

la educación

Revista Interamericana de Desarrollo Educativo
Revue Interaméricaine de Développement Éducatif
Inter - American Review of Educational Development
Revista Interamericana de Desenvolvimento Educacional

AÑO XLIV

Nº 134-135

I-II, 2000

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ORGANIZACIÓN DE LOS ESTADOS AMERICANOS
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EFFECTS OF STIMULATION AND PSYCHO-SOCIAL DEVELOPMENT ON HEALTH AND NUTRITIONAL STATUS: A REVIEW¹

Robert G. Myers*

SUMMARY

The purpose of this article is to bring together several lines of scientific research which, in different ways, demonstrate that a synergistic relationship exists between the psycho-social status of a child and his or her nutritional and health status. This means that improving the psycho-social condition of children by creating a sound emotional climate and through early stimulation will have effects on survival, growth and health — not simply the reverse. The article begins with several conceptual considerations, moves on to a synthesis of research results, and closes with general implications for policy and programming.

Conceptual considerations

The relationship between development and health or nutrition is usually discussed in terms of "the effects of health and nutrition on child development." This statement brings with it at least two conceptual problems. The first problem stems from potential overlaps between health, nutrition and child development. Unless we have separate categories it is difficult to work with the relationships among them. The second problem is that focussing on the effects of health and nutrition on child development suggests a linear relationship in which causal effects run in only one direction. The heart of this paper is dedicated to establishing a counter argument — that the relationships are interactive or synergistic rather than linear. In order to discuss the topic, then, we need to be clear at the outset about what each of the three concepts means and about the way in which the relationships among them are being perceived.

Health can be defined holistically and positively as a general state of well-being, or it may be defined narrowly and negatively as the absence of disease. Although most of the world thinks about health in a holistic way, and although the definition of health in the Constitution of the World Health Organization supports

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that position, the modern medical profession has a strong bias toward viewing health as absence of disease and toward adopting a biological model of disease which leaves out mental and social and emotional dimensions.²

The indicators used to measure changes in health status reflect this modern medical bias. Improvements in health are signaled typically by reductions in the incidence of measles or polio or malaria or bouts of diarrhea. Indirect indicators of the health of a population include reductions in the rates of child mortality or improvements in longevity. Indicators of psychological, social and spiritual well-being are rarely considered when measuring health status. Mental health, if included as part of being healthy, is described in terms of the absence of psychiatric problems. Or, sometimes, mental, social and emotional health gets assigned to a separate category called "child development."

Nutrition

For many people, nutrition is a part of health: i.e., one cannot claim to be healthy if suffering some form of malnutrition. For others, nutrition is distinguished from health by linking it directly to food intake or to growth, measured by changes in such indicators as weight or height or arm circumference. One can eat more or less and be bigger or smaller but still contract a disease.

Nutritional interventions are often distinguished from health interventions. The former are restricted to providing proper food and diet; the latter are associated primarily with treatment of disease. However, good nutritional status is also recognized as a condition for achieving and maintaining good health and therefore becomes part of a preventive approach to health.

In recent years, a synergistic relationship between nutritional status, represented by growth or food intake, and health status, represented by absence of disease, has been broadly recognized. Poor eating and growth faltering increases the chances of sickness. Sickness affects food intake and increases the chances of growth faltering. Both sickness and growth faltering can lead to death.

Child Development

Development is not the same as growth although the two are often used interchangeably. Whereas growth is described by a change in size, development is characterized by changes in *complexity* and *function* (Brazleton 1982). A child who learns to coordinate eye and hand movements in order to grasp an object shows a sign of developing a more complex way of thinking, independently of the size of the child. In simple language, child development is, "A process of change in which the child learns to handle ever more complex levels of moving, thinking, feeling, and relating to others." This definition makes clear that development includes improvements along a physical dimension as well as along mental, emotional and social dimensions. Moreover, these dimensions are interrelated: changes along one dimension both influence and are influenced by development along the others. Emotional development, for instance, affects physical and cognitive development. If a child is under emotional stress and has not developed an ability to cope with stress, the ability to develop physically and to learn can both be affected.

