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Impact of the application of neurolinguistic programming to mothers of children enrolled in a day care center of a shantytown

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ABSTRACT

Context: Of the members of a family, the mother is without doubt the most important one, which provides justification for including an evaluation of her mental health as one of the variables to be considered as determining factors in each child's level of development.

Objective: To assess the impact of the application of Neurolinguistic Programming (NLP) on child development, home environment and maternal mental health.

Design: Randomised controlled trial.

Setting: The study included children enrolled in the municipal day care center of a shantytown in the City of São Paulo.

Participants: 45 pairs of mothers and respective children between 18 and 36 months of age.

Main measurements: Children's development (Bayley scales); home environment variation (HOME); and maternal mental health (SRQ). Comparison between before and after the intervention was made in terms of children's psychomotor development, home environment and maternal mental health.

Intervention: Application of the NLP technique to the experimental group and comparison with a control group. 1 - Experimental (EG), consisting of 23 children submitted to intervention by NLP; and 2 - Control (CG), with 22 children with no intervention. Length of intervention: 15 sessions of NLP.

Results: 37 children remained in the study (EG = 10, CG = 27). Variations in mental development (OR 1.21, IC 95% 0.0 to 23.08) in their home environment (Wilcoxon): p = 0.96 (before) and p = 0.09 (after); in maternal mental health: p = 0.26, 2 df.

Conclusions: There was a trend that indicated positive effects on the home environment from the intervention.

Key Words: Day care center. Child development. Home environment. Mother's mental health.

INTRODUCTION

In recent decades, demographic and socioeconomic transformations, such as population growth, changes in the composition of the work force, industrialization and migration from rural to urban areas have radically altered the structure and functions of families and the types of social services that they require. Among the changes, there are the greater participation of women in the work force and the increasing proportion of families headed by women. Among the principal consequences of these transformations, there have been changes in the type of care received by children as well as an increasing need for day care services.[1]

In Brazil, a comparison of data for 1920 and 1990 shows that there was a considerable increase in the proportion of women belonging to the so-called economically active population (EAP) in this period. While 15.3% of this population consisted of women in 1920, this share had grown to 35.5% by 1990. According to current estimates, 23 million Brazilian women work outside the home and the number of families headed by women increased from 13% in 1970 to 20.3% in 1990.[2]

This significant increase in the participation of women in the workplace has resulted in a greater need for day care services for children under 6 years

of age. In spite of this, estimates suggest that at the beginning of the 1980's, only 10% of all children in this age group were provided with day care. In 1995, the National Residency Sample Survey, which was performed in 10 metropolitan regions, revealed that 23.2% of the children from 0 - 6 years of age were attending day care or preschool services, with 56.5% of them enrolled in private institutions.[3]

In recent decades, there has been a growth in the volume of research assessing the role of day care services in the biological, psychological and social health of children. The majority of studies on the subject have focused on the effects of this type of institution on the emotional, social and intellectual development of children.

Generally speaking, the studies suggest that there is no difference between the emotional and social development of children who receive day care and those who stay at home, as long as the day care service is of good quality and the families offer reasonable levels of attention to the children. Regarding intellectual development, day care attention seems to act as a protecting factor for children from lower socioeconomic level families who are at higher social risk.[4-8]

Some other researchers found different results regarding the impact of day care services on the children's lives. Anderson[9] states that children provided with day care are more sociable, more popular and deal with peers better than those raised mainly at home. According to Field[10] and Howes,[11] however, this beneficial effect of day care on the sociability and friendliness with peers seems to be true only when *good quality* care is offered.

On the other hand, additional studies have provided data showing that children attending day care are more aggressive towards their peers and less obedient towards teachers and parents at older ages.[12,13] These same negative effects, however, are not reported by many other studies, and the level of aggressiveness is not extreme. At the levels presented, the aggressiveness can be interpreted as positive, as done by Clarke-Stewart,[14] who sees it as a sign that the child is improving the ability to think by itself, is becoming more independent and more assertive.

