluation framework*. Working Paper No. 01/2016, CSIL Centre for Industrial Studies. Retrieved from https://www.csilmilano.com/docs/WP2016_01.pdf

Florio, M. (2019). *Investing in science social cost-benefit analysis of research infrastructures*. MIT Press.

Gheorghe, A., Rogers, J., Kennedy, J. A., & Kuzminskyi, V. (2017). *Childonomics—Methodology for appraising the return on investment of social services for children and families*. Oxford Policy Management. Retrieved from https://www.eurochild.org/projects/childonomics/

Heckman, J. J., & Tim, K. (2014). Fostering and measuring skills interventions that improve character and cognition. In J. J. Heckman, J. E. Humphries, & T. Kautz (Eds.), *The GED myth: Education, achievement tests, and the role of Character in American life* (pp. 341–430). Chicago University Press.

HM Government (2018). *Improving the home learning environment. A behavior change approach*. UK Department for Education. Retrieved from https://www.gov.uk/government/publications/improving-the-home-learning-environment

Karoly, L. A. (2016). The economic returns to early childhood education. *The Future of Children*, *26*, 37–55.

Koundouri, P., Davila, G., Giannouli, A., Kourogenis, N., Xepapadeas, A., Xepapadeas, A. P., & Souliotis, I. (2014). *OpenAIRE Feasibility/Business model report D3.7*, OpenAIREplus, 2nd Generation Open Access Infrastructure for Research in Europe, INFRA-2011-1.2.2.

Kristensen, N., Kolodzieiczyk, C., Bolvig, I., & Houlberg, K. (2017). The efficiency potential in social programs: Accounting for heterogeneity in benefit-cost analysis. *Journal of Benefit-Cost Analysis*, *8*, 1–23.

Lynn, P. (2019). *Sample design: Criteria and procedures*. Deliverable 9.1 of the European Cohort Development Project, Horizon 2020, European Commission, Research Executive Agency, Brussels.

Mascherini, M., Salvatore, L., Meierkord, A., & Jungblut, J.-M. (2012). *NEETs: Young people not in employment, education or training: Characteristics, costs and policy responses in Europe*. Publications Office of the European Union Luxembourg.

OECD (2009). *Doing better for children*. Retrieved from www.oecd.org/els/social/childwellbeing

OECD (2015). Cost benefit analysis of investment projects. In *Government at a Glance 2015*, OECD, Paris. Retrieved from https://www.oecd-ilibrary.org/governance/government-at-a-glance-2015/cost-benefit-analysis-of-investment-projects_gov_glance-2015-30-en

OECD (2019). Reference framework for assessing the scientific and socio-economic impact of research infrastructures. OECD Science, Technology and Industry Policy Paper No. 65. Retrieved from https://doi.org/10.1787/3ffee43b-en

OECD Family Database. *Public policies for families and children, PF 1.6 Public spending by age of children*. Retrieved from http://www.oecd.org/els/family/database.htm

OECD Family Database. *Public policies for families and children, PF1.1 Public spending on family benefits*. Retrieved from http://www.oecd.org/els/family/database.htm

O'Leary, C., & Fox, C. (2018). Understanding the potential policy impact of a European longitudinal survey for children and young people. In *Measuring youth well-being. How a pan-European longitudinal survey can improve policy*. Springer.

Psacharopoulos, G., & Patrinos, H. A. (2018). Returns to investment in education: a decennial review of the global literature. *Education Economics*, *26*, 445–458. Retrieved from https://www.researchgate.net/publication/325629937_Returns_to_investment_in_education_a_decennial_review_of_the_global_literature

Pollock, G., Ozan, J., Goswami, H., Rees, G. & Stasulane, A. (Eds.) (2018). *Measuring youth well-being: How a pan-European longitudinal survey can improve policy* (Vol. 19). Springer.

Pollock, G., Fox, C., Ozan, J., Szymczyk, A., Doyle, O., & Taylor, L. K. (2020). *Estimated academic and policy user community for the Growing Up in Digital Europe /EuroCohort survey*. EuroCohort Working Paper No. 5. Retrieved from https://www.eurocohort.eu/working-papers/

Richardson, D., Carraro, A., Cebotari, V., & Gromada, A. (2020). *Supporting families and children beyond COVID-19: Social protection in high-income countries*. Innocenti Research Report. UNICEF Office of Research, Innocenti, Florence.

