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Photo method for nutrition logging

Development and evaluation of a photographic logging instrument

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Abstract

Developing an accurate method for dietary assessment (nutrition logging method) that is suitable for everyday use is a huge challenge, especially when children and adolescents are the target group. The evaluation of the photo method, an instrument that utilizes digital photographs, shows that it is possible for children from 7 years of age to independently document their intake (type and quantity of food and beverages) using this simple method. The method is valid ($rs \geq 0.81$, $p \leq 0.01$) and objective (ICC ≥ 0.91, $p \leq 0.01$) with regard to the evaluation of the photos by independent specialists. Furthermore, it is accurate in terms of the energy intake and micronutrient intake, which means that the deviations were below 10% compared to a weighed dietary record on the group level. The majority of subjects (the participants) were very satisfied with the instrument, which is attributable to a very low burden on the subjects due to ease of use. In light of the continuous advances in information technology, such as automatic image evaluation, in future, these results could enable quick, simple, and accurate nutrition logging in subjects with various ages, places of origin/ethnicities, and levels of education.

Keywords: dietary assessment methods, nutrition logging, photo method, children and adolescents, nutritional behavior, food photography

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Introduction

Precisely measuring what people in various age groups and population groups eat is a huge and perpetual challenge for nutritional research. The reasons for this include the complexity, diversity, and temporal heterogeneity of individual nutritional intake. Despite these many challenges, it is important to be able to document and evaluate the normal everyday intake of various population groups in an unbiased manner. Therefore, the aim of the study described here was to develop a novel, contemporary method of recording that is sufficiently accurate, is suitable for various population and age groups, and provides advantages with regard to the aforementioned problems compared to classical methods.

Background

Requirements for recording methods

When selecting a recording method, it is important to always clarify how high the expected burden on the participants can be for the target group in question, and what level of cooperation and motivation can be expected from the participants in that target group. Important factors here include age and level of education [1]. In addition, taking into account current immigration figures, the person's place of origin/ethnicity may affect the selection of a suitable method.

Recording methods are a particular challenge in studies on the target group of children and adolescents (C&Ado). For example, their reading and writing skills, cognitive performance, knowledge of nutrition, and ability to estimate portion sizes may be less well developed compared to adults. Therefore, until the subjects reach a certain age, the parents/guardians have to take responsibility for the documentation of intake. This can present a problem at certain times, for example when the children are away: at school, doing sports, or spending time with friends. The fact that the caregivers change throughout the day makes it more difficult to record intake accurately and consistently [2]. Between the

ages of 8 and 10, children quickly develop in the aforementioned cognitive areas, however they still have a lack of background knowledge regarding food, and especially portion sizes, which would be required in order to fill out a nutrition log independently [3]. The further they progress through adolescence, the more likely they are to be able to record their intake independently – but their nutritional behavior also becomes more unstructured as they get older. At this age, the influences of food from outside the home and of peers grow in particular [2]. One example of this would be frequent snacks between meals [4], which can be particularly challenging for adolescents when it comes to accurate nutrition logging. In addition, it is indeed possible that as children progress through adolescence, their motivation to participate in and take responsibility for nutrition logging may decrease [5].

One significant and common problem with self-logging at all ages is underreporting, which is to say the intentional or unwitting failure to document all nutritional intake. This disproportionately affects recording of intake of less healthy foodstuffs [6, 7].

This is particularly unfortunate in light of the increasing prevalence of obesity, because underreporting occurs more frequently in the case of overweight and obese persons [8]. Such deviations from actual intake in the documentation can have a significant effect on the validity, and therefore the reliability of the data collected.

