A RANDOMIZED FIELD TRIAL OF ACINDES: A CHILD-CENTERED TRAINING MODEL FOR CHILDREN WITH CHRONIC ILLNESSES (ASTHMA AND EPILEPSY)

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ABSTRACT A randomized field trial of a child-centered model of training for self-management of chronic illnesses was conducted of 355 Spanish-speaking school-aged children, between 6 and 15 years old, with moderate to severe asthma and epilepsy, in Buenos Aires, Argentina. The model, based on play techniques, consists of five weekly meetings of 8–10 families, with children's and parents' groups held simultaneously, coordinated by specially trained teachers and outside the hospital environment. Children are trained to assume a leading role in the management of their health; parents learn to be facilitators; and physicians provide guidance, acting as counselors. Group activities include games, drawings, stories, videos, and role-playing. Children and parents were interviewed at home before the program and 6 and 12 months after the program, and medical and school records were monitored for emergency and routine visits, hospitalizations, and school absenteeism. In asthma and epilepsy, children in the experiment showed significant improvements in knowledge, beliefs, attitudes, and behaviors compared to controls (probability of experimental gain over controls = .69 for epilepsy and .56 for asthma, with $\sigma^2 = .007$ and .016, respectively). Parent participants in the experiment had improved knowledge of asthma (39% before vs. 58% after) and epilepsy (22% before vs. 56% after), with a probability of gain = .62 ($\sigma^2 = .0026$) with respect to the control group. Similar positive outcomes were found in fears of child death (experimental 39% before vs. 4% after for asthma, 69% before vs. 30% after for epilepsy), as well as in disruption of family life and patient-physician relationship, while controls showed no change. Regarding clinical variables, for both asthma and epilepsy, children in the experimental group had significantly fewer crises than the controls after the groups ($P = .036$ and $P = .026$). Visits to

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physicians showed a significant decrease for those with asthma ($P = .048$), and emergency visits decreased for those with epilepsy ($P = .046$).

An 18-item Children Health Locus of Control Scale (CHLCS) showed a significant increase in internality in experimental group children with asthma and epilepsy ($P < .01$), while controls did not change or performed worse 12 months after the program. School absenteeism was reduced significantly for those with asthma and epilepsy (for the group with asthma, fall/winter $P = .006$, and spring $P = .029$; for the group with epilepsy, $P = .011$).

Conclusion. The program was successful in improving the health, activity, and quality of life of children with asthma and epilepsy. The data suggested that an autonomous (Piagetian) model of training is a key to this success, reinforcing children's autonomous decision making.

KEY WORDS Asthma, Children, Chronic illnesses, Diabetes, Self-help, Training.

Chronic physical conditions (such as asthma, epilepsy, and diabetes) have increasing importance in health care.¹⁻³ In the US, for example, the three conditions together affect at least 3,747,000 children and adolescents under 18 years old (85% with asthma, 10.9% with epilepsy, and 4.1% with diabetes).⁴ Asthma is considered the principal cause of school absenteeism due to chronic physical conditions, and all three are the cause of a large number of emergency visits,⁵ with negative effects on family dynamics and children's well-being,⁶ which is of concern especially when the current medical treatment possibilities are so promising.^{7,8}

For asthma, the growing concern about the increase in morbidity and mortality,^{9,10} despite the availability of promising therapeutic tools, spawned the development of several educational and self-help programs.¹¹⁻¹⁶ However, for other chronic problems such as epilepsy, the efforts aimed at improving outcome through self-management and child autonomy are only just beginning.¹⁷

Most programs developed to date are "disease specific." Interest has been mounting in studies directed toward chronic illness as a whole.¹⁷ However, most programs are located in medical centers. We do not know of any training program with a common methodology for chronic conditions. In an attempt to fill this need, we developed a self-management training model for Spanish-speaking children 6 to 15 years old with asthma and epilepsy.

THEORETICAL RATIONALE

The program is based on the hypothesis that, by learning about the alternatives from which they can choose, children acquire tools to build an autonomous model of behavior that is in agreement with their health-expected values. This requires placing the children in the center and recognizing their leading role in the management of their own health.