Rodriguez, R. D. (2018). Fundraising expense myth: What is the "correct" fundraising expense ratio for your organization? *Advancing philanthropy*. Retrieved from https://afpglobal.org/news/fundraising-expensemyth-what-correct-fundraising-expense-ratio-your-organization

Saminder, G., & Gillian, P. (2016). The value for money of children's centre services. Research Report. Frontier Economics. Retrieved from http://www.frontier-economics.com/publication/the-value-for-money-of-childrens-centre-services/

Schweinhart, L. J. (2016). Use of early childhood longitudinal studies by policy makers. *International Journal of Child Care and Education Policy*, *10*. Retrieved from https://ijccep.springeropen.com/articles/10.1186/s40723-016-0023-5

SHARE Survey on health, ageing and retirement in Europe, ERIC (2016). *Annual activity report 2016*. Retrieved from http://www.share-project.org/fileadmin/pdf_documentation/SHARE-ERIC/SHARE_AAR2016_final.pdf

SHARE Survey on health, ageing and retirement in Europe, ERIC (2018). *Annual activity report 2017/18*. Retrieved from http://www.share-project.org/fileadmin/pdf_documentation/SHARE_AnnualActivityReport_2017-18.pdf

Stoop, I., Billiet, J., Koch, A., & Fitzgerald, R. (2010). *Improving survey response: Lessons learned from the European social survey*. Wiley.

Stoop, I., Koch, A., Halbherr, V., Loosveldt, G., & Fitzgerald, R. (2016). Field procedures in the European social survey round 8: Guidelines for enhancing response rates and minimising nonresponse bias. ESS ERIC Headquarters. Retrieved from http://www.europeansocialsurvey.org/docs/round8/methods/ESS8_guidelines_enhancing_response_rates_minimising_nonresponse_bias.pdf

Support to reinforce the European strategy forum for research infrastructure StRESFRI (2019). *Guidelines on cost estimation of research infrastructures*. Retrieved from https://www.esfri.eu/latest-esfri-news/new-study-guidelines-cost-estimation-research-infrastructures-str-esfri

Technopolis Group, Comparative impact study of the European social survey (ESS) ERIC (2017). *Final report*. Retrieved from https://www.europeansocialsurvey.org/docs/findings/ESS-Impact-study-Final-report.pdf

Thunström, L., Newbold, S., Finnoff, D., Ashworth, M., & Shogren, J. (2020). The benefits and costs of using social distancing to flatten the curve for COVID-19. *Journal of Benefit-Cost Analysis*, *11*, 179–195.

Villar, A., & Fitzgerald, R. (2017). Using mixed modes in survey research: Evidence from six experiments in the ESS. In Breen M. (Ed.), *Values and identities in Europe. Evidence from the European social survey*. Routledge. Retrieved from http://openaccess.city.ac.uk/16770/1/Villar_and_Fitzgerald_chapter16.pdf

Vining, A., & Weimer, D. L. (2010). An assessment of important issues concerning the application of benefit-cost analysis to social policy. *Journal of Benefit-Cost Analysis*, *1*, 1–40.

Washington State Institute for Public Policy (2016). Benefit-cost results—Public health and prevention. http://www.wsipp.wa.gov/BenefitCost?topicIdp9.

Wilska, T. A., & Salmela-Aro, K. (2019). *Governance*. Deliverable 5.1 of the European Cohort Development Project, Horizon 2020, European Commission, Research Executive Agency, Brussels.

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APPENDIX

The oecd family database

The OECD family database provides data on current spending across EU Member States on children and young people's well-being in per capita terms. The most recent year for which data for

