



## RESEARCH ARTICLE

# Feasibility and reliability of the Self Administered Children's Lifestyle Assessment (SACLA), a new tool to measure children's lifestyle behaviors: the VIF Program

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## Keywords

Lifestyle questionnaire • Children • Health • Reliability • Feasibility

## Summary

**Objectives.** To develop a self-administered children health-related behaviors assessment, and to test its feasibility and reliability in a group of French children.

**Methods.** A sample of 216 children participated in the first stage of this study, dedicated to the feasibility assessment. An independent sample of 99 children participated in the assessment of reliability via questionnaire test and retest.

**Results.** Missing or inappropriate responses on different parts of the questionnaire ranged from 0 to 35%, more evident on the

drink intake and sleep areas. Some questions in fact have been modified or removed. No problems were reported on the dimensions of physical activity habits and sedentary behaviors. The mean percentage of agreement in test-retest reliability for the questionnaire dimensions was 78% (47-99%). Overall, kappa coefficients were good.

**Conclusions.** This questionnaire is an acceptable and reliable instrument for assessing lifestyle habits in French children.

## Introduction

Overweight and obesity in children are considered the main childhood health problem in European countries. In 2010, based on International Obesity Task Force definitions and the World Health Organization's Childhood Obesity Surveillance Initiative, it was estimated that about 25% of European children (aged 6-9 years) were overweight and obese [1]. In a recent systematic review and meta-analysis, a high prevalence of childhood overweight and obesity was reported, although a trend toward stabilization in most European countries was shown [2]. In France, recent data suggested a quite stable prevalence of obesity, with a prevalence of overweight that is declining despite remaining high between 2013 and 2017 [3]. Overweight and obesity in children are associated with adverse health consequences from a physical, social, and psychological point of view [4]. Persistence of obesity into adulthood can also lead to increased morbidity of type 2 diabetes, cardiovascular diseases, cancer, and increased early mortality [5].

This epidemic phenomenon may be partly explained by unhealthy behaviors. Indeed, the roles of dietary and lifestyle factors in obesity, especially sugar-sweetened beverages, poor diet quality, physical inactivity, prolonged screen time, and short sleep duration are important risk factors for being

overweight and obese [4, 6-8]. Many implemented intervention or promotion programs that aim to encourage a healthy lifestyle in children and adolescents have been developed to reduce the prevalence of childhood and adolescent obesity [9]. However, one review concluded that most studies in nutrition education intervention research measured knowledge or behavioral capabilities in preschool and school-aged children, and that most studies assessed knowledge rather than behaviors [10]. In addition, for the assessment of nutrition behaviors in children, most of these measures were based on parental responses [11-14]. Several studies have shown the accuracy of parental responses to their children's nutrition behaviors to be weak to moderate [15-17]. It was thus concluded that relying on such parental responses might hamper researchers' abilities to detect relationships that have policy implications for the child nutrition community [15].

The burgeoning problem of unhealthy behaviors in children and the need for population surveillance have led to the development of a questionnaire on lifestyle habits that includes nutrition, physical activity, sleep patterns, and sedentary behaviors. Therefore, the aim of this study was to develop a Self-Administered Children Lifestyle Assessment (SACLA) questionnaire and to test their feasibility and reliability in a population of French children.

## Methods

### STUDY DESIGN AND PARTICIPANTS

This ancillary study used data from the *Vivons en Forme* (VIF; “live healthy”) Program. The VIF organization is a continuation of the obesity prevention scheme previously called EPODE (*Ensemble Prévenons l’Obésité des Enfants*), a community-based prevention program aimed at promoting healthier lifestyles among children and their families, and involving municipal services in charge of child education and care [18].

This present investigation is a test-retest study, which involved a portion of the children participating in the VIF Program. The study was conducted between January 2013 and June 2014. The development of the self-reported measure and feasibility assessment were conducted between January 2013 and August 2013; reliability assessment was performed between October 2013 and June 2014.