This hypothesis is complemented by the notion that this child-centered training is reinforced if parents also learn to recognize and accept their children's autonomy, becoming "facilitators" rather than managers. In this model, the physician plays a consultant role, offering alternatives and specific therapeutic guidance.

The work of Piaget and others leads to the conclusion that "knowledge is actively constructed by the individual," in contrast to the conception that knowledge simply is transmitted culturally.¹⁸

For our research, most important was the recognition that children's responses to illness are not only emotional, but also cognitive.¹⁹

The second main idea of Piaget's work is that the process central to the construction of knowledge is self-regulation.²⁰

Piaget describes two types of adult-child relationship: (1) heteronomous (regulation by others) and (2) autonomous (cooperative). In the heteronomous relationship, the adult unilaterally prescribes what the child must do. The reason to follow these rules is therefore external to the child's own reasoning. Piaget warned that this coercion socializes only the surface of behavior and actually reinforces the child's tendency to rely on purely external regulation. In terms of affective development, coercion can produce feelings of inferiority, low motivation, and lack of confidence. In addition, it generates three responses: (1) resistance, (2) mindless conformity, and (3) calculation (follow rules only under adult surveillance). In chronic illnesses, this leads to known problems of poor adherence and patient-physician dependency. The autonomous relationship is characterized by mutual respect and cooperation and promotes the child's autonomy (self-regulation).

The results of other learning theories applied to health^{21,22} are consistent with Piaget's observations. Social learning theory, for example, explains that negative experiences over which there is little control lead to the development of high beliefs in external control (chance, powerful others) and low beliefs in internal control.²³ As pointed out by Bandura, those who believe they cannot exercise any control over their health outcomes "see little point in even trying."²⁴

One would expect that, after a successful program, participants would change their beliefs and attitudes about their ability to look after themselves, and that this would lead to significant changes in prevention behaviors. This would translate into measurable and stable changes in functional and clinical variables, with considerable benefit for the well-being and functioning of the children, their families, and those who look after them.

To corroborate this hypothesis, we assessed, in psychometric as well as clinical and functional variables, the impact of this model of child-centered group train-

ing. For this purpose, we developed a randomized field trial for children with asthma and epilepsy.

METHODS

PROGRAM MODEL

The model is based on the idea of children's autonomy: They are trained to assume a leading role in the management of their own health. The child is in the center; parents learn to be facilitators, and physicians provide guidance, acting as counselors. Other children in the group provide the necessary peer support. Teachers (not doctors) coordinate the group activities. This training model is designed to be applied in institutions such as schools or community centers, which are more appropriate for learning than hospitals or clinics.

Structure. The program consists of five weekly 2-hour meetings for each group, followed by a reinforcement meeting 2 to 6 months later. In these meetings, children and parents (1) learn about the child's condition (asthma, epilepsy) and identify body signals and early warning signs; (2) recognize the elements of equilibrium (maintaining balance, avoiding imbalance) and identify their own triggers; (3) understand treatment, therapeutic alternatives, and the usefulness of a direct patient-physician relationship; (4) handle specific risk situations (identify risks and learn strategies to handle them, including emergency home treatments; and (5) develop appropriate decision-making strategies based on the child's own expected values.

It is expected that, by the end of the program, the children will acquire self-management skills and achieve self-reliance and appropriate preventive strategies, thereby improving their social functioning and quality of life.

The children in the experimental groups were organized according to age bracket (6–8, 9–12, 13–15 years), with a maximum of 10 children per teacher and a maximum of three simultaneous meetings. The majority of the groups included children between 7 and 12 years of age. Parents were placed together in one group, which was coordinated by one or two teachers. Children and parents in the control group were given the same evaluations as those in the experimental group, but received only routine care without additional training.

