

CHILDREN AND ADOLESCENTS: A SPATIO-TEMPORAL ANALYSIS BETWEEN INEQUALITIES AND WELL-BEING¹

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Abstract. The physical, psychological, social and environmental well-being of children and adolescents is often a subject of debate in both the scientific and institutional spheres.

Accentuated by the pandemic, the phenomenon has aroused considerable interest in the media; there was therefore a need for a deepening through the study of the phenomenon itself measured through the construction of a "system" of statistical indicators traceable to various domains. These "measures" will allow us to describe in the most exhaustive way possible the vast area of the "well-being of children and adolescents", so as to proceed to the possible construction of a synthetic index that can summarize the living conditions of Italian children and adolescents. Information from multiple sources will then be used to study the evolution over time of the indicators identified and to assess the possible changes caused by the COVID-19 pandemic on the quality of life of children, in different geographical areas of the country. The results of the study could allow Policy Makers to have a valid monitoring tool, efficient and useful to plan social and environmental improvement interventions for the benefit of the young generations who represent the future of our country.

1. Introduction

The well-being of children has been at the center of social debate for years (Istat, Statistiche focus 2023). The problem, also exacerbated by the pandemic emergency, has increased awareness that, starting from the principle that today's children will be tomorrow's adults, investment in them not only effectively combats poverty but also increases GDP values. Thus, the need for measuring the well-being of children is born, which ISTAT has addressed at different times with the project "Multipurpose Surveys", the Bes and the SDGs Report (2023), compilers of indicators useful to provide information on the state of health of the country. It's in this direction that the contribution of the study has focused on the assumption that the welfare of minors (and for such we have understood the range from zero to seventeen years), although seen as a basic need that must be guaranteed in the various areas where personality develops (school, family, etc.), is established in the context in which they live. To this end, several sources of information

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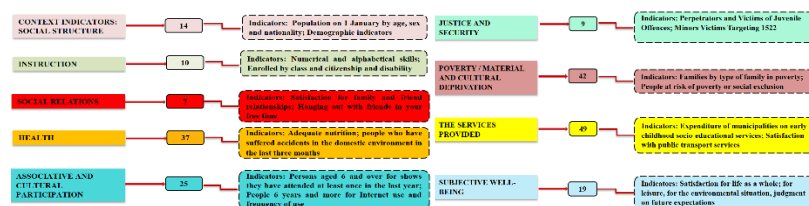
which have been updated repeatedly were taken into account for the development of the project; allow the elaboration of historical series useful to provide indications on the evolution of phenomena related to children and in different geographical areas of the country, giving rise to a "system" of statistical indicators that have made it possible to experiment a synthetic index (Fortunati *et al.*, 2022).

2. The construction of the Database for Child Welfare Indicators

In the absence of a fully shared definition of well-being, it was considered to adopt a multidimensional approach by identifying 212 indicators that provide a key reading on the condition of the phenomenon from multiple dimensions and multiple data sources. Indicators have been identified under 12 thematic areas, which are further sub-themes and cover the following topics: Culture, communication and travel, Daily life and public opinion, Economic situation of households, Education and training, Environment, Health and healthcare, Services, Justice and Security, Politics and institutions, Population and families, Professional condition, Services and Subjective well-being. In the selection of indicators, some requirements such as availability over time were taken into account, with a preference for those whose year of dissemination was at least 2020 and the inclusion of age groups up to 17 years. Once the most significant indicators have been selected, they have been collected within a Data-base containing a set of information relating to the definition of the indicator, the age class of the reference population, the source and type of survey, the time availability of data, the last territorial detail, the link to access the data, the type of dissemination and finally the in-depth notes.

The selected indicators have been further classified into 9 domains of Well-being covering the following contents (Figure 1).

Figure 1 – Domains of Well-being and number of Indicators.



Source: Our data processing from Istat.

3. Dimensions of Well-being

The indicators proposed below may provide useful guidance for assessing the collective well-being of the new generations to which they belong.

a. Context indicators: social structure

The population living in Italy is characterized by a progressive aging with young people constantly decreasing. In Italy, at 1 January 2023, residents between 0 and 17 years amounted to 8,040 thousand a decrease compared to 2019. The majority of children of the male sex reside mainly in the North (Table 1).

