

## **Early Child Development: A Conceptual Model\***

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### **Abstract**

This paper reviews different theoretical approaches - psychoanalytical, behavioral and social learning, biological, cognitive, and systems theories - to identify the key individual and environmental influences on child development. Based on this review and building from Bronfenbrenner's ecological theory, a model is proposed that takes individual and environmental factors into consideration. Despite the complexity of the ecological model, it offers a holistic approach to analyze multilevel and interactive influences of child development. More specifically, the model incorporates a broad range of factors, multiple pathways by which they interact, and a multilevel approach. The proposed model has the potential, especially to address issues of socioeconomic inequality which can be at the core of programs and policies targeting children, at the community level.

“Children are like wet cement. Whatever falls on them makes an impression”

Dr. Haim Ginott

Early childhood literature is growing as the result of recognition that early experiences shape long-term human development. *The Education For All (EFA) Development Index* provides some indication that, in terms of *Universal Primary Education (UPE)*, adult literacy, gender and quality of education are improving globally. A growing number of countries are employing comprehensive planning efforts to improve early childhood experiences and education. However, serious barriers remain undermining access to and delivery of high quality services to young children. As UNESCO (2005) reported, low adult literacy rates are pulling the EDI down in some countries. Although efforts vary considerably by country, region, and community, there are indications that a holistic approach is needed to improve the situation.

Recognizing the complexity of the many relationships involved in EDI, there is a need for a general framework in guiding explanatory research. The purpose of this paper is to develop a framework that identifies key determinants of EDI so that socially and culturally relevant outcomes can be achieved. The framework takes a closer look at the bioecological model of Bronfenbrenner (1979; 1986; 1989) in order to better understand the multi-dimensional and multi-sectoral nature of EDI in the context of Canada. The bio-ecological model is both bi-directional and the interactions between the four systems, *micro-*, *meso-*, *exo-*, and *macro-* level systems are synergistic in nature. The complexity of the interactions between the systems is daunting but encourages epidemiologists, social scientists, and psychologists to better utilize factors that impact on children’s health and wellbeing. It represents a starting point for thinking about integrated service models and in general, community health.

The discussion below is organized as follows: First, a short historical description of theories that explain learning and development is provided to better understand how the relationship between environment and other interlocking systems has evolved over the past several decades. Second, a closer look at the bio-ecological model of Bronfenbrenner is undertaken within the premise of a broader context of the systems theory. Third, the key concepts with specific reference to the micro and macro systems in the bio-ecological model are incorporated into a framework for conceptualizing the impact of environment on children’s development in a Canadian province. Finally, a brief description of some of the challenges in undertaking an ecological analysis is provided.

### **Child Development: An Overview of 20<sup>th</sup> Century Theories**

Several theories of child development exist intended at predicting diverse aspects of development. Some focus on the children’s internal processes and others on external influences related to developmental changes. A vast majority of the theories stem from

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work done by psychologists that has been tested in clinical or controlled settings. In general, they all offer a lens to examine a child's early years of development in order to provide a basis for action to improve their lives.

**Psychoanalytical Theories:** According to psychoanalytical theories, development happens in various stages and children are confronted with conflicts between biological drives and societal expectations. Two notable theories in this category are the *psychosexual theory* by Sigmund Freud (1959) and the *psychosocial theory* by Erik Erikson (1980; 1995). Freud emphasized that a child's personality formation is influenced by parents' management of his sexual and aggressive drives. Erikson's work is an extension of Freud's in that he included societal influences on personality formation. In terms of its practical implications, however, psychoanalytic theories help to address deviant behaviors better than other types of behaviors.

**Behavioral and Social Learning Theories:** This set of theories suggests the importance of the environment and nurturing in the growth of a child. Prominent theories in this tradition include *behaviorism* by John Watson (1928), *theory of operant conditioning* by Skinner (1953), and *social learning theory* by Albert Bandura (1977). Watson saw children as passive beings that like clay can be molded. Skinner introduced the term 'operant conditioning' to describe the fact that learning occurs as a result of the organism responding to, or operating on, its environment. Bandura believed that children learn by observation and imitation. Children tend to be selective in what they imitate and they are more eager to imitate a behavior if it results in outcomes they value. *Social learning theories* in general maintain that overt reinforcement, punishment, or observational learning molds children's learning. They have been instrumental in developing education policies in the United States and have also helped to lay the foundation for early intervention programs such as Head Start.