Group activities of the model include games, drawings, stories, videos, and role playing. They are designed to develop

1. Observation, discrimination, and communication skills²⁵
2. Autonomous decision-making skills, with the children working through

decision trees and conditional probabilities of events to learn to assess which road is best to reach their expected health management goal

3. An appropriate, simplified communication code based on the colors of traffic lights, modified from Lewis et al.,²⁶ to relate body signals, triggers, treatments, decisions, and health states

Parents work with similar concepts, but with the goal of learning to trust their children; the parents develop the necessary tools to become facilitators, instead of managers.

A teacher's coordination manual was developed with general and specific objectives for each session. Games and activities are planned specifically to cover the concepts designed to reach each session goal.

Coordinators. The groups were coordinated by specially trained teachers. These teachers need to meet certain requirements: On one hand, they have to know how to promote children's self-regulation or autonomy (something well developed by the Piagetian constructivist school, for example).²⁷ On the other hand, they are trained in certain specific aspects of chronic conditions (asthma, epilepsy) and their clinical management. Selection is made after a 2-week course aimed at play-trained, constructivist teachers. Once selected, they receive a 6-month course of "on-the-job training" that includes courses and lectures. The group meetings are supervised by program physicians; the child's physician participates by being especially invited to the treatment session, at which he or she meets separately with children and parents and answers their questions.

EVALUATION

The field trial was performed in collaboration with several health facilities in Buenos Aires City and its outskirts (Neurology, Pulmonary, Allergy, and Immunology Outpatient Clinics of the Children's Hospital Ricardo Gutiérrez; the Neurology Clinic at the Pedro de Elizalde Children's Hospital; and the Pediatric Neurology and Asthma Clinics of the Hospital Nacional Gervasio Posadas). Medical records of 892 children, aged 6 to 15 years, with asthma (60%) and epilepsy (40%) were reviewed.

Those patients meeting the inclusion criteria were interviewed at home and, after signing an informed consent form, were assigned randomly using clustering techniques to experimental or control status.²⁸⁻³⁰

For each condition, the sample was stratified by age, sex, number of attacks, number of hospitalizations, medications used, socioeconomic level, and mother's perception of severity.

INCLUSION CRITERIA

The following inclusion criteria were used: For asthma (defined according to the AAP Committee on Allergy and Immunology Guidelines),^{31,32} only children whose condition was considered moderate or severe were included (those requiring medication the whole year, one or more times per month, or permanently). For the epilepsy group, children with normal IQ scores³³ (from a test adapted by Dr. Pages Larraya, published in 1996, for Argentine children) and no developmental delays were admitted if they had any kind of epilepsy that required permanent medication and their condition had been confirmed by electroencephalogram diagnosis at least 5 months before inclusion in the group.

RANDOMIZED TRIAL

Home surveys were administered by lay workers. Once the random assignments were made, families in the experimental groups were invited to participate in the program and received home interview follow-ups 6 and 12 months after the groups finished. Those assigned to the control group were home surveyed simultaneously. Home surveys included Health Locus of Control Scales (HLCs) of both adults and children (CHLCs) and a sociocultural questionnaire; in addition, the school absenteeism during the years prior to and after the program was recorded. The number of crises, routine and emergency visits, and hospitalizations were registered from medical records 6 months prior to and up to 1 year after the program.

PROCESS MEASURES

Health Locus of Control Scale. We revised and translated the scale of Parcel and Meyer,³⁴ and its validity and reliability were established in a sample of 264 primary school students (between 7 and 12 years of age).³⁵ Internal consistency was very high, with a Kuder-Richardson formula-20 coefficient of .82. To test the construct validity, we used cluster analysis. Two clusters were obtained (internal and external), each with two subscales clearly delineated ("chance or fate" and "powerful others" in the external cluster and "I can" and "I know" in the internal). This corresponds with the literature.³⁶ To compare the locus of control in children with epilepsy and asthma with that of children in the general population, the Duncan test of multiple comparisons was used.³⁷ Statistical differences were assessed with the Mann-Whitney-Wilcoxon test across treatment conditions.³⁸

Sociocultural survey. Children and parents were interviewed at home before the groups were formed and 6 and 12 months after formation using a questionnaire

that covers five areas: (1) knowledge and beliefs concerning own illness, (2) family dynamics, (3) patient-physician relationship, (4) treatment knowledge, and (5) child independence and self-management.