Table 1 – Italian and foreign minors (amounts in thousands) by sex and geographical distribution - Years 2023 - 2019.

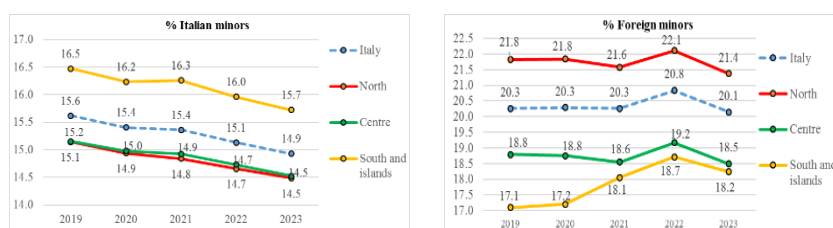
Years	Italian minors residents			Foreign minors resident		
	Males	Females	Total	Males	Females	Total
1 January 2023						
Italy	4,134	3,906	8,040	538	498	1,036
North	1,817	1,716	3,533	335	311	646
Centre	780	739	1,519	122	112	234
South and Island:	1,537	1,451	2,988	81	74	155
1 January 2019						
Italy	4,403	4,158	8,561	525	487	1,012
North	1,926	1,818	3,744	328	305	633
Centre	827	782	1,609	122	112	234
South and Island:	1,649	1,558	3,208	76	69	145

Source: Istat - Movimento e calcolo della popolazione residente annuale. Data warehouse IstatData.

The incidence of Italian minors in the total resident population shows a constant decrease over the years, from 15.6% in 2019 to 14.9% in 2023 (Figure 2).

Regarding foreigners, however, it should be noted that children under 18 years of age living in Italy represent, on average, 20.1% of the total population (5,141,341 foreign citizens), a slight increase compared to 2019 in the South.

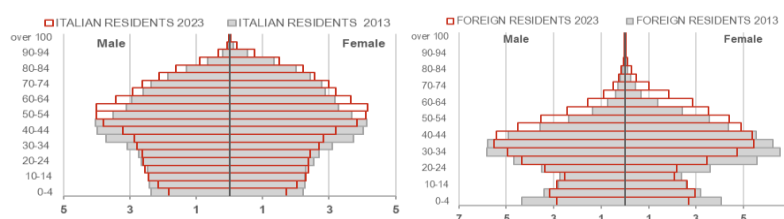
Figure 2 – Percentage of Italian and foreign children living in Italy. 1 January 2019 – 2023.



Source: Our data processing from Istat.

Demographic pyramids make the decline in population more visible. The one related to Italy in 2023 is a swollen pyramid in the center that tends to move upwards to show that the Italian population has an average age and a high age index, unlike foreigners (Figure 3).

Figure 3 – Age pyramid at the population resident in Italy on 1st January, by citizenship. Years 2013 and 2023 compared.

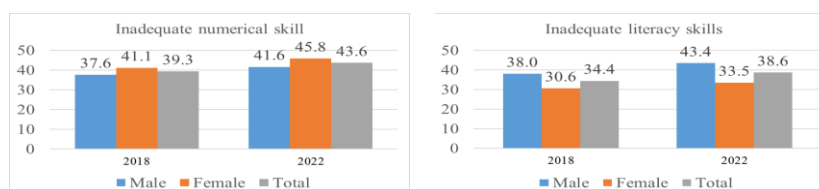


Source: Our data processing from Istat.

b. Instruction

The focus on indicators was mainly on alphabetic skills, that is, the ability to understand and express thoughts and ideas in written or oral form, and on numerical skills, that is the ability to use mathematical concepts in order to solve the problems of everyday life. The picture that emerges is not encouraging if it is true that - in the five-year period '18-'22 - as regards third-grade students, among males, a "suffering" emerges in this sense with a figure that increases by 5.4 percentage points compared to 2.9 of females who, instead, (4.7% compared with 4.0% of males).