Some current studies further indicate that the positive as well as the negative impacts are greater in children that enroll in day care services during the first year of life.[15]

The conflicting conclusions of the most recent studies have lead to the realization, therefore, that a great controversy has been established, with many non-systematic revisions[4-6,8,16] having been undertaken. Thus, there is no overall consensus to the question, as these studies present great variation and methodological flaws.

One point, however, is well established: all of the effects of day care on the lives of children are directly related to *the quality of the services offered*. The relation between quality of care and social and cognitive development is well established. A series of tests of child development has verified that children who receive high quality care present better results than those that receive lower quality care.[1]

There are also other areas of research in the medical literature. One of them deals with the role of day care in the lives of children from populations of low socioeconomic level: in the light of the higher risks these children are exposed to, both regarding their delays in intellectual development and their higher rates of malnutrition, morbidity and mortality, day care services have been considered as protective institutions.[1]

Considering the question of the macro-environment, it is important to emphasize that when speaking of children, it has to be remembered that the context within which they are placed begins with the family unit, which, in its turn, exists within the community in which they live. But the family always represents the first social nucleus into which the child is inserted. That is why it is necessary to emphasize the importance of parents and family as basic elements in children's emotional balance and source of appropriate assistance, without neglecting the provision of guidance and help needed for parents to be able to adequately play their roles in their children's education.[17]

Of the members of a family, the mother is without doubt the most important one, which provides justification for including an evaluation of her mental health as one of the variables to be considered as determining factors in each child's level of development.[18]

Insofar as the gains obtained by the child through day care might be jeopardized by a detrimental family environment, targeting intervention at the mothers of children enrolled in day care services is plainly justified.

The model of intervention chosen for this study was that of Neurolinguistic Programming (NLP).

METHODS

Fourty-five mother/child pairs were invited to participate. The children constituted the total number of 18 to 36 month-olds enrolled in the chosen day care center, at the time of study. Among the 45 mothers, 23 were randomly selected to undergo NLP, forming the experimental group (EG) and the remaining 22 formed the control group (CG). Of the 23 invited mothers, 10 participated in the 15 NLP meetings, which were held from December 1996 to December 1997.

The effects of the application of NLP to the mothers were evaluated before and 9 months after the onset of the intervention by means of the following measurement instruments applied to both groups, the experimental group (EG) and the control group (CG):

1) In the children, the variation in their development, using Bayley scales;
2) In the mothers, the variation in their mental health, using a socioeconomic evaluation questionnaire, the *"Self Report Questionnaire"* (SRQ); and
3) In the families, the variations in the home environment, using the "*Home Observation for Measurement of the Environment"* (HOME) assessment.

The analysis for obtaining measurement of the impact of intervention used the comparison of before and after findings regarding those children (and their mothers) that presented delay in neurological or psychological or motor development before the application of NLP, in both groups (EG and CG).

The intervention consisted of the application of the NLP technique, which aims to "*make people able to obtain the best possible results in whatever they do".* NLP has been widely used in the educational and professional fields to create a more efficient level of communication, as well as to improve personal development and speed up learning.

In the present study, the technique was applied to the mothers with the objective of raising their awareness of the need to participate more positively in their children's development as well as simultaneously preserving and increasing the gains the children had been obtaining at day care during their enrollment. The topics included in the program were: self-esteem, communication, parent/child relationships, internal and external interpersonal relationships.

These topics were developed at 15 meetings, during the year 1997, always on Sundays, as those were the only days available to the mothers who worked outside the home.

Focus Group. This is a qualitative research method which has as its objective a group discussion on a given subject.[20,21] There is a pre-established itinerary to guide the meeting, but the discussion is open, precisely to allow the group's ideas to come out spontaneously. The utilization of a qualitative research method such as focus groups is justified by the fact that it is a source of information complementary to the quantitative research.

