Building a Set of Indicators to Assess Migrant Children's Integration in Europe: A Co-Creation Approach

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Abstract

The integration of refugee and migrant children, one of Europe's most vulnerable populations, is a crucial challenge for EU societies and their present and future social cohesion. Despite extensive knowledge on migrant integration, we still lack specific instruments to measure children's integration and set goal-oriented targets to promote it. Our research responds to this need by presenting and discussing a new child-centered system of indicators with a twofold purpose: (1) to assess and monitor the integration of refugee and migrant children across European countries and (2) to guide policymakers and relevant stakeholders. The indicator system's holistic and transversal nature marks an improvement over previous measurement attempts by considering different dimensions of integration; subjective and objective perspectives, as well as contextual factors; and indicators relevant for and comparable across different European countries. The research uses a co-creative methodology that ensures both scientific rigor and relevance for stakeholders and policymakers. A child-centered perspective, active participation of children throughout the research process, and an iterative co-creation design contribute to the system's added value. First-hand experiences, ongoing dialogues, and an ecological approach involving stakeholders at micro, meso, and macro levels (children, families, school representatives, public officials, and politicians) served to develop and validate the set of indicators. As a result, we are offering (1) 14 indicators that assess the integration outcomes of migrant children across five dimensions: access to rights, language and culture, well-being, social connectedness, and educational achievements, and (2) 16 indicators highlighting key barriers and facilitators influencing integration outcomes (i.e., societal and political aspects, particularly school organization and learning support).

Keywords Migrant children · Integration · Co-creation · Indicators

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1 Introduction

The integration of refugee and migrant children is a crucial challenge for European societies and their present and future social cohesion. According to Eurostat, there are currently almost 6.6 million foreign-born children living in the European Union, and 23 million European citizens are children of migrants (Eurostat, 2024). In countries such as Belgium, Germany, Ireland, or Sweden, migrants and their descendants already constitute more than 30% of the population (Eurostat, 2023). And almost one in four 15-year-old students in EU countries was either foreign-born or had at least one foreign-born parent in 2015 (OECD, 2018, 2023). Moreover, the proportion of minors in migrant populations has been on the increase since the beginning of this century (Bhabha & Abel, 2020). These children are among Europe's most vulnerable populations (McAuliffe & Triandafyllidou, 2021).

Despite extensive knowledge on migrant integration, we still lack specific instruments to measure children's integration and set goal-oriented targets to promote it (UNICEF, 2019). Social indicators have become preferential tools in this regard, as they facilitate the study of where we are and where we are going concerning specific objectives and goals. These statistics allow us to evaluate specific programs and determine their impact (Horn, 1993, p. 147) while maintaining a welfare perspective on complex social phenomena (Maggino, 2017). Although there have been numerous attempts to measure integration through social indicators (Zaragoza Declaration, Migrant Integration Policy Index, OECD Integration indicators), none of these have been specific to refugee and migrant children.

The recent specialized literature on migrant children's integration emphasizes the benefits of adopting participatory research designs to incorporate children's subjectivity and perspectives (Due et al., 2014). Thus, innovating upon previous indicator-building procedures (Maggino, 2017), we adopted a co-creative approach to ensure the meaningful engagement of children and other relevant stakeholders and to represent their perspectives in developing this information system (Ramaswamy & Ozcan, 2014). Implementing this co-creation strategy involved designing a stepwise iterative process to ensure a constant exchange between researchers and participants in six European countries, representing different contexts at the European level. This design aimed to identify the most robust indicators across methodologies, stakeholders, and contexts. The process involved a mapping exercise of existing indicators and an effort to develop some original ones where needed.

In sum, to our knowledge, there are no available systems of indicators specifically designed to measure migrant and refugee children's integration. This is matched with the need to incorporate research methodologies that focus on children's experiences and perspectives. This article contributes to filling both gaps by discussing a new co-created and child-centered system of indicators that aims to assess and monitor refugee and migrant children's integration across Europe and to provide guidance to policymakers and relevant stakeholders. First, we discuss the state the of the art regarding migrant children's integration and its measurement. Next, we introduce the methodological framework and describe the co-creation process implemented. We then describe the results obtained: a new system of indicators encompassing one set 14 indicators for the latent variable of migrant children's integration, and another

set of 16 indicators highlighting key barriers and facilitators influencing integration outcomes. Finally, we discuss our methodology's main contributions, limitations, and findings and present our main conclusions.

2 State of the Art

There is broad consensus among migration scholars to define integration as a two-way dynamic process of interaction between migrant populations and the receiving society, which encompasses adaptations across different life domains (Bauböck, 1994). Integration is necessarily a contextualized process shaped by the settings where it occurs, in which migrants and host societies have joint albeit asymmetric responsibilities (Garcés-Mascareñas & Penninx, 2016).It is also well acknowledged that the integration of refugee and migrant children requires specific consideration and treatment as it is embedded in children's developmental processes and in the particular sets of institutions and relations in which they participate. Specialized literature emphasizes the centrality of educational settings as the primary contexts for inclusion and as decisive for their short and long-term results (Heckmann, 2008). This literature, however, still lacks a more transversal perspective, incorporating child developmental studies and connecting with the normative frameworks that regulate migrant and refugee children's rights (Ahad & Benton, 2018).

Regarding normative frameworks for migrant integration, the inclusive and intercultural models set out by the Council of Europe (2008) and UNESCO (1994, 2006, 2016) underlie all current legislation and practice in Europe, including the EU Action Plan on Integration and Inclusion 2021–2027. The inclusive model promotes equality, highlighting the responsibility to ensure migrants' inclusive education, employment opportunities, and access to health (European Commission, 2020). The intercultural model assumes intercultural dialogue to reduce prejudice and stereotypes in public life, thus promoting the inclusion of all members of society (Barrett, 2013). Considering the encompassing values and rights enshrined in the Convention on the Rights of the Child, this normative framework jointly underscores two fundamental goals for migrant and refugee children's integration: (1) that children become fully recognized and valued members of society at the formal and informal levels, and (2) that children can reach their full potential.

Child and adolescent developmental studies emphasize the complexity of the interactions between several systemic levels affecting children's growth (Clauss-Ehlers et al., 2013). In particular, the ecological theory highlights the influence of proximal and distal figures and groups to provide children with the resources and opportunities necessary for survival and development as autonomous members of society (Bronfenbrenner, 1994). In this regard, social relationships and education are critical catalysts for migrant and refugee children's development and social integration as they provide engagement with diverse networks (peers, educators, families, caregivers, neighbors, and institutional figures) relevant to children's socialization (Pugh et al., 2012). In this way, schools are not just external stimulation and education contexts but also unique sources of meaningful learning, impacting all aspects of child development and children's life trajectories in the long term (Morrison et al., 2019).

