

RELATION OF NUTRITIONAL STATUS TO BEHAVIOURAL
AND LEARNING DISORDERS ON THE ONEIDA RESERVE

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Department of Indian & Northern Affairs

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OVERVIEW

The following report presents a summary of a pilot investigation on the Onedia Reservation near London, Ontario, carried out during the summer of 1977. The investigation of the relationship between nutritional status and behavioural-learning disorders in Indian children grew out of a large study of 140 urban middle-class Caucasian children conducted in the Neuropsychology Laboratory of the Royal Ottawa Hospital. In that study, it was found that several important relationships appeared to exist between patterns of food-intake and various behavioural and learning difficulties. The investigation of the food-intake pattern of the 140 children indicated that only 24 were on a nutritionally adequate diet in all food categories, according to the standards presented in Canada's Food Guide (1977). Many of the children had food allergies and there was evidence of a significant relationship between the presence of food allergies and the presence of deficits in brain function (Tryphonus and Trites, in preparation). Further analysis revealed that there was a significant relationship between the consumption of junk foods and the presence of difficulties in learning. On the basis of the documented inadequacies of the diets of many Canadian Indian children and the concerns expressed by some that certain factors in the diets of Canadian Indian children may be contributing in important ways to behavioural and school problems in these children, it was decided to conduct a pilot investigation to attempt to understand something about the nature of the problem and point the way for further well-controlled studies. The following sections present a review of relevant literature followed by a more detailed discussion of the aim and method of the present investigation, the results of the investigation, and finally a discussion.

A. REVIEW OF THE LITERATURE

There is abundant evidence that the diets of Canadian Indian and Eskimo children have changed radically over the past several years (Draper, Undated; Nutrition Canada, Indian Survey Report, 1975; Schaefer, 1977). Certain aspects of the change in feeding patterns, for example, bottle feeding of infants, have been found to be associated with chronic health problems such as chronic middle-ear disease (Schaefer, 1971). It can be considered that the dietary changes have, in fact, been changes for the worse and further, that the children may be suffering from nutritional deprivation. It could also be postulated that not only may the children have chronic health problems, but the nutritional deficiencies may also lead to behavioural and learning problems.

Nutrition and Mental Ability

Studies of the relationship between malnutrition and mental development are in their infancy. At this point the influence of malnutrition on mental development remains a rather open question. As Richardson in a conference on Malnutrition, Learning, and Behaviour correctly pointed out, "The social conditions in which learning and experience are least conducive to optimum mental development are generally similar to those in which the poorest level of nutrition is most likely to exist. In order to demonstrate clearly that malnutrition in children is a cause of mental subnormality or of a general impairment of mental ability at all levels, it is necessary to demonstrate an effect distinct from that caused by social conditions" (Richardson, 19 , p. 355). Several investigators have attempted to control for social conditions by studying the children who suffered early nutritional difficulties but were adopted later. Winick, Meyer & Harris (1975), in a study lacking important controls, concluded that children who were nutritionally deficient early in life and who suffered growth and mental impairment improved when exposed to more adequate social-family conditions. Although these types of studies need to be replicated, the implications are that poor nutrition has a definite, but possibly reversible, effect on mental abilities. Studies of severely malnourished infants in South Africa

Cognitive Abilities of Indian Children

Numerous studies have been conducted on the mental ability, school achievement and behavioural characteristics of Canadian Indian children; however, most suffer from rather serious flaws. Generally, the studies suffer from small sample size, use of restricted test batteries, inadequate collateral information and lack of follow-up. Further, there are difficulties in testing children from minority groups since the norms for the standardized tests are generally biased against these individuals. Unfortunately, there has not yet been an adequate normative study of ability patterns in Canadian Indian children. Studies which have been conducted frequently point to the relative deficits in reading, verbal fluency and related verbal deficits in Indians as compared to white students (Jamieson & Sandiford, 1928; Kemary, 1970; Mickelson & Galloway, 1973; Schubert & Cropley, 1972; MacArthur, 1969; Fraser, 1969; etc.). There is some evidence in the literature (for example, Havinghurst & Hilkevitch, 19) that certain sub-groups of Indian children do relatively less well on Performance IQ measures as well. However, in a review by Clifton (19) it is appropriately stressed that factors such as ethnicity, cultural values, varying environments and other factors can contribute to these differences. We would add to the list that diet needs to be carefully studied as well.