Socioeconomic Evaluation. The questionnaire includes, as the name suggests, economic topics (per capita income) and social aspects of the family.

Evaluation of the home environment. With an average duration of 30 minutes, the inventory method used was the one which specifically evaluates children from 0 to 3 years of age (there are other specific HOME inventories for evaluating pre-school and 6 to 10 year old children). The items of the inventory are graded "yes or no", aiming at greater objectivity. The mother/child pair only receives positive grades from observations made during the interview.

The HOME method consists of four clearly defined areas to evaluate the quality of child development:

1) *Child's outings*: when the child makes contact with the outside environment and with other people;
2) *Available toys*: assessing how adequate the child's toys are for the purpose of stimulation;
3) *Family routine*: measuring the quality of the mother's relationship with her child;
4) *Discipline*: verifying how rigid or flexible the

parents are in establishing discipline.

In addition to these topics, there are also items related to the physical environment.

In order to make it more preceptive, with better applicability, the HOME inventory was divided into 6 sections encompassing the 4 areas that were to be evaluated:

1) *Emotional and verbal responsiveness*: evaluating the attention given by the mother to her child, by way of answering questions, offering tenderness, and praising, among others;
2) *Acceptance*: this topic is related to the absence of maternal aggression towards the child, i.e. to what extent the mother is not impatient, irritable or aggressive towards her child;
3) *Organization*: relating to aspects of the physical and temporal environments of the child: a) how much the mother offers a secure and organized environment to the child, with health care; and b) how much the mother is concerned with her child's social relationships;
4) *Availability of toys*: evaluating the availability of toys that are adequate for the child's age group and how much the mother gets involved in playing with her child;
5) *Maternal Involvement*: observing the pair to verify how much the mother stimulates her child with attitudes and games that promote adequate development;
6) *Variation of daily stimulation*: complementary to the other topics, including questions such as the father's participation in the child's care, the family getting together at meal times, the value placed on story-telling and the child's contact with relatives.

Maternal Mental Health. The *SRQ-20 (Self-Report Questionnaire)* is a screening mechanism recommended by the World Health Organization for the identification of psychiatric non-psychotic disturbances in the community.[23] This is done by applying 20 questions with "yes or no" answers and it focuses on symptoms present during the last 30 days. Mari and Williams[24] validated its Portuguese version for Brazil. For the present study, a 7/8 cut score (sensitivity of 89% and specificity of 81% for Brazilian women) was used, as recommended by Mari and Williams.[25]

Child Development. Bayley (1993) published *The Bayley Scales of Infant Development - Second Edition* (BSID-II), a revision of the scales published in 1969, for the evaluation of child development between the ages of 1 - 42 months. The revised edition includes new behavior patterns for evaluating children according to recent findings regarding children's capabilities and also for special populations, such as the premature, HIV positive and autistic. The original subdivision was maintained: motor scale, mental scale and record of child behavior. The motor scale evaluates mainly the quality of movements, and sensorial and perceptual-motor integration. The mental scale evaluates cognitive aspects, the motor abilities involved in the solution of problems, language and abilities for social interaction. The record of child behavior evaluates the child's orientation and participation in relation to the environment, with the tasks and with the examiner, as well as the child's emotional organization and the quality of the movements performed. It works as a tool for facilitating the evaluation of the two scales used, providing a more qualitative view of the child, in the form of clinical observation.[26]

RESULTS

Prior to the NLP intervention, all the 45 children were evaluated, as well as their mothers and home environments.

Nine months after the onset of the intervention, the 37 remaining children and their families were re-evaluated. Only these children could be subjected to comparison, as the other 8 children had left the day care service.

It is important to note that even before the re-evaluation of each mother/child/home environment set, it was known that between the first and second evaluation important changes had gone into effect in the day care facility which could possibly have interfered in the proposed measurements. The changes occurred both in the

administrative and technical areas of the service and were, as with NLP, aimed towards the overall improvement of the children.

