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The impact of training for day-care educators on childhood anaemia in nurseries: an institutional randomised clinical trial

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Abstract

Objective: To test the impact of training for educators on the health of children enrolled in public and philanthropic day-care nurseries.

Design: A randomised, institutional, non-blind clinical trial was conducted. An educational intervention was performed in four day-care centres and the control group consisted of four other day-care centres. Interviews with the mothers, collection of blood from the children by digital puncture and anthropometry were performed. The chosen indicator for the improvement of health was anaemia (Hb <11 g/dl). An unconditional logistic regression model was set for the risk factors for anaemia, considering associations with $P \leq 0{\cdot}05$ as statistically significant.

Setting: Eight day-care centres in the city of Sao Paulo, Brazil.

Subjects: Two hundred and fifty-two children from day-care nurseries.

Results: The children from the day-care centres that were not subject to intervention presented a 2·11 times greater risk (95% CI 1·04, 4·30; $P = 0{\cdot}40$) of having anaemia at the end of the study independent of the control variables (sex, age, time in the day-care centre, anaemia at the beginning of the study, maternal age, use of oral iron supplements, number of siblings, per capita family income, use of antibiotics and the necessity of avoidable hospitalisations) used in the construction of the final logistical model.

Conclusions: The assessed educational intervention promoted significant changes in the health status of the children, reinforcing the importance of training for professionals who care for young children in day-care centres in developing countries in order to promote child health.

Keywords
Anaemia
Day care
Health education
Health promotion

In countries with a predominantly low-income population in a condition of high socio-biological vulnerability, the day-care centre, as an initial and alternative educational environment in which the children of working women are cared for, is considered a privileged space for the execution of programmes to prevent and control infant morbidity and mortality[1].

In this sense, health promotion initiatives in schools in developing countries, which involve collaboration between primary-care centres and pre-schools under a commitment to equity, highlight the importance of adequate training for day-care centre educators who are responsible for providing basic infant needs during the school time such as development stimulation, adequate hygiene and quantitative and qualitative feeding in order to effectively promote child health[1].

Thus, training for day-care centre educators regarding scientific knowledge and the application of programmes related to the topics of health and nutrition, which is not routinely given in regular undergraduate curricula, is a promising strategy to improve the care offered to children enrolled in day care[2].

Although the allocation of resources to child health programmes is considered a potentially valuable economic investment[3], a dose of realism in terms of the benefits of urban health politics has been suggested because there is little evidence regarding the potential of such programmes to generate a positive impact on children's health[4].

Furthermore, despite high public investment in health policies worldwide, which subsidises the development and execution of innumerable programmes to control and prevent the most prevalent childhood illnesses, high rates of infection and nutritional disorders are still present among infants and pre-school children in developing countries[5].

Among these conditions, anaemia stands out for its multifactorial detection characteristic and for its potential

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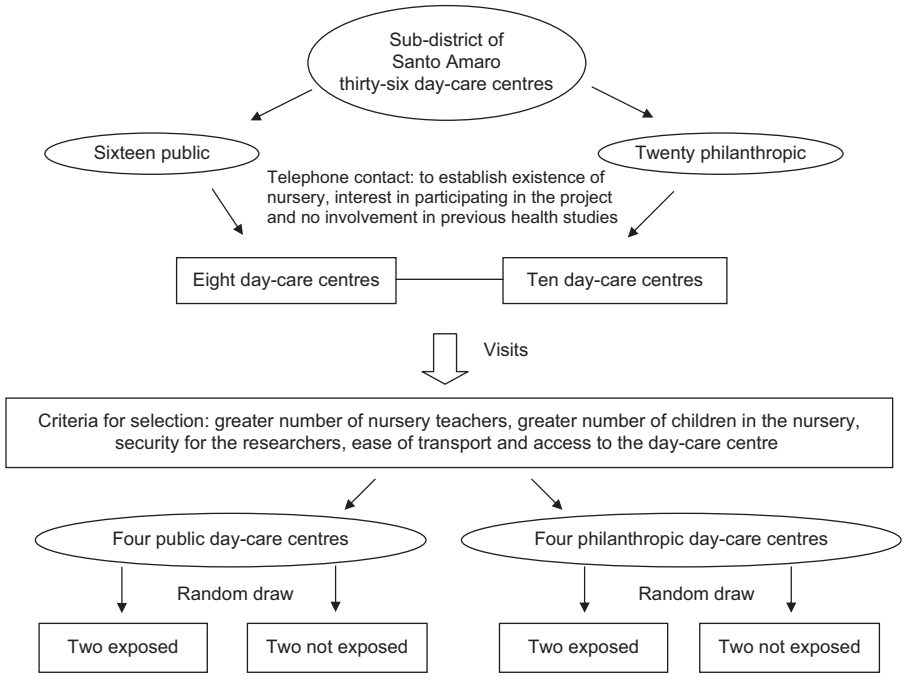