**Biological Theories:** Biological theories maintained that heredity and innate biological processes impact growth in children. Thus, development is a biological process, primarily determined by genetic potential. The main thrust of the theory lies in this work of Gesell (1950). Gesell maintained that development is genetically determined by 'maturation patterns', occurring in a predictable manner. He arrived at 'milestones of development', the stages by which normal children can accomplish different tasks. Maturation theories are helpful in identifying development from a 'normative' perspective, but they more or less fail to capture the factors that risk development. Clearly, children who fall behind 'normal' children require more time to develop, and can have important ramifications for the family and society. This, in turn, risks the development of 'normal' children if more resources have to be allocated to the 'non-normal' children. It goes without saying that Goessel's oversimplification of development as a maturational process rather than a complex system of varying processes, including behavioral, can be insufficient in complex modern societies.

**Cognitive Development Theories:** The cognitive development theories focus on how children learn. Jean Piaget (1952) is a prominent theorist who focused on what children knew and how they knew it. Children's understanding of the world is the result of their involvement and interactions (Piaget & Inhelder, 1962). Lev Vygotsky's (1978) *sociocultural theory* maintained that children's knowledge is socially constructed. Children's acquisition of their culture's values, beliefs, and problem-solving strategies is in response to social interaction with more knowledgeable members of society. Vygotsky devised the concept, *the zone of proximal development* to include the range of tasks that are too complex to be mastered independently by a child but can be accomplished with adult guidance or associations with knowledgeable peers. By introducing the influence of social environment, Vygotsky made a significant contribution to our understanding of children's development (for a detailed comparison of Piaget's, Gesell's, and Vygotsky's theories, refer to the work of Agbenyega, 2009).

**System Theories:** Another set of theories is the systems theory. Its main thrust is that development cannot be explored or explained by any one single concept, like biology, but rather by a more multidimensional and complex system. Urie Bronfenbrenner (1977; 1979; 1986; 1989) formulated the theory known as the *ecological systems theory* to make this point. Bronfenbrenner's perspective has some bearing on the works of Bandura and Vygotsky in that environment is either explicitly or implicitly considered as a primary mechanism in children's development by all three theorists. According to Bronfenbrenner, a child's development is shaped by the varied systems of the child's environment and also by the interrelationships among the systems. The relationship between the child and the environment as he saw it is reciprocal; the environment influences the child and the child influences the environment. Human beings, Bronfenbrenner suggested, cannot develop in isolation, but within a system of relationships that include family and society. The theory is further discussed in the next section. The work of Bronfenbrenner and two other psychologists Mamie Clark and Edward Zigler laid the foundation for the landmark program, Head Start in the US (Woo, 2005), which indicates its potential for conceptualizing children's development from a holistic perspective.

### **The Bioecological Model: The Nested and Interconnected Structures in Development**

Child development takes place through processes of progressively more complex interaction between an active child and the persons, objects, and symbols in its immediate environment. To be effective, the interaction must occur on a fairly regular basis over extended period of time.

Bronfenbrenner, 1998, p. 996

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The ecological environment, as Bronfenbrenner (1979) put it, is a “set of nested structures, each inside the next like a set of Russian dolls” (p. 3). A child’s development is gradual and involves a reciprocal relationship between the child and his environment. This is a major breakthrough in theorizing complicated structures of multicultural and multiethnic societies, such as Canada. From a functional perspective, this hierarchically organized system can be better understood within a related framework, the *Process, Person, Context, and Time* (PPCT) model.

### The PPCT Model

Bronfenbrenner’s ecological theory has four major components: process, person, context, and time (Wachs and Evans, 2010).