PROBABILITY OF GAIN

The probability of gain technique, developed by Colditz et al.,³⁹ is a powerful measure of performance. It is an estimate of the probability that a randomly selected subject from the experimental group would perform better after the program than a randomly selected control subject. Statistical significance was assessed with the Mann-Whitney-Wilcoxon test. Differences were significant at $P < .05$.

VARIABLES

School absenteeism. School absenteeism is a good functional measure.⁴⁰ We used it to define the net effectiveness of the program, measured in terms of "healthy days" per child over a period of 100 school days.

Clinical variables. The clinical variables monitored by the program have already been described (number of crises, routine and emergency visits, hospitalizations). The results are expressed as number of episodes (events) per child throughout the observation period.³⁸

Statistical significance was tested with the Mann-Whitney-Wilcoxon test.

RESULTS

Table I shows the study population. Based on the inclusion criteria described, 388 children were registered. Just 8.5% refused to participate. A total of 355 children (188 with asthma, 167 with epilepsy) were randomly placed in experimental or control groups. Of the 230 in the experimental groups, 74 did not attend. Of these, 5% said the reason they declined to participate was lack of interest, 50% gave reasons related to their dissatisfaction with the medical care of the referring physician or department, and 45% referred to private problems as the cause. We considered it important to test if the families that did not participate were different from those that participate in regard to the variables tested in the randomization. This may have implications for program generalizability. There were no statistical differences between these families ($P < .05$).

Overall, 56 families were lost to follow-up, most of them (37) from the control group.

Several variables were statistically controlled with the Student *t* test (age, sex, socioeconomic level, number of crises/seizures, number of hospitalizations, type

TABLE I Study Population

	Asthma		Epilepsy		Total	
Registered	(100%)	207	(100%)	181	(100%)	388
Refused	(9.2%)	19	(7.7%)	14	(8.5%)	33
Randomized	(90.8%)	188	(92.3%)	167	(85.1%)	355
	Experimental (100%) 127	Control (100%) 61	Experimental (100%) 103	Control (100%) 64	Experimental (100%) 230	Control (100%) 125
Invited, not coming	(34.6%) 44	—	(29.1%) 30	—	(32.2%) 74	—
Dropouts	(11.1%) 14	—	(4.9%) 5	—	(8.3%) 19	—
Lost to follow-up	(3.9%) 5	(29.5%) 18	(13.6%) 14	(29.7%) 19	(8.3%) 19	(29.6%) 37
Completed follow-up	(50.4%) 64	(70.5%) 43	(52.4%) 54	(70.3%) 45	(51.3%) 118	(70.4%) 88

of medication, and mother's perception of severity). Before the groups, children in the experimental and control groups did not show statistical differences in these variables ($P > .05$).

PROCESS MEASURES

Changes in the Children Health Locus of Control. Before randomization, children with asthma and epilepsy had more external scores on the locus of control than scores obtained from a sample of the general population of children from a public school.

Experimental versus control group. Over the course of the training program, experimental group children became more internal in general. Six months after the program, children in both experimental groups had higher internality scores than the control groups, but this difference was not significant statistically. However, 12 months after the program, experimental group children were significantly more internal than comparable control children ($P < .01$).

While children with epilepsy were more external than all groups before the program, HLCS scores of the experimental group children after 12 months were indistinguishable from the general population.

LONG-TERM EFFECTS ON THE LOCUS OF CONTROL

A multiple regression model testing the change in internality scores from before the program to 1 year after it, controlling for age, showed significant effects for both experimental conditions ($P < .004$) and type of chronic condition (asthma or epilepsy; $P < .0001$) (Table II).