Six classes of 8-10 year-olds who involved the VIF Program in France participated in the study. An informative letter was given to parents explaining the objectives of the study and a guarantee that the data would remain strictly anonymous and confidential.

A total of 315 participants took part, and sample characteristics are shown in Table I. The reliability study was conducted over a 2-week period, requiring two participant contacts. During the first visit, the selected version of the questionnaire was completed, and demographic data were obtained. Up to 2 weeks later, participants completed the same questionnaire. Both questionnaires were completed by children in class at school under the supervision of a teacher. This study did not involve any intervention, and was conducted on a volunteer basis. Data were retrospectively

collected by the study organizational structure (<https://vivonsenforme.org>). In this context, written informed consent was not required according to French human research regulations. The answers provided by children were anonymous and confidential. This data collection was approved by the French National Commission of the Informatics Personal Data.

### QUESTIONNAIRE

The SACLA questionnaire was written by a group of highly skilled professionals with experience of public health studies in nutrition. Before data collection for reliability assessment, an initial pretest questionnaire was completed by a sample of 216 children. This pretest was conducted to evaluate the clarity, comprehensiveness, and acceptability of each question, as well as questionnaire length, and the quality and response rate for each question. Questions were deleted or modified if they were completed by less than 80% of subjects. After each step, appropriate changes were made to produce the final questionnaire.

The final questionnaire consisted of 20 questions divided into four parts:

- *introductory part*: demographic and social information;
- *part one*: dietary habits;
- *part two*: lifestyle habits;
- *part three*: physical activity. The demographic information comprised gender, date of completion, and the class level.

Dietary habits (part one; 11 questions) were assessed by dietary history (closed-ended questions). It was completed by questions about drinking habits and a food frequency questionnaire about consumption of fruit, vegetables, dairy products, sweets, salted snack foods, and type of beverages. Questions about lifestyle habits (part two; 6 questions) were also divided into several sections: (i) sleep habits; (ii) duration and mode of commuting to school (passive or active transport); and (iii) sedentary behaviors. The answers to these questions were a simple choice according to several defined answers. Questions about physical activity habits (part three; 3 questions) were divided into three sections: (i) sport practice; (ii) physical activity during recess; and (iii) child self-perceived levers and brakes of physical activity. Closed-ended questions were also used for this part.

### STATISTICAL ANALYSIS

Categorical variables are expressed as percentages. The test-retest reliability was evaluated using the intraclass correlation coefficient (ICC) for quantitative items, simple Cohen’s kappa coefficient for nominal variables, and weighted Cohen’s kappa coefficient for ordinal variables for categorical items [19]. The values of concordance coefficients (ICC and kappa values) are as follows: poor agreement of values < 0.45; average-to-good agreement of values = 0.45-0.75; and excellent agreement of values > 0.75 [20]. Statistical testing was performed at the two-tailed a level of 0.05. Data were analyzed with SAS software version 9.4 (SAS Institute, Cary, NC, USA).

Tab. I. Sample demographic characteristics.

	Phase 1*		Phase 2*	
	N	%	N	%
<b>City</b>				
Total	216	100	99	100
Vitré (Ile et Vilaine)	117	54	-	-
Anzin (Nord)	43	20	-	-
Royan (Charente-Maritime)	56	26	-	-
Roncq (Nord)	-	-	50	50
Saint-Martin-de-Crau (Bouches du Rhône)	-	-	25	26
Vieux-Condé (Nord)	-	-	24	24
<b>Gender</b>				
Boys	95	44	50	51
Girls	121	52	49	49
<b>School levels</b>				
CE2	95	44	55	56
CM1	121	56	44	44
<b>Type of school</b>				
Private	37	17	-	-
Public	136	63	-	-
Priority education area	43	20	-	-

\* Phase 1: feasibility study; phase 2: test-retest study.

## Results

### FEASIBILITY

Missing or inappropriate responses on different parts of the questionnaire ranged from 0 to 35%. Table II shows the rate response mean for each dimension of the questionnaire. The highest proportion of problems was reported on the drink intake dimension. Some questions on this item in fact have been modified or removed. Problems were also reported on sleep dimension (both week and weekend) and least frequently on physical activity habits.