#### Process

The *proximal*-or *near-processes* involve all sorts of transactions between the child and the immediate surroundings that are responsible for the child’s competencies and general well-being. These transactions drive development. From a research perspective, examples of proximal processes, either protective or preventive, can be phrased in questions, such as: Does the child get lessons about appropriate behaviors? Does the child receive authoritative parenting (love in combination with strict rules)? Does the child get protection from physical and psychological harm (toxins, fire, etc)? Does the child get nutrition? Does the child get parental involvement in understanding religious or cultural practices?

In addition to the proximal processes, there are also *distal processes* at work. Distal processes include a family’s own ability to support a child as well as interact with other environments, of which, the child is a part of (e.g., access to community resources, resources to enable integration with different people of different ethnic or social classes). However, unlike the proximate processes, the distal processes may have only an indirect influence on the child.

#### Person

The influence of family, caregivers, or peers is largely determined by the characteristics of the child itself. For example, children with disabilities can be at greater risk of experiencing negative social relationships. Similarly, differences between boys and girls in their maturity, coping skills, reasoning etc., contribute to differentials in social relationships and healthy functioning in terms of biology. In what follows, individual level variables, such as age, sex, temperament, disability and illness can be linked to development. Such variables can also influence proximal processes, either directly or indirectly. For example, child care practices (proximal processes) will differ based on a child’s temperament, which in turn, impact growth and development.

### Context

The best known component is the ecological *context*, and is perhaps, the most important of all four components in conceptualizing and designing studies on child development. Context refers to the multiple venues modifying the proximal processes, and they include environments in which the child is in constant interaction, whether it's physical, social, or economic interaction. For example, the fewer children a caregiver has, the better he/she is able to provide quality care, which influences positive development.

The context, according to Bronfenbrenner, constitutes four distinct concentric systems: *micro*, *meso*, *exo*, and *macro*, each having either direct or indirect influence on a child's development (for more details on the four systems, refer to the work of Parrila, Ma, Fleming, & Rinaldi (2002)). The salient elements of the four systems are explored here. A fifth system, *chrono*, was later added to incorporate the dimension of time as it relates to a child's environment. This may involve internal or external changes, such as the physiological changes or events, such as the loss of a parent. A graphic representation of the key features in Bronfenbrenner's bioecological model is presented in Figure 1.

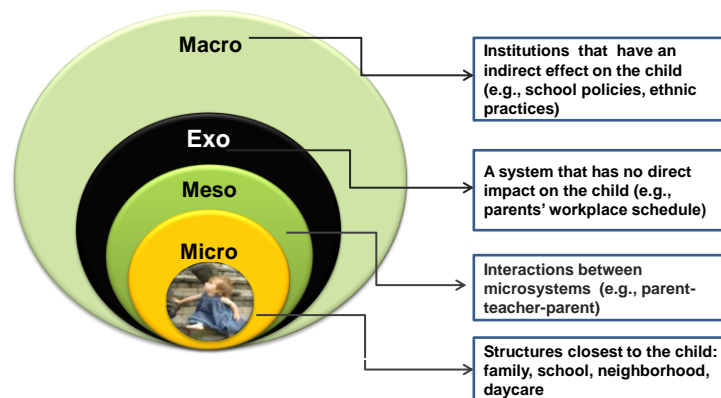


Figure 1: Bronfenbrenner's bio-ecological model of child development

**Microsystem:** The *microsystem* is the innermost level, the one that is closest to the child that the child is in direct contact with. The microsystem consists of such contexts as family, playmates, day care, school, and neighborhood. wherein the proximal processes occur. This layer has the most immediate and earliest influence on the child. The relationships at this level can be, as Bronfenbrenner called it, *bi-directional* since the child's family can influence the behavior of the child and vice versa.

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For practical purposes, the micro-level variables of early child development, either proximal or distal processes may include, among other familial or childcare environments, nutrition, parenting style, parent's health, and demographic and socioeconomic status (e.g., marital status, income). Among preschool children (age 0-5 years), parenting is the primary proximal process. In instances where both parents work, their caretaking abilities are compromised, impacting microsystem influences on proximal processes.