TABLE II Hierarchical Multiple Regression Analysis Relating Change in Internality over 12 Months to Treatment Condition and Chronic Condition, Controlling for Age, with the Outcome Variable the Change in HLCS Scores 1 Year After the Program

Variable	Standardized beta	t	P	R ²
Step 1: control variable				
Age*	.21	2.16	<.04	.05
Step 2: predictor variables				
Treatment condition† (experimental or control)	-.27	-2.99	<.004	
Chronic condition type‡ (asthma or epilepsy)	-.35	-3.9	<.0001	.22

Note: $F(3.96) = 12.04$, $P < .001$; total model $R^2 = .27$.

*Age positively correlates to internality.

†Experimental group children show more change in internality than control children over and above age effects.

‡Children with asthma show more change than children with epilepsy over and above age effects.

KNOWLEDGE, BELIEFS, ATTITUDES, AND BEHAVIORS

The answers to the home survey of parents of children in the experimental groups showed significant changes after they participated in the groups. Their knowledge and fears of their child's death are shown in Fig. 1. Parents' knowledge improved in the asthma group (39% before vs. 58% after) and epilepsy group (22% before

FIGURE 1 Sociocultural survey of parents (proportion of subjects).

vs. 56% after), while controls performed worse (probability of gain: $P [E > C] = .62$; $\sigma^2 = .0026$).

In the area of fears and anxieties, beliefs of parents of children in the experimental groups showed significant improvement. For example, regarding fear of their child's death (decrease from 39% to 4% for the group with asthma and from 69% to 30% for the group with epilepsy), while controls showed no change ($P [E > C] = .65$ asthma and $.63$ epilepsy with $\sigma^2 = .0026$).

Surveys of the children showed similar trends ($P [E > C] = .69$ epilepsy and $.56$ asthma with $\sigma^2 = .007$ and $\sigma^2 = .016$, respectively).

Most parents did not feel that either asthma or epilepsy was disruptive of family life, that their child had fewer possibilities than other children, or that he or she was limited in daily life activities. However, those who felt otherwise changed significantly after participating in the groups, while controls did not, especially for asthma ($P [E > C] = .60$ and $.63$; $\sigma^2 = .0026$). After participating in the groups, the parents of children with epilepsy allowed them to sleep at friends' homes more often ($P [E > C] = .59$; $\sigma^2 = .0026$).

Communication between physicians and children with asthma showed marked improvement after participation in the groups ($P [E > C] = .73$), as well as in children's confidence in self-care skills (children self-administered the medicine: ($P [E > C] = .65$; $\sigma^2 = .0258$).

CLINICAL OUTCOMES

Table III summarizes the results. For both asthma and epilepsy, experimental group children had significantly fewer crises (asthma attacks or seizures) after

TABLE III Clinical Outcomes: Number of Crises,* Routine Medical Visits, and Emergency Visits per 12 Months. Shown by Mean Number of Observations per Child (SD) and Significance Level

	Before Group		After Group		
	Experimental	Control	Experimental	Control	P†
Asthma (nE = 65, nC = 52)					
Regular visits	3.29 (3.90)	2.92 (1.85)	1.65 (2.17)	2.14 (2.04)	.048
Emergency visits	.43 (0.80)	.75 (1.18)	0.37 (0.30)	.70 (.90)	ns
Crises*	2.02 (2.84)	2.37 (3.07)	1.09 (2.21)	2.19 (2.04)	.036
Epilepsy (nE = 50, nC = 35)					
Regular visits	3.64 (3.01)	3.89 (4.47)	3.06 (2.57)	2.91 (3.19)	ns
Emergency visits	.90 (0.95)	.83 (0.95)	.22 (0.58)	.46 (0.66)	.046
Crises*	.80 (1.46)	.49 (1.15)	.34 (0.98)	1.11 (2.77)	.026

*Crises: asthma attacks or seizures.

†Significant at $P < .05$ by Mann-Whitney-Wilcoxon test.

FIGURE 2 School absenteeism: mean number of absences per 100 school days. *REF. POPUL.: Sample of 345 children in a public school in Buenos Aires, Argentina.

participating in the groups than the controls ($P = .036$ and $P = .026$, respectively). Visits to physicians decreased significantly for children with asthma, as did emergency visits for children with epilepsy ($P = .048$ and $P = .046$, respectively).