For the purpose of statistical analyses of maternal mental health and home environment, the 37 children considered were those that underwent both evaluations (10 in EG and 27 in CG). To evaluate the impact of the intervention on the children, 9 of them, who had already shown normal mental development at the first evaluation, were excluded. Thus, for the analyses of the child development component, 27 children remained, 8 in EG and 19 in CG.

Focus groups

The first focus group described, briefly, how some of the women who lived in the shantytown evaluated their own way of life. The negative aspects were: discrimination suffered from people not living in the shantytown, violence as much from drug dealers (residents in the shantytown) as from police, lack of citizen's rights and instability of their homes. The only positive characteristic stated was the fact that they did not pay rent.

The second focus group considered parents' evaluation of NLP and resulted in their becoming aware of the need to seek improvement in the quality of their lives. The result also showed that the group was interested in facing personal questions such as self-esteem, family ones such as relationships between couples, as well as the process of raising their children. On the other hand, the group presented difficulties in understanding the contents of the NLP course as well as problems in attending the meetings.

Finally, it can be concluded that NLP as applied to this group seems to have led to positive results for a portion of the participants. This is evident both in the participants' comments and in the fact that only 10 of the 23 mothers who were invited attended the NLP meetings.

Socio-demographic characteristics

Table 1 shows that there are no significant differences in per capita income between the two groups, therefore making it practicable to compare one to the other in relation to the other variables.

Table 2 shows that there are no significant differences in the level of schooling between the mothers of the two groups, therefore making it practicable to compare one to the other in relation to the other variables.

Child development test

One of the 37 children refused to undergo the test and was excluded from the sample in the child development evaluation.

To assess the efficacy of the intervention, the data were analyzed as a function of mental development, because of its greater importance and the fact that there is a reasonable overlap with motor development.

Table 3 shows that there are no significant differences in the mental development between the children of the two groups. They were therefore equivalent before the intervention, making it practicable to compare one to the other in relation to the possible effects of intervention.

The results in relation to the Bayley scales were as follows:

Mental development - Before the intervention, 9 children (25%) presented normal levels, 9 children (25%) presented moderate delay and 18 (50%) showed significant delay. After intervention, 28 children (77.8%) presented normal development, 8 children (22.2%) showed moderate delay and none of them presented significant delay (Table 4).

Motor development - Before the intervention, 20 children (55.6%) presented normal development, 3 (8.3%) had accelerated performance (also

Table 1 - Comparison of per capita income between the experimental and control groups (n = 37)

Group	Mean	Standard deviation	p
Experimental	81.04	56.80	0.70
Control	91.22	76.08	

Table 2 - Comparison of maternal education level between the experimental and control groups (n = 37)

Group	Mean	Standard deviation	p
Experimental	2.90	2.38	0.82
Control	2.71	2.19	

considered normal, since the tasks were done in less time) and 13 (36.1%) showed moderate delay. After the intervention, 23 children (63.9%) showed normal results and there were none with development delay that could be considered significant or moderate. On the contrary, 13 children (36.1%) demonstrated accelerated performance.

Table 4 shows that the majority of the children from both groups presented improvement in mental development. When the two groups are compared using the Odds Ratio, the following result is found: OR = 1.21 (CI 95%: 0.0 to 23.08) (Exact Fisher's Test: p = 0.669). This result shows that there was no significant difference between the two groups.

Home environment

The children's home environment was evaluated by means of visits with the application of the HOME inventory. As described previously, the HOME inventory is divided into 6 sub-items.

The assessment of the HOME scores was performed by statistical analysis based on posts rather than the scores, since it was performed on data with non-parametric distribution (Tables 5 and 6).