The fundamentals of (photographic) recording methods

The most accurate instrument that is used independently by subjects is the weighed dietary record. However, this high level of accuracy is often at the expense of the subjects (or subject selection), because it requires a high level of motivation and cognitive ability (due to the complexity and the effort required),

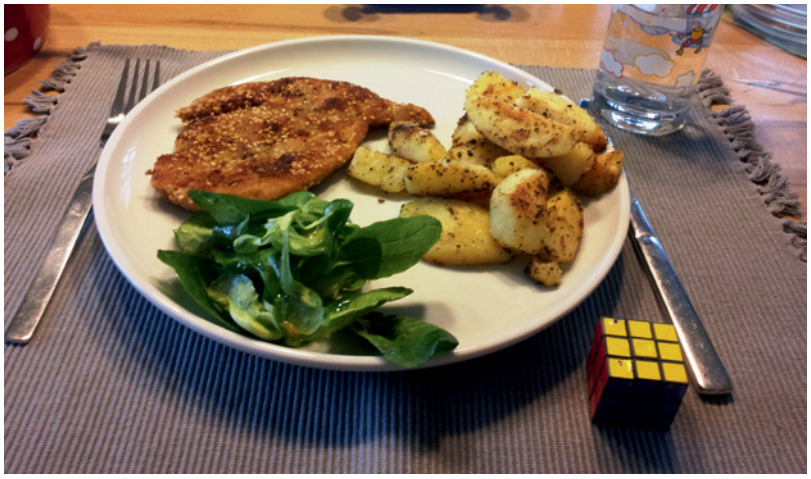

Fig. 1: **Photo from the main study phase**

and can greatly influence nutritional behavior (e.g. through underreporting/under-eating). Therefore, for C&Ado especially, a weighed dietary record may only be suitable under certain circumstances, due to its complexity. We are attempting to overcome these drawbacks through the development of a new photographic instrument that remains quantitative in character and retains a high level of accuracy despite its simplicity. The photo method is designed to be quicker, less behavior-influencing, and less complicated than other logging methods, making it suitable for various age groups. The high level of accessibility provided by such an instrument is an additional advantage. Advances in information technology and, for example, the increasing number of people using smartphones (especially C&Ado), mean that the necessary technology is readily available [9].

The validity of a photographic method for a precise recording of food intake was first investigated by Bird and Elwood in 1983 [10, 11]. Further validations and determinations of the (inter-rater) reliability of photographic methods were performed in numerous subsequent studies [12–15]. In these studies, precisely matching reference images were usually created for the foodstuffs consumed, and the subjects were provided with uniform devices (cameras or smartphones) with which to log their intake. The data collected was usually evaluated by specialists who compared the amount of food in the picture to the reference photos in which the quantity of food depicted was known. Studies on photographic recording methods with C&Ado were mostly carried out by or together with the parents [16–18], and this was done for very short periods of time and under controlled conditions [19, 20]. The relevance of the present study compared to previous studies is mainly provided by the fact that the C&Ado themselves were responsible for logging (◆ Figure 1) and by the fact that the image data was evaluated using reference photos that did not exactly match the evaluated photos in terms of the contents, which is much more realistic, for example with regard to larger-scale data collection under everyday conditions. In addition, the logging in this study was carried out over a longer period of time (one week), under unrestricted everyday conditions (free living) with unrestricted food selection, and with mainly the participants' own devices being used.