Fig. 1 Methodology for the selection of day-care centres (control variables: maternal age, use of oral iron supplementation, number of siblings, per capita family income, age, use of antibiotics and avoidable hospitalisation)

to cause psychological, behavioural and neurological sequelae that are irreversible and proportional to the duration of this specific nutritional deficiency, the age of onset and its severity[6,7].

Within this context, the objective of the present study was to test the training of day-care educators as a useful tool for reducing the prevalence of anaemia in children, which meets the prerequisites of effectiveness, low cost, straightforward applicability and a significant impact on the improvement of the health and nutrition of children attending public and philanthropic day-care nurseries.

Experimental methods

The present study is an integral part of 'Projeto CrechEficiente'[8]. The design of the study is a randomised, institutional, non-blind clinical trial with a monitoring period of 7 months. The research was carried out in day-care centres in a sub-district of the city of Sao Paulo, Brazil.

Screening and recruitment

The institutions involved in the trial were selected from among all thirty-six day-care centres in this sub-district: sixteen public (direct administration by the city) and twenty philanthropic (indirect administration performed by philanthropic institutions) centres.

After contacting the managers of these schools by telephone, thirteen day-care centres were excluded for not possessing a nursery, one for not showing interest in participating in the project and four for already being involved in previous health research. The eighteen remaining day-care centres (eight public and ten philanthropic) were visited by the project's field staff, and a questionnaire was filled out with information about the school's operations, the characteristics of its human resources and the number and ages of the children in attendance.

In the second stage of selection, these eighteen day-care centres, which abide by admission rules guaranteeing care for low-income families, were ranked according to the existence of the characteristics of interest for the development of the project[9]. The following criteria were prioritised in order of decreasing value: a relatively large number of nursery teachers, a relatively large number of children in the nursery, the safety of the area for the researchers (because some day-care centres are located in areas with high rates of violence) and the ease of transport and access to the premises. From this methodology, four public day-care centres and four philanthropic day-care centres were selected as best qualified for the development of the project. Later, two day-care centres of each type of administration were randomly selected to receive the intervention, so both the trained and untrained groups consisted of two public and two philanthropic day-care centres (Fig. 1).

Of the sixty-seven nursery teachers who were active at the start of the monitoring period in the eight selected day-care centres and were therefore subject to the proposed intervention, five discontinued their activities in the schools, leaving sixty-two teachers (thirty-one in the

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exposed day-care centres and thirty-one in the non-exposed centres) who remained until the end of the study.

Study protocol and intervention

A course entitled 'Infant Nutrition and Health: Training for Day-care Educators and Managers' was administered for all thirty-one teachers in the exposed group. The course consisted of 40 h of activities within the premises of the day-care centres themselves. The course was registered by the Dean of Extension of the Universidade Federal de Sao Paulo protocol no. 1485[10].