Hospital admissions decreased, but for both groups, the number of admissions was too few to be evaluated.

SCHOOL ABSENTEEISM

Absenteeism rates are shown in Fig. 2.

Before participating in the groups, the children from the general population and those with asthma and epilepsy did not show significant differences regarding their school absenteeism.

For children with asthma, seasonal variation is an important factor affecting school absenteeism. Therefore, we studied the differences observed according to season (March–July = fall/winter; August–November = spring) 1 year before and 1 year after formation of the groups. After the program, the experimental group children with asthma, as well as those with epilepsy, improved significantly in their school attendance, while controls did not (asthma fall/winter $P = .006$ and spring $P = .029$; epilepsy $P = .011$). To compare absenteeism rates, school absenteeism in a sample of 345 children without chronic illness from a public school in Buenos Aires City was recorded. After participating in the groups, experimental

group children showed even better school attendance than the reference population.

DISCUSSION

We developed a randomized trial of an autonomous model of training for children with chronic illnesses (asthma and epilepsy), the first of this kind in Latin America. The program is coordinated by specially trained teachers and supervised by physicians. The fact that it is placed outside hospital facilities offers children and families a more appropriate learning environment. This also is thought to increase community acceptance and generalizability.⁴¹

The refusal rate was low (8.5%). However, between 29.1% and 34.6% of the experimental group families who were invited and accepted to participate in the groups did not. We do not believe this to be a problem for the program's external validity since those who did not come had no differences from the rest of the population in the variables tested for randomization, and only 5% of those who did not show up attributed it to lack of interest. Most likely, this effect is related to the fact that families were invited without previous knowledge regarding the program, a factor of randomized trials that is included to avoid selection bias. In this sense, the low rate of dropouts from the program is quite encouraging.

The curriculum design was common to both groups (asthma and epilepsy), favoring its extension and adaptability to other chronic problems of children. During the five group sessions, the leading role of the child in the management of his or her condition is emphasized and, accordingly, so are the new roles for the adults responsible for the child's care (parents as facilitators and physicians as consultants).

The training method (for both children and parents) is based on play techniques used in constructivist education,⁴² which have been shown to be more efficient than the passive transmission of knowledge.

Children are given new tools to reinforce and develop their leading role in their own health care.

This role playing has an important affective and motivational impact. Play, Van Der Kooij and Hellendoorn said,⁴³ fosters cognitive development and information processing.

The results obtained suggest that the integration of affective, motivational, and cognitive elements might have influenced the positive changes observed in beliefs, attitudes, and behaviors after the program. This was studied first with the HLCS, both in the children and in their parents. Studies of children's health beliefs have suggested that children's health management behaviors have a posi-

tive correlation with their mothers' perceptions about their health.³⁶ We wanted to test the hypothesis that our autonomous model of training could change this, whether that change (if produced) influenced the child's health management decision making, and if this influence was beneficial to his or her health.

Using a multiple correlation model, variables such as age, maternal HLC, and perception of severity were important predictors of CHLC before the program. However, after the program, the multiple correlation model vanished as the HLC of the children in the experimental group increased in internality and became significantly less associated with external variables (such as maternal beliefs and socioeconomic level).

When studying the influence of maternal perceptions on school absenteeism in children with asthma, Parcel et al.⁴¹ observed that absenteeism rates were higher in children of mothers perceiving their illness as more severe.

School absenteeism has been used extensively to measure variations of children's activities (functionality) according to illness.^{25,44}

Experimental group children showed a significant decrease in absences from school after the intervention. These observations, together with the significant change in internality observed in the CHLCS after the program, suggest that the positive impact in children's independence is the main factor behind the improvements seen in their functioning, and that this is best measured by school absenteeism ("healthy days" present in school).

Many process measures of knowledge, beliefs, attitudes, and behaviors also showed significant positive changes in both children and parents. These changes, in turn, helped to explain many of the changes observed in clinical and functional variables.

Knowledge improved significantly in participating children with asthma and epilepsy and their parents compared to controls. The positive impact was also significant in lessening the perceived vulnerability and increasing the children's assumption of a leading role and self-management behavior.