Table 5 shows that before the intervention, the two groups (EG and CG) were practically identical and that afterwards there was positive differentiation due to an increase in the overall EG score, a difference that is nonetheless marginally significant, statistically speaking. The sub-items that presented greatest significance in the EG were acceptance and maternal involvement.

Maternal Mental Health

Table 6 shows that when the maternal mental health presented before the intervention is compared to mental health after one year, none of the EG mothers got worse while 6 CG (22.2%) did. Two EG mothers (20.0%) showed improvement and 4 (14.8%) of the CG had the same result. Eight EG mothers (80.0%) and 17 CG mothers (63.0%) did not show any change. The differences between the two groups did not reach statistical significance (p = 0.26 with 2 d.f.)

DISCUSSION

Starting from the premise that day care centers are possibly the best place to introduce interventions intended to improve the development of pre-school children from low income families, the authors analyzed the results before and after the application of NLP in mothers of children enrolled at the AGF Jr. Day Care Center, in a shantytown in the suburbs of the City of São Paulo, State of São Paulo, Brazil.

The first important result was that more than 70% of the children presented some sort of delay in neurological, psychological or motor development at the initial evaluation. The improvement in mental

Table 3 - Comparison of mental development in the experimental and control groups before the intervention (n = 27)

	Experimental group		Control group		p-value
Development	n	%	n	%	
Normal	2	20.0	8	29.6	0.675
Moderate delay	3	30.0	6	22.2	0.741
Significant delay	5	50.0	13	48.1	0.854

Table 4 - Comparison of levels of improvement in mental development in the experimental and control groups before and after the intervention (n = 27)

	Experimental group		Control group		Total
Improvement in development	n	%	n	%	
Not improved	1	12.5	2	10.5	3
Improved	7	87.5	17	89.5	24
Total	**8**	**100.0**	**19**	**100.0**	**27**

development of most of the children detected after the intervention should be attributed to other factors, since there was no significant difference in the degree of improvement between the EG and the CG.

Regarding the home environment, both groups were practically identical before the intervention, and there was positive differentiation after the intervention, due to the increase in the overall score of the experimental group, although, statistically, the difference observed was only marginally significant. The sub-items that presented greatest differentiation in the EG were acceptance and maternal involvement. The improvement in these items may be associated with the application of NLP to the parents, as it does not depend on other factors linked to an increase in purchasing power, for example the availability of toys.

Regarding maternal mental health before and one year after the intervention, there was a trend towards improvement in the EG when compared to the CG, but without reaching statistical significance.

The small size of the sample limits the possible conclusions that can be drawn from the investigation. Furthermore, only 10 of the 23 mothers invited to participate in the EG accepted becoming involved, while those that refused were included in the CG, which could be considered as a bias in the analysis of the results.

There are studies, such as the "Head Start" project in the United States, that emphasize the importance of stimulation for children from low income families in the pre-school period, so that they may have a better performance in their future schooling and even in their professional life.[27]

Rossetti-Ferreira et al have reported that, starting from the proposition that "day care centers educationally equip the child; they are the child's right and a duty of the State and family", it is necessary to organize the environment at day care services so that they will respect the specific characteristics of each group of children. This necessity to optimize the day care services should include raising parents' level of awareness.[28]

Berghout et al,[29] when examining 77 children aged 3.9 to 6.1 years, studied the children's degrees of satisfaction regarding their child care providers and reported that the children living under more stressful conditions had a more negative perception of their educators. Children who were considered as more hostile and less sociable, and whose mothers came from lower socioeconomic levels, also had more negative opinions about their interaction with educators. Parents with higher levels of schooling are more capable of preparing their children for the day care experience. In this context, it seems important to provide less-educated parents with the conditions both to strengthen their own bond with their children and their children's with the day care service.