This educational intervention included lectures, hands-on activities and discussions based on the content of the CrechEficiente Manual as follows: food, growth and development, daily activities that build healthy habits, signs and symptoms of illnesses, infectious diseases, non-infectious diseases including nutritional disorders, accidents and violence, minimum operating conditions and team care, as well as facilities and equipment. These nine chapters were especially developed for the managers and the educators, with content and illustrations given in simple language appropriate for their comprehension[11]. Such course activities were followed by sixteen full-day staff supervision visits, once a week to each of the four exposed day-care centres, in order to attend all practices and reinforce the course content during the routine activities to overcome operational difficulties. The main intervention goals were to offer health-based knowledge and daily practical activity to improve infants' care and health state. Specifically, the teaching included the advantages of breast-feeding and qualitatively and quantitatively adequate complementary feeding including mineral and vitamin supplementation, aimed to prevent and recover macro- and micronutrient disorders. Moreover, actions were performed to teach how to control and prevent infectious diseases, accidents and violence using practical activities and, consequently, improve the management of infant care including assistance guidelines for education professionals and the referring criteria to health institutions.

The initial population of the present study consisted of 280 children between 4 and 29 months of age who were enrolled and regularly attended the nurseries of the eight selected day-care centres. The following children were excluded from the present study: three children who were not present during the field activities; five disabled children with chronic diseases (two with Down's syndrome, one with another genetic syndrome and two with cerebral palsy); and two children whose guardians did not agree to participate in the research or did not sign the terms of informed consent. Of the 270 remaining children at the beginning of the research, eighteen children were absent from the day-care centres during the monitoring period. Three other children were excluded only from the multivariate analysis due to a lack of data on the variables used. Therefore, 252 children were selected and studied in the univariate analysis and 249 children in the multivariate analysis, with sample losses of 10·0 % and 11·1 %, respectively, for each of the two statistical procedures.

This procedure provided a sample size required to detect a minimum intervention effect (OR = 1·17), when anaemia in exposed group children was compared with that of the control group children, with a statistical power of 80 % and a two-sided significance level (type 1 error) of 0·05. The present study could not be a blinded study because the day-care centres knew the training strategy. Thus, researchers were unable to prevent an intervention bias.

Assessments

A structured and pre-encoded questionnaire was used for the collection of individual data on the children, including demographic, clinical, epidemiological, socio-economic and environmental variables. In order to ensure uniformity in fieldwork procedures carried out by the interviewers, a manual of norms and definitions was created for the completion of this instrument[12].

Data collection was carried out in the day-care centres by means of interviews with the mothers or guardians, anthropometry and blood samples drawn from the children by digital puncture. All procedures were standardised and tested in the pre-test stage of the project by an interdisciplinary field team consisting of Universidade Federal de Sao Paulo health-care graduate students.

For the measurement of Hb levels, a portable Hb photometer (HemoCue Haemoglobin Photometer®) was used by the same researcher in the health assistance room at each day-care centre. That instrument is based on the photometric reading of blood utilising β-Hb microcuvettes. The HemoCue system, which provides results expressed in g/dl in 30–50 s without requiring calculations, is comparable to standard laboratory techniques for the measurement of Hb levels[13]. An Hb concentration of $<11{\cdot}0$ g/dl was considered to be diagnostic of anaemia[14].

The children were weighed on a digital paediatric scale, BP Baby model, Filizola® brand, a Brazilian manufacturer which sustains a quality international certification. This instrument has a minimum capacity of 125 g, a maximum of 15 kg and a height scale with markings every 0·5 cm up to 120 cm. The anthropometric procedures adopted are recommended internationally. *Z*-scores were used to quantify nutritional disorders. The benchmarks adopted for age and sex were those of the WHO as of 2006[15].

The completed questionnaires were evaluated in terms of their internal consistency before data entry. The information was transcribed into databases using double entry and posterior validation in order to correct errors. The statistical packages used were Epi Info™ 2000 (Centers for Disease Control and Prevention, Atlanta, GA, USA)[16] and the STATA statistical software package version 10·0 (StataCorp, College Station, TX, USA)[17].

Statistical analyses

To evaluate the effect of the proposed training, anaemia was chosen as an indicator of the change in the health status of the children, and the risk factors studied were based on the effects on anaemia identified in other studies of children in the same age group[18]. The criteria used to define the cut-off points in the dichotomous construction of variables complied with the values recognised and recommended by official entities or with the average value of the variables in the study sample[14,15].