Figure 4 - Inadequate literacy skills and numerical competence (third grade secondary school students). Years 2018 and 2022.



Source: Our data processing from Invalsi.

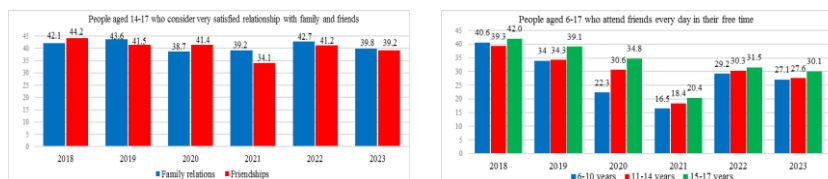
c. Social relations

The set of indicators included in this dimension allows you to grasp the different aspects of social relations in two sub-domains: family relationships and friendships.

The degree of satisfaction for family and friend relationships is generally high among young people. The 14-17 age group considers these relationships to be quite satisfactory. Conversely, the level of satisfaction for the friendly network reaches a negative peak in 2021 and then rises in 2022. The percentage of minors who attend friends every day tends

to increase with age, reaching the highest values between 15-17 years. Over the last five years, however, rates of attendance have fallen by about 12%.

Figure 5 – Family and friendly relationships (for 100 people with some characteristics).

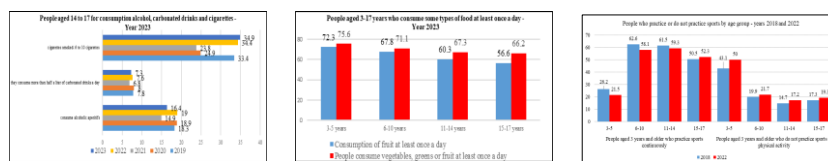


Source: Istat, Indagine Multiscopo sulle famiglie: aspetti della vita quotidiana.

d. Health

The Health dimension offers a large number of indicators ranging from health facilities to nutrition and physical and sports activity.

Figure 6 – Lifestyles and risk factors (per hundred people with the same characteristics).



Source: Istat Indagine Multiscopo sulle famiglie: aspetti della vita quotidiana.

In 2023, although decreasing compared to 2019, the figure of very young people who consume alcohol (16.3%) and carbonated drinks (7.3%) is remarkable. In constant increase instead (except the covid bracket), cigarette consumption (from 6 to 10 per day). Decreases with increasing age groups, the daily consumption of fruit with a peak of just over 50% for the 15-17 years. Ditto for the daily consumption of at least one food among fruits, vegetables and vegetables that sees the same band arrive to 66,2 against 75.6 of the class 3-5 years and 71.1 of that 6-10.

Young and sedentary couple inseparable but not too much: in the five-year period, all the bands have indicators generally always negative except for the 15-17 age group. In the post-pandemic, all data in all age groups, from the point of view of sports practice, appear increasing (Figure 6).

e. Associative and cultural participation

In 2022 compared to 2018, visitors to monuments and archaeological sites grew (an increase of 2.6% in the age group 6-10 years) and children who visit exhibitions and

museums and participate in sports shows. The decline in cinema spectators continues, affecting all age groups and those aged 1-14 (-9.5%). In the last 5 years the use of the Internet has increased exponentially, especially among children aged 6-10 years with a frequency of daily use (Table 2).

Table 2 - People aged 6 and over for shows they have attended at least once in the last year and for Internet use and frequency (per 100 people with the same characteristics).