B. THE PRESENT INVESTIGATION

The present pilot study was initiated to assess the possible relationships of dietary status, including consumption of specific food substances to learning and/or behavioural difficulties in Canadian Indian children. Initially, the aim was to conduct an in-depth analysis on 25 children from each of three reservations. It was decided to train Indians as research assistants in order to facilitate communication with the families and with the children themselves. After a great deal of interviewing, three research assistants were selected and a timetable as outlined in Appendix I was established. Unfortunately, problems arose on two of the reservations and hence a full and complete investigation was obtained

for only the Oneida Reservation for which Guy Smith was the research assistant. The experiences and recommendations prepared by the three research assistants along with that of Mrs. Erika Dunbar, who was the research supervisor on this project, are included in Appendix II. Since the complete investigation was obtained on only the Oneida Reservation, the following report presents findings for only that group.

Aim and Method

The specific purpose of this pilot investigation was to determine if there is an association between the child's nutritional status and the presence of school learning problems, behavioural problems at home or at school, or specific patterns of cognitive deficits.

Sample

Twenty-five children were selected and the parents were contacted to gain their permission to include their child in the study. The step-by-step procedure for contacting the sample is presented in Guy Smith's summary in Appendix II. The sample contained children between the ages of 4.6 and 8.1 years with a mean age of 6.22 years and standard deviation of 0.94. There were 8 males and 17 females. The average educational level using the code of 0 for pre-school, 1 for kindergarten and 2 for Grade 1, was 0.64 with a standard deviation of 0.76. The average percentile for height was 61.68 inches with a standard deviation of 26.9 and for weight was 65.24 pounds with a standard deviation of 25.4.

Test Materials

The parents were interviewed and extensive background information was obtained on each child. The forms used for gathering these data are presented in Appendix III. Using the format outlined in the background forms, data were gathered systematically on the child's birth and development milestones, history of illnesses, general school history and family history of medical, learning or behavioural problems. The parents were given various forms, including the Vineland Social Maturity Scale (Doll, 1965), an allergy questionnaire, a reading

disability questionnaire and a general health questionnaire to fill out on each child. In addition, the parents were asked to complete the Conners' Parent Rating Scale (Conners, 1970) which gives detailed behavioural descriptions of the child and yields scores reflecting severity of conduct problems, passivity, hyperactivity, tension, and other behaviours. Using food models, the researcher trained parents to complete a 7-day food history for their child. The parents were supervised very carefully over the succeeding days while this information was collected.

The child's school teacher was contacted and detailed academic achievement reports, achievement test results, as well as behaviour ratings of the child were completed. The behaviour rating forms are presented in Appendix IV and include the Myklebust Pupil Rating Scale (Myklebust, 1971) and the Conners' Teachers' Rating Scale (Conners, 1969). Thirdly, each of the children was individually assessed on a wide variety of tests. The forms used for recording these data are presented in Appendix V. The tests were selected to provide a sampling of a wide variety of mental abilities, along with a standardized motor and sensory evaluation. This motor and sensory evaluation has been standardized on over 2,000 Canadian urban children but it has not been used in studies on Indian populations. The tests have been standardized in both French and English and extensive normative data are available (Trites, 1977). The tests include three Verbal Subtests from the Revised Wechsler Intelligence Scale for Children (Wechsler, 1974), the Knox Cube Test (Arthur, 1947), a measure of visual memory span; the Peabody Picture Vocabulary Test (Dunn, 1965), a receptive language test ; the Raven Progressive Matrices Test (Raven, 1960), a non-verbal perceptual discrimination measure of ability; the Wide Range Achievement Test (Jastak and Jastak, 1976), achievement levels for reading, spelling and arithmetic; the Early School Personality Questionnaire (Coan & Cattell, 1972), a measure of personality traits; height, weight and minor physical anomalies (Waldrop & Halverson, 1971).

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