Data consistency analysis was performed and univariate descriptive statistics were gathered. To quantify the random associations of continuous variables, a Student's t test or a Mann–Whitney test was used in accordance with the characteristics of the sample distribution and the homogeneity of variances identified by the Kolmogorov–Smirnov and Bartlett tests, respectively[19]. In the case of categorical variables, a corrected χ^2 test was used[20].

To adjust for the confounding variables obscuring the effect of training on the state of anaemia at the end of the monitoring period, multivariate analysis was performed in terms of OR estimates[21].

The selection criteria for the explanatory and control variables for the composition of the final logistic model were association with anaemia in the initial phase of the study (baseline) with $P < 0{\cdot}05$ and association with anaemia at the end of the study with $P < 0{\cdot}20$. A plausible effect on iron status during the monitoring period was reflected by the use of antibiotics and avoidable hospitalisation (morbidity indicators) and oral iron supplementation for a period of more than a month (indicator of treatment of anaemia and/or replenishment of iron supply).

A maximum level of $P = 0{\cdot}05$ was chosen to indicate a statistically significant association, in accordance with the planned sample design.

Ethical aspects

The present study was approved by the ethics and research committee of the Universidade Federal de Sao Paulo. Children with nutritional disorders, including anaemia, were referred to outpatient care in the Assistance Unit of Nutritional Specialty in the Department of Paediatrics of the same university. The teachers of the four non-exposed day-care centres received the same training as did those of the exposed day-care centres after the conclusion of the project.

Results

Table 1 presents the average and prevalence of the variables that characterised the children at baseline and compares the group of children assisted by trained teachers (exposed day-care centres) with the control group (non-exposed day-care centres).

Thus, the initial prevalence of anaemia in the group exposed to training was 34·7 % (95 % CI –26·4, 43·7) and in the non-exposed group it was 38·3 % (95 % CI 29·8, 47·3). A P value $>0{\cdot}05$ (in this case, $P = 0{\cdot}643$) does not indicate a statistical difference between the groups.

Table 2 presents the prevalence of anaemia at baseline and at the end of the study in children who did or did not exhibit the risk factors investigated, with their respective OR and 95 % CI.

Thus, it can be observed that children younger than 19 months old at the beginning of the study, who had a 3·48 times greater risk of exhibiting anaemia compared with children of the oldest age group ($P < 0{\cdot}001$), did not maintain their status as a risk group in the final phase of the study, their association having weakened during the monitoring period ($P = 0{\cdot}114$). The same holds for the interpretation of the other risk factors presented.

Table 1 Averages with their respective SD and prevalences with their respective 95 % CI of the characteristics of children in public and philanthropic day-care nurseries in a sub-district of the municipality of Sao Paulo in 2007 (baseline)

	Exposed nurseries			Non-exposed nurseries			
Characteristics (continuous variables)	*n*	Average	SD	*n*	Average	SD	*P* value
Age (months)	124	19·1	6·03	128	18·7	6·21	0·714*
Hb (g/dl)	124	11·34	1·45	128	11·29	1·33	0·767*
Per capita family income (R$)	122	221·57	144·79	127	204·39	139·02	0·157†
Exclusive breast-feeding (d)	119	84·10	60·80	126	82·57	53·14	0·983†
Maternal age (years)	124	27·64	6·71	128	28·27	6·46	0·444*
Weight at birth (kg)	124	3·17	0·49	128	3·12	0·59	0·452*
	Exposed nurseries			Non-exposed nurseries			
Characteristics (categorical variables)	*n*	Prevalence	95 % CI	*n*	Prevalence	95 % CI	*P* value‡
Anaemia	124	34·7	26·4, 43·7	128	38·3	29·8, 47·3	0·643
Exposure to day care <120 d	124	22·6	15·6, 31·0	128	13·3	7·9, 20·4	0·078
Male	124	53·2	44·1, 62·2	128	53·1	44·1, 62·0	0·912
Z-score indicator weight-for-age <−2	124	4·8	1·8, 10·2	128	3·9	1·3, 8·9	0·957

*Student's t test.
†Mann–Whitney test.
‡Corrected χ^2 test.

