Chapter 12

Description of the Evaluation Framework

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EPODE for the Promotion of Health Equity's overall objective is to analyse the added value of community-based approaches based on the EPODE methodology (1, 2) in order to reduce inequities associated to childhood obesity and related determinants. Based on scientific evidence (3-6), four energy-balance related behaviours were addressed by the EPHE interventions: promotion of fruit and vegetables intake, tap water intake, active lifestyle and adequate sleep duration. The project involved seven different community-based programmes based on the EPODE methodology across Europe, and was guided by the EPHE Scientific Advisory Board composed of representatives from 6 European Universities. Based on the results of the baseline survey, the interventions focused on the energy balance-related behaviours and their associated family-environmental determinants whenever there was a difference between the high and the low socio-economic groups.

The EPHE evaluation study aims:

- to explore and identify inequalities in selected Energy Balance Related Behaviours (EBRB) and related environmental determinants, which are associated with childhood obesity and overweight;
- to provide evidence-based results concerning the inequalities in childhood obesity and overweight across 7 European countries.
- to assess the effectiveness of EPODE methodology to tackle inequalities in obesity and overweight;
- to assess the sustainability of potential effects, a year after the termination of the interventions;

The evaluation of the EPHE project and the outcomes are presented in the next chapter.

1. Methods/Design

The EPHE evaluation study consisted of a prospective two-year follow-up study design. It assessed the behavioural change and its sustainability in selected energy balance-related behaviours and related family-environmental determinants in children, according to their socio-economic status. The evaluation study was performed on 3 measurement periods: on the baseline survey (May-June 2013), after the end of the EPHE interventions (May-June 2014), and one year later (May-June 2015). The study included self-reported only measurements through a parental questionnaire.

In the framework of the survey, a formal declaration from the Medical Ethics Committee of the VU University Medical Centre was obtained, that it does not fall under the scope of the Medical Sciences People Research Act (WMO). In addition, permission to research in schools was acquired from local community and/or school authorities, when necessary.

1.1. Description of selected cities

This cities were selected by the national coordination team. All countries are represented by one city, with the exceptions of France and Bulgaria, where two cities participated in the project.

All cities are considered medium-sized for the country-specific standards. Except for France, the selected cities are located in urbanised areas. In Bulgaria, Greece and Portugal's cases, the cities belonged to the metropolitan areas of the big cities, contrary to the rest of the EPHE-cities. Mouscron (Belgium) is positioned in the west of Belgium, in the French speaking part close to the French border. The towns of Triaditsa and Studenski (Bulgaria) belong to the metropolitan area of the capital city Sofia, located in the west of Bulgaria. Flandres-Lys Community of towns (CCFL)

is located in the north of France. Marousi town (Greece) is part of the metropolitan area of the capital city Athens, positioned in the centre of Greece. Maia city (Portugal) is situated to the north of Porto city, in the north of Portugal. Otopeni (Romania) is located in the south of Romania, 15 kilometres north of the capital, Bucharest. Zwolle (The Netherlands) is positioned in the north of the Netherlands, 12 kilometres north-east of Amsterdam.

Three out of the nine participant municipalities began the implementation of the EPODE methodology during the first year of the EPHE Project, whereas the other six were already committed to an EPODE-like programme. Health campaigns launched by programmes other than those that are EPODE-like, are taking place in the majority of the engaged municipalities. However, these do not always overlap with the target group or the themes of EPHE.

1.2. Sampling and recruitment

We aimed at recruiting at least 150 families with children aged between 6 and 9 in every selected city/town with a similar variation regarding age and ethnicity per site, and a preferably low number of different ethnicities (other than the local) per site.

The families were approached through schools. Every national coordination team and local team were in charge of engaging teachers in the selected schools to enable the distribution and collection of the questionnaires. Teachers, acting as mediators, approached the families. The national coordination teams and local project managers of every country were responsible for engaging and guiding school directors and teachers in order to recruit the participants. Parents were provided with an informed consent form, describing the purpose of the study.