Family dynamics also improved, with consequences such as increased child autonomy both in daily life activities (sleeping over at friends' homes) and in health management (medicine preparation, increased self-monitoring).

In chronic illnesses, another variable with an impact on children's autonomous behavior is the dependency generated by the relationship with the health care provider. Perrin and Shapiro,⁴⁵ studying the HLC of healthy children and of children with chronic conditions and their mothers, concluded that young children and children with a chronic illness and their families rely heavily on providers, perhaps to the detriment of learning effective skills for independent health-

related decision making. Interestingly, mean HLCS scores obtained in our study of Argentine healthy children and children with asthma and epilepsy coincide with those obtained by Perrin and Shapiro in the US. This suggests that our results could be replicated with US children.

In our study, Argentine children with chronic illnesses obtained lower (more external) scores than "healthy" children. Children with epilepsy were more external than those with asthma, who, in turn were more external than healthy children. After the program, however, experimental group children showed a significant growth in internality, to the point that those with asthma became more internal than healthy children, and those with epilepsy obtained similar scores.

Perrin and Shapiro⁴⁵ suggested that "internality could be learned," stressing that "only when children manage to limit the power of others over their health, will they be able to take charge of their own health behavior. In so doing, they may well develop an increasingly internal locus of control orientation."⁴⁵

The evidence suggests that our program has been successful precisely in this regard, helping children limit the power of adults and giving them tools to develop autonomous decision making based on their expected values. This has a clear impact on better health and well-being.

Results for children with epilepsy are worth a comment. Experimental group children showed significant progress in clinical variables such as reduction in the number of seizures and emergency visits and school absenteeism, and their HLC scores showed statistically significant changes in internality. They remained more external than children with asthma. After the program, however, they were indistinguishable from children of the general population. At 12 months, the results are even stronger than at 6 months, suggesting a long-term impact of the program.

HLC externality in children with epilepsy has been documented by others.⁴⁵ The fact that, in our study, they were able to "learn" enough to become as internal as any other child has important clinical implications for these children, especially if we consider that, 12 months after the program, the controls were more external and had worse clinical outcomes and school absenteeism.

The positive impact of our program for Spanish-speaking, South American children, most of low socioeconomic status, and the validation by comparable results on psychometric tests originally designed for use in English-speaking populations have important implications for transcultural research.^{46,47}

Hui and Triandis⁴⁷ suggest that differences in measurement and impact in populations of different cultures observed in some papers most likely are due

to methodological problems that emerge from lack of attention to cross-cultural equivalencies. Our results could not be applied to other Hispanic populations without careful adaptation and comparative research.

We did develop a curriculum for children with insulin-dependent diabetes mellitus as well. Even though we did not have a control group, the 28 children that received training showed similar results as the other experimental group children, suggesting that the program can also be beneficial for these children.

CONCLUSIONS

1. We developed a school-based model for training children with chronic illnesses. This is the first program developed in Latin America and the first curriculum developed for Hispanic children with chronic disorders.
2. This training model differs from others in several ways. It is child-centered (based on children's expectations), relies on play, and is coordinated by teachers rather than by health personnel. A curriculum for teacher training was also developed. This may help its generalizability and implementation in different settings. Above all, the program underscores the children's leading role in prevention by training them to recognize early warning signals.
3. After the intervention, process measures showed significant changes in knowledge, attitudes, beliefs, and behaviors, including CHLC. Children increased their sense of well-being, parental anxiety decreased, and family dynamics improved.
4. The children in the experimental group also showed positive changes in school absenteeism and in clinical variables (reduction of number of attacks and emergency and routine visits).
5. Results for epilepsy warrant a special comment. To our knowledge, this is the first experience of self-help group training successfully developed for children with epilepsy. Clinical changes were very positive (decreased number of seizures and emergency visits), and the internality of the CHLC showed a significant increase at 1-year follow-up. School absenteeism, child's autonomy, and self-management behavior also improved significantly.

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