The research devoted to migrant and refugee children also emphasizes the holistic nature of their integration process, underscoring five closely intertwined dimensions: access to rights, language and culture, well-being, social connectedness, and educational achievements (Serrano et al., 2023) (see Table 1).

Research across these two bodies of literature also identifies critical aspects across the social structure and settings that are pivotal in hindering or boosting their appropriate development and social integration. Among these, political and organizational leadership are robustly emphasized as essential (Crul et al., 2010; Penninx & Martiniello, 2006). So, political leadership conditions the effective integration of refugee and migrant children by defining the legal frameworks that mediate their access to rights, through the allocation of resources for relevant services and specific needs, and by setting the tone for how refugees and migrants are generally perceived and

Table 1 Dimensions of refugee and migrant children's integration

	Access to rights	This dimension refers to the recognition of migrant and refugee children's legal status and their practical rights, such as education and health care. This dimension reflects their formal recognition as society members and fundamentally impacts their opportunities (Ager & Strang, 2008; García Cívico, 2010)
	Language and culture	It refers to the capacity of children to communicate in the local language, which is fundamental for full participation in society, the realization of legal rights, and social and personal development (Heckmann, 2008). It also refers to children's capacity to integrate both origin and local cultures to ensure individual and social mutual enrichment (Akkari & Radhouane, 2022)
	Well-being	Children's health and psycho-social well-being are essential prerequisites for a positive functioning and human experience (WHO, 2004) and become particularly relevant during childhood and adolescence, determining cognitive and behavioral capacities at this stage (Barnett & Belfield, 2006)
	Social connectedness	It refers to children's network of social ties through which they participate in the social structure. These ties constitute the basis for social capital and social support (Bronfenbrenner, 1986; Granovetter, 1973), building blocks for social identity and transmitters of values, attitudes, and behaviors (McLeod & Lively, 2003; Tajfel & Turner, 1985)
	Educational achievements	Acquisition of knowledge, skills, and credentials through formal education becomes necessary to succeed in everyday life and enjoy better opportunities (Ainscow, 2016). Educational achievements thus equip students for a better life

Source: own elaboration, based on (Serrano et al., 2023)

treated (Bilgili et al., 2015). The host society's negative attitudes at all levels towards migrants, refugees, or ethnic minorities are crucial in hindering their integration experiences (Castañeda et al., 2015; Schachner et al., 2018).

At the same time, but on a local level, schools' cultures and leadership styles are similarly crucial to providing opportunities and practical means to meet these children's needs (Ainscow, 2016). The literature also focuses on the importance of school settings, particularly whether migrant and refugee children tend to attend school centers where disadvantaged social categories are overrepresented (Save the Children, 2019). Other more specific organizational barriers and facilitators have to do with the availability, both at the policy and school levels, of services to meet diverse educational needs, such as language and learning support (Sinkkonen & Kyttälä, 2017) or counselling and mental health services at schools (Mohamed & Thomas, 2017).

Despite the extensive body of knowledge and evidence on all these aspects, research about the integration of migrant and refugee children still lacks specific instruments to measure children's integration and set goal-oriented targets (UNICEF, 2019). In this regard, social indicators are particularly suitable tools as they synthesize several complex social phenomena (involving objective life conditions and subjective human experiences) into manageable and comprehensive information while maintaining a welfare perspective to orientate policymaking (Maggino, 2017). There are diverse indicator systems to measure and monitor the integration of migrants, such as the Zaragoza Declaration indicators (Council of the European Union, 2010), the Migrant Integration Policy Index (Huddleston et al., 2015), or the OECD Integration indicators (OECD/EU, 2018). Nevertheless, none of these instruments was designed for, or has been adapted to, data collection *on* minors. Moreover, they all generally tend to focus on macro-level aspects. All this relates to a general lack of data and disaggregated information on children's integration outcomes (White et al., 2012).

Recent specialized research on migrant children underscores the benefits of overcoming these limitations by adopting a child-centered perspective, which values children's subjectivity and their multiple and heterogeneous experiences of migration (Gornik & Sedmak, 2021). In particular, researchers call for incorporating a multidimensional point of view (Foertsch et al., 2023) and adding to the political, structural, and intercultural aspects relevant to adults those educational and socioemotional aspects that specifically affect minors (Gornik & Sedmak, 2021). Adopting participatory research designs, and thus conducting research *with* minors, is also seen as beneficial in incorporating children's subjectivity and agency (Due et al., 2014), following the highest normative and ethical standards (Lundy & McEvoy, 2012).[1]

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[1] Article 12 of the UN Convention on the Rights of the Child (1989) states: "States Parties shall assure to the child who is capable of forming his or her own views the right to express those views freely in all matters affecting the child, the views of the child being given due weight in accordance with the age and maturity of the child".

3 Methodology

The development of the system of indicators followed a co-creation approach to ensure the representation and engagement of children and other relevant stakeholders from a multi-level perspective.[2] We adopted an ecological systemic framework (Bronfenbrenner, 1994) to define the stakeholders to be involved in this co-creation process by levels of proximity to children (see details in Table 2).

The research was conducted in six countries (Belgium, Germany, Greece, Ireland, Italy, and Spain), representing key variations in migrant populations and receiving contexts at the European level. We implemented a stepwise iterative design that ensured the robustness of the selection and definition of the indicators across different local contexts, stakeholders, and methodologies. This design, described in detail below, was organized into three main steps. In each of the steps we assessed, selected, and refined, in an iterative manner, the indicators to include (see Fig. 1). In the first step, we mapped and pre-selected a list of 50 variables and their corresponding indicators. The second step content-validated this list of indicators, providing further evaluation and refinement, and led to the selection of 35 indicators. The third step ecologically validated the latter, while providing further refinement and the selection of the final 30 indicators.

Throughout all the steps, we consistently applied the following selection criteria (Hales, 2010; Heink & Kowarik, 2010):

1. *Relevance and Adequacy (for the importance of inclusion).* The relevance of an indicator reflects its importance for the issue at hand (namely, in our case, children's integration results and their main barriers and facilitators). Adequacy

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[2]Applying a child-centred perspective, we emphasized, in particular, co-creation with children. For this,

Table 2 Ecological levels of refugee and migrant children's integration process

Micro level	The child and his/her family
Meso level[1]	The school, neighborhood, and other primary places in children's daily life, including all possible relations at this "local" level, from small groups to formal organizations (such as associations or social services)
Macro level	The political, economic, and social systems in the broad sense, including the vertical axis of policymaking, that is, the relationship between the national, regional, and local levels