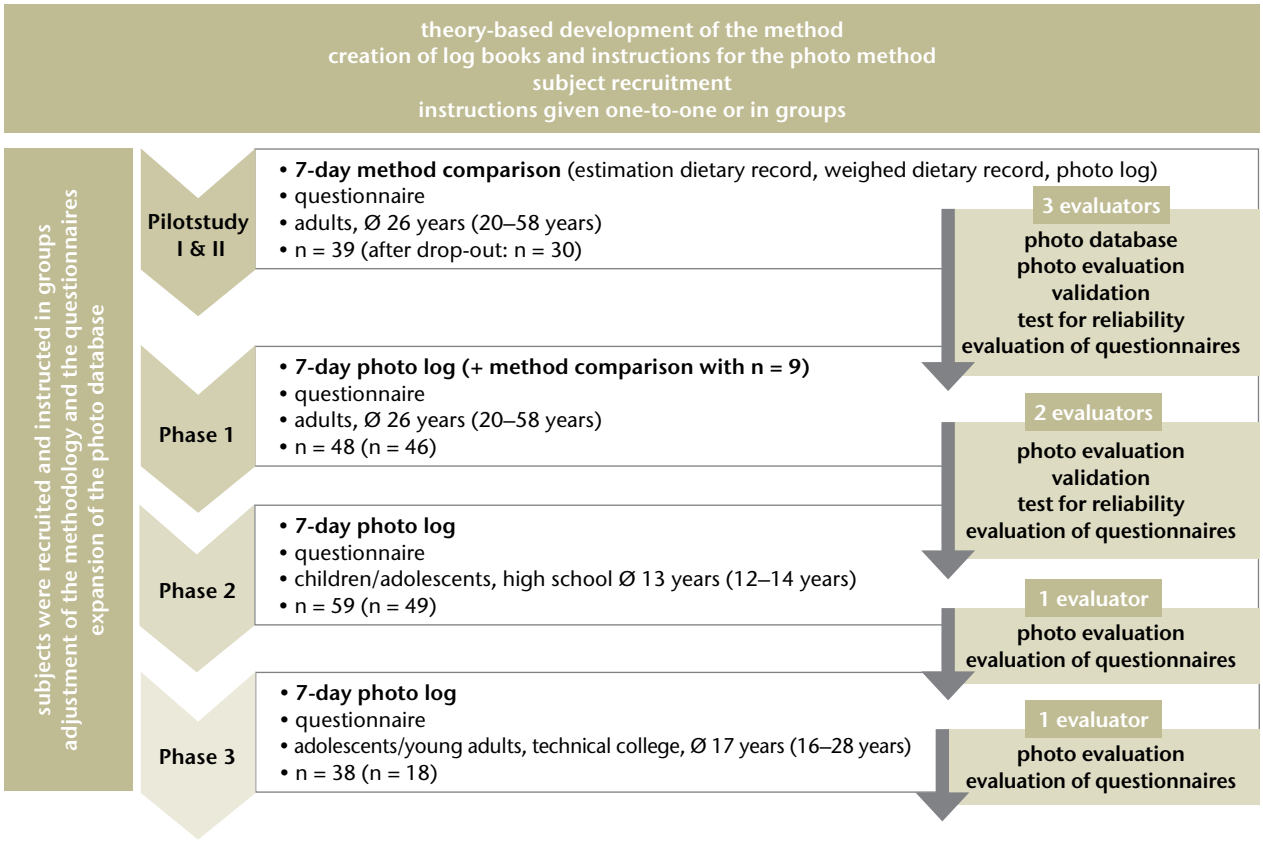

Fig. 2: **Overview of study organization with pilot phase and main study phases**

Study organization and methodology

Study design

The intake logs performed for this piece of work are non-interventional, i.e. observational, prospective, cross-sectional studies. For the sake of simplicity, the photographic instrument developed for this purpose shall hereinafter be referred to as the photo method. It was applied in five different project phases (pilot study I & II, study phases 1–3) in subjects of different age groups, and its application was subsequently evaluated (◆ Figure 2).

Here, the aim of the pilot studies was to use a method comparison to find out the level of validity and inter-rater reliability (objectivity) of a photographic method when the image evaluation is performed by independent evaluators using a specially created reference photo database. Furthermore, satisfaction with the various nutrition logging methods was tested (questionnaire), along with the feasibility of the methods under unrestricted everyday conditions and over a period of seven days. The photo method was compared with two classical recording methods: an estimated and a weighed dietary record. All three instruments were used simultaneously by the same subjects. Because this procedure was so time-consuming, the selected target group were adults, especially since the age group did not play any role in determining validity and reliability.

In the three main study phases, the practicability and feasibility of the method with C&Ado was to be tested, and this target group's satisfaction with the instrument was to be determined (also ascertained using an age-adjusted questionnaire). It should be noted here that even the very youngest children had to do their own logging, without the help of their parents. In main study phase 1, an additional test was performed to determine the validity and objectivity of the method in that age group (comparison with a weighed dietary record).