TABLE A1 High, medium and low-cost countries for delivering a survey

Country	PPP adjusted GDP per capita 2017 (€)[1]	annual net earnings for a single person without children in 2015 (€ 100 % average worker)[2]	Cost level
Bulgaria	14,800	4,334	Low
Romania	18,800	5,119	Low
Lithuania	23,500	6,652	Low
Hungary	20,300	6,702	Low
Latvia	20,000	6,815	Low
Slovakia	22,900	8,201	Low
Croatia	18,500	8,842	Low
Czech Republic	26,800	8,941	Low
Poland	20,900	8,967	Low
Estonia	23,600	10,638	Low
Slovenia	25,500	12,062	Medium
Portugal	23,000	12,400	Medium
Cyprus	25,400	N/A	Medium
Greece	20,200	15,234	Medium
Malta	28,900	16,924	Medium
Spain	27,600	20,845	Medium
Italy	28,900	21,114	Medium
France	31,100	26,775	High
Belgium	35,000	26,954	High
Ireland	54,300	27,906	High
Germany	37,100	28,268	High
Austria	38,100	28,524	High
Finland	32,700	29,981	High
Sweden	36,300	33,920	High
Netherlands	38,400	34,826	High
Denmark	38,400	34,878	High
United Kingdom	31,600	37,995	High
Luxembourg	75,900	38,631	High

[1] https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=sdg_10_10&plugin=1

[2] The most recent year for which EUROSTAT data about the annual net earnings for a single person without children are available online is 2015. See http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do

all the 21 countries are available is 2013.[22] This source provides aggregate national government expenditure on:

[22] The OECD family database also provides an estimate of total spending on children and young people's in 2015 for Austria, Czech Republic, Finland, France, Germany, Italy, Spain and United Kingdom. However, to ensure a better homogeneity across the data set we have chosen to not to use these data.

TABLE A2 Size of countries. source: our calculation on eurostat data

Country	Population 2018	Population 2018 0–24	Size
Germany	82,792,351	19,854,840	large
France	66,926,166	19,983,214	large
United Kingdom	66,273,576	19,745,072	large
Italy	60,483,973	13,964,775	large
Spain	46,658,447	11,503,890	large
Poland	37,976,687	9,831,918	large
Romania	19,530,631	5,132,265	large
Netherlands	17,181,084	4,879,437	large
Belgium	11,398,589	3,237,557	large
Greece	10,741,165	2,635,682	large
Czech Republic	10,610,055	2,658,075	large
Portugal	10,291,027	2,517,097	large
Sweden	10,120,242	2,956,434	large
Hungary	9,778,371	2,489,938	large
Austria	8,822,267	2,262,834	small
Bulgaria	7,050,034	1,642,606	small
Denmark	5,781,190	1,698,122	small
Finland	5,513,130	1,514,231	small
Slovakia	5,443,120	1,437,466	small
Ireland	4,830,392	1,604,875	small
Croatia	4,105,493	1,049,970	small
Lithuania	2,808,901	730,935	small
Slovenia	2,066,880	504,807	small
Latvia	1,934,379	485,114	small
Estonia	1,319,133	341,992	small
Cyprus	864,236	254,637	small
Luxembourg	602,005	168,071	small
Malta	475,701	120,033	small

- education;
- childcare;
- cash benefits and tax breaks;
- other benefits in-kind.

According to OECD family database public spending on the family can be categorised as follows. Child-related cash transfers to families with children, which includes:

- child allowances, which are sometimes income-tested, and with payment levels that in some countries vary with the age or number of children;
- public income support payments during periods of parental leave;
- income support for single parent families (in some countries).

TABLE A3 Projected country level average financial cost per phase during EuroCohort (€)