School selection

One major point was to account for the variability of the socio-economic status and ethnicity of the sample population, both within and between communities. For that reason, the schools were selected from different neighbourhoods of both higher and lower socio-economic statuses.

1.3. Socio-economic and demographic assessment

Education, social class and income are the most commonly used indicators to assess the socio-economic status in nutritional research (7). In this study the educational level, the employment status and the income position were used in order to distinguish the socio-economic status of the parents. Given the current economic instability of the European Union, employment status was assessed instead of the social class. As it is difficult for some countries to evaluate or to obtain quality data, we used the concept of perceived income position, asking parents to self-report their current financial status.

Table 1. Socio-demographic characteristics of the EPHE population per country.

Country	Total n	Gender		Age child (years)	Age of mother[a]		Income position[b]		Employment status mother		Educational level mother	
		Boys (%)	Girls (%)	Mean (SD)	< 30 (%)	> 30 (%)	High (%)	Low (%)	Employed (%)	Not employed (%)	High (%)	Low (%)
Belgium	196	53.4	45.4	6.58 (0.55)	21.4	77.9	88.8	11.2	64.8	24.5	42.7	57.3
Bulgaria	205	46.8	52.7	7.97 (0.78)	8.7	90.1	81.8	18.2	84.1	15.9	74.3	25.7
France	160	38.8	57.5	6.34 (0.55)	30.9	69.1	79.6	20.4	53.5	46.5	35.2	64.8
Greece	159	46.5	45.9	7.37 (0.66)	3.2	94.4	51.0	49.0	61.5	38.5	52.8	47.2
Portugal	241	51.0	48.5	6.85 (0.74)	12.4	87.1	55.8	44.2	73.8	26.2	46.0	54.0
Romania	176	56.8	43.2	7.39 (0.54)	17.7	82.3	75.9	24.1	78.0	22.0	53.8	46.2
The Netherlands	129	47.3	52.7	7.83 (0.98)	6.5	90.7	87.9	12.1	76.8	21.4	61.3	38.7
Total	1,266	49.8	49.2	7.17 (0.90)	14.6	84.4	73.6	26.4	72.5	27.5	52.7	47.3

[a] The analysis includes the age of the mother only when the mother was the respondent; the age of the second parent was not assessed. Response categories: 1 = Below 20; 2 = 21-24; 3 = 25-30; 4 = 31-35; 5 = 36-40; 7 = above 40. Number of subjects included in "age of mother" per country: Belgium = 148; Bulgaria = 171; France = 136; Greece = 128; Portugal = 208; Romania = 147; The Netherlands = 107; Total = 1,038.
[b] Income position categories: (1) Living comfortably on present income (2) Coping on present income (3) Finding it difficult on present income (4) Finding it very difficult on present income. Income position was defined as "high" when the response was (1) or (2) and "low" when the response was (3) or (4).

The food security level of the household was also assessed (8).

Two socio-economic groups were distinguished, based on the classification for each indicator assessed: "mother's and father's employment status" (employed/not employed), "income position" (good/not good), "mother's and father's educational level" (low/high). The aforementioned variables are described in detail by Mantziki et al. (8). The subdivision into two socio-economic groups was very unequal when based on employment status and income position for the majority of the samples (Table 1). In addition, knowing that educational level has been classified as a good social factor that explains differences in nutritional outcomes (9-11), for the current article, the samples were divided into two groups based on the "educational level of the mother" (low/high). For each country's sample, the median of the educational level was used as the cut-off point to determine the educational level of the mother (low/high).

1.4. Development of questionnaire

A self-reported questionnaire was developed, with questions addressed to the parents. The questionnaire assessed information relevant to:
- the family's socio-economic status and household's food security level;
- the child's energy balance-related behaviours and associated environmental determinants;
- the parental perception of a healthy body of a child.

