

## Ernesto Pollitt and the Investigation on Malnutrition

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### Abstract

This article presents a brief review of the research work of Dr. Ernesto Pollitt, who has dedicated his entire life to the study of the psychological development of children on four continents, within a rigorous methodological framework and a constant concern to reverse the effects of malnutrition on the cognitive development of infants. His work covers iron deficiencies and their effects on intellectual functioning and academic performance, as well as breastfeeding and its nutritional function; to lead to the design of public policies that have benefited thousands of children in Peru and the approach of a probabilistic theory of human development that takes as a central axis the milestones of motor development during the 24 months of life.

**Keywords:** Ernesto Pollitt; Malnutrition; Psychological Development; Education

Peru is a country that has a diversity of social problems mediated by economic inequality that has generated important educational and social gaps, with notable effects on nutrition, psychological development and academic performance [1-3]. One of the authors who has devoted more than five decades to the study of malnutrition and its effects on psychological development is the Peruvian psychologist Ernesto Pollitt (1938 - 2016), who died two years ago [4].

Ernesto Pollitt studied psychology at the Pontifical Catholic University of Peru and obtained his doctorate at Cornell University (Ithaca, New York), under the mentorship of pediatrician and nutritionist George Graham, who had conducted research on the effects of the administration of noodles strengthened with proteins in a sample of undernourished children of Chiclayo's province in the north of Peru. By then, Pollitt had decided to devote himself to the study of psychological development of children by the influence of John Money, of whom was the assistant between 1962 and 1963 in the Hospital John Hopkins [5]. But it was thanks to the recommendation of Dr. Graham that Pollitt would dedicated his life to the investigation of malnutrition in children of Peru and various countries of the world. In this way, after obtaining his PhD in evolutionary psychology, he worked as an assistant professor in the Department of Pediatrics at Yale University and in the Child Study Center.

A few years later and with Carmen Saco as her partner, Pollitt settles in Geneva and works at the United Nations Research Institute for Social Development (UNRISD), where he investigated different nutritional and psychological variables of children from urban and rural areas of Philippines, India, Iran and Mexico [4]. His first research work about the effects of malnutrition on development was published in the Interamerican Journal of Psychology, having Dan Granoff as co-author. In this study, a sample of children from Lima who had severe protein-calorie malnutrition were evaluated. Measurements of cognitive and motor development were taken with the Bayley Scale, as well as somatic measurements, such as height, weight and cranial perimeter, reporting that the children had a delay in their mental and motor development [6].

In another study, Dr. Pollitt and Henry Ricciuti collected a data series of biological variables (such as size and age of the mother, number of pregnancies, weight, and child care) and social (education of the mother, family instability, family income, time of residence of the

mother in Lima) of mothers from marginal urban areas of Peru and correlated them with the size of 48 children, finding that mothers of children with smaller stature were significantly lower, had more pregnancies reported and had joined a couple more times, that is, marital instability was higher in mothers of short children compared to mothers of tall children [7]. This study was published in 1969 in the American Journal of Orthopsychiatry, establishing a precedent on the importance of the characteristics of the mother in the nutritional status of children. In other investigation, Pollitt, *et al.* [8] analyzed whether there were significant differences between various mental health measures (such as anxiety, depression, social isolation and dissatisfaction as mate) of a group of mothers who were recruited from Outpatient Pediatric Clinic at Cambridge Hospital, finding that the psychopathological symptomatology of mothers has an effect on the physical and psychological development of their children.

Another study that was published in the Journal of the American Dietary Association, was elaborated by Pollitt and Wirtz [9] who investigated the mothers of newborn children, reporting that the weight gain of newborns during the first 30 days, could be explained by the social contact that is established between the mother and her baby, hence, it was concluded that the communicative behaviors of the mother towards her baby have a nutritional function. The evidence collected by Pollitt in several studies on various sociobiological variables related to the mother indicate that they have predictive power not only in their nutritional status and psychological development, but also in academic performance [10]. In that sense, Pollitt has also been one of the first worldwide authors, that has highlighted the importance of breastfeeding in the psychobiological development of infants [11].

In 1974, Pollitt published his first book: "Malnutrition, poverty and intelligence" [12] that is the product of his research experiences on the effects of deficiencies of various micronutrients in intelligence and other cognitive variables. Within this line of work we can mention the study he did with Carol Thomson, with whom published the article *Protein-calorie malnutrition and behavior: A view from psychology* [13]. In this work he made a wide critical review of several published studies on the effects of protein caloric malnutrition on mental development, focusing on research designs, the validity of psychological tests such as the Weschler Intelligence Scale which are used for the assessment of mental health and the validity of the intervention programs that come from them. Marasmus and Kwashiorkor syndrome are reviewed, as two severe forms of protein caloric malnutrition, with their respective clinical, epidemiological, biophysiological, neuro-anatomical and behavioral manifestations.

On the other hand, at the beginning of the 1980s, Dr. Pollitt was named Associate Professor of the University of California (Davis, USA), and worked on various research projects with Carmen Saco, about deficiencies and their cognitive and psychological correlates in children from Egypt, Guatemala, India and Indonesia. In one of these studies, he evaluates the cognitive functioning of children with iron deficiency with and without anemia, who obtain low scores on the Bayley Scale, but after being treated experimentally with iron supplements for a period of 7 to 10 days, they manage to improve mental development levels [14]. In another work published with Kathleen Gorman, Pollitt investigates the family factors that have an impact on the academic performance of children from four villages of Guatemala, reporting that the nutritional history of individuals, mediated by family conditions of poverty have negative cumulative effects on school performance, particularly in memory and learning [15].