Tab. II. Mean rate response according to each part of the questionnaire.

	Rate response (%)
<b>Part 1: dietary habits</b>	
Breakfast	100
Morning snacking	89.7
Tea time	100
Afternoon snacking	99.0
Snacking front of the TV	99.0
Foods intake	85.8 to 98.0
Drink intake	69.7 to 99.0
<b>Part 2: lifestyle habits</b>	
Sleep Week	72.7
Sleep Weekend	64.6
Mode of commuting to school	94.9
Screen	93.9
<b>Part 3: physical activity habits</b>	
Practice sport	99.0
Recess	98.0
Feeling	94.9

Tab. III. Test-retest reliability of the questionnaire (retest after 2 weeks).

	Number of items	Agreement (%)	Reliability index*
<b>Part 1: dietary habits</b>			
Take Breakfast	1	88.7	0.66 (0.48-0.84)
What	9	75.8 to 88.9	0.62 (0.46-0.76)
Take Morning snacking	1	79.6	0.66 (0.53-0.80)
What	4	85.7 to 98.6	0.70 (0.65-0.91)
Tea time	1	80.8	0.19 (0-0.43)
Afternoon snacking	1	82.6	0.62 (0.46-0.78)
Snacking front of the TV	1	80.6	0.61 (0.45-0.77)
Foods intake	9	42.7 to 64.3	0.40 (0.27 to 0.49)
Drink intake	6	37.2 to 75.5	0.39 (0.18 to 0.56)
<b>Part 2: lifestyle habits</b>			
Sleep week	1	NA	0.37 (0.17-0.52)**
Sleep weekend	1	NA	0.41 (0.23-0.56)**
Mode of commuting to school	1	97.9	0.96 (0.90-1)
Screen	5	91.4 to 92.5	0.83 (0.74- 0.84)
<b>Part 3: physical activity habits</b>			
Practice sport	1	99.0	0.97 (0.92-1)
Recess	1	90.7	0.71 (0.53-0.89)
Feeling	1	95.7	0.58 (0.21-0.95)

NA: not applicable; \*Reliability index indicates the Kappa value [95%Confidence interval (CI)] or the median (range) of Kappa individual items values in case of multiple items per dimension unless otherwise as indicated; \*\* intraclass correlation coefficient (95% CI).

### RELIABILITY

Test-retest reliability data for the questionnaire are presented in Table III. Test-retest agreement was observed in 37.2-99.0% of children respondents, with means of 72.1, 91.8, and 95.1% for dietary habits, sedentary behaviors, and physical activity habits, respectively. This agreement is generally confirmed by the kappa coefficients (Tab. III), which were 0.19-0.70 for dietary habits, 0.37-0.96 for lifestyle habits, and 0.58-0.97 for physical activity habits.

### Discussion

Dietary intake and physical activity habits are major factors in the development of overweight and obesity. Reliable and valid instruments to measure the effectiveness of counseling on nutrition, physical activity habits, sedentary behaviors, and sleep in children are lacking. To our knowledge, this study is the first to develop a self-reported measure of lifestyle habits (including dietary, sleep, sedentary and physical activity behaviors) in French children, and to test its feasibility and reliability. The main result of our study is that the developed questionnaire can be considered acceptable and reliable for children aged 8-10 years.

Given the multifactorial nature of overweight and obesity, it was necessary to adopt a multidisciplinary approach to questionnaire development that focused on the diverse dimensions that predispose to childhood obesity [4]. Obesity is caused by the combination of a less active lifestyle, including sedentary behaviors, and a failure to reduce energy intake in line with reduced total energy expenditure arising from reduced physical activity [4, 6-8, 21]. In addition, patterns of reduced sleep duration have been reported simultaneously with patterns of increased obesity [22-24]. Many studies show that chronic partial sleep loss may increase the risk of obesity and weight gain [25-26]. Therefore, we

decided to develop a questionnaire with three dimensions: (i) dietary habits; (ii) lifestyle habits (including sedentary and sleep ones); (iii) physical activity. As noted, the majority of studies that assess behaviors in children are based on parental responses with corresponding weak-to-moderate accuracy [11-17]. Therefore, to improve the accuracy of assessment, we developed a questionnaire that was to be completed by the children themselves.