One conclusion from the brief presentation above is that the distinctions among health, nutrition and child development are not as clear as they may seem at first glance. Further, even if relatively narrow definitions are used (absence of disease, food intake or growth and psycho-social well-being), we should pay attention to inter-relationships. Thus, instead of the more common view of health, nutrition and development represented in Figure 1, we should be guided by an emerging view represented in Figure 2. The more limited view depicted in Figure 1, in which social and psychological well being (child development?) is seen only as a by-product of good health and nutrition, undercuts the integration of psychosocial components into nutritional and health actions. It does not allow realization of the potential for *effects of improved psychosocial well being on growth and on disease or its absence*. By way of contrast, the second formulation of relationships affirms that improvements in the social and psychological condition of both caregiver and child can affect survival and physical development.

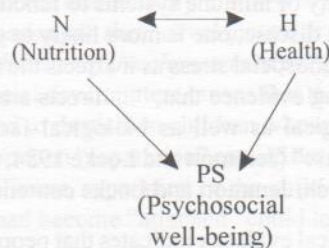


Figure 1: A common view of nutrition, health and psychosocial well-being

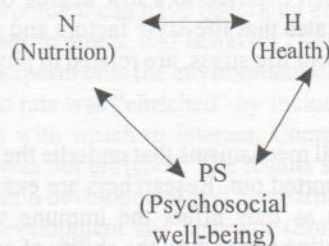


Figure 2: An emerging view of nutrition, health and psychosocial well-being

A Literature Review

At least six inter-related lines of research converge to support the existence of a synergetic relationship in which the psycho-social well-being of children affects their health and nutritional status as well as the reverse. Evidence will be presented below that is derived from research dealing with:

1. *Stress*. The effect of psychological stress on health;
2. *Brain development*. Animal research on brain development;

3. *Touch*. Effects of touch on low birthweight and premature babies;
4. *Positive-deviance*. Children who thrive in conditions that put them at risk;
5. *Nutritional Recuperation*. Effects of stimulation/affect on children in nutritional recuperation centers; and
6. *Planned interventions*. Effects on children at risk or with moderate or mildly malnourished children.

1. *Stress*

People are exposed to stress when they are placed in situations requiring some sort of change or adaptation in response to novelty, uncertainty, or unpleasantness. These situations can be acute and short-lived or moderate and prolonged. Social and psychological sources of stress include such conditions as overcrowding, parental rejection, family discord, separation, violence, etc. Although stress is related to disease, stressful situations do not produce infection; rather, they create reactions that impair the ability of immune systems to function properly. If one is under stress and exposed to a disease, one is more likely to get sick.

Research examining psychosocial stress as it affects the functioning of immunological systems is providing evidence that, "... directs attention to interactions among social and psychological as well as biological factors in the etiology, course, and treatment of disease" (Jemmott and Locke 1984, p. 78). Summarizing, an extensive review of research, Jemmott and Locke contend that:

... the bulk of empirical evidence indicates that people who have been exposed to a high degree of recent life stress have greater degeneration of overall health, more disease of the upper respiratory tract, more allergies, a greater risk of hypertension, and greater risk of sudden cardiac death and coronary disease than do people who have been exposed to a low degree of life stress. Other research indicates that life-style factors and poor mental health, quite apart from life stress, are related to physical health status. (Ibid., p. 79)

The specific physiological mechanisms that underlie the relationship between stress and disease are being sorted out. Researchers are examining the effects of hormonal reactions to stress as they affect the immune system through such changes as the level of circulating antibodies, the ability of certain cells to destroy foreign organisms, and the ability of such cells to multiply. This continuing search takes as its starting point acceptance of the general relationship, now well-established, of the effects of stress on immune systems and, hence, on health status.

The degree to which stress influences disease varies from person to person. This variation is not only related to the timing, duration and proximity of the source of stress, but also to *the adaptive capacity of each person*. That adaptive capacity, or resilience, is affected in turn, by such personal characteristics as self-esteem, self-efficacy, and the sense of control over external events, as well as by the degree of social support available (Krantz and Glass 1984; Rutter 1985, Gentry and Kobasa 1984). These are psychological and social characteristics that can be fostered and that begin to appear in the very earliest months and years of a child's

development. They can be fostered by responding adequately to psychological and social needs, assuring children the experience of success and a sense of love and social support. Moreover, these responses require something more than attending to a child's health and feeding a child.