Country	Preparation	Implementation	Operation	Termination	Total[1]	%
Austria	1,046,550	11,087,225	21,425,916	50,000	34,778,329	4.9
Belgium	1,139,550	16,628,295	28,518,236	50,000	47,947,227	6.7
Bulgaria	268,950	2,937,050	5,545,764	12,500	9,069,005	1.3
Croatia	303,600	2,937,500	5,545,989	12,500	9,105,559	1.3
Cyprus	528,150	5,653,775	10,187,085	25,000	16,964,044	2.4
Czech Republic	294,450	4,472,445	7,446,460	12,500	12,650,959	1.8
Denmark	1,046,550	11,087,225	21,425,916	50,000	34,778,329	4.9
Estonia	269,175	2,937,500	5,545,989	12,500	9,069,937	1.3
Finland	1,172,100	11,011,288	21,425,916	50,000	34,829,666	4.9
France	1,265,100	16,628,295	28,518,236	50,000	48,077,142	6.7
Germany	1,139,550	16,628,295	28,518,236	50,000	47,947,227	6.7
Greece	576,150	8,524,395	14,170,386	25,000	24,105,950	3.4
Hungary	294,675	4,472,895	7,446,685	12,500	12,651,890	1.8
Ireland	1,172,100	11,011,288	21,425,916	50,000	34,829,666	4.9
Italy	576,150	8,524,395	14,170,386	25,000	24,105,950	3.4
Latvia	269,175	2,937,500	5,545,989	12,500	9,069,937	1.3
Lithuania	268,950	2,937,050	5,545,764	12,500	9,069,005	1.3
Luxembourg	1,046,550	11,011,288	21,425,916	50,000	34,699,751	4.9
Malta	528,150	5,653,775	10,187,085	25,000	16,964,044	2.4
Netherlands	1,139,550	16,628,295	28,518,236	50,000	47,947,227	6.7
Poland	294,450	4,472,445	7,446,460	12,500	12,650,959	1.8
Portugal	576,150	8,524,395	14,170,386	25,000	24,105,950	3.4
Romania	294,450	4,472,445	7,446,460	12,500	12,650,959	1.8
Slovakia	269,175	2,937,500	5,545,989	12,500	9,069,937	1.3
Slovenia	528,150	5,653,775	10,187,085	25,000	16,964,044	2.4
Spain	576,150	8,524,395	14,170,386	25,000	24,105,950	3.4
Sweden	1,139,550	16,628,295	28,518,236	50,000	47,947,227	6.7
UK	1,265,100	16,628,295	28,518,236	50,000	48,077,142	6.7
Total	19,288,350	241,551,318	428,543,344	850,000	714,233,011	100

[1]Including fundraising costs.

Public spending on services for families with children, which includes:

- the direct financing or subsidisation of childcare and early childhood education facilities;
- public childcare support through earmarked payments to parents;
- public spending on assistance for young people and residential facilities;
- public spending on family services, including centre-based facilities and home help services for families in need.

Financial support for families provided through the tax system which includes:

TABLE A4 Estimated per capita public spending by age of children and young people for OECD EU member states in 2013 (USD PPP). Source: OECD