In 1986, Dr. Pollitt, *et al.* sampled 334 children between 6 and 60 months of age who lived in the west of Java in Indonesia, in a treatment with nutritional supplements of 400 Kcal daily for three months, and eight years later, they evaluated 125 of these children with tests of vocabulary, memory and arithmetic; comparing their evaluations with 106 children in a control group who did not receive the nutritional supplements in the first evaluation. It was reported that the children in the experimental group obtained higher scores than their peers in the control group, suggesting that nutritional supplements administered during childhood had a long-term effect on the cognitive abilities of these children [16]. In a similar study, also with children from Indonesia, in a Java town, Pollitt, *et al.* provided nutritional supplements for 12 months to 42 children living in poverty and reported a marked increase in their mental and motor development curves when comparing measurements before and after treatment, but those who had a shorter stature, obtained less favorable scores [17].

In Thailand, Pollitt, *et al.* evaluated 1358 children between 9 and 11 years, who were classified into three groups according to their levels of iron deficiency, and were treated with ferrous sulfate tablets of 50 mg/g for two weeks and with tablets of 100 mg/g for 14 weeks. Their intellectual capacity, was also evaluated using the Raven Progressive Matrices Test, as well as their school performance using language and math tests. The results indicate that there was a positive association between iron level, intellectual capacity and academic performance in language [18]. This and other nutritional studies in Thailand allowed Ernesto Pollitt to win the Prince Mahidol International Public Health Prize in 2000, which was awarded to him by the Mahidol Foundation of the Royal House of Thailand in Bangkok [4].

All these investigations can be summarized in the idea that iron deficiency anemia is one of the most prevalent in the world, and that it is mediated by the poverty conditions in which millions of people around the world live. Thus, in countries such as Egypt, United States, Guatemala, Indonesia and Thailand, iron deficiency has negative effects on cognitive processes and school performance of preschool children, but with treatment, this effects can be reversed or mitigated [19]. Consequently, a series of investigations carried out by Dr. Pollitt, Santiago Cueto and Enrique Jacoby in Peru, involved the development of an experimental school breakfast program for boys and girls in Huaraz, a province located in the Peruvian Andes. Their results suggest that school breakfast has a favorable impact on children's cognitive functioning and school performance, and was associated with a decrease in school absenteeism [20-23].

A characteristic feature of Ernesto Pollitt's academic work is that his studies focused on the solution of social problems, such as the malnutrition of poor children and the reversal of their effects through the implementation of nutritional supplements. In that sense, the work of Pollitt has had an impact on the design of public policies in Peru, his investigations have convinced the current authorities, so they develop social programs such as "Vaso de Leche" (Glass of milk) or "Desayuno Escolar" (School Breakfast) in the most vulnerable areas of the country. Pollitt's books analyze precisely the role of the state in the fight against poverty within the context of Latin American countries and in relation with the international panorama [3,24,25].

However, the work of Pollitt is not only a precursor of important research topics such as malnutrition and its cognitive, behavioral and educational effects, breastfeeding, or the application of its data for the design of social programs; but also makes a relevant theoretical contribution, by proposing a probabilistic theory of development. Thus, by the end of the 1990s, he began to develop the idea that information on malnutrition can predict the trajectory of development [26]. Another element of his theory is the weight assigned to motor development as a predictor of psychological development and as an excellent indicator of the overall development of children under two years old [27]. In this way, the motor achievements that emerge as a natural behavior during the first 24 months of life, constitute a valuable predictor of intellectual development and future academic performance, above the emotional or social areas of the development scales [28]. The thesis of Pollitt proposes to use the level of motor development as an indicator of integral development during the first two years of life, instead of using physical growth as a criterion [29].

So far, we have briefly reviewed Dr. Pollitt's research on malnutrition, which has been carried out on children from the most disadvantaged areas of the planet, and which lead to the development of theoretical and social proposals, which have produced good results in Peru and other regions of the world. It only remains to say that Dr. Pollitt has been a consultant to various international institutions such as UNESCO, the World Health Organization (OMS), UNICEF, International Nutrition Sciences and the World Bank. In addition, he has been a member of the National Academy of Sciences in Peru, and won the Nutrition Award given by the American Academy of Pediatrics in 1998, and the American Society of Nutritional Sciences gave him the prize of excellence in research of the American Society in International Nutrition. The Latin American Nutrition Society made him an Emeritus Member in 2003 and in 2007 the Peruvian Nutrition Society awarded him the National Nutrition Award [4].

Likewise, Pollitt's work includes a wide variety of research articles, book chapters and specialized books that add up to 300 research documents and review papers. His contributions go through sciences such as nutrition, psychology, education, medicine and sociology;

gathering them around a common concern: the development of children and the factors that intervene in their proper adjustment or their irregularities. We hope that this review motivates readers to approach the work of Dr. Pollitt and to continue with his lines of research, which do not exhaust the problem of child malnutrition, and rather, on the other hand, encourage interdisciplinary research between different fields of knowledge.

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