Years	Age	Events attended at least once in the last year					Use of the Internet and frequency of use				
		Theatre	Cinema	Museums, exhibitions	Sports shows	Archaeological sites	Use the internet	Every day	One or more times a week	Sometimes a month	A few times a year
2018	6-10 y	32.7	73.5	44.7	36.5	33.2	59.2	21.0	31.0	5.7	1.5
	11-14 y	36.3	80.0	53.5	45.2	41.3	85.9	62.1	20.5	2.7	0.6
	15-17 y	31.2	80.8	48.2	39.8	36.3	95.5	84.4	9.7	1.2	0.2
2019	6-10 y	31.9	74.5	46.8	36.1	34.4	62.5	27.4	28.9	4.5	1.7
	11-14 y	33.6	81.3	53.4	43.4	40.7	90.0	68.3	19.6	1.2	0.9
	15-17 y	31.4	82.2	50.8	41.0	37.0	94.7	83.7	9.5	0.9	0.6
2020	6-10 y	22.8	66.9	35.4	29.1	27.2	75.8	42.8	30.2	2.1	0.8
	11-14 y	24.0	72.7	42.3	36.8	33.5	93.4	76.9	16.0	0.4	0.1
	15-17 y	22.1	74.0	37.8	36.5	27.5	95.1	86.8	7.4	0.3	0.5
2021	6-10 y	2.4	9.1	7.9	4.8	10.2	89.1	55.5	30.2	2.6	0.8
	11-14 y	3.1	11.8	8.8	7.6	10.5	96.6	86.3	9.6	0.3	0.4
	15-17 y	1.6	17.0	8.4	9.3	10.2	98.3	93.5	4.2	0.1	0.5
2022	6-10 y	15.0	44.3	31.4	24.8	24.9	85.1	44.6	34.7	4.6	1.2
	11-14 y	15.4	49.0	32.9	31.5	26.2	96.5	80.8	14.8	0.7	0.1
	15-17 y	17.0	59.4	31.6	30.8	25.3	97.9	92.8	4.5	0.4	0.2

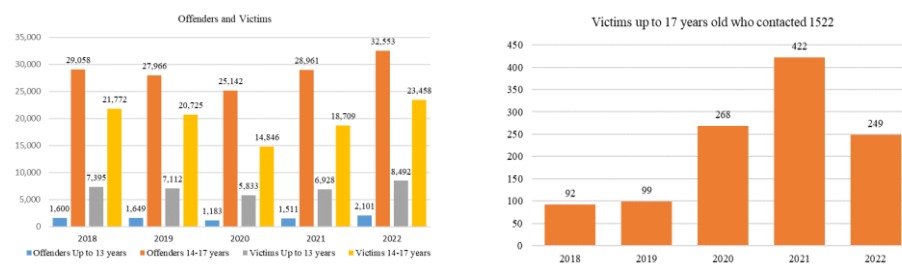
Source: Istat, Indagine Multiscopo sulle famiglie: aspetti della vita quotidiana.

f. Justice and Security

The increase in juvenile crime in the period 2018-2022 is worrying and the slight decrease due to the pandemic period is only illusory, since the trend is on a sharp rise: offenders in the age group up to 13 years are increasing by more than 31% against 12% in the 14-17 age group.

The same trend for victims of crime, an increase of 14.8% in the range up to 15 years and 14.8% in the 14-17 range. The number of victims of violence who turn to 1522 for requests for help during the pandemic has increased dramatically, a sign that the Covid-19 pandemic and the measures taken to contain its spread (for example, confinement within the home), as well as the unfolding of the socio-economic consequences of the crisis triggered by the health emergency, have accentuated the risk of violent behavior (Figure 7).

Figure 7 - Offenders and victims of crimes by age group and victims up to 17 years of age who contact 1522 – Years from 2018 to 2022.

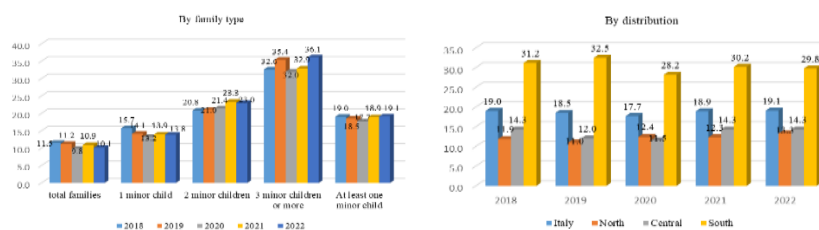


Source: Istat - Crimes reported to the judicial authorities by the State Police, the Carabinieri and the Financial Police - Processing of data archived by the public utility number 1522.

g. Poverty/material and cultural deprivation

In times of crisis, social exclusion is a real risk for children living in families with greater economic difficulties. The incidence of relative poverty is increasing as the number of family members increases. The spread of the phenomenon increases as the number of minors in the family increases. Among the family types, in fact, the highest values show families with three or more minor children, for which the relative poverty rate is more than three times higher than the national average (36.1% against 10.1%).