Age/ Country	Austria	Belgium	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Luxembourg	Netherlands	Poland	Portugal	Slovak Republic	Slovenia	Spain	Sweden	United Kingdom
0	8,199	10,383	11,335	22,456	23,084	12,161	12,183	16,821	2,663	11,358	12,936	7,110	30,728	10,023	5,792	8,560	10,387	20,931	6,509	16,104	9,343
1	4,958	5,318	7,307	11,493	2,766	9,110	8,420	10,123	1,428	8,094	4,043	5,422	21,687	4,143	2,255	1,047	5,455	4,541	3,038	9,854	5,725
2	5,260	9,220	7,157	11,594	2,754	11,138	9,203	10,150	1,523	8,361	4,043	6,886	24,230	4,453	1,615	1,048	5,884	3,912	3,532	12,067	7,548
3	9,766	11,510	6,813	11,163	2,773	10,621	12,279	12,675	1,617	6,128	14,711	8,331	26,772	9,887	3,214	4,172	3,571	2,897	5,390	12,496	17,220
4	12,290	11,466	6,614	11,048	2,868	10,723	12,386	13,037	4,137	6,891	11,237	8,502	18,709	11,308	3,745	4,675	3,973	2,411	5,432	12,684	17,250
5	12,673	11,467	6,023	11,018	2,848	10,769	12,357	13,144	6,417	7,002	12,461	8,740	17,596	11,590	5,358	4,970	4,244	2,212	5,469	12,727	14,626
6	10,646	13,682	6,861	21,392	3,566	10,375	10,402	13,575	6,216	6,384	12,171	10,272	31,181	11,319	4,775	7,647	5,473	8,754	7,079	12,173	14,673
7	14,943	13,771	7,320	21,562	7,721	11,557	10,351	13,530	6,360	8,015	12,302	10,226	31,687	11,320	7,076	7,714	6,521	9,219	7,099	18,144	14,830
8	15,161	13,778	7,321	15,340	7,851	11,675	10,069	13,448	6,406	8,146	12,395	10,241	30,808	11,324	7,180	7,792	6,594	9,213	7,111	17,418	15,013
9	15,156	13,739	7,320	15,335	7,740	11,379	10,031	13,522	6,380	8,166	12,217	10,267	30,117	11,328	7,184	7,823	6,657	9,217	7,116	15,702	14,997
10	16,598	13,741	7,324	15,338	7,745	11,434	10,108	14,905	6,432	7,896	12,209	10,336	28,783	11,325	7,198	7,864	6,558	9,225	7,128	15,696	14,884
11	17,426	13,840	8,542	15,341	7,680	11,420	13,368	16,004	6,233	7,097	12,129	10,914	28,076	11,381	7,194	7,879	6,507	9,257	7,126	15,706	17,352
12	17,516	18,866	9,846	15,389	7,834	11,442	13,712	15,973	7,340	6,981	13,298	10,952	28,676	13,629	7,156	9,445	6,493	9,201	9,274	15,747	17,443
13	17,521	20,236	9,940	17,271	7,755	15,736	13,783	15,940	7,515	6,988	15,624	10,967	29,054	15,129	6,774	9,789	6,517	9,218	9,600	16,196	17,580
14	17,511	20,375	9,956	17,713	7,671	16,090	13,742	15,954	7,518	7,120	15,547	10,968	28,914	15,223	6,796	10,019	6,548	9,190	9,579	16,272	17,456
15	16,987	20,375	9,946	17,682	7,701	15,900	13,749	15,931	7,385	6,964	15,767	10,863	29,216	15,197	6,755	9,995	6,553	9,193	9,591	16,314	17,346
16	16,497	20,249	9,950	17,126	7,488	15,468	13,483	15,718	7,359	6,679	15,811	10,527	27,273	15,065	6,744	9,898	6,293	9,073	9,333	16,348	14,989
17	16,653	20,051	9,752	16,483	6,974	13,864	13,212	15,174	7,220	6,577	15,940	10,191	26,486	15,171	6,673	9,337	5,999	8,928	8,810	16,113	13,554
18	15,307	17,121	8,896	12,218	6,307	12,495	12,704	13,236	3,689	5,470	16,037	6,537	14,700	12,857	5,975	5,514	5,581	8,404	6,911	15,760	9,648
19	10,309	15,038	7,093	9,729	5,081	7,356	10,691	10,801	3,170	4,546	12,288	4,550	13,687	12,911	4,839	3,488	5,042	6,779	6,280	8,043	8,689
20	8,562	12,715	5,393	9,334	4,534	7,470	7,431	9,703	2,611	4,059	10,691	4,554	11,324	12,382	4,617	2,524	4,338	5,482	5,666	7,238	8,364
21	8,070	10,179	4,637	11,014	4,151	9,712	6,357	8,903	2,005	3,486	8,748	5,456	10,299	11,250	4,459	2,072	3,780	5,116	4,864	8,560	5,847
22	7,512	7,266	4,005	11,656	3,435	10,633	5,314	7,805	1,732	2,943	6,449	4,289	8,109	9,742	3,741	1,902	3,435	4,602	3,798	8,429	3,681
23	6,931	4,461	3,434	11,493	2,721	9,983	4,140	6,953	1,538	2,338	3,608	3,909	6,313	7,481	3,102	1,888	3,023	3,875	2,858	7,946	2,492
24	6,344	2,602	2,745	10,461	2,113	8,447	3,016	5,853	1,108	1,717	2,662	3,624	4,728	5,670	2,118	1,732	1,813	3,035	2,051	6,824	1,755
25	4,163	1,306	1,902	8,996	1,117	6,582	2,170	4,911	1,018	1,175	2,057	3,223	3,426	4,016	1,005	1,837	859	2,009	1,403	5,462	1,271

TABLE A5 Population (0–25) per age for OECD EU member states in 2013. Source: EUROSTAT