Although most of the recent psycho-neuro-immunological research on the link between stress and disease has been done with adults (or with animals), there is little reason to believe that these same conclusions would not hold with young children (Garmezy and Rutter), and there is some reason to believe that they may be even stronger in children (Jemmott and Locke, p. 82).

Implications. The knowledge that healthy social and psychological experience helps an individual to cope with exposure to stress certainly provides a valid reason for attending to social and psychological development in the early years, when self-esteem (or a sense of failure) begins to form. However, there are also more immediate implications of social and psychological attention to (or neglect of) young children. The survival and health of children aged 0 to 6 living in stressful conditions can be affected dramatically. *Failure to provide children with the psychosocial support needed for their development is a source of stress and at the same time deprives children of the chance to learn to cope with stress.* Neglecting psychological and social development means that these children will be more susceptible to disease and to death than children whose needs are being met. Indeed, some of the earliest work on "separation" carried out by Bowlby demonstrates that, under particular conditions, separation of the child from a caregiver (usually the mother) to whom it had become "attached" could lead to death (Bowlby, 1969).

2. Brain development

A considerable body of research with animals suggests that early stimulation and an enriched environment can have beneficial effects on survival, maturation, growth, responsiveness to stress, and behavior (Newton and Levine 1988; Crnic 1983). In controlled experiments the environment of well-nourished and of previously undernourished rats was "enriched" by including in the environment playthings and other rats with which to interact. Comparisons were made with rats whose environment was not enriched. The results showed that an enriched environment can affect brain development and can partially compensate for effects of under-nutrition on development and behavior (Smart 1987). Specifically, when previously undernourished rats have been subsequently provided with adequate food and placed in different environments (enriched and impoverished), results show:

- compensatory effects of enriched environments on brain weight, forebrain length and width, and on the depth, area synapses, synaptic disc diameter and dendritic branching with the occipital cortex.
- that previous undernourishment did not impair the ability of the rats to respond to environmental enrichment.
- that brain maturation of the environmentally enriched but previously undernourished rats always remained below that of the environmentally enriched but previously well-nourished rats.

Clearly, both nourishment and enrichment have effects on the growth and development of the brain. An enriched environment produced compensatory effects, and an undernourished state did not allow the experimental animals to live up to their potential.

Implications. Although the mechanisms producing these effects are still being discussed, it is clear that there is more to both achievement and growth promotion than increasing food intake, and a varied and enriched environment helps. *Failure to provide young children with a stimulating and varied environment will negatively affect brain development.*

3. Touch

One non-nutritional aspect of the social interaction between caretaker and infant that seems to have an effect on physical growth operates through the sense of touch. To a large extent, research examining the effect of touch on growth and behavior of infants stems from research with animals showing that handling, or touch, affects the level of growth hormone (Schanberg, Evoniuk, and Khun, 1984). It is hypothesized that the touch system is part of a primitive survival mechanism found in all mammals which depend on maternal care for survival in their earliest weeks or months. Absence seems to trigger slowing of metabolism (until the mother can return)- hence its need for nourishment is reduced. This is functional in the short run but leads to stunted growth if prolonged.

Turning this idea around, it is increasingly clear that touch seems to promote growth and brain maturation and has an effect on activity and behavior. In an intervention experiment, a group of premature babies in an United States hospital were lightly massaged and their limbs moved passively during three 15 minute periods per day for 10 days. As a result, the babies averaged a 47 per cent greater weight gain per day than other infants who were kept in incubators and were not massaged, even though the massaged infants did not eat more than the others. The massaged infants were also more active and alert during sleep/wake behavior sessions, and showed more mature signs on a variety of behavioral tests. Eight months later, they did better than the others on tests of mental and motor ability and continued their advantage in weight (Field, Bauer and Nystron 1986).

A study in south India (Landers 1989) showed that low birthweight babies who were massaged showed a remarkable catch-up in their weight and on a battery of developmental tests over a period of six months. This research showed a clear effect of mother-child interaction on both physical and developmental outcomes.