Figure 8 – Families in relative poverty for some family types and by distribution. (Percentage composition) - Years from 2018 to 2022.



Source: Istat - The survey on family income and living conditions.

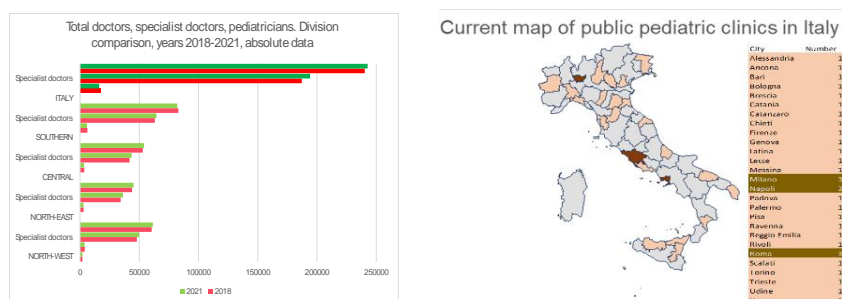
The incidence of households with at least one minor is higher in the South and Islands (29.8%) than in Northern Italy (14.3%), and in the Centre (13.3%).

If we consider families with three or more members, this percentage rises to 39.3%. It should be noted that the South and Islands is also the distribution that during the period considered showed a decrease of this value of 1.4% (Figure 8).

h. Services provided to citizens

The State's response to citizens' demands for social welfare depends mainly on the services provided and their accessibility. For children and adolescents, basic services are identified in health, safety, leisure, education and training. As far as health and prevention are concerned, the State mainly provides with the basic pediatric service and the establishment of pediatric hospitals (Figure 9).

Figure 9 – Total doctors, specialist doctors, pediatricians. Division comparison, absolute data. Years 2018 and 2021 - Current map of public pediatric clinics in Italy.



Source: Istat, processing of data on staff in the public and private health system.

Table 3 – The expenditure of municipalities for social services. Years 2018 -2021. Number of families with minors, absolute data in thousands.

Service provided	2018	2021	Differences
Professional social work	670	678	8
Family foster care service	18	17	-1
Child Adoption Service	8	7	-2
Family Mediation Service	10	12	2
Parenting support activities	59	54	-4
Other Professional Social Service Activities	55	42	-13
Interventions for the social integration of weak or at-risk individuals	46	36	-10
School socio-educational support	48	52	5
Territorial or home socio-educational support	60	57	-4
Other socio-educational and job placement activities	35	23	-12
Contributions for family foster care	17	16	-2
Contributions and tuition supplements for nurseries	38	42	3
Contributions and tuition supplements for supplementary or innovative services for early childhood	4	4	0
Contributions and tuition supplements for other semi-residential services	12	11	-2
Contributions and tuition supplements for residential facilities	22	22	0
Financial contributions for school services	157	153	-4
Nurseries and spring sections	144	141	-4
Supplementary services for early childhood	10	5	-6
Summer day centers	164	200	36
Playrooms / laboratories	94	97	3
Summer or winter camps (with overnight stay)	6	6	0

Source: Istat – Survey The expenditure of municipalities for social services, years 2018- 2021.

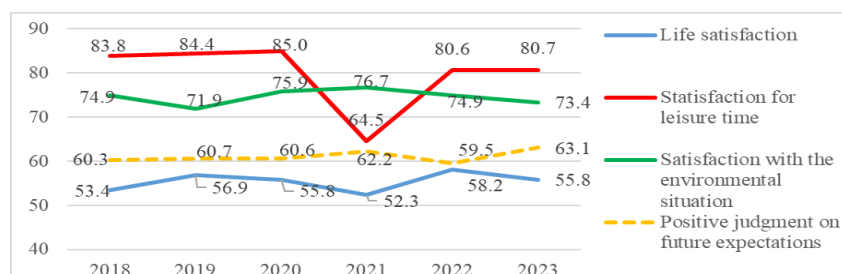
Municipalities offer citizens the numerous services in the field of social assistance, in particular to families with minors. There are 79 types of interventions and of these, 21 concern minors in families (Table 3).