The EPHE parental questionnaire was developed using items from relevant, validated questionnaires addressed within European populations. Items derived from questionnaires of large European socio-economic surveys (12, 13) were chosen to define the socio-economic status. For the assessment of the energy balance-related behaviours and their environmental determinants, items from the ENERGY Parent and Child questionnaires (14), the Pro-children child questionnaire (15) and its updated version, PRO-GREENS (16), were used. These tools have been translated (15, 17) into several European languages, including some that were of interest to us, and validated. Items with intraclass correlation coefficient (ICC) classified as "poor" (ICC < 0.5) were excluded (15, 17). Concerning the household food security level, a short form of the household food security scale developed by the United States Department of Agriculture (18) was used. In order to assess the parents' perception of their child's body weight, the pictorial instrument and related questions developed by Collins (19) were used. All items derived from validated questionnaires were adapted to the needs of the EPHE parental questionnaire, when necessary. Additional items were constructed whenever no validated items or questionnaires existed to our knowledge.

The questionnaire was translated into the language of each participant country, and back-translated into English. It was mandatory for all participant countries to use the same version, layout and format of questionnaire. The EPHE questionnaire is available on our website.

1.5. Measures

A total number of 105 items are included in the EPHE parental questionnaire. The average time to fill it out is approximately 45 minutes.

1.5.1. *Descriptive and socio-economic variables*

The descriptive and socio-economic information are assessed by ten items. The descriptive information include the age and gender of both the parents and child. In addition, the size of the household is assessed by two items. To assess the socio-economic status, the years of education, labour status and type of working sector of both parents were asked, as well as the perception regarding the household income, in order to assess its main source, given ethical restrictions to ask for the exact household income. The 6-item USDA questionnaire was used to examine the food security level of the household over the past year (18).

Socio-demographic characteristics (Table 1) were measured in:
- Likert-type scales:
- age of the respondent: 1. 20 and below / 6. 41 and above;
- age of the child: 1. 6 years old / 4. 9 years old and above;
- parental education level: 1. Less than 6 years / 6. More than 17 years;
- perception of income: 1. Living comfortable in the present income / 4. Finding it difficult in present income);
- an 8-category scale:
- labour status;
- source of income
- a 6-category scale – sector of employment.

1.5.2. *Energy-balance related behaviours*

Eighteen questionnaire items assess the four energy-balance related behaviours of the child:
- fruit and vegetables consumption;
- soft drinks/fruit juices and water consumption;
- screen time;
- sleep duration.

Another 62 questionnaire items assess the determinants related to the social and physical environment of the child, within the family setting. In order to keep the length of the questionnaire within acceptable limits, we had to prioritise the many aspects of behaviour that could be relevant. The Scientific Committee decided (in consultation with the experts) to keep sedentary behaviour as the indicator of physical activity. Other relevant aspects which were not included were snacks and meals (breakfast, lunch and dinner), and consumption of energy-dense food. For more information, please see the additional files of the publication available on our website.

The consumption of fruit and vegetables is assessed by food frequency questions, referring to a usual week, and measured in an 8-point Likert scale (1. Never / 8. Every day, more than twice a day) (20). The consumption of fruit juices, soft drinks and diet soft drinks is measured in weekly frequency and consumed amount. The frequency is measured in a 7-point Likert scale (1. Never / 7. Every day, more than once a day) (21). The amount is measured by 2 items for fruit juices, and 3 items for soft and diet soft drinks, assessing how many glasses (or small bottles of 250 ml), cans (330 ml) or big bottles (500 ml) the children usually drink (21). The amount is calculated by summing the portions. In order to measure water consumption, 2 questions were constructed to measure the daily frequency (1. Never / 7. More than 6 times a day) and number of glasses consumed when drinking water (1. None / 6. 5 or more glasses). Sedentary behaviour is assessed by means of daily time spent in television (TV) viewing and computer (PC) using, both during the week and on weekends, separately. They were measured in a 9-point Likert scale (1. Not at all / 9. 4 or more hours a day) (21). The total screen time was calculated by the sum of weekly (hours per weekday*5+hours per weekend day*2) TV and PC use. Furthermore, 2 questions informed by the ENERGY Parent questionnaire assess the sleeping habits of the child (1. Sleeping routine; 2. Sleep duration per week-/weekend-day) (21).