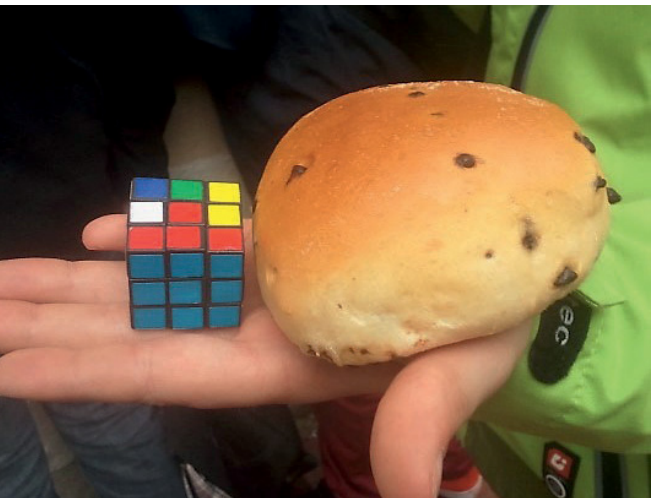

Fig. 3: **Photograph of the 3D template for the main study phases**

Study population

Adult subjects (for the pilot studies) were recruited through invitations

and internal cooperation within the *Universität Paderborn* [University of Paderborn] (convenience sample). Any adult who volunteered was eligible to take part. All of the younger participants (for the main studies) were recruited through collaborations with three randomly selected schools in Paderborn (1 elementary school, 1 high school, 1 technical college). No claims are made with regard to the representativeness of the data collected.

Study organization

In the pilot study, the instructions were given to the subjects in person wherever possible, and most of the participants were given the instructions in groups where this could be organized. The instructions for the estimated and weighed dietary records given to the adult subjects were relatively detailed; the instructions for taking photographs were also very detailed. The date and time stamp on the camera or smartphone was to be activated so that the exact time of consumption could be determined during the evaluation. The subjects were to use their own devices; in exceptional cases, the university provided devices on loan (compact digital cameras). The instructions for the photo method were as follows: Take the picture from an approximately 45° angle, and place a two-dimensional 5x5 cm template (provided) in the picture at a distance of 30–40 cm, ensuring that it is easily visible. This functions as a size reference. After the subject had finished eating, any leftovers were to be photographed in the same way. In addition, the subjects were asked to photograph the food labels where possible in order to obtain information about the ingredients and nutritional composition of the foodstuffs (e.g. the fat content of milk). All data had to be saved on a storage medium and handed over at the end of the week together with the estimated and the weighed dietary records.
The C&Ado were instructed in school classes (main study phases). The instructions were tailored to the subjects' stage of cognitive development, and the younger the subjects, the shorter the instructions were kept in order to avoid overwhelming this target group and to make logging easy for them. A video explaining the procedure was also created for this age group, and a photo game was developed to teach these subjects what makes a "good" or "bad" photo. In these three main study phases, small notebooks were created as a brief reminder of what to do. The subjects could also use them to log any foodstuffs that they may have forgotten to record by photo. In addition, instead of the 5x5 cm templates, they were given colorful 3x3 cm 3D templates (◆ Figure 3) in the form of a Rubik's cube keyring, so that the volume of the food could be better assessed, and also to provide an additional incentive for the subjects. This group of subjects was also able to borrow digital cameras if needed, but most of them used their own devices or those of their parents.

As a further incentive, the subjects in the pilot phase were given a personal nutritional evaluation, and the pupils from the first two main study phases received a pasta cookbook for children or a drinking bottle with a water filter. The adolescents and young adults from phase 3 were not given an incentive as the topic was integrated into their classes (social assistant training classes, home economics classes).

Using the photos provided by the first 17 subjects of pilot phase I, a reference photo database was created by combining the image data with the exact, weighed data (weighed dietary record). This was used as an aid for estimation of the amounts by the independent evaluators in all subsequent evaluations. The database was constantly updated with the photos from subsequent subjects as soon as these had been evaluated. The photos provided by the next 13 subjects (pilot phase II) were assessed in order to validate three independent evaluators, among other things. These evaluators were to determine the type and amount of photographed food or drinks and enter this into a table provided. Incompletely logged days were excluded from the evaluation. This data was compared with the data from the weighed dietary records for validation and determination of inter-rater reliability. The evaluators were given back the corrected tables after the pilot phase so that they could reflect on their estimations. In addition, the subjects were given questionnaires in order to determine their satisfaction with the method, its practicability, and any problems. These questionnaires were mainly made up of multiple-choice questions.
In the main study phases, initially, a further validation was carried out by two independent evaluators with a subsample of nine subjects, who also completed a weighed dietary record. All the subsequent data sets were then only evaluated by one evaluator after the validity result was satisfactorily determined. In the main study phases, after recording was complete, all subjects received questionnaires regarding satisfaction and practicability/feasibility.