The users who benefited from these interventions were, in the four-year period 2018-2021, about 35 million, with an expenditure of almost 93 and a half billion euros. The total number of users who used services for children and adolescents was about 6,600,000.

i. Subjective well-being

Subjective well-being defines the evaluations and perceptions that individuals express about their life in general and on more specific areas and represents one of the fundamental size on which the Bes framework is based (Istat, 2023. *Rapporto Bes*). It was therefore chosen to consider the 4 indicators that measure the subjective well-being of Bes of young people aged 14 to 19. As you can see from the graph, during the pandemic (2021) it is the satisfaction for leisure time and for one's life that suffer a decrease, in the first case the reduction is drastic and then rises and remains stable between 2022 and 2023. The satisfaction for the environmental situation, on the other hand, reaches its peak in that period and the positive opinion on future expectations is almost stable over time with slightly higher values in 2023.

Figure 10 – *Subjective well-being (14-19 years).*



Source: Istat, *Indagine Multiscopo sulle famiglie: aspetti della vita quotidiana*.

4. Testing of a synthetic index of the well-being of children and young people

For the construction of the composite indexes have been analyzed all indicators inserted in the DB based on territorial availability and which are, at the time of processing, the most updated. A reduced set of 5 key indicators representing the thematic areas related to education, services, justice and safety and health was tested for NUTS 1 (Table 4).

The synthesis of elementary indicators makes it possible to obtain a one-dimensional measure of a complex and clearly multidimensional phenomenon (OECD, 2008). The synthesis indices do nothing but collect all the "signals" coming from the basic indicators

to express them in a single number comparable in space and, where possible, also in time. The objective is to synthesize the selected indicators with the function that can better "interpret" the greatest number of information contained in the starting matrix.

Table 4 – List of indicators for measuring the well-being of minors.

Dimension	Indicator	Source	Toward (a)
Education and training	Percentage of repeaters/students, for primary, secondary and second grade schools	Istat, MIUR data processing	-
Services	Expenditure on social interventions and services for families with minors	Istat	+
Justice and security	Number of minor perpetrators reported/arrested by the police on the average population of the same age group	Istat, Ministero dell'Interno data processing	-
Health	% people with excess weight of 6-17 years	Istat, HFA, Health for all	-
Health	Drug consumption rate of 0-14 year olds and children	Istat, HFA, Health for all	-

(a) +: indicator in agreement with the phenomenon; -: indicator discordant with the phenomenon.

Source: Our data processing from Istat.

Table 5 – Original values of basic indicators.

Geographical areas	Percentage of repeaters/students, for primary, secondary and second grade schools		Expenditure on social interventions and services for families with minors		Number of minor perpetrators reported/arrested by the police on the average population of the same age group		% people with excess weight of 6-17 years		Drug consumption rate of 0-14 years	
	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021
Northwest	3.0	0.4	39.0	37.9	3.6	3.8	18.1	21.7	14.5	7.6
Northeast	2.9	0.3	36.0	37.5	3.7	3.7	20.7	22.0	14.5	6.3
Centre	3.0	0.5	41.5	40.5	3.0	2.8	24.6	25.7	12.4	8.8
South	3.1	0.8	40.4	38.8	2.2	1.6	29.0	33.2	12.5	6.5
Islands	4.1	0.9	30.3	30.9	3.8	2.7	27.9	29.8	13.9	8.6

Source: Our data processing from Istat.

Table 5 presents the original data of the 5 variables for the years 2018 and 2021, expressed in their different units of measurement.