Massage is a common, but declining childcare practice found in many cultures throughout the world. Why the practice is so widespread is not known, but a reasonable guess is that it emerged from experience and became a socially institutionalized practice providing an effective and natural way to assist underweight babies to survive, grow, and develop in adverse conditions.

Implications. These research findings leave us with questions but, independent of the work on attachment (Harlow and Harlow 1966), give support to such common Third World practices as massaging, carrying babies on the back and sleeping with babies, all of which are ways of maintaining physical contact and communicating through touch. What comes through clearly is that *caregiver-child interaction is very important for growth as well as mental development.*

4. *Positive deviance: children who thrive in "at risk" conditions*

Most nutrition research has been directed towards discovering causes of malnutrition and identifying the effects of attention to malnourished children. More recently, another line has focused on children who grow up in conditions of poverty that often lead to undernourishment but who manage to be well-nourished. Why do some children thrive while others do not? What are the mechanisms of biological, social and behavioral adaptability that allow these "positive deviant" children to grow and develop well?

Zeitlin, Ghasserni and Mansour (1990) review 16 studies which compare children who thrive with those who do not. They also examine a large body of related research. The authors consider three kinds of correlates, noting the importance of 1) socio-demographic and 2) physiological correlates of malnutrition, and then focusing on another cluster of variables: 3) "the psychosocial and behavioral aspects of the mother-child interaction, their individual temperaments, and the social network supporting the dyad." Their purpose was to learn from adaptive childcare and feeding behaviors and the social networks that support them.

The review examines energy metabolism, growth-related hormonal adjustments, immune responses of the body, and psychological stress as related to positive deviance. A link is made between psychosocial well-being, nutritional thriving, and a healthy condition. The importance of examining psychological as well as genetic or physiological factors is explained as follows:

The fact that some children are genetically more resistant than others adds to the unexplained variance in the results of psychological research, just as uncontrolled psychological factors add to the 'noise' in physiological findings. (Zeitlin, et.al., p. 33)

Zeitlin, et al., go on to say:

Stressful caretaker-child interaction can be expected to increase protein requirements while tending to decrease the amount of food that the child consumes. Pleasantly stimulating interactions, on the other hand, enhance the child's tendency to exercise its developing organ systems and hence to utilize nutrients for growth and development. (p. 33)

In short, psychological stress has a negative effect on the use of nutrients whereas psychological well-being stimulates the secretion of growth-producing hormones. "These mechanisms help to explain how psychosocial factors, such as the affect between mother and child, are associated with adequate growth and development" (Zeitlin et al., p. 34)

Implications. There are positive caregiver-child interactions and conditions of social support that are specifically adaptive in protecting the nutritional status and health of infants and young children. (p. 36)

■ *Positive caregiver-child interactions*

From their review, Zeitlin, et al. identified characteristics of caregiver-child interactions associated with adequate growth and development:

- Frequent interaction (holding, hugging);
- Rapid, consistent, and appropriate response to perception of a child's needs;
- Speaking and responding to a child's vocalizations, both when holding the child and when the child is at a distance;
- Looking directly into the child's eyes;
- Showing affection by smiling and friendly behavior rather than inflicting hostile or dominant behavior;
- Permitting the child to imitate and guide interaction;
- Avoiding interaction that is too slow or too rapid and overstimulating;
- Giving clear instructions;
- Rewarding achievements;
- Reprimanding without being brusque, harsh, or severe;
- Avoiding forms of control in which the only objective is to demonstrate authority over the child;
- Creating a stimulating physical environment for the child.

A nutrition-related intervention related to positive deviance was found to be actively feeding toddlers instead of expecting them to feed themselves.

Although these observations need to be associated with age and elaborated to give a more specific idea of how and what to do, that is not our purpose here; rather, we are concerned with establishing the general principle that actions to improve psychosocial well-being will affect growth.