Phase		n	Age Ø (± SD)
		30	**26.0 (7.3)**
Pilot	f	20 (67%)	26.1 (8.3)
	m	10 (33%)	25.9 (2.4)
		46	**9.3 (0.6)**
1	f	29 (62%)	9.3 (0.6)
	m	17 (38%)	9.2 (0.5)
		49	**13.1 (0.5)**
2	f	20 (41%)	13.0 (0.6)
	m	29 (59%)	13.2 (0.5)
		19	**17.2 (1.5)**
3	f	18 (95%)	17.3 (1.5)
	m	1 (5%)	16.0 (–)

Tab. 1: **Subject data for all phases of the study**
f = female, m = male,
SD = standard deviation

ICC: Statistical parameter for the assessment of interval-scaled data with regard to the agreement between two raters (inter-rater reliability) [23].

Goldberg-cut-off: A method by which the rate of underreporting with regard to energy intake can be assessed within a sample. If the ratio between the energy intake recorded by a method and the metabolic rate is less than the cut-off value, this is an indication of underreporting [21].

phase	pilot	1 (9 years)	2 (13 years)	3 (17 years)
data supplied (by)	n = 30 (39)	n = 46 (48)	n = 49 (59)	n = 19 (38)
participation rate	78 %	98 %	83%	50 %
Ø photos/day	7. 4 (2.6)	7.8 (2.6)	8.2 (2.8)	6.0 (1.7)
Ø completely logged days	7	6	5	4

Tab. 2: **Participation rate and number of documented days and photos**

Evaluation

The assessments from the photo logs and weighed dietary records were evaluated with regard to energy and nutrient intake in the individual subjects and for each of the methods using DGE-PC professional (version 5.1.0.013). This program is based on the data from the German Food Database *[Bundeslebensmittelschlüssel]* (BLS Version 3.01). The validation was carried out, inter alia, by determining the correlation coefficients as well as through assessment using Bland-Altman plots, a graphical method for determining agreement between methods. The inter-rater reliability was assessed using the Intraclass Correlation Coefficient (ICC). In the three main study phases, the rate of underreporting was determined through the use of certain age and gender-specific Goldberg cut-off values [21, 22].

Results

Study population and participation rate

The basic data on the subjects in the various study phases can be found in ◆ Table 1. The average age was 26 years old for the pilot phase, and 9, 13, and 17 years old for each of the main study phases respectively. The participation rate, i.e. the proportion of subjects that provided usable results was 78% in the pilot phase. In the main study phases, this figure reduced with increasing age. The number of days documented also decreased from phase 1–3 as the age of the participating subjects increased. In the pilot phase, the average was 7 documented days, as specified (◆ Table 2).

Validity and reliability

The detection rate, determined by the proportion of photos correctly identified with regard to the contained food, was 95% overall in the subjects from pilot phase II (n = 13) and the subsample from main study phase 1 (n = 9). Out of an average of 44 comparison photos per participant, only three were wrongly identified by the evaluators with regard to the type of food.

◆ Table 3 shows an example of the extent and direction of the deviations in the photo estimates compared to the weighed dietary record on the group level for the food and energy intake (pilot phase II). All of the estimated values were on average below the weighed values. The deviations in terms of the intake of energy and of macronutrients and selected micronutrients (with the exception of iron) were small. They were all below 10%. However, the deviations in energy intake on an individual level fluctuated between 0 and 18%.

The correlation coefficients (according to Spearman, r_S), which serve as an indicator of the validity of the photo method instrument compared to the weighed dietary record on the group level, showed a high, significant ($p \leq 0.01$) association for all determined variables (◆ Table 4).

A high correlation is an indication of, but does not necessarily equate to, a high level of agreement between two measurement instruments [24]. For this reason, Bland-Altman analyses were also carried out. ◆ Figure 4 shows an example of the differences in daily energy intake between the two methods (photo method [PM] minus weighed dietary record [WDR]) plotted against their average. For the purpose of interpretation, an auxiliary line was inserted at the mean value of the differences, and based on each of these auxiliary lines, at plus and minus the doubled standard deviation – these are the "limits of agreement". All values were within these limits, except for one. The same was true for all other macronutrients and micronutrients considered in pilot phase II and main study phase 1.