Source: own elaboration

[1]For the meso level, we followed a whole-school approach, considering the different members of the educational communities (Ainscow, 2020)

we engaged children between 6 and 18 years old, with different migrant backgrounds, by means of adapted research methods and at all stages of the research process. In addition to children's participation in specific research activities, a Children's Research Advisory Group (CRAG) was formed to monitor the research process since its inception, which acted as an expert group providing feedback and insights in critical moments of the research process (Clarke, 2020). The CRAG was composed of 10–15 migrant and refugee children, resident in Ireland.
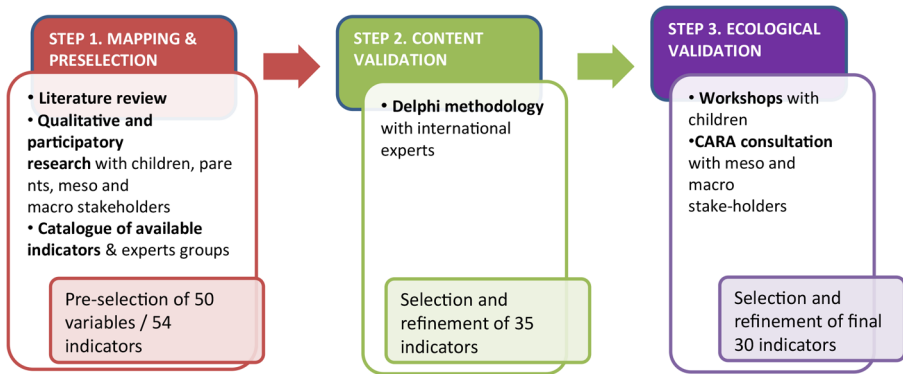
Fig. 1 Steps of the selection process. *Source*: own elaboration

refers to its validity and reliability to represent its intended meaning (Maggino, 2017). At each process step, these criteria established the preferred indicators for selection.

2. *Feasibility and Efficiency (for the strategic exclusion of indicators)*. Feasibility reflects whether an indicator can be readily observed or whether a reliable, valid, and normatively acceptable measurement can be produced at a reasonable cost. Efficiency involves avoiding redundancies and selecting indicators that require less effort for data collection or that provide more information at once. These exclusion criteria pursue to reach the most parsimonious and empirically robust set of indicators.

3. *Comprehensiveness.* It reflects whether the selection of indicators includes all aspects required to capture the conceptual model it intends to reflect (Maggino, 2017). For this, we assessed and ensured a sufficient representation of the relevant dimensions and topics (as identified in our analysis) throughout the process.

We set to include a maximum of 30 indicators, considering that this number can provide significant heterogeneity of information while being manageable enough for the sustainability of the information system and for its consideration by relevant stakeholders. Departing from the pre-established twofold purpose of the system of indicators (Maggino, 2017) – namely, to assess children's integration outcomes and to provide policy guidance to relevant stakeholders – the co-creation process aimed to identify two types of indicators. First, indicators to assess refugee and migrant children's integration results (or 'indicators of integration'). And second, indicators of societal and political aspects that foster or hinder these integration results ('indicators of barriers and facilitators'). The latter are conformed or significantly shaped by policies, programs, and other forms of intervention and, as such, are susceptible of policy recommendations (Noll, 2004). Since indicators of integration results correspond to children (micro level) and indicators of barriers and facilitators correspond to the meso and macro levels, combining both types of indicators also helps reflect all relevant levels of proximity to the child (see Table 3).

Table 3 Types of indicators considered for inclusion

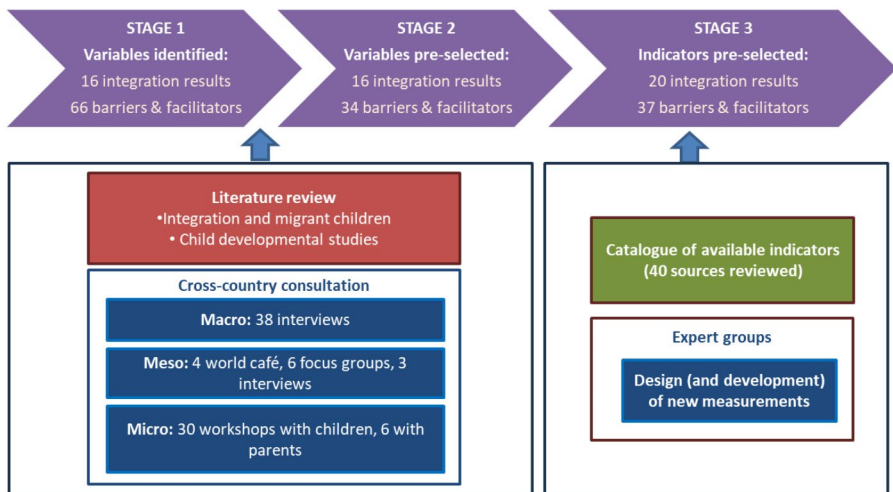| Denomination	Type	Level	Purpose	Use
Integration results	Results (Constitutive)	Micro	Proxy the latent variable of integration	Comparative overview
Barriers and facilitators	Process (Concomitant)	Meso Macro	Monitor societal and political aspects that foster or hinder integration	Policy recommendations

Source: own elaboration

Fig. 2 Mapping and pre-selection (Step 1)

3.1 Step 1. Mapping and Pre-Selection

The first step was designed to obtain an initial list of pre-selected indicators and it involved three main tasks or stages: mapping, selection of variables, and selection of empirical measurements (Fig. 2).

3.1.1 Mapping of Variables

To produce an exhaustive mapping of the relevant variables, we conducted a comprehensive literature review, the main findings of which have been presented in the *State of the Art* section above.[3] In addition, we conducted a broad cross-country consultation with children and other relevant stakeholders, employing different qualitative

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[3] The search was launched on 27 bibliographic databases, including only indexed and peer-reviewed sources. The search included six key words (migrant*; child*; inclusion; integration; education*; inter-

and participatory research techniques adapted to the different target groups and age ranges. A total of 430 participants were engaged in the consultation (see Table 1 in supplemental materials). In all activities, trained facilitators designed a safe and open setting for participants to express their experiences and views on children's integration process, contributing to characterizing these processes and any significant barriers and facilitators.

A thematic analysis (Thomas & Harden, 2008) identified all the themes and variables that emerged in this consultation, particularly those commonly present across different stakeholders and countries. This analysis revealed a significant alignment with the literature regarding relevant elements to assess children's integration results, thus confirming the adequacy of the identified five dimensions. The consultation was particularly rich in detecting key barriers and facilitators at the meso and macro levels, which were further categorized into nine thematic clusters, also largely aligned with the literature (see Table 4). Considering the overlaps between the literature and the consultation, 16 key integration results and 66 key barriers and facilitators emerged for potential selection (see Table 2 in supplemental materials).

3.1.2 Selection of Variables

Based on this initial mapping exercise, we proceeded to the pre-selection of 50 variables. First, all 16 integration variables identified were pre-selected, since they only amounted to one-third of the targeted 50 variables, in order to ensure a sufficient representation of these. The remaining 34 variables were then extracted from the 66 identified barriers and facilitators.