■ *Social support*

The efficiency and quality of the network of social support available to caregivers figures prominently in the identification of children that thrive in conditions of risk. A supportive system (or family or community) helped to moderate effects of overwork as well as of stress and depression. The importance of social support noted in the Zeitlin review is also a central finding in one of the most detailed positive deviance studies that has been carried out, following a group of multiracial children from different social backgrounds in the same Hawaiian community from the prenatal period to the threshold of adulthood. In their book, *Vulnerable but Invincible*, Werner and Smith (1982) identify protective factors within the child and the caregiving environment that differentiate high-risk children who are resilient from those who develop serious learning and behavior problems. The major sources of support within the caregiving environment were (p. 134):

- Four or fewer children spaced more than two years apart;
- Much attention to the infant during the first year;
- Positive parent-child relationship in early childhood;
- Additional caretakers besides the mother and care by siblings and grandparents;
- Steady employment for mother outside the household;
- Availability of kin/neighbors for emotional support;

- Structure and rules in the household and shared values — a sense of coherence;
- Close peer friends and availability of counsel;
- Access to special services.

In summary, these studies of "positive deviant" and "resilient" children help to identify conditions and behaviors that permit some families to bring up well-nourished children in spite of the conditions of poverty in which they live. They draw upon and reinforce other lines of research demonstrating the interaction between nutritional and non-nutritional behaviors and between a child's characteristics and the environment in which the child grows and develops. Crucial features of that environment are the relationship of the child with its caregiver and the psychological and social support available to the caregiver.

5. *Nutritional recuperation*

Whereas the studies of positive deviance compare children of different nutritional levels experiencing different environmental conditions, studies of children in recuperation centers examine what happens to children who are all seriously undernourished when they are exposed to a different type of environment. Two telling examples come from Chile and Jamaica where experimental studies were set up in nutritional recuperation centers. The studies compared a) the progress of children who received a treatment of stimulation and play as well as food with b) the progress of those who received only food (Chile) or those who were well-nourished (Jamaica).

■ Chile

In the Chilean experiment (Monckeberg 1986), infants were fed, provided with psycho-sensory stimulation (for about 30 minutes twice a day), with physical exercise (also about 30 minutes twice a day), and with opportunities to play with children with similar characteristics who received the same diet but no psychomotor or affective stimulation.

For the stimulated children:

Not only was the weight gain different, but the physical growth was better and there was a significant difference after 50 days of treatment. The psychomotor quotient also exhibited the same pattern. While for the control group the average quotient was 65 (plus or minus 12) at the 150th day of treatment, for the experimental group it was 85 (plus or minus 7). Monckeberg, p. 28

These differences, for weight, psychomotor and mental development were more pronounced for children who were less than 6 months of age at admission to the recuperation center than for those between 6 and 12 months of age.

To explain the differences in recovery, Monckeberg hypothesizes that stimulation and affect trigger and help reinitiation of growth. He then makes reference to

the links mentioned above relating resumed growth to biochemical processes and to the functioning of growth-producing hormones.

■ Jamaica

The Jamaican study (Grantham-McGregor 1984) compared three groups of children. Two of the groups had been admitted to the hospital for nutrition recuperation and one group was well-nourished but admitted for other reasons. In the recuperation program, one group of malnourished children was also provided with psychosocial stimulation, the other was not. The stimulation consisted of instructing attending nurses to play with the children for one hour each day.

When children entered the hospital, both malnourished groups had similar developmental quotients and were significantly behind the control group. By the time they left, all three groups had improved, but the intervened group had improved the most and was no longer significantly behind the control group.

One of the more interesting features of these two studies is that they both followed up the children after leaving the recuperation center. In the Jamaican case, that follow-up included an active program of home visiting using community health workers (CHW). The CHWs visited homes once per week over 24 months. Visits included reinforcement of the need for psychosocial interaction as well as monitoring of the physical status of the children. During this time the weight recuperation was maintained. The gains registered in psychosocial development were maintained as well, so that the children who had been played with in the hospital continued on a par with the comparison group of well-nourished children when followed over a period of 36 months. In the Chilean case, no additional action was taken following departure from the recuperation center. As contrasted with the Jamaican study, the Chilean follow-up led to the conclusion that the program of stimulation succeeded in raising mental performance only for the period of the program. A decline was observed when the children went back to their former environments. By way of comparison, in a small group of 35 recuperated children, who had been adopted after discharge by families of higher socioeconomic status, mental ability scores were normal, well above the scores quoted above.