Concerning feasibility, our study clearly shows that the lifestyle questionnaire was easy to complete, with few missing values; it is thus highly feasible for use with children as a lifestyle measure. The very low proportions of missing data may be because a teacher or a trained person was at hand to help if necessary. The highest proportion of problems was reported on the dietary intake dimension. Some questions about drink intake have been modified or removed due to the high percentages of reported problems on these items. The item about the place where children used to have teatime was removed because answers from respondents diverged and the question was not closed-ended. Another difficulty, reported by teachers, concerned the question on snacking in front of the TV. Indeed, 14% of respondents quoted their evening meal and 8% their teatime. Therefore, we decided to develop the answers about snacking further and to formulate this question as closed-ended. The question “during meals at home, what do you drink most often (drink 1 and drink 2)?” has also been modified. The question about the second drink was answered by only 67% of respondents, and many children cited several drinks for their choice of second drink. However, the overall small proportion of missing or inappropriate responses confirmed the feasibility of the lifestyle habits questionnaire. In addition, to improve the comprehensiveness of the questionnaire, some unclear questions have been removed or modified following discussions with teachers and children after completion of the questionnaire.

Another outcome of our study shows fair-to-excellent levels of test-retest reliability of the questionnaire according to the established standards for reliability coefficients [20]. A similar questionnaire developed in the USA also showed moderate-to-strong test-retest reliability, with the retest after 8 weeks [27]. Our good overall reliability might be explained by a teacher being on hand to help children complete the second (retest) questionnaire. Reliability should therefore be tested further in a different context (e.g., without a teacher or trained person).

The current study has strengths and limitations. The main strength is the development of the first self-reported questionnaire of lifestyle habits (dietary, sleep, sedentary and physical activity behaviors) in French children to quickly assess children’s nutrition behaviors. Another strength is the diverse population from several schools, although this was limited to a small convenience sample. Thus, the samples included are not necessarily representative of the population of French children as a whole. Regulatory and ethical constraints represent a further limitation of our study. It was not possible to record certain additional clinical data on children, such as body weight, height, and body mass index for this ancillary study; these parameters may have influenced the answers from participants [28, 29]. Moreover,

social desirability (the tendency to respond in such a way as to avoid criticism) and social approval (the tendency to seek praise) might also bias our results [30]. In addition, test and retest might also constantly be answered on the bases of a wrong self-perception. Our results should be taken with caution because an external evaluation is also missing.

## Conclusions

Our results support the use of the Self-Administered Children Lifestyle Assessment (SACLA) questionnaire as an acceptable and reliable instrument for assessing lifestyle habits in 8-10 year-old French children. These initial results are promising and suggest that this instrument is suitable for use to compare population estimates of lifestyle behaviors.

## Acknowledgements

Funding sources: this research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

The authors thank all participating youths and cities for their collaboration in the study.

## Conflicts of interest statement

The authors declare no conflict of interest.

## Authors' contributions

Each author of this article contributed significantly to the study. MR and GB designed the research; GB and MR conducted the research; JV and VD analyzed the data; VD and AD performed the statistical analysis; JV wrote the paper; MR had primary responsibility for the final content; all authors read and approved the final manuscript.

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Received on December 17, 2020. Accepted on January 25, 2021.

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**How to cite this article:** Vanhelst J, Deken V, Boulic G, Duhamel A, Romon M. Feasibility and reliability of the Self Administered Children's Lifestyle Assessment (SACLA), a new tool to measure children's lifestyle behaviors: the VIF Program. *J Prev Med Hyg* 2021;62:E117-E121. <https://doi.org/10.15167/2421-4248/jpmh2021.62.1.1921>

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