Age/ Country	Austria	Belgium	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Luxembourg	Netherlands	Poland	Portugal	Slovak Republic	Slovenia	Spain	Sweden	United Kingdom
0	77,976	127,664	108,692	58,246	14,021	59,637	785,203	674,411	100,035	89,012	69,790	524,021	6,012	175,587	378,895	89,600	55,828	22,003	453,294	113,487	804,201
1	79,607	129,655	109,146	59,718	14,725	60,455	792,716	665,848	105,801	87,932	72,128	538,422	5,984	180,066	388,824	95,663	61,091	22,117	475,616	113,452	814,026
2	80,661	132,111	119,504	64,422	15,864	61,830	811,397	684,310	110,394	90,027	70,922	549,886	6,230	184,869	413,175	99,508	57,903	22,683	481,415	118,224	802,553
3	78,599	131,196	121,413	64,006	15,669	61,410	810,141	674,000	114,810	96,807	71,293	559,136	6,032	185,681	429,198	96,035	59,805	22,153	492,831	115,175	791,938
4	80,036	131,742	122,945	66,564	15,850	60,751	817,806	693,673	112,645	99,509	70,652	565,676	6,007	185,999	427,148	100,159	57,141	22,386	519,609	113,245	792,240
5	78,875	129,241	118,385	65,643	15,493	60,075	815,226	693,323	108,153	97,519	71,022	563,733	5,966	182,529	399,823	98,232	54,464	20,552	501,018	112,071	782,737
6	80,660	128,596	108,825	66,634	14,587	60,394	830,504	679,924	109,935	101,219	66,542	563,851	6,071	185,741	379,897	100,925	54,015	19,581	497,160	111,392	761,549
7	80,948	125,487	102,991	65,676	14,012	59,111	814,249	690,255	106,725	97,947	65,027	559,948	5,956	187,713	365,911	104,926	54,516	18,646	486,932	107,422	738,772
8	82,221	123,851	98,257	65,801	13,561	59,242	811,139	708,941	105,443	94,398	65,236	564,337	5,977	193,606	354,320	103,486	54,003	18,435	481,849	107,344	717,502
9	80,935	120,766	94,370	65,766	12,660	58,158	808,033	709,866	105,805	94,036	63,966	559,070	5,960	200,397	348,265	106,301	51,673	17,741	473,572	105,764	700,694
10	83,059	119,895	93,457	65,167	12,562	57,159	814,241	723,162	106,612	96,383	63,081	554,507	5,996	201,347	351,747	107,282	50,889	18,178	454,994	102,808	684,868
11	80,796	121,912	91,609	66,273	12,161	57,571	827,658	740,709	107,147	96,756	61,831	560,097	6,109	203,324	364,510	106,889	51,540	18,187	451,693	98,856	688,723
12	83,814	123,948	90,888	68,228	12,485	58,268	844,728	774,419	107,278	97,573	60,926	568,569	6,460	207,168	374,521	116,352	55,028	18,872	451,288	98,629	707,471
13	83,930	122,356	89,486	67,549	11,725	58,986	806,845	776,505	107,331	94,420	60,267	558,200	6,234	202,560	377,660	113,987	55,925	18,069	440,838	96,381	728,242
14	87,246	123,194	90,328	67,903	11,444	58,345	803,419	793,557	107,504	97,327	60,246	558,885	6,239	201,335	388,977	110,856	56,755	18,492	427,889	97,609	744,936
15	90,384	125,104	90,847	69,593	11,803	60,618	790,864	819,081	107,828	101,271	59,506	557,634	6,439	195,575	405,453	110,555	58,546	18,806	430,216	98,985	760,601
16	94,642	125,655	91,102	70,278	12,467	62,150	799,971	806,180	108,563	109,455	57,411	558,878	6,571	194,631	422,214	109,725	59,596	19,540	426,017	104,481	770,870
17	94,438	125,251	96,985	72,834	12,602	64,570	792,391	782,723	108,461	115,987	55,644	558,078	6,296	195,365	434,307	108,955	60,930	19,553	425,122	112,796	771,852
18	98,354	127,080	108,522	73,491	13,103	66,775	768,596	797,051	111,670	119,149	55,605	567,276	6,466	202,655	462,245	108,764	65,680	20,138	432,388	121,689	788,245
19	102,737	132,190	122,809	72,028	14,046	66,600	759,693	833,070	109,660	121,177	55,474	582,595	6,361	204,625	481,104	113,207	72,240	20,430	451,867	126,676	812,891
20	105,470	138,183	123,795	73,946	16,206	68,759	789,843	854,829	118,164	124,999	55,678	606,645	6,420	208,934	499,789	114,044	73,419	20,775	470,394	132,567	836,779
21	108,041	141,120	131,438	72,131	16,698	67,784	791,073	896,047	123,021	129,573	54,903	608,559	6,389	213,451	529,394	115,354	76,875	22,410	472,820	135,450	866,695
22	107,594	141,923	133,541	72,597	18,825	68,475	797,534	992,202	122,445	127,765	56,484	618,018	6,658	216,024	540,841	114,757	78,320	23,122	483,689	137,497	876,042
23	108,091	140,550	132,888	71,337	20,115	67,072	788,577	988,850	125,082	124,105	56,236	619,465	6,676	209,614	544,056	113,177	78,382	24,473	500,066	131,521	870,672
24	109,469	141,431	138,424	69,614	20,359	67,668	790,377	1,022,753	128,641	122,923	57,182	634,149	7,048	208,664	558,736	114,552	80,929	26,690	516,666	130,118	873,372
25	108,577	140,331	137,429	67,004	20,152	64,658	784,883	1,009,129	121,407	122,410	59,501	624,324	7,037	209,413	567,451	114,334	81,756	27,167	532,641	125,037	869,590