Implications. Psycho-social stimulation as well as feeding is important in helping malnourished children recover their rate of growth. We see an effect of stimulation on nutrition.

6. *Planned interventions*

Yet another form of evidence supporting the importance of attending to both nutritional and non-nutritional conditions affecting growth and development comes from studies of intervention programs carried out in conditions of everyday life where many children suffered from mild to moderate malnutrition. In several instances, interventions have been designed to try to sort out effects from nutritional supplementation and effects from non-nutritional interventions intended to improve psycho-social development.

In an extraordinary study carried out with families in poor neighborhoods of Bogota, Colombia, 280 Colombian infants at risk of malnutrition were randomly assigned to one of four experimental groups formed by the presence or absence of

one, or both, of two interventions: 1) nutritional supplementation for all members of the family, from the last trimester of pregnancy until the target child was three years old; and 2) a twice-weekly home-visiting program designed to promote early cognitive development, from birth of the target child until age three (Super et al., 1987). All families received free medical care and were studied prospectively.

The following extract summarizes some results: At three years of age, children who had received nutritional supplementation averaged 3 centimeters and 800 grams more than controls: the incidence of children with severe growth retardation was reduced by half. Home visiting had no overall effect on size but did reduce the number of severely underweight children. At age six (three years after intervention) the Supplementation effects remained at about the same magnitude. Children in the Home Visit condition had become larger than controls, by 1.4 centimeters and 483 grams. Both interventions reduced the incidence of stunting and wasting. Dietary recall data suggest that changes in family functioning as well as biological mechanisms account for the observed pattern of results. The effects noted for the Bogota experiment were greater for lower levels of father's education.

A host of other studies could be cited (see review by Pollitt 1987) to support the contention that nutrition interventions can have short- and long-term effects on some aspect of behavior such as improved attention, heightened social responsiveness, reduced irritability and inability to tolerate frustrations, higher activity levels, and increased independence. These behaviors are related to both cognitive and social behavior in the long run.

What causes these effects? How should these findings be interpreted? Pollitt (1987) suggests that, in much of the literature, interpretation has been built around a model based on the biomedical tradition of disease causation that did not take into account the social context in which development occurred or the previous and subsequent history of an individual. This static, linear model and interpretation contrasts with another model beginning with the premise that "through its interactions with illness and adverse family and socio-economic conditions, under-nutrition increases the probability of diverting the trajectory of mental development..." (Pollitt 1987, p. 19). It also differs from a view that "effects may occur within a synergistic system where the malnourished infant is less successful at engaging caretakers in interaction and, in turn, is responded to less often and with less sensitivity, resulting in a failure to develop normal patterns of social interaction" (Lester 1979, as quoted in Barrett et al., p. 542).

Slowly, an interactive view is being recognized and used as a basis for designing as well as reinterpreting research results. For instance, in a study of food intake and human function carried out in Mexico (as part of a three-country study including Egypt and Kenya), the interactive model serving as the basis for analysis of cognitive performance and social conditions was as follows:

... one pathway by which low intake may affect development is through subtle effects on the young child's manner of interacting with his or her environment, including reduced activity, attentiveness and social responsiveness. These behaviors, which lead to reduced stimulation and hence reduced opportunity for more complex responses, may also affect the child's intake, perpetuating continued low intake because he or she does not 'demand'

food. Similarly, development may be compromised by an interaction between child passivity and maternal time allocation in households where child care time is limited because the caretakers are pushed by economic necessity to long hours of work. In such a situation, low intake in the child interacts with the behavioral consequences of poor economic resources, with each component contributing to and reinforcing less than optimal outcomes. (Chavez et al., 1987, p. 298)

Following this model, a measure of cognitive development for children at 30 months was related to measures of 1) growth (length), 2) caretaking (using the observed appearance of the child as a proxy for maternal caretaking), 3) current diet, and 4) socioeconomic status. In a series of regression analyses allowing a look at different combinations of the variables, cumulative growth was the dominant significant variable, but caretaking and SES, were also significant. When all four variables were entered, length and child care continued to be significant.