**Mesosystem:** The *mesosystem* is the second immediate layer and contains the microsystem. It focuses on the connections between two or more systems, essentially different micro systems, such as home, playmate settings, school, etc. For example, what happens in a micro system, such as the home in which a child lives, can influence what happens in the school or a play ground, and what happens in a school or a playground can influence interactions at home. More specifically, a parent's and a teacher's involvement in the child's education, if mutual, will result in mesosystem functioning.

The connection between other larger structures, such as a church or community, can also be expected to have distal processes at work because they help the family to provide the necessary support a child needs. For example, counseling services available to the family in times of need can influence the functioning of the mesosystem.

**Exosystem:** The *exosystem* is the third layer. Although the child does not directly encounter the system, it impacts his development. The system contains micro and meso systems, and thereby impacts the wellbeing of all those who come into contact with the child. Further, the policies and decisions that are made at a wider level can also indirectly impact the child. For example, a parent's workplace schedule (e.g., shift work) can influence the proximal processes that occur and consequently the development of the child. In cases where a parent cannot get time off to attend to a parent-teacher meeting, the parent will have limited interaction with the teachers, thereby influencing a child's development adversely. A school's policies on special needs children or children of different racial and ethnic background can all be considered as exosystem influences on the child.

**Macrosystem:** The outermost context layer is the *macrosystem*. This societal blueprint influences all lower layers of the ecosystem. Aspects of the macrosystem that influence other lower layers include cultural characteristics, political upheaval, or economic disruption, all of which can solely or collectively shape development. For example, cultures having more liberal divorce laws are more likely to have more single parent families. This, in turn, affects income, hindering the opportunities that are available to the child (e.g., participation in sports). Similarly, parents from different countries, who leave their homeland to start a new life in another country, may encounter problems related to



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language, geography, employment, etc., contributing to an unstable environment where children can be at a greater risk of development.

### **Time**

The *time* component of Bronfenbrenner's model encompasses various aspects, such as chronological age, duration and nature of periodicity. An event has varying degrees of impact on development, and the impact decreases as time progresses. Events, such as a parent's debilitating illness, divorce, or change of residence can have a more profound impact on young children compared to older ones.

In summary, the systems theory surmises that human development must move beyond examining a child's biology. The bioecological theory is the first theory to embed the context in which children live by biological predispositions. It is based on the thesis that children do not develop in isolation, but, develop instead in a variety of contexts or environments in which they interact continuously. Development is not only shaped by the immediate environment, but also by the interaction with the larger environment.

### **Studying the Ecology of Children's Development: The Case of Alberta's Children**

In recent years, studies of children's development have broadened beyond to consider the impacts of various ecological levels and interactions (Evans & Wachs, 2010; Fisher-Owens, Gansky, Platt, Weintraub, Soobader, Bramlett, & Newacheck, 2007; Holt, Spence, Sehn, & Cutumisu, 2008; Lustig, 2010; Program Effectiveness Data Analysis Coordinators of Eastern Ontario, 2009). Based on discussion above, a model is proposed to predict children's development in a Canadian context. A test of the model using data at the individual and area-level for the province of Alberta will be undertaken, as part of the Early Child development Mapping (ECMap) project.

To clearly understand the lives of young children, we need to:

- identify areas of strength and vulnerability in the child population;
- understand the multi-directional interactions between nature and nurture (child and community characteristics);
- present research evidence revealing gaps in theoretical frameworks and prospects for change to facilitate planning and evaluation of programs or interventions;
- initiate and/or improve collaborative efforts between groups, organizations, community members, and lay people involved in children's care and development; and
- stimulate community actions affecting the child, environment or both so that positive outcomes for children are realized.

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The ECMap project of Alberta was launched in 2009. It aims to achieve these objectives, through collection, analysis, and dissemination of Early Development Instrument (EDI) data, Statistics Canada's census data (2006), and various administrative data and inventories of community assets, gathered at the community level. The conceptual model presented here will explore various levels of personal, social, economic, and environmental influences. A short description of the EDI is as follows:

The Ontario Early Years report (Mustard and McCain, 1999) set the stage for the EDI. Magdalena Janus and Dan Offord (2000) developed the instrument in consultation with various community stakeholders to provide a population-level estimate of child development at the time of school entry<sup>1</sup>. The EDI:

- is, mainly a teacher rating of children's readiness for Grade 1 and is assessed during kindergarten;
- has been implemented in many communities across Canada with Alberta joining the data collection in February 2009 (Wave 1); and
- Wave I cover 104 core items on five domains of children's development—physical health and wellbeing, social competence, emotional maturity, language and cognitive development, and communication skills- and includes 9641 children.