To choose from among the latter, we ranked them based on their policy relevance and adequacy *across contexts*, following the results of each country's consultation, and as assessed by six teams of researchers (one per country). In total, 22 variables were chosen by 3–4 teams and 21 by at least two teams, providing a prioritization list of 43 variables. We then proceeded to exclude variables within each of the nine identified clusters strategically. To do this, we applied the criteria of feasibility and efficiency. Those variables that could be proxied by or included in some other variable and those that presented feasibility issues (such as lack of data) were candidates for exclusion. We also considered choices between possible levels of observation (i.e., policies at the macro level vs implementation at the meso level). Nine variables from six different clusters were dropped this way, reaching the target of 34 variables while ensuring the representation of all the identified clusters. The full list of candidate variables, the reasons for exclusion and the 50 pre-selected variables are detailed in Table 3 in the supplemental material.

3.1.3 Selection of Empirical Measurements

Once the pre-selection of 50 variables was finalized, we identified the best available empirical measurements for each of them. Interdisciplinary and cross-country work-

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cultural*) using the three main fields (Title, Abstract and/or Keywords). This first search resulted in 526 articles, which were all consulted.

	Cluster	Description of themes
Table 4 Thematic clusters of barriers and facilitators	1 **POLITICAL LEADERSHIP**	Political leadership in intercultural and inclusive values, including legal and practical provisions for children's effective access to rights
	2 **SCHOOL SEGREGATION**	Whether there is concentration of disadvantaged students (by socio-economic status, by ethnic or migrant background, etc.) in some schools, and policies and resources to avoid or tackle with this
	3 **SCHOOL OR-GANIZATION & TEACHERS**	School organization and leadership around intercultural competences and inclusive values, parental involvement, or teachers' attitudes and training
	4 **ALLOCATION OF STUDENTS**	Criteria for incorporation to educational levels upon arrival and separation of students (by performance levels, or into different tracks at early ages)
	5 **LEARNING SUPPORT**	Provisions for preparatory classes, learning and language support, supplemental activities, etc
	6 **FOREIGN LANGUAGES AT SCHOOL**	Use and teaching of multiple and foreign languages
	7 **MENTAL HEALTH SERVICES**	Availability of counselling and therapeutic services in the school or otherwise
	8 **ETHNIC/LIN-GUISTIC/CUL-TURAL POINTS OF SUPPORT**	Whether multiple languages and cultures are incorporated in the school, and presence of ethnic, cultural or migrant networks in the local communities and school
	9 **NEGATIVE ATTITUDES**	Experience of negative attitudes or harassment (including bullying)

groups, specialized by topic, reviewed over 40 secondary sources (see Table 4a in the supplemental material) and consulted with local and international experts to produce a catalog of available data and empirical measurements. For selecting among these, we prioritized those that most adequately reflected each defined variable, according to these multiple and combined sources of expertise, and discarded those with feasibility or efficiency problems (e.g. measures of language competence requiring to run extensive and specialized tests). We also prioritized data and measures that were widely used or already validated, regularly produced by trusted sources, and available for all European countries or at least the six countries analyzed (Bauler et al., 2007).In this way, many of the selected measures originate in MIPEX, Eurydice, Eurostat or PISA. For complex or multi-layered variables (a total of six), two or more empirical measurements were sought to represent this complexity, reaching a final pre-selection of 57 indicators (see Table 4b in the supplemental material).

In many cases (26 out of 57), we found that no adequate data were available with the desired characteristics, particularly regarding coverage. Most of these measurements (20) required data collection from children and the rest from schools (6). We

identified previously used and validated survey items that could be replicated or adapted for these cases and proceeded at a later stage to collect the data. In four additional cases, it was necessary to design new survey items, which were thoroughly discussed by interdisciplinary groups of experts (see Table 4b in the supplemental material).

3.2 Step 2. Content Validation

In Step 2, the list of 57 pre-selected indicators was evaluated to produce a selection of 35 content-validated indicators using the Delphi method (see Fig. 3). Content validation aims to ensure that an assessment instrument measures the targeted construct it is supposed to measure (Rusticus, 2014). The Delphi methodology is particularly suited for complex subjects and constructs, as it produces a consensus reflecting shared knowledge among experts (Boulkedid et al., 2011; Fink et al., 1984), who respond to a questionnaire and exchange their opinions, producing a collective decision (Brady, 2015; Linstone et al., 1975).

Our Delphi consultation included 24 international experts selected from a pool of highly recognized scholars and experts in migration, education, public policy, childhood, and mental health, including several specialists in indicators and monitoring systems. The large number of participants,[4] the heterogeneity of their profiles, and their level of expertise and specialization (see Table 5a in supplemental materials) help ensure that their consensus reflects the best available knowledge (Miller, 2013). The Delphi consisted of two consecutive consultation rounds implementing the CARA procedure developed by Hernández Franco et al. (2009).[5]Experts provide scores on four formal aspects for each indicator in this procedure: Clarity, Adequacy, Relevance, and Accessibility (see Table 5). By providing disaggregated and standardized scores across multiple criteria, the CARA procedure produces a more nuanced base for consensus-building than the traditional "benchmark-based" consensus used in many Delphi studies (Bajo Marcos et al., 2023). These four criteria represent our criteria for inclusion (Adequacy and Relevance), besides two other technical criteria applicable to feasibility and strategic exclusion (Accessibility and Clarity). We further complemented this procedure by asking for qualitative inputs from the experts, thus contributing to more detailed assessments and reflections and selecting 5 top indicators by each expert. The initial CARA scores and comments were provided to all experts in the second round, in which most participated and modified their inputs, engaging in a feedback dialogue.The analysis was conducted in two stages. First, we employed *CARA-based metrics* to establish a prioritization list. These metrics include

57 indicators pre-selected:
20 integration results
37 barriers & facilitators

DELPHI

35 content-validated indicators:
14 integration results
21 barriers & facilitators

Fig. 3 Content validation (Step 2). *Source*: own elaboration

[4]Boulkedid et al. (2011) find that the median of Delphi participants is 17.

[5]This was conducted online using the software Calibrum.