The analysis lends support to an interpretation of development that looks at the interaction between the characteristics of the child and its environment, including interaction with the caregiver and with the conditions surrounding both the caregiver and the child. The researchers concluded that:

Social-environmental conditions of the household (as measured by socioeconomic status indicators and maternal caretaking) clearly affect development. The biological and behavioral experiences of the child, as reflected in growth, also affect development. The mechanism of these effects is probably synergistic. That is, child nutrition, health and activity ... have a synergistic relationship with respect to social and social-relational conditions, with respect to risk of poor or delayed cognitive development. The model is analogous to the dynamic interaction of infection and malnutrition, which have a synergistic relationship with respect to mortality. (Chavez, et al., 1987, p. 303)

Focusing on weight instead of cognitive development, and on infants, aged 0 to 6 months, a similar kind of interaction seems to be present. Infants increased faster in weight from birth onwards if the exterior and interior sanitary conditions of their homes were better, and if the preschoolers and mothers of the household appeared cleaner ... (p. 327). The implication is that nutrition interacted with an environmental condition related to better health and to better maternal care, as represented in the attention given to cleanliness of the house.

These six lines of research go a long way toward establishing the synergistic nature of the relationship between psychosocial status and health and nutritional status. An even more complete review would also draw on other strains of research including: 1) anthropological research which examines the wisdom embodied in so-called "traditional" medicine (see, for example, Neguissie 1988; Choppo 1988), 2) research dealing with practices and traditions of various currents of non-Western medicine (e.g., Wu 1982) or 3) research on "psychosomatic" illness. Indeed, medi-

cal anthropology, behavioral medicine, and psychiatry all suggest a close connection among social, mental and physical well-being.

Summary

The review presented above provides evidence that satisfying psychosocial needs can have an effect on nutritional and health status through its effect on metabolism linked to stress reduction, and by helping to produce changes in the care demanded and provided. At the same time, nutrition is seen to have an effect on psychosocial development, operating primarily through its impact on attention, responsiveness, independence, irritability, and affect.

The discussion suggests a kind of spiral effect in which a child who is free from social and psychological stress and who is provided with appropriate stimulation uses its food intake more efficiently because biochemical processes kick in to help the operation of the immune system and to foster growth. This helps provide energy and needed nutrients, increasing the physical activity of the child and hence the child's ability to interact. In interaction, the child more easily attracts the attention of the caregiver and demonstrates its needs. The caregiver responds, providing food and affection, further energizing the child.

The spiral applies to the caregiver as well. A caregiver who is free from social and psychological stress and who is better nourished and healthier will be better able to energize and respond to the child, helping the child to demand more food, increasing the food intake.... But the spiral can move downwards as well as upwards, with an impaired ability of the child to elicit a response from the caregiver leading to reduced food intake, producing even further inability to interact, leading to lower food intake, etc.

Some Implications for Policy and Programming

1. *Combine program actions*

The review of the literature has tried to show that satisfying social and psychological needs can have an effect on both nutrition and health. It should not be surprising, then, that the first implication for programming to be drawn from the evidence is that nutritional and health actions should be combined with other actions designed to improve the social and psychological well-being of the child. Doing so takes advantage of the synergistic relationships that have been identified.

2. *Support caregiver and child, not just the child or the mother*

Researchers have emphasized that satisfying a child's psychosocial needs requires mutually satisfying caregiver-child interactions within a supportive and stimulating environment. Thus, programming should be directed towards the caregiver-child dyad (using the word "dyad" captures the reciprocal nature of the interaction between caregiver and child) as well as to the caregiver (usually the mother) and to the child, viewed individually. Improving the nutritional and health condition of both is obviously important but, again, needs to be supplemented by attention to the kind of interaction occurring between caregiver and child.

What can be done to improve the interaction? Caregivers can be helped to interact better with their infants, toddlers and preschoolers by at least two kinds of action — strengthening the supporting environment and providing information to caregivers within a supportive structure.

3. *Improve the supporting environment*

The first, and probably most important, type of action is one that will help to remove limiting conditions that prevent natural interaction from occurring. Most caregivers will be loving and attentive and responsive and stimulating if they are given the chance. But there are many pressures on resources, time, and psyche that produce stress in caregivers, affecting their interaction — other than stress induced by under-nutrition. As suggested by Zeitlin, et al., there is an important need to look at the social support systems caregivers can count on — at whether there are additional hands and hearts available. Are there ways in which time taken for other tasks can be reduced? These concerns are in addition to efforts to improve the larger environment through changes in water systems, sanitation and other features of the physical environment. They are, in addition to providing opportunities for general education, an action which has many indirect benefits for caregiving.