Caruso,[30] in a study that included 54 one-year-olds in the United States, suggested that questions involving children in day care services should be analyzed within the wider context of family

Table 5 - Average post and p-value of the HOME scores, according to Wilcoxon's test before and one year after NLP intervention in the experimental and control groups (n = 37)

NLP	Group	Average post	corrected p
BEFORE	Experimental	18.65	
	Control	18.44	0.96
AFTER	Experimental	24.00	
	Control	17.15	0.09

Table 6 - Change in maternal mental health (positive SRQ = emotional disturbance and negative SRQ = no disturbance) measured by SRQ before and one year after the intervention in the experimental and control groups (n = 37)

	EG		CG			
Maternal mental health	n	%	n	%	d.f.	p-value
Mothers with negative SRQ that became positive	0	0.0	6	22.2		
Mothers that remained the same	8	80.0	17	63.0	2	0.26
Mothers with positive SRQ that became negative	2	20.0	4	14.8		

processes. This emphasizes the importance of working with parents of children enrolled in day care services.

Ramey et al,[31] in a study performed in 1984 in the United States to assess intervention for preventing development delay in 121 children from poor families, observed a lower average HOME score than that found among middle class families. A similar result was obtained by the same authors in a study made in the US in 1975.[32] The results obtained in the present study regarding the application of the HOME inventory in poor families coincide with those from both of Ramey's studies. Ramey's findings also reinforce the importance of interventions such as the one used in this study for poor families with the objective of improving the family environment.

The high rate of mental morbidity found in the mothers of the sample (28.9%) is in agreement with Miranda et al,[33] who found a morbidity rate of 63% in mothers of malnourished children and of 38% in mothers of healthy children, in a study investigating the association between maternal mental health and children's malnutrition, performed in a municipality in the São Paulo metropolitan region with a sample of 105 mothers.

In another study, Miranda et al[18] demonstrated an association between maternal mental health and mother/child interaction. In the present study, the possible improvement in maternal mental health detected after the intervention of NLP could have positively influenced the mother/child interaction, and consequently the home environment.

A lengthier follow-up would be necessary to detect whether this improvement in home environment is durable and whether it would have positive effects on the children's development.

The very high percentage of delay in development observed at the initial evaluation indicates the necessity for further studies on psychological and motor development in other day care services for low income populations, in order to verify whether similar values are generally found throughout low income day care populations. The data suggest that NLP applied to the parents might have had a positive influence on the home environment. Other studies with larger samples are needed to confirm this possibility as well as to evaluate the repercussions of applying NLP to parents and its effects on the development of their children enrolled in day care services.

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RESUMO

Contexto: Entre os componentes do grupo familiar, sem dúvida a mãe é o mais importante, justificando-se por isso uma avaliação de sua saúde mental enquanto uma das variáveis a ser considerada dentre os fatores que determinam o nível de desenvolvimento da criança. **Objetivo:** Avaliar o impacto no desenvolvimento infantil, ambiente familiar e saúde mental materna da aplicação da Programação Neurolingüística (PNL) nos pais, em creche de favela de São Paulo. **Tipo de estudo:** ensaio clínico randomizado. **Local:** Creche municipal em favela de São Paulo. **Amostra:** 45 mães e suas crianças de 18 a 36 meses. **Variáveis estudadas:** desenvolvimento psicomotor infantil, ambiente familiar e saúde mental materna. Desenvolvimento infantil: Escalas Bayley, ambiente familiar: HOME, saúde mental materna: SRQ. **Intervenção:** PNL: 15 sessões. Experimental (GE); 23 crianças, intervenção pelo PNL e controle (GC); 22 crianças sem intervenção. **Resultados:** 37 crianças remanescentes (GE = 10, GC = 27): Variações no desenvolvimento mental (OR = 1,21 – IC 95% 0,0 – 23,08); no ambiente familiar (Wilcoxon): antes p = 0,96; após p = 0,09; na saúde mental materna: p = 0,26, 2 g.l. **Conclusões:** Existe tendência mostrando efeito positivo da intervenção no ambiente familiar.