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Table 2 Prevalences and OR with their respective 95% CI for risk factors for anaemia among children in public and private day-care nurseries in a sub-district of the municipality of Sao Paulo, 2007 (at baseline and study endpoint)

		Prevalence of anaemia (baseline)				
Risk factors	*n*	%	*n*	OR	95% CI	*P* value
Age (months)						
<19	252	51·7	(60/116)	3·48	2·00, 5·96	<0·001
≥19		23·5	(32/136)	1·00	–	
Per capita family income <0·5 MW						
Yes	249	46·3	(50/108)	2·10	1·24, 3·55	0·008
No		29·1	(41/141)	1·00	–	
One or more siblings <3 years						
Yes	252	52·1	(25/48)	2·22	1·18, 4·20	0·019
No		32·8	(67/204)	1·00	–	
Maternal age						
<20 years	252	56·0	(14/25)	2·43	1·05, 5·61	0·056
≥20 years		34·4	(78/227)	1·00	–	
Weight at birth						
<2500 g	252	22·2	(6/27)	0·46	0·18, 1·19	0·155
≥2500 g		38·2	(86/225)	1·00	–	
Exposure to day care						
<120 d	252	46·7	(21/45)	1·68	0·87, 3·22	0·164
≥120 d		34·3	(71/207)	1·00	–	
Z-score indicator weight-for-height						
>2	252	57·1	(4/7)	2·38	0·52, 10·87	0·223*
≤2		35·9	(88/245)	1·00	–	
Gestation (weeks)						
<37	252	26·7	(8/30)	0·60	0·25, 1·40	0·322
≥37		37·8	(84/222)	1·00	–	
Z-score indicator weight-for-age						
<−2	252	45·5	(5/11)	1·48	0·44, 4·97	0·370*
≥−2		36·1	(87/241)	1·00	–	
Exclusive breast-feeding (months)						
<4	252	38·0	(62/163)	1·21	0·70, 2·07	0·586
≥4		33·7	(30/89)	1·00	–	
Maternal education (years)						
<4	252	44·4	(8/18)	1·43	0·54, 3·76	0·637
≥4		35·9	(84/234)	1·00	–	
Avoidable hospitalisation						
Yes	252	38·6	(34/88)	1·15	0·67, 1·97	0·706
No		35·4	(58/164)	1·00	–	
Sex						
Male	252	36·6	(49/134)	1·01	0·60, 1·68	0·912
Female		36·4	(43/118)	1·00	–	
		Prevalence of anaemia (end of study)				
	n	%	*n*	OR	95% CI	*P* value
Initial anaemia						
Yes	252	33·7	(31/92)	3·56	1·88, 6·73	<0·001
No		12·5	(20/160)	1·00	–	
Exposure to day care (baseline)						
<120 d	252	35·6	(16/45)	2·71	1·33, 5·52	0·009
≥120 d		16·9	(35/207)	1·00	–	
Sex						
Male	252	26·1	(35/134)	2·25	1·17, 4·33	0·020
Female		13·6	(16/118)	1·00	–	
Maternal age (baseline)						
<20 years	252	36·0	(9/25)	2·48	1·02, 5·99	0·071
≥20 years		18·5	(42/227)	1·00	–	
Use of oral iron supplements						
≥1 month	252	28·6	(18/63)	1·89	0·97, 3·67	0·085
<1 month		17·5	(33/189)	1·00	–	
Age (baseline)						
<19 months	252	25·0	(29/116)	1·73	0·93, 3·21	0·114
≥19 months		16·2	(22/136)	1·00	–	
Exposure to training						
No	252	24·2	(31/128)	1·66	0·89, 3·11	0·150
Yes		16·1	(20/124)	1·00	–	
Avoidable hospitalisation during monitoring						
Yes	252	11·1	(3/27)	0·46	0·13, 1·60	0·319
No		21·3	(48/225)	1·00	–	