1.5.3. *Assessment of family-environmental determinants*

All family environmental variables were assessed by one or two items, using a five response category format. Depending on the item the response categories range
   a. -(+2) I fully disagree I fully agree,
   b. -(4) never to (yes) always,
   c. -(4) never to every day.

Exemptions are the variables assessing the situation of specific habit and the TV availability, where binary response categories are used (i.e. 1.yes, 2. no) (8).

The social environmental determinants were, for fruit and vegetables consumption, parental demand, parental permissiveness, active encouragement, the facilitating and the parental knowledge on recommendations (16, 22); for fruit juice\soft drink consumption and TV viewing\computer time, it was paying attention\monitoring, parental permissiveness, negotiating, communicating health beliefs to avoid negative modelling; the parental self-efficacy to manage child's intake; and rewarding\comforting practice (22). The physical environmental determinants were the home availability and the situation specific habit.

1.6. Data collection

In order to ensure the confidentiality of the data, a process to warrant the anonymity was applied. Each city/town received the edited questionnaires labelled with the country's abbreviation and a three-digit code, indicating the subject's number. This number corresponded to the family's surname, indicated in a document kept by each

country's national coordination team. As such, only the national coordination team was aware of the subject's identity, for follow-up purposes. Once filled out, the questionnaires were returned sealed in a provided envelope. The parents were informed in advance of the process of confidentiality through an information letter included in the informed consent form. Only the children who had returned the informed consent form indicating their parents' agreement would participate in the study.

The questionnaires were distributed through schools. More specifically, the teachers were provided with the labelled questionnaires and envelopes, which were disseminated by them to the participating children in the class. Following this distribution, the children gave the questionnaires to their parents. The number of distributed questionnaires was noted down, in order to monitor the response rates after the collection.

Similarly, after a specified period of one to two weeks, the questionnaires were returned to the teachers. Finally the local project managers were responsible for collecting the returned questionnaires and deliver them to their national coordination team. Every national coordination team kept at least one hard copy of each document, for safety reasons. As mentioned earlier, each local University has access to their national data.

1.7. Data handling

The questionnaires from all countries were shipped to the coordinating University in the Netherlands (Vrije University of Amsterdam), where the general analyses were conducted. A scanned process from the same scanning company facilitated the data transfer into SPSS files, for all three stages of the evaluation. All the national data are available to the national participant University and country for further analysis.

Statistical analysis

The total sample analyses included all subjects from all communities. Due to minor discrepancies between the translated versions of the questionnaire –i.e. missing response categories in certain items–, minor adaptations in the response categories were made when necessary.

The Mann-Whitney U test for the ordinal variables and Pearson's chi-square test for the binary variables were used to detect differences in behaviours and determinants between the two socio-economic groups. The Wilcoxon signed-rank test for the ordinal and the McNemar's test for the binomial were used to detect differences in energy-balance related behaviours and determinants between the follow-up measurements within the low and within the high education groups. Here, we present medians and quartile ranges (Mann-Whitney U test and Wilcoxon signed-rank test), as well as percentages (Pearson's chi-square) in order to illustrate the differences between the two groups. Knowing that the mean ranks produced by non-parametric tests are not always sufficiently informative, and that differences in spread may be as equally important as differences in medians (23), further assessment of frequencies

and distributions per item was explored. The results of the additional assessments are discussed in the article, but not presented for practical reasons.

Adjustment for multiple testing was conducted using the Benjamini and Hochberg method (24), using the Stata software 13 (StataCorp. 2013. *Stata Statistical Software: Release 13*. College Station, TX: StataCorp LP).

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