The objective is the implementation of a synthetic indicator through:

– *construction* of a battery of elementary indicators expressed in appropriate units of measurement; – *normalization* of elementary indicators so as to make them independent of the size of geographical areas and to clear them from specific units of measurement; – *aggregation* of normalised indicators and *construction* of synthetic indices (Mazziotta *et al.*, 2020). In this regard, very well-known synthesis methodologies have been chosen in the literature (Methodological note I.ranker):

1. *Method MPI²*: transforms elementary indicators into deviations from the mean relativized to the standard deviation; it makes it possible to penalize the score of units that, with the same arithmetic average, have a greater imbalance between the values of the

indicators. The sign \pm depends on the type of phenomenon considered and the direction of the elementary indicators (De Muro *et al.*, 2009). In this work we will use the version with negative penalty, since it has decreasing variations of the indicator correspond to positive variations in the phenomenon under examination.

2. *Ranking method (MG)*: assigns the rank assumed by each unit in a decreasing way that goes from the first to the n th position of the ranking. This transformation makes it possible to release the indicators from the unit of measurement and return them to integer values from 1 to n without taking into account of the variability

3. *Method of averaging standardized values (MZ)*: transforms the elementary indicators into deviations from the mean relativized to the standard deviation.

4. *Method of relative indices (MR)*: re-proportions the value assumed by each unit so that it oscillates between the lowest value assumed by the indicator equal to 0 and the highest value equal to 1.

5. *Taxonomic method of Wroclaw (MTW)*: is based on the concept of "ideal unit", which assumes the best values among those observed for each of the indicators considered. The synthesis of the indicators is obtained by calculating the "Euclidean distance" between the actual values of the elementary indicators and those of the ideal unit. Table 6 shows separately, for the year 2018 and 2021, the specific values of the Index of the well-being of children and young people and also offers the ranks of the indicators used for consultation. For a correct reading, it is useful to underline that for each territorial breakdown, the scores of the Index, have been calculated separately; therefore, the comparison between the breakdowns takes a full meaning only within the single annuity taken into account.

Table 6 – Results and Ranking of the synthesis methods.

Geographical areas	2021					2018				
	MG	MZ	MR	MPI	MTW	MG	MZ	MR	MPI	MTW
Northwest	0.5	0.2	0.6	101.3	0.6	0.4	0.2	0.6	100.9	0.6
Northeast	0.4	0.5	0.7	104.4	0.5	0.6	-0.1	0.5	98.2	0.6
Centre	0.5	0.1	0.6	100.4	0.6	0.3	0.6	0.8	105.9	0.4
South	0.5	0.2	0.6	100.1	0.7	0.5	0.5	0.7	104.5	0.5
Islands	0.8	-0.9	0.2	90.0	1.0	0.9	-11.9	0.1	87.6	1.0
Geographical areas	Ranks					Ranks				
	MG	MZ	MR	MPI	MTW	MG	MZ	MR	MPI	MTW
Northwest	2.5	2	2	2	3	2	3	3	3	3
Northeast	1	1	1	1	1	4	4	4	4	4
Centre	4	4	4	3	2	1	1	1	1	1
South	2.5	3	3	4	4	3	2	2	2	2
Islands	5	5	5	5	5	5	5	5	5	5

Note: The indicators were summarized using the Istat software "Rankert Tool".

Consider that one of the objectives of the work is to compare different methodologies of synthesis not so much with the aim of electing one as a "winner" but with the intent to analyze the results as a whole (Mazziotta *et al.*, 2018).

The results of the application do not fully help to understand which synthesis function is the most suitable, but, regardless of the method used, it is clear that the level of well-

being increases along the peninsula from South to North, with the North-West and the North-East obtaining, for all indicators, values much higher so as to be the geographical areas with the best level of well-being in 2021. In 2018, Centre and Southern areas prevailed.

5. Reflections and conclusions

The proposal of this paper is not to indicate a specific route for the identification and subsequent implementation of indicators of the condition and welfare of children on the basis of a defined interpretative model, from which to derive the design and construction of appropriate indicators. This possibility is naturally attractive and innovative, but it can only be a long-term goal. It has thus adopted the path of carrying out an accurate search of the data and statistical information available today for consultation and collecting them in a Database. The available indicators represent an information base that is far from negligible and sufficiently varied and in-depth to develop a first analysis for the comparative measurement of well-being at the territorial repartition level.

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