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Table 2 *Continued*

		Prevalence of anaemia (end of study)				
	n	%	*n*	OR	95 % CI	*P* value
Use of antibiotics						
Yes	252	28·6	(2/7)	1·60	0·30, 8·50	0·431*
No		20·0	(49/245)	1·00	–	
One or more siblings <3 years						
Yes	252	25·0	(12/48)	1·41	0·67, 2·96	0·476
No		19·1	(39/204)	1·00	–	
Gestation						
<37 weeks	252	23·3	(7/30)	1·23	0·50, 3·05	0·836
≥37 weeks		19·8	(44/222)	1·00	–	
Per capita family income <0·5 MW						
Yes	249	20·4	(22/108)	1·03	0·55, 1·93	0·952
No		19·9	(28/141)	1·00	–	
Weight at birth						
<2500 g	252	18·5	(5/27)	0·88	0·32, 2·46	0·986
≥2500 g		20·4	(46/225)	1·00	–	

MW, minimum wage.
*Fischer's exact test.

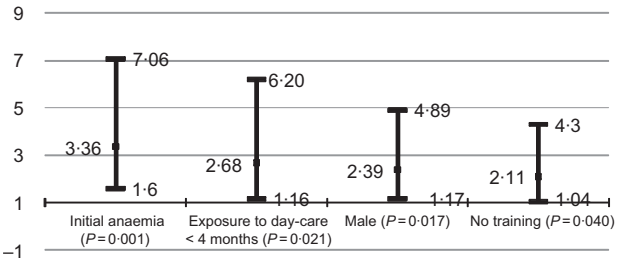

Fig. 2 Multiple logistic regression with OR and their respective 95 % CI for risk factors for anaemia (end of study) among children in public and philanthropic day-care centres in a sub-district of the municipality of Sao Paulo (*n* 249; $P = 0{\cdot}0002$)

Notably, children attending the day-care centres exposed to the treatment did not exhibit a statistically significant association with anaemia at the end of the study period ($P = 0{\cdot}150$) based on univariate analysis.

Figure 2 presents the multiple logistic model (multivariate analysis) for the risk factors for anaemia ($P = 0{\cdot}0002$), with the four OR of variables that exhibited statistically significant associations with anaemia in the final phase of the study and their respective CI, controlled for selected variables in the construction of the final model. This figure shows that anaemia in the initial phase, male sex, length of attendance at day-care of <4 months at baseline and lack of day-care centre exposure to the training programme are independent risks.

Discussion

Even though nutritional education may be considered a promising strategy for improving health within populations, studies that measure its impact on child health are not unanimous in terms of its actual effects, primarily when such educational actions seek to improve the quality of care offered by teachers to children in day-care centres[4].

The effectiveness of this type of health promotion strategy is the result of multiple factors: content offered in training, the way the lessons are conducted, interest among participants, incorporation of information, understanding of the importance of the topic discussed, difficulties in applying the acquired knowledge in practice, motivation to modify pre-established routines and the current sociocultural context[22]. In the CrechEficiente Project, the education trial showed a statistically ($P = 0{\cdot}009$) significant improvement in infant feeding knowledge for the exposed group when compared with the concomitant non-exposed group[23].

The selection of anaemia as an indicator of change in the status of child health employed in the present study to evaluate the effect of the proposed training is based on children's susceptibility to variation in iron levels within the first years of life. This particular nutritional deficiency has been used as an indicator of child health due to its high prevalence in the paediatric age group, multifactorial detection characteristics and demonstrated association with other health indicators in diverse studies, including premature weaning, malnutrition and a higher incidence of bacterial infections[18,24].

Children in the control group of day-care centres, who were cared for by educators who did not receive the experimental training, presented two times the risk of having anaemia at the end of the study period compared with the children whose educators completed the training.

This finding gains greater validity due to the inclusion of explanatory factors with the potential to influence anaemia status in the multivariate analysis, providing the broad perspective necessary for events that are triggered by multiple risk factors[18,21]. As such, the effect was shown to be statistically significant when controlling for the other ten variables in the multifactorial model, including previous anaemia status. Furthermore, the exposed and non-exposed day-care centres were similar in the initial phase of the study in terms of biological,

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environmental and socio-economic characteristics of the children represented in the present study and in terms of the demographic, socio-economic and professional characteristics of the educators according to a parallel study performed with this group, suggesting that the randomisation procedure worked adequately[23].