The ICC was very high both in the pilot phase (three evaluators) and in the subgroup of main study phase 1 (two evaluators), which is an indication of high inter-rater reliability and thus of the objectivity of the method (◆ Table 5).

Underreporting (calculated using the Goldberg cut-off, see above) was very rare in main study phases 1 and 3 (4%). The rate was 12% for high school students (phase 2). Especially the boys of this age group tended to under-report (17%), while the girls on the other hand had a low rate of underreporting (5%).

	intake according to weighed dietary record	estimation using photo method	deviation	deviation (%)
g Fd/day (SD)	1,952 (± 996)	1,860 (± 1 048)	-92 (± 186)	-7.3 (± 10.6
kcal/day (SD)	1,564 (± 501)	1,490 (± 520)	-74 (± 171)	-5.3 (± 13.1)

Tab. 3: **Deviations in food and calorie intake in pilot phase II (n = 13)**
Fd = food, SD = standard deviation

phase		correlation coefficient r_s	
		pilot phase	main study phase
amount of food	**g/day**	0.99**	0.90**
energy	**kcal/day**	0.91**	0.87**
energy density	**kcal/100g**	0.97**	0.93**
fat	**g/day**	0.85**	0.95**
carbohydrates	**g/day**	0.95**	0.92**
protein	**g/day**	0.94**	0.93**
calcium	**mg/day**	0.96**	1.00**
iron	**mg/day**	0.97**	0.88**
folate	**µg/day**	0.94**	0.93**
iodine	**µg /day**	0.97**	0.85**
vitamin D	**µg /day**	0.87**	0.95**
Ballaststoffe	**g/day**	0,81**	0,87**

Tab. 4: **Correlations between estimated intake according to the photo-method and intake according to the weighed dietary record in pilot phase II (n = 13) and in main study phase 1 (subsample, n = 9)**
r_s = SPEARMAN's correlation coefficient, ** p ≤ 0,01

Satisfaction and practicability

The evaluation questionnaire revealed that when the three methods were compared (pilot phase), the largest proportion of subjects preferred the photo method, and thought that it was the easiest and quickest method. In addition, the majority of people believed that this method had the least influence on eating behavior. Half of the participants would choose the photo method if they had to record their food intake again (◆ Table 6).

In terms of practicability, i.e. feasibility, half of the subjects in the pilot phase indicated that they had often not taken the scales with them for accurate documentation of intake away from home. By contrast, the clear majority of all participants (79%) saw no problem in taking a smartphone or camera with them in order to document intake away from home photographically. Limitations were mentioned more frequently with regard to the weighing method, and those mentioned included that weighing away from home was unpleasant or embarrassing, and generally very inconvenient. One of the most frequently mentioned opinions was that the hectic nature of everyday life made it difficult to carry out this complicated method. This suggests that there is a need to establish a method that is better adapted to everyday use and is less burdensome for the subjects.

The younger the C&Ado were, the more satisfied they were with the photo method (◆ Table 7). Choosing to take part in such a study again was more common among the younger children of primary school and high school age (78% and 90% respectively), than in the older subjects from the technical college (35%). 79–84% saw no problem in taking a camera or smartphone with them at all times in order to document intake away from home.

Discussion

Studies on photo-based nutrition logging in different age groups have shown that under certain conditions (precisely matching reference photos, partially predetermined foodstuffs, logging under controlled conditions, identical/predetermined devices, support by parents, etc.), in most cases, these novel instruments have a high level of validity and reliability and/or objectivity [10–20]. The pilot phase of the present study, a 7-day method comparison with adult subjects, also showed that the method has a high level of validity and objectivity. The Bland-Altman analysis showed that the photo method is as suitable as a weighed dietary record (a classical validated method), as a method for evaluating energy and nutrient intake (at the group level). The pictures taken by the subjects were of good quality, which suggests that the relatively brief explanations of the method that were mostly given in groups were sufficient for the various target groups. The rate of detection was also very high, which further suggests that there is no problem in working with photo-based logging methods using the subjects' own cameras or smartphones under everyday conditions, which can reduce study costs. The fact that only half of the adult subjects would opt for the photo method again, despite finding it easy to use, is presumably due to the fact that the subjects were not yet aware of its high level of accuracy.