Table 5 CARA (*) criteria

Criteria	Description	Score range
Clarity	Whether the indicator is drafted in a concrete and non-ambiguous way and has a single possibility of interpretation	1 to 4
Adequacy	Whether the indicator is appropriate to measure key or highly influential factors to achieve the socio-educational integration of migrant children	1 to 4
Relevance	Whether the indicator is essential regarding public policies or educational centers to accomplish their mission of socio-educational integration of migrant children	1 to 4
Accessibility	Whether there are sources of accessible information to obtain the necessary data to make a reliable indicator measurement	Yes / No

Source: own elaboration.
(*) Acronym translated and adjusted from Hernández Franco et al. (2009)

Table 6 Classification criteria and resulting groups

Positions of CARA-based rankings	Quality criteria	Level of prioritization (groups)	Number of indicators (total: 57)
Top positions[1]	With additional quality criteria	A	12
	No additional quality criteria	B	19
Intermediate position	With additional quality criteria	C	9
At the bottom	No additional quality criteria	D	17

Source: own elaboration
[1]The details can be consulted in Bajo Marcos et al. (2023)

two average-based rankings (one for Adequacy and Relevance and one for all CARA scores) and two quality criteria (indicators in the top 5 of more than a quarter of the experts and indicators with the maximum score in Adequacy or Relevance from 60% or more of the experts).[6] The 57 indicators were classified into four priority groups (A, B, C, D) according to these metrics (see Table 6), providing a robust overall ranking based on Adequacy and Relevance and reflecting Clarity and Accessibility.

We then analyzed the *qualitative input* from the experts, which allowed us to go beyond the quantitative logic of the metrics. We identified the aspects (positive or negative) where clear or broad consensus emerged and singled out comments from experts specialized in the particular topic, measurement, or source involved. All indicators were improved by introducing further points of clarification and information, and some were refined or modified following experts' suggestions (see Table 5c in

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[6] Details on how these metrics were constructed and combined can be consulted in Bajo Marcos et al. (2023).

the supplemental material).[7] Finally, where significant concerns were raised – either about the empirical measurement (e.g., reliability of answers or empirical evidence on the indicator's unreliable behavior) or about their usability and social impact (e.g., potential for misinterpretation and social stigmatization) – and no solutions were suggested or found, indicators were dropped from the prioritization list. The selected 35 indicators were those with the highest CARA-based metrics that either did not raise significant concerns or for which concerns could be satisfactorily addressed (see Table 7). A detailed summary of the Delphi-based selection is in Table 5b in the supplemental material.

3.3 Step 3. Ecological Validation

Ecological validation ensures that research results are applicable to real-world settings, reflecting the actual experiences and circumstances of the populations studied (Bradshaw & Bekoff, 2001; Cicourel, 2007), and considering cultural, social, and economic factors (Rykiel, 1996). Indicators validated through ecological methods enhance practicality and applicability in real settings, benefiting policy formulation and intervention strategies (Sam & Berry, 2010). In the research domain of this article ecological validation guarantees that selected indicators are relevant and well-adjusted from the perspective of all relevant stakeholders (educators, community members, policymakers and children themselves) leading to more comprehensive measurements (Betancourt & Khan, 2008; Reis et al., 2014). Thus, in the final step, the 35 content-validated indicators were evaluated and validated by children and other relevant stakeholders at the meso and macro levels to validate and select

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[7] Most of these involved: replicating survey items for different populations (e.g., principals and teachers)

Table 7 Delphi results per classification group

Level of prioritization (groups)	Number of indicators	Result	
		Nr Included	Nr Dropped
A	12	12	0
B	19	14	5*
C	9	5	4*
D	17	2 **	15
Total	57	33 **	24

Source: own elaboration. *Note.* * Three (in group B) and one (in group C) were absorbed into a higher-ranking indicator. ** One was re-elaborated and transformed into three indicators to address experts' concerns (instead of just covering the acquisition of citizenship, the acquisition of permanent residence and of refugee status were included). This meant 35 indicators emerged from this selection

to increase their robustness; widening or adjusting the definition of different groups of reference; or resorting to a higher-order indicator (i.e. from an existing indicators system used as reference). The suggestions sometimes led to a change in the survey items used as a basis for the indicator, resorting to other well-established survey items where available. In a few cases this required developing new or adjusted survey items following the experts' qualified suggestions (see Table 5c in supplemental materials).
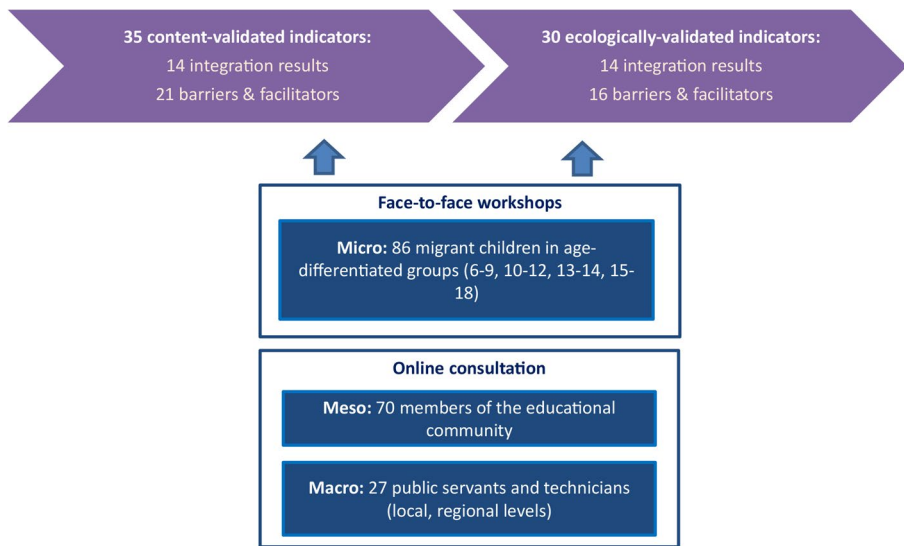
Fig. 4 Ecological validation (Step 3). *Source*: own elaboration

the final set of 30 indicators. For this, we conducted a cross-country and multi-level consultation similar to the one carried out in Step 1 (Fig. 4).

Children of different backgrounds validated the indicators in 17 on-site workshops organized per age (6–9, 10–12, 13–14, 15–18).[8] In these workshops, children assessed the 14 indicators built from survey items to be collected from children.[9] Children discussed their relevance, clarity, meanings attached, and any issues identified. The validation with other relevant stakeholders was split into two sub-samples: one at the macro level (a total of 27 public servants and technicians in the areas of education, migration and refugee services, and public administration) and one at the meso level (70 people among teachers, principals, and managers, but also other members of the educational community, such as school mediators, administration, external evaluators, or parent spokespersons). This consultation was carried out online in all six countries.[10] These stakeholders evaluated the 35 indicators using the CARA criteria in a single round and volunteered comments.

Among children, the assessment of the relevance and clarity were overwhelmingly good across the board, with very few exceptions.[11] Among the meso and macro-level

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[8] Additionally, all modifications carried out in the Delphi, and in particular the modified survey items, were discussed with the Children's Advisory Group in a dedicated workshop before their final selection.

[9] These were translated into the 7 languages of the participating countries (English, French, Dutch, German, Greek, Italian and Spanish). We produced an adapted version for smaller children (6 to 9 years old), simplifying the wording and formulation of some survey items (six), and leaving out others that were considered not appropriate for this group (five).

[10] We used the Calibrum platform. The indicators and all contents were translated into the 7 languages of the participating countries.