TABLE A6 Estimated public spending by age group of children and young people for OECD EU member states in 2013 (billion USD PPP). Source: Our processing on OECD and EUROSTAT data

Country/ Age group	from 0 to 5	from 6 to 11	from 12 to 17	from 18 to 25	Total
Austria	4.2	7.3	9.1	7.0	27.7
Belgium	7.7	10.2	14.9	9.6	42.4
Czech Republic	5.2	4.4	5.4	4.7	19.8
Denmark	4.9	6.9	7.1	6.1	24.9
Estonia	0.5	0.6	0.5	0.5	2.1
Finland	3.9	4.0	5.4	4.9	18.1
France	53.9	52.6	65.9	40.4	212.7
Germany	51.7	60.3	75.0	61.4	248.5
Greece	1.9	4.1	4.8	2.0	12.8
Hungary	4.4	4.4	4.2	3.2	16.3
Ireland	4.2	4.7	5.4	3.5	17.8
Italy	24.8	34.9	36.1	21.8	117.6
Luxembourg	0.8	1.1	1.1	0.5	3.5
Netherlands	9.4	13.3	17.8	15.9	56.4
Poland	8.9	14.6	16.4	15.2	55.1
Portugal	2.3	4.9	6.5	2.4	16.1
Slovak Republic	1.9	2.0	2.2	2.1	8.2
Slovenia	0.8	1.0	1.0	0.9	3.7
Spain	14.3	20.2	24.4	15.9	74.8
Sweden	8.7	10.0	9.8	8.8	37.3
United Kingdom	57.0	65.6	73.4	34.8	230.7
TOTAL	271.7	327.1	386.5	261.4	1,246.7

- tax exemptions (e.g. income from child benefits that is not included in the tax base);
- child tax allowances (amounts for children that are deducted from gross income and are not included in taxable income);
- child tax credits (amounts that are deducted from the tax liability). If any excess of the child tax credit over the liability is returned to the tax-payer in cash, then the resulting cash payment is recorded under cash transfers above (the same applies to child tax credits that are paid out in cash to recipients as a general rule, for example, in Austria and Canada).[23]

To enable comparison, the analysis is presented in per capita US dollars (PPP)[24]. It is worth noticing that data presented below do not include health expenditure. This absence is a rel-

[23] See OECD Family Database, PF1.1 Public spending on family benefits.

[24] At this stage, it is not feasible to present these data in euros because of the nature of the underlying data and the way in which the OECD presents its analysis. The OECD has collated budget data from national governments, and categorised these data to enable comparison. The budget data for each country have then been converted to USD, taking account of relative differences between countries in their purchasing power parity (PPP). The OECD does not publish the underlying data it has taken to calculate PPP values. Converting Member States spending disaggregated by Country and age group to euros would create severe approximation problems, whose extent would display a large volatility among Countries. Therefore, this report presents Country and age group data in US dollars while the report converts at the end in euros only

TABLE A7 Population (0–25) per age for non-OECD EU member states in 2013. Source: EUROSTAT