The average deviations in energy, macronutrient, and micronutrient intake were low at the group level. Deviations on the individual level were sometimes higher, but there was a high degree of accuracy in this study starting from a group size of n = 9. Therefore, when applying the photo method for individual nutrition counseling, particular attention must be paid to accuracy, but in the case of larger food intake data collection studies, this high level of accuracy at the group level is an advantage and is completely suf-

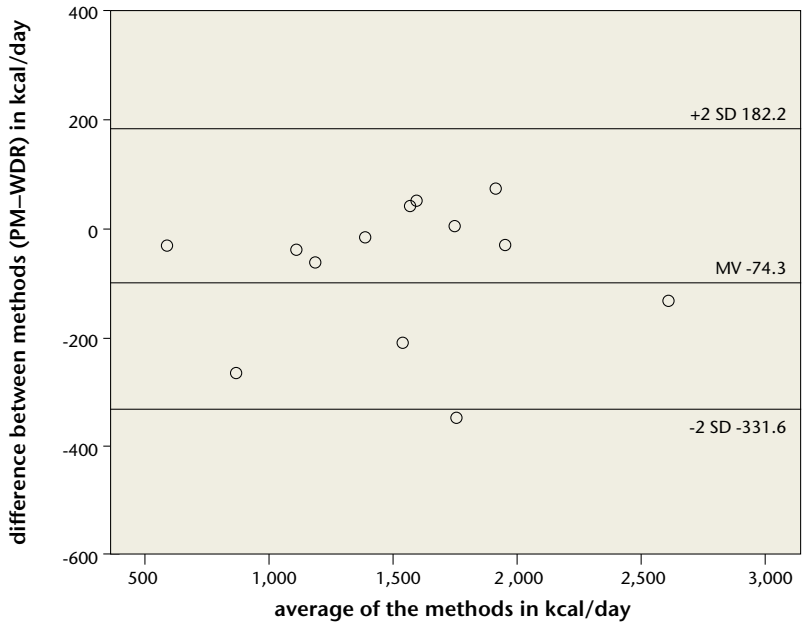

Fig. 4: **Bland-Altman diagram for comparison of the weighed dietary record and the photo method for measuring daily energy intake (kcal/day) in pilot phase II (n = 13)**
PM = photo method, MV = mean value, SD = standard deviation, WDR = weighed dietary record

	$ICC_{3\ evaluators}$ pilotphase (n = 13)	$ICC_{2\ evaluators}$ phase 1 (n = 9)
intake of food g/day	0.99**	0.95**
energy intake kcal/day	0.93**	0.91**

Tab. 5: **Intraclass correlation coefficients (ICC) for independent evaluators in the pilot phase and in main study phase 1**
ICC = Intraclass Correlation Coefficient, Fd = food, ** p ≤ 0.01

	estimation log	weighed dietary record	photo method
Which method did you like best?	25%	29%	46%
Which method was easiest and quickest to use?	32%	4%	64%
Which method influenced your normal dietary habits the least?	39%	–	61%
Which method gave the most reliable results with regard to your actual food intake?	4%	93%	4%
Which method was the most time-consuming and difficult to use?	11%	79%	11%
Which method would you choose if you had to record your intake again?	21%	29%	50%

Tab. 6: **Satisfaction with the three recording methods (pilot phase, n = 28)**

ficient. The fact that the deviations in the main study phase were lower than those in the pilot phase may be an indication that a three-dimensional template is more suitable than a two-dimensional one, as it may allow more accurate estimation of the amounts of food. In addition, it is possible, and indeed likely, that the evaluators' performance improved due to a "training effect". By this time, they had already evaluated hundreds of pictures and had received feedback on the extent and direction of their deviations.