[11] The results were more mixed for smaller children (6–9 year-old), who encountered difficulties in all countries to understand, follow or keep concentrated, despite having simplified and adjusted the items for

stakeholders, almost all indicators received high scores in all four CARA criteria, with relatively low variability and minimal differences between high and low-ranking indicators. For the final selection, indicators with the lowest scores in the meso and macro sub-samples and indicators that had raised some issues among children were selected as candidates for exclusion. Considering issues of efficiency and balanced representation of the different ecological levels and dimensions, five indicators were finally selected for exclusion, concluding the final selection of 30 indicators (see Table 6 in the supplemental materials for a detailed summary of the results).

4 Results: The New System of Indicators

The final system of indicators that emerged from the co-creation process described above comprises 30 indicators that proxy 28 variables (two are composite variables with two empirical indicators). Fourteen are indicators for children's integration results, and sixteen are for barriers and facilitators at the meso and macro levels (see Table 8).

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this group. Based on the qualitative comments from children and stakeholders, some changes were made in the wording of 12 indicators, mostly with the aim of making them more child-friendly. Additionally, it was decided that a cartoon-based adaptation would be prepared of the items to be asked to children from 7 to 9 years old to provide visual aid and increased interest. However, by the age of 6, most children are just starting their reading learning and their stage of cognitive development, and it was confirmed during the workshops that following the simplified and adapted items was extremely difficult and rare at this age. So, another major conclusion was reached to exclude 6-year-olds from the collection of these data.

Table 8 Summary overview of the system of indicators	Dimensions/Clusters	Number of variables and indicators
Indicators for integration results	1. Access to rights	2 variables (2 indicators)
	2. Language & culture	2 variables (2 indicators)
	3. Well-being	2 variables (2 indicators)
	4. Social connectedness	3 variables (4 indicators)
	5. Educational achievements	4 variables (4 indicators)
Indicators for barriers and facilitators	1. Political leadership	3 variables (4 indicators)
	2. School segregation	1 variable (1 indicator)
	3. School organization & teachers	4 variables (4 indicators)
	4. Learning support	4 variables (4 indicators)
	5. Mental health services	1 variable (1 indicator)
	6. Negative attitudes	2 variables (2 indicators)

4.1 Indicators for Integration Results

These fourteen indicators (see Table 9) observe integration results at the micro level (children's results) and proxy the latent variable of integration. All five dimensions of integration are represented with at least two indicators – four in the case of the more complex dimensions of social connectedness and educational achievements. The dimension of social connectedness includes three distinct variables for peers, teachers, and institutions, and two separate indicators for peers (reflecting levels of support and bridges between children with different backgrounds). The educational dimension includes variables on achievements throughout the educational trajectories. Quite notably, while all indicators for access to rights and educational achievements are available from secondary sources, the opposite is true for the dimensions of language and culture, well-being, and social connectedness, which required specific data collection on children's perceptions and experiences.

4.2 Indicators for Barriers and Facilitators

These sixteen indicators (see Table 10) capture barriers and facilitators of integration at the meso and macro levels. They include nine indicators at the meso level – including school (six) and neighborhood – and seven at the macro level. All indicators for the macro level can be obtained from available secondary sources (i.e., MIPEX, Eurydice). In contrast, almost all indicators for the meso level (a total of eight) require specific data collection from schools or children. The clusters with the most significant representation are the clusters of school organization and learning support (four indicators each), which combine macro and meso-level indicators to reflect both the legislation, recommendations, and resources (LRR) relevant to school organization and learning support and their implementation at the school and neighborhood levels. These clusters are followed by those of political leadership (three variables and four indicators at the macro level) and negative attitudes (two indicators at the meso level).[12]

5 Discussion

In this article, we have presented the first system of indicators for assessing refugee and migrant children's integration in Europe with a comparative perspective. Institutions such as the European Union, the OECD (OECD/European Commission, 2023), the Migration Policy Institute (Jiménez, 2011), or the Migration Policy Group (Bilgili et al., 2015) have systematically developed sets of indicators to measure the integration of immigrants. However, none of these instruments were designed for or adapted to capture children's specific realities and data collection on minors. Thus, despite extensive knowledge and evidence on refugee and migrant children's integration pro-

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[12] Three of the clusters initially identified are not represented ("Allocation of students", "Foreign languages at school" and "Ethnic, linguistic and cultural points of support").

Table 9 Integration results indicators[1]

DIMENSION	Variable	Count	Indicator	Source
ACCESS TO RIGHTS	**Children's access to compulsory education**	1	Scholarization rates. Proxied by: foreign children enrolled at school as a share of foreign children in compulsory ages	Education ministries / Eurostat
	Children's access to health care	2	(Dif.) Share of children under 16 with unmet needs for medical examination	EU-SILC
LANGUAGE & CULTURE	**Children's competence in host language**	3	Average perceived ability to understand and to speak the primary host language	N/A*
	Children maintain their cultural identity while adopting new cultural values and intercultural competences	4	Share of children who feel close both to persons from their cultural origins and to persons who may have very different cultural backgrounds, either from their places of residence or from intersecting social categories (age, gender or same interests and hobbies)	N/A*
WELL-BEING	**Children's life satisfaction / happiness**	5	(Dif.) Share of children who consider that they are quite happy or very happy	N/A*
	Children's sense of belonging	6	Average score in school belonging items (how frequently they feel that they belong at their school, that can be themselves at school, and that people at their school care about them)	N/A*
SOCIAL CONNECTEDNESS	**Friends and peers**	7	(Dif.) Average score in peer support items (how frequently they feel that their friends try to help them, can talk with about what makes them happy or sad, stand up for them)	N/A*
		8	Share of all children with friends from a different country or from a different culture	N/A*
	Teachers	9	(Dif.) Average score in teacher support items (how frequently they feel that their teachers try to help them, really listen to them, stand up for them)	N/A*
	Institutions	10	(Dif.) Average score in trust in essential institutions in their country of residence: education, healthcare and law and order	N/A*

Table 9 (continued)

DIMENSION	Variable	Count	Indicator	Source
EDUCATIONAL ACHIEVEMENTS	**Children's academic skills**	11	(Dif.) Share of low achievers in reading, mathematics and/or science	PISA
	Children complete compulsory education	12	(Dif.) Share of persons aged 16–20 with compulsory education completed (if arrived in the host country before age 15)	PIAAC
	Children remain in formal education beyond compulsory levels	13	(Dif.) Share of early leavers among foreign-born and non-foreign born persons aged 18–24	Eurostat
	Types & levels of formal non-compulsory education attended	14	(Dif.) Share of persons aged 16–24 who have completed (or who are currently studying) upper secondary or tertiary studies in the survey country	PIAAC

Source: own elaboration. *Legend:* * specific data collection from children; ** specific data collection from schools (principals or/and teachers); (Dif.)=Difference in share/average between migrant-background children and native children. *Note*: for the sake of space "children" in this table refers to migrant-background children, unless otherwise specified

[1]For further details and survey items (including adaptations for 7–9 year-old children), see Table 7 in supplemental materials

cesses, this is the first available instrument to assess children's integration results and to set goal-oriented targets to promote it.