Age/Country	Bulgaria	Croatia	Cyprus	Latvia	Lithuania	Malta	Romania	Total
0	65,930	41,661	10,124	19,713	30,461	4,183	179,018	351,090
1	68,526	40,980	9,724	18,744	30,241	4,244	184,451	356,910
2	69,058	43,341	10,102	19,150	30,330	4,013	206,839	382,833
3	72,786	44,133	10,049	20,947	30,816	4,104	215,029	397,864
4	70,160	43,121	9,751	22,717	29,173	4,134	215,565	394,621
5	67,742	41,274	9,209	21,966	27,229	3,860	211,666	382,946
6	66,884	41,195	9,406	20,907	26,815	3,849	212,816	381,872
7	65,277	42,405	8,954	20,090	26,678	3,882	215,701	382,987
8	64,915	40,364	9,054	18,937	26,755	3,849	209,509	373,383
9	62,622	39,886	8,863	19,340	27,058	4,010	209,877	371,656
10	61,980	40,402	8,688	18,572	26,657	3,917	207,351	367,567
11	61,964	41,288	9,233	18,036	27,970	3,972	210,421	372,884
12	65,850	43,723	9,346	18,675	30,394	4,377	221,371	393,736
13	66,623	45,206	9,358	17,761	32,638	4,399	219,867	395,852
14	59,672	47,560	9,933	16,761	33,361	4,651	220,128	392,066
15	58,081	50,050	10,458	17,200	34,237	4,825	217,025	391,876
16	64,947	50,807	11,119	17,947	35,615	4,939	212,272	397,646
17	64,995	48,813	11,623	19,555	37,328	5,030	216,986	404,330
18	71,517	48,240	12,319	21,375	38,447	5,193	225,947	423,038
19	76,271	48,728	13,051	23,556	42,078	5,559	219,125	428,368
20	80,134	47,380	14,021	27,052	45,710	5,838	221,305	441,440
21	86,683	51,239	13,681	27,734	45,185	5,939	225,759	456,220
22	93,527	50,848	14,187	29,119	43,574	6,023	250,798	488,076
23	97,619	51,011	14,228	29,306	40,627	6,283	286,060	525,134
24	99,470	53,222	14,971	30,403	39,782	6,245	289,749	533,842
25	97,341	53,148	14,637	30,666	40,959	5,979	290,008	532,738
Total	1,880,574	1,190,025	286,089	566,229	880,118	123,297	5,794,643	10,720,975

evant shortcoming of this approach, because health represents an important dimension of well-being.[25]

To obtain data on total spending on children and young people's well-being the OECD per capita expenditure by age data for 2013 has been combined with Eurostat population data by age for the same year. This provides a broad estimate of the scale of national spending on public services for children and young people by the 21 EU Member States which were also OECD members in 2013. The expenditure included in this analysis relates to welfare spending (cash benefits, tax breaks, and other benefits in kind) and education spending (childcare and compulsory schooling). It should be stressed that the underlying spending data are aggregated by OECD from the individual national budgets and there are a number of significant limitations around these data (the limitations of this approach are presented in OECD, 2009). The total estimated 2013 public spending on children and young people's well-being by the 21 EU Member States which were also OECD members in 2013 which we obtained as described above is about 1.25 trillion USD PPP.

We have also produced a rough bottom line estimate of total spending on children and young people's well-being for EU Member States which were not OECD members in 2013 (Bulgaria, Croatia, Cyprus, Latvia, Lithuania, Malta and Romania) by multiplying the number of residents of these countries belonging to each cohort from 0 to 25 by the corresponding 2013 per capita spending on children and young people's well-being of Greece, which in that year was the OECD EU Member State displaying the lowest overall level of this indicator. The total estimated 2013 public spending on children and young people's well-being by the EU Member States which were not OECD members in 2013 which we obtained as described above is about 46.3bn USD PPP. The estimates presented above suggest a combined expenditure of around 1.3 trillion in 2013 USD PPP for the 28 EU Member States. At 2013 PPP,[26] this would amount to around €950b. (Table A1-A4)

the combined spending on children and young people's well-being of the 28 EU Member States using the USD PPP for the EU as a whole.

[25] See OECD (2009).

[26] According to the OECD database, the PPP for the EU as a whole in 2013 was 1 USD = 0.734 euro.