Underreporting, an otherwise frequently documented problem [6, 7, 25], was also relatively rare, which is attributable to the fact that the C&Ado were in most cases satisfied or very satisfied with the instrument, and due to the fact that the instrument was simple to use in an everyday context. Especially in light of changing everyday dietary habits in many age groups, with frequent snacks and eating on the go becoming more common (as described in the introduction), this method has a clear advantage over other logging methods. In C&Ado in particular, snacking can also contribute significantly to energy intake and should therefore not be neglected in nutrition logs [26].

The subjects in all study phases and in all age groups were satisfied with the photo method and preferred it to the other two methods. The exceptions were the subjects from the technical college (see limitations and suggested solutions). A high level of motivation among the subjects is particularly important when nutrition logging is carried out over longer periods of time (e.g. 7 days). Longer periods of logging also potentially mean a lower deviation from the actual energy and nutrient intake [27]. In the three main study phases in which C&Ado, aged on average 9, 13, and 17 years, used the photo method exclusively as the documentation instrument for seven days, it was shown that children aged 7 years and over are indeed capable of providing usable

How would you rate the photo method?	very good	good	poor	very poor
phase 1 (n = 48)	44 %	54 %	2 %	-
phase 2 (n = 51)	16 %	82 %	2 %	-
phase 3 (n = 28)	–	39 %	54 %	7 %

Tab. 7: **Satisfaction with the photo method (main study phase 1–3)**

photo logs. Especially in light of the fact that the eating habits of many C&Ado are becoming more unstructured and the fact that the caregivers often change during the day [2–4], this ability to perform the required task independently is of great importance. The clear majority did not have any problems with always keeping the camera or smartphone with them, which indicates that the method has a high level of practicability and is compatible with everyday life, especially in view of increasing levels of smartphone ownership and use [9].

Limitations and suggested solutions

The "photo method" is a promising novel food logging instrument for data collection that is simpler than other methods whilst remaining sufficiently accurate, with a low burden on subjects. This means that it has clear advantages over other classical and novel instruments. The main drawback is the amount of time that is required for the evaluation of the pictures by trained staff. However, the evaluations become faster with time. In the case of other established methods used in large-scale studies (e.g. 24 h recall or diet history), specialist staff has to schedule a relatively long period of time for interviewing each subject. Recent PC-based surveys of this type are less time-consuming and require fewer human resources, but the major drawback is that they are usually less precise than the current comparison methods [28–32].

The fact that the older subjects from the technical college were less satisfied, and on average also took fewer photos for fewer documented days, is probably due to a limitation in methodology. These participants who took part in main study phase 3 were not given any individual incentive, which possibly led to a much lower level of motivation. Therefore, in any potential future surveys of this type, care should be taken to ensure that the conditions are the same for all subjects. However, other studies have also shown that motivation to carry out independent nutrition logging generally reduced in adolescents as age increased [5]. In addition, one way to motivate young people in particular was to integrate this method, or a comparable method, into a user-friendly smartphone app.

Furthermore, with the photo method, the identification of certain (exotic) foods can sometimes be problematic, but this problem was rare in this study and it did not lead to any significant deviations in the energy and nutrient intake. At the group level (from n = 9), the method was very accurate and was comparable to the gold standard for self-logging methods, the weighed dietary record. However, in some cases there were higher deviations at the individual level, which could be remedied through more intensive training of the evaluators, or through the future application of automatic evaluation systems. Underreporting of energy intake is also a possibility with the photo method, as with most recording methods, and the subjects may also forget to log their intake (in this case forgetting to photograph). Due to the method's high level of practicability, however, it may be possible to reduce underreporting.

These and other disadvantages and limitations can be corrected or reduced through future further development of the method, for example with automatic image evaluations, which are currently being developed by several research groups [33–36]. However, these automatic, computer-based applications are sometimes still very imprecise, they are limited with regard to the foodstuffs that can be identified, and they require further research before unrestricted use under everyday conditions will be possible. Another possible way of improving the photo method would be to integrate it into an app (this is currently in the planning stage). Such an app could for instance make it possible to set personal reminders, to set different languages, and to use automatic data transmission. The motivation of the participants could thus be further strengthened and it would be possible to perform quick and simple nutrition logging in large and various groups of subjects.

Conflict of Interest
The author declares no conflict of interest.

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