Developing this set of indicators required adopting a *child-centered perspective* that acknowledges the peculiarities of children's integration processes and their specific settings and developmental stages (Ahad & Benton, 2018; Heckmann, 2008). For this, and moving beyond the methodological, analytical, and normative debates around the term integration (Heckmann & Schnapper, 2003; Lacroix, 2013; Portes & Rumbaut, 2014), we have incorporated the insights derived from child developmental studies and socio-educational inclusion in order to focus on the specific challenges and barriers faced by refugee and migrant children.

Under this perspective, a multi-level approach is critical to reflect the interactions between several systemic levels affecting migrant and refugee children's growth (Clauss-Ehlers et al., 2013; Pritchard et al., 2019). In this way, not only the importance of schools but also their complex interactions with different ecological levels (micro, meso, macro) become cornerstones, as reflected in our results, where school-related variables and indicators are present from all the different levels– from school belonging at the micro level, for instance, to different legislation and implementation measures at the macro and meso level– which can be extrapolated to other settings, such as health (Scharpf et al., 2021).

We have further applied a *co-creation methodology* that aims to ensure the relevance of the resulting information system. In this way, while a thorough literature review and the constant involvement of international and interdisciplinary researchers provided the scientific bases of this process, the engagement of children and other stakeholders ensured the representation of all relevant perspectives (including policymaking) in the development of the information system (Ramaswamy & Ozcan, 2014). In this regard, co-creative research methods have become increasingly popu-

Table 10 Barriers and facilitators indicators[1]

CLUSTER	Variable	Eco-logi-cal level	Count	Indicator	Source
POLITICAL LEADERSHIP	**LPC acquisition of superior legal status**	MA	1	MIPEX policy score (0–100) for policy strand Citizenship	MIPEX policy indicators
		MA	2	MIPEX policy score (0–100) for policy strand Access to Permanent Residence	MIPEX policy indicators
	LPC access to education	MA	3	MIPEX policy score (0–100) for MIPEX indicators on Access to Education (Education Strand)	MIPEX policy indicators
	LPC access to healthcare	MA	4	MIPEX policy score (0–100) for policy strand Health	MIPEX policy indicators
SCHOOL SEGREGATION	**Concentration levels in disadvantaged schools**	MS	5	(Dif.) Share of children enrolled in disadvantaged schools	PISA
SCHOOL ORGANIZATION & TEACHERS	**Clear leadership and school identity around intercultural values against xenophobia, prejudice, and stereotypes**	MS	6	Arithmetic mean of principal and teachers' scores in how important they consider "Intercultural values (e.g., appreciation of diversity, cultural awareness, openness, and tolerance)" are for their schools	N/A**
	School promotion of parental involvement in school activities, extra-curricular activities, and parental associations	MS	7	Share of schools adapting participation channels for parents' needs (e.g., language, culture, etc.)	N/A**
	Intercultural competence as part of syllabus or/and transversally	MS	8	Arithmetic mean of principal and teachers' inclusion of intercultural competencies (up to 5 different items) in the school curriculum and during their lessons, respectively	N/A**
	LRR Intercultural competence as part of syllabus or/and transversally	MA	9	MIPEX policy score (0–100) for MIPEX indicators on Intercultural education (Education Strand)	MIPEX policy indicators

Table 10 (continued)

CLUSTER	Variable	Eco-logi-cal level	Count	Indicator	Source
LEARNING SUPPORT	**LRR Preparatory classes for newly arrived migrants**	MA	10	Whether there are provisions of preparatory classes or additional classes in the language of schooling for newly arrived migrant students at the state or national level	Eurydice
	LRR Educational support for migrant children	MA	11	MIPEX policy score (0–100) for MIPEX indicators on Targeting Needs (Education Strand)	MIPEX policy indicators
	Supplementary community services for learning/ language support	MN	12	(Dif.) Share of children who access opportunities for learning support (outside school hours) at their schools or communities	N/A*
	Extra-curricular activities available / after-class learning centres	MN	13	(Dif.) Share of children who access opportunities for extra-curricular activities at their schools or communities	N/A*
MENTAL HEALTH SERVICES	**Counselling and therapeutic services at school**	MS	14	Share of schools with some staff dedicated to psycho-social support or personal counseling	N/A**
NEGATIVE ATTITUDES	**Experience/perception of negative attitudes**	MN	15	(Dif.) Share of children who avoid some places (such as shops, public transportation, and some places in school…) for fear of being mistreated	N/A*
	Experience of harassment and/or physical violence (incl. bullying) outside family	MS	16	(Dif.) Share of children who have experienced bullying	N/A*

Source: own elaboration. *Legend:* * specific data collection from children; ** specific data collection from schools (principals or/and teachers); LPC=Legislation and Practice conditioning…; LRR=Legislation, Resources, and Recommendations on…; MI=micro; MS=meso (school); MN=meso (neighborhood); MA=macro; (Dif.)=Difference in share/average between migrant-background children and native children. *Note*: for the sake of space, "children" in this table refers to migrant-background children, unless otherwise specified

[1]For further details and survey items (including adaptations for 7–9 year-old children), see Table 7 in supplemental materials

lar in different science domains and have proven particularly effective in intervention tools and policy design activities (Van Praag, 2021). In the case of migrant and refugee children, some participatory and co-creative experiences have proven successful in policy design (Beks, 2022; Van Vooren & Lembrechts, 2021), empowerment processes (Baraldi, 2021), community-based healthcare models (Riza et al., 2020), and interventions in mental health (Eruyar et al., 2018) or psycho-social support (Sordé-

Martí et al., 2023). However, none of this previous research had previously tried to produce a set of indicators as the one presented here.

In our methodology, we emphasized co-creation with children, recognizing the validity of children's agency and their capacity to co-create valuable knowledge, following the most recent literature (Due et al., 2014; Horgan & Kennan, 2021; Martin et al., 2023)with the highest normative and ethical standards (Lundy & McEvoy, 2012). Most significantly, a Children's Advisory Group informed the research process since its inception and in all its stages (Clarke, 2020), and over 300 children (from age 6) across all six countries participated in the crucial mapping and pre-selection, and in the final validation and refinement of indicators. Our co-creation process also engaged other relevant stakeholders following an ecological perspective and a whole-school approach (Ainscow, 2020). We designed a *stepwise iterative process* to implement this co-creation strategy, ensuring constant exchange between researchers and participants. Thus, the initial literature review was cross-checked with the results from 36 workshops with children and parents, 10 research activities at the meso level (including world cafes, focus groups and interviews) and 38 interviews with policymakers carried out in six different countries. The subsequent refining process involved six teams of researchers and a Delphi process with 24 external experts, and it was validated in 17 workshops with children and two CARA-based assessments with stakeholders at meso and macro levels.