4. *Work with caregivers to improve childrearing practices*

A second set of actions would focus more directly on the caregiver. Without underestimating the natural parenting abilities of most caregivers or disregarding the many traditional practices that help foster a positive interaction between caregivers and their children, it is possible to see important ways in which working with caregivers could improve interaction and foster child development. Many mothers, for instance, are not aware of the ability of their newborns to hear and see and respond at birth, do not value play, see no harm in “bottle propping” (leaving the child alone with the bottle instead of interacting during the feeding with a bottle), or are unaware of the importance of stimulating the child through touch, talking, and eye contact. (Kotchabhakdi 1988) In urban conditions, a teenage girl may not have had the socialization to child care she would have had in a rural area. She is in need of help with her parenting skills. In short, programs of parental support and education that include discussions of ways to satisfy psychosocial as well as nutritional and health needs will be appropriate.

5. *Treat feeding as a social and developmental process*

Feeding is a childrearing practice that varies considerably from place to place and family to family. From the review of evidence emerges a natural link between nutrition and psychosocial development related to the fact that feeding is a social and developmental as well as a nutritional process.

In nutrition programs, *how* a child is fed would be attended to — along with attention to screening for malnutrition and to *what* a child is fed. Feeding is at once a social activity with psychosocial development purposes as well as a nutritional activity with nutritional and growth purposes. The quality of the social and psychological interaction during feeding affects nutritional status both through a physio-

logical effect on the child and through its influence on the amount of food the child demands and ingests. These considerations are seldom included in nutrition manuals (Myers, 1992, Appendix to Chapter 9).

Interactions during breastfeeding or bottle-feeding, during the weaning process, and at meal times can encourage or discourage proper feeding while helping to satisfy important developmental needs.

A Concluding Note

To carry out the above suggestions for policy and programming, a first step is to recognize the synergistic nature of health, nutrition and psychosocial or educational interventions. A second step, and perhaps an even greater challenge, is to overcome the compartmentalized structures of governments and other organizations that make an integrated approach to enhancing survival chances, growth and development so difficult.

RESUMEN

El propósito de este artículo es reunir varias líneas de investigación científica que, de maneras diferentes, demuestran que existe una relación sinérgica entre el estado psico-social y el estado nutricional y de salud de un niño. Esto significa que el fortalecimiento del estado psico-social de los niños, a partir de la creación de un ambiente emocional sano y de estimulación temprana, tendrá efectos en la supervivencia, el crecimiento y la salud — no sólo el contrario. Este trabajo empieza con varias consideraciones conceptuales, ofrece luego un resumen de los resultados de la investigación y concluye con implicaciones generales de política y de programación.

NOTES

1. This paper draws heavily on Chapter 9, titled "Relating health and nutrition to social and psychological development" in R. Myers, *The Twelve Who Survive* (London: Routledge, 1992). The article was originally prepared for presentation at the Symposium on "Recent advances in research on the effects of health and nutrition on children's development and school achievement," Ocho Rios, Jamaica, May 24-26, 1995.

2. Consider the following definitions given by herbalists in Oaxaca, Mexico, when asked, "What does it mean to be healthy?": "It is when a person is content, calm, with a desire to work and to eat. The eyes shine. It is when a person has no problem with family, neighbors or authorities and it is to be well with God and fellow men. In general it is to feel happy." The response to "What does it mean to be sick?" was: "One can see that a sick person has problems. They look tired, can't move along, are sad and desperate. They do not have peace in the family. When they look emaciated, the blood is giving out and now there is no peacefulness. It is when one smokes and drinks all the time or is desperate with fright". (Instituto Nacional Indigenista, p. 14) The emphasis of the Mexican herbalists is not very different at root from that of the World Health Organization (WHO). The Constitution of the World Health Organization tells us that: Health is a state of complete physical, mental and social well-being and is not merely the absence, of disease or infirmity.

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