Therefore, the training programme tested in the present study indirectly protected children from developing anaemia at the end of the study. However, due to the multifactorial nature of the data, it is worth pointing out that the analysis of the training effect did not consider absenteeism among the children during the monitoring period. Thus, quantification of the time (number of days present at the day-care centre) that the children were under the care of the educators in both groups was not possible and, consequently, the possibility of differential care exists.

At the same time, children who had been attending a particular day-care centre for <4 months at the beginning of the study, when compared with other children, exhibited a greater risk of having anaemia at the end of the study, regardless of the group to which their day-care centre was assigned. This finding reinforces the potential of these public and philanthropic institutions to contribute to the improvement of the health of children of low socio-economic status, possibly by offering more adequate conditions than their homes, which usually lack the human resources and materials necessary to supply the nutritional–hygienic necessities of early childhood and to guarantee adequate child development[25].

Moreover, boys exhibited a higher risk of anaemia compared with girls. Such a finding is rare in the literature, yet some studies that have identified this risk factor have suggested that a greater prevalence of anaemia among boys could be explained by their faster development compared with girls, leading to a greater need for iron in the body[26].

It is worth noting that even though the study design was a randomised, institutional, clinical trial, it included day-care centres that were selected under operational ease/convenience criteria with a large number of teachers and located in poor but in more safe areas. Consequently, the results of the present study may not be generalised to day-care units with a small staff and located in less safe areas and the group of children is not probabilistically representative of the population of children who attend Brazilian day-care centres.

Likewise, the group of teachers who completed the educational intervention may not fully represent the teachers in the national educational network of day-care centres. Therefore, the external validity or possibility of generalisation of the results to day-care centres that function in other contexts must be considered with caution.

However, the importance of a health education strategy for professionals who educate and care for small children in day-care centres in developing countries is emphasised because these caregivers do not normally receive healthcare guidance as part of their regular training. Instead, they use knowledge and practices based on common sense, acquired day-to-day through their own experiences, which are often misguided, potentially undermining the provision of care and leading to the onset of nutritional disorders and infections[26,27].

Thus, inadequately prepared professionals are highly susceptible to flaws in their caregiving routines that can be corrected easily and effectively through training, significantly improving the quality of the service they provide[2]. Training these professionals may be the best opportunity to improve their interactions with children in day-care nurseries, which are considered the key component of quality care[28]. Parents, day-care centre managers and health professionals believe that health promotion and education programmes directed at children's caregivers can improve children's health[29].

In addition, economic investment in this type of educational intervention appears to lead to a better cost–benefit relationship compared with other health-care strategies. In a study conducted in Bolivia, the authors estimated a benefit of US$1·38–2·38 for every dollar invested in child health programmes[3].

More specifically, it is estimated that investment in programmes to control anaemia among children, which certainly affects their cognitive abilities, could provide an increase of 13–25% of the value of their future salaries as adults, improving their chances of survival and social inclusion[3].

Even within a short period (7 months), the assessed training programme promoted significant changes in the health status of the children based on the indicator used, which is important considering the consequences of anaemia in the long term[6,7]. Therefore, the findings evidenced in the present study, in concordance with those of other experiments, reinforce the importance of establishing policies for nutritional education as a strategy for improving child health, even in day-care centres with few resources and diverse demands[3,30].

In this context, it seems plausible to conclude that the effect of training in this institutional clinical trial is a valid indicator of the improvement of care offered by the participating educators. Such an educational intervention can be reproduced in day-care centres in poor communities of low socio-economic status to overcome possible barriers to the learning process and, consequently, to minimise the existing gap between the preparation and administration of this training programme and the effective change in the caregivers' actions.

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and sampling strategy, and participated in the data interpretation and analysis. M.N.O. participated in the process of selecting the survey instrument and collaborated in the data collection. D.P. collaborated in the study conception. F.A.B.C. participated in the data analysis and interpretation. All authors approved the contents of the manuscript. The authors thank the principals and teachers of the day-care centres for their participation in training, assistance in the process of obtaining the informed consent and in data collection. The authors also express their appreciation to Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) for funding the research project.

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