This comprehensive iterative process aimed to identify the *most parsimonious and empirically robust results* across methodologies, stakeholders, and contexts. Step 1's exhaustive mapping revealed a significant overlap between the literature and participatory consultations, resulting in an extensive list of over 80 variables and highlighting the intricate nature of integration. However, 22 variables were consistently chosen across countries, emphasizing transversal key themes. In Step 2's Delphi consultation, CARA-based metrics provided a robust overall ranking of indicators, complemented by an expertise-reflective approach to refine indicators further and capture the best available knowledge (Miller, 2013). Ecological validation in Step 3, involving assessment by children and stakeholders, received overwhelmingly positive feedback. The entire process adhered to clear criteria for indicators' prioritization (Adequacy and Relevance) and exclusion (Feasibility and Efficiency), ensuring the representation of all relevant aspects of the conceptual model (Maggino, 2017).

In line with scholars who call for an *extensive approach to the analysis of integration* (Gibson & Hidalgo, 2009; Spencer et al., 2020), the developed system of indicators reflects different dimensions and all levels of proximity to the child. The first set of indicators, proxying the latent variable of integration, includes all five dimensions identified by the literature. The second set, focusing on societal and political aspects, centers around school organization and learning support, mirroring the acknowledged importance of schools in migrant children's integration (Heckmann, 2008; Morrison et al., 2019). This improves previous research, frequently using (non-holistic) approaches to partially measure immigrant children's integration,[13]

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[13] This is the case, for instance, of Haller et al. (2011), who produced a 6-indicator Downward Assimilation Index to predict educational and occupational (under)achievement among second-generation migrants.

and largely focusing on migrant children's academic outcomes (Cebolla-Boado & Finotelli, 2015; Ham et al., 2020; Levels & Dronkers, 2008; Volante et al., 2021).

The resulting information system also incorporates *children's subjectivity*, with several indicators based on their perceptions of life-encompassing issues, such as their well-being and social connections, and many other issues, such as their language competence. The need to use subjective indicators in this context has been repeatedly highlighted (Bajo Marcos et al., 2022; Gońda et al., 2021; Gornik et al., 2019; Herati et al., 2023). This is complemented by the inclusion of indicators that measure objectively assessed conditions at all micro, meso, and macro levels, which allows for contrasting these different appreciations on the matter of integration (Foertsch et al., 2023). Other works highlight the importance of combining both subjective and objective indicators for measuring integration dimensions such as academic achievement (Paparusso, 2021) or psychological health (Lemonjava et al., 2020). However, none of this previous research benefits from a holistic strategy that considers all dimensions of integration and includes subjective and objective approaches together with contextual factors.

6 Conclusions

As emphasized by the OECD, the ability of societies to maintain social cohesion in the presence of large migration flows depends on their capacity to integrate foreign-born populations (OECD, 2018). In this sense, the integration of refugee and migrant children in European societies is a crucial challenge that will impact not only these children's lives but also present and future European societies. The increasing diversity of European societies exerts pressure and offers opportunities that call for adapting schools and relevant legislation. For this, high-quality data and monitoring tools are required. We provide the first available instruments to assess children's integration results and set goal-oriented targets.

The indicator system serves a twofold purpose. First, it aims to assess and monitor refugee and migrant children's integration across Europe with a comparative perspective based on 14 indicators encompassing five dimensions (access to rights, language and culture, well-being, social connectedness and educational achievements). Second, it aims to guide policymakers and relevant stakeholders by providing information on 16 indicators that monitor key societal and political aspects for which policy recommendations are possible, with a particular weight of school organization and learning support. Schools are, in fact, not only the most affected by increased inflows of migrant children and the growth of second-generation populations in Europe but also crucial contexts for the integration of migrant children and migrant populations in a process that lasts for two or three generations (European Commission/EACEA/Eurydice, 2019).

This new system of indicators has a holistic and transversal vocation that improves previous attempts to measure the integration of migrant and refugee children. Most significantly, we adopted a child-centered perspective for its development and have strived to ensure children's active participation from the inception phases and throughout the research process, two aspects that were absent in previous attempts at

measuring children's integration. For doing this, we have incorporated the insights derived from child developmental studies and socio-educational inclusion. And we have implemented an iterative co-creation approach across six countries that ensures that children's first-hand experiences shape the research results by means of repeated exchanges between the research team and participants. This co-creative methodology ensures the necessary scientific basis but also its relevance for stakeholders and policymaking, as the ecological approach that permeated the design ensured the participation of the full spectrum of relevant stakeholders from the micro, meso and macro levels (i.e. children, their families, school representatives, public officials and politicians). The result is a system of indicators that considers all dimensions of integration, and that includes subjective and objective perspectives as well as contextual factors, always centered around children.

Some relevant limitations of the research and the resulting system of indicators must be acknowledged. The most important one concerns the challenge of limited availability of data (White et al., 2012). The optimization of any indicator system relies heavily on utilizing existing data sources to enhance its feasibility, efficiency, and sustainability (Bauler et al., 2007). However, guided by criteria such as relevance, adequacy, and comprehensiveness, our selection of indicators included quite a few that required data not readily accessible. This was the case in particular with indicators demanding data collection directly from children to capture their perspectives, emotions, and experiences and, in some instances, from educational institutions. As a result of this, less than half of the 30 identified indicators are available in existing data sources. This reliance on specific data collection efforts poses challenges to the sustainability of the indicator system, emphasizing the necessity for policymakers to address these data gaps.

Finally, while the indicator system was crafted to provide a comprehensive view of the intricate and diverse process of migrant children's integration, it does have limitations in offering specific insights. Nonetheless, its transversal nature, grounded in robust results across various contexts and stakeholders, positions it as well-suited for application in other EU countries, aligning with the values and objectives of the European Action Plan on Integration.

Refugee and Migrant Children in Schools and Other Experiential Environments in Europe. The authors declare no conflict of interest.

Data Availability The system of indicators is fully available with detailed information and in an interactive format at: https://immerse-h2020.edu/dashboard-of-socio-educational-integration-indicators. Relevant research materials, datasets and documentation emerging from the IMMERSE Project are available at Zenodo: https://zenodo.org/communities/immerse-h2020/records?q=&l=list&p=1&s=10.

Declarations

Ethics Approval and Consent Ethical approval for the research was obtained from the corresponding ethical committees (Pontifical University Comillas, Save the Children Italy, University College Cork), and all research activities were consulted with the Ethical Advisor of IMMERSE. All participants in the research and co-creation process provided their informed consent.

Competing Interests The authors declare they have no financial or non-financial competing interests.

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