The proposed model (Figure 2), based on the bioecological model of Bronfenbrenner, recognizes the importance of multi-level environments as well as interactions among them as key to development. The research question behind the model is: what characteristics (child, family, school, community level) best account for community differences in children's developmental outcomes (physical health and wellbeing, social competence, emotional maturity, language and cognitive development, and communication skills). A detailed description of the variables constituting the five dimensions in EDI is beyond the scope of this paper, and only the dimensions are indicated in the model.

### **Individual-level influences**

The 12 broad factors that have been identified and adopted as health determinants in Canada are (Berkman & Kawachi, 2000; Health Canada, 1996): (1) biology and genetics endowment; (2) personal health practices and coping skills; (3) social support networks; (4) healthy child development; (5) education; (6) income and social status; (7) employment and working conditions; (8) social environments; (9) physical environments; (10) health services; (11) gender; and (12) culture. The 12 factors form the key to

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<sup>1</sup> It is important to note that school entry means different things in different jurisdictions and provinces in Canada; it means kindergarten in some and Grade 1 in others.

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conceptualizing health in general. Most or all of these factors influence and are influenced by children's health and development, in particular.

There are theoretical reasons to hypothesize relationships between genetic and biological factors and development. The concepts of sex and gender differ; sex is a biological category and gender is regarded as a socially and historically constructed entity. That being said, both can impact behavior, coping skills, social discrimination, and so on, and thereby development. Bandura's (2001) own view of biology highlighted a potentialist view (see also, Thurston & Vissandjee, 2005). To him, "a biological determinist view highlights inherent constraints and limitation. A biological potentialist view of human nature emphasizes human possibilities."(p.21). Prosocial behaviors may be expected to differ between boys and girls. According to Beall, 1993), although boys are not necessarily discouraged from engaging in prosocial behaviors, they are not actively engaged in such behaviors. A child's age and sex can be potential moderators of the relationships between socioeconomic and cultural environments and development. For instance, as Duncan & Brooks-Gunn (2000) suggested, family poverty in the preschool years relates more strongly than later poverty to indices of cognitive ability (e.g., intelligence, verbal ability).

In the model proposed here, such child- level variables as age, sex, special needs status, and school days missed will be examined. From a methodological perspective, the impact of special needs status on development would perhaps be best studied by treating them as a separate group. By doing so, one could avoid the confounding influences at various system levels of such a status. Nevertheless, it is worth considering the influence of this variable in a broader context because special needs status can be associated with lower levels of social interactions, suggesting a proximal cause of underdevelopment in children.

### **Neighborhood and community-level influences<sup>2</sup>**

The contextual variables included here are neighborhood and community characteristics. Neighborhood and community level factors can influence development in different ways. To a greater extent, the ability of a parent to fulfill his/her expectations is likely to depend upon the context in which the parent finds him/herself. More specifically, the quality of neighborhood (e.g., safety, accessibility, cohesion), the resources available (e.g., library,

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<sup>2</sup> The terms, neighborhood and community, may mean different things to different people. In this paper, a community is conceived as a geographic region that actively supports and strengthens connections between families, neighborhoods, and the whole society. While community leaders from all sectors, including profit and nonprofit sectors (e.g., business, church) may adopt a more formal strategy to come together and work to address critical issues in a community, it may be less formal for leaders in a neighborhood to do so.

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parks), the ability to secure benefits and social relations (social capital), and the collective experiences of involvement in socio-cultural institutions (e.g., health club, church) all can facilitate interactions and development.<sup>3</sup> In addition, Physical environments, such as population density, urbanization, availability of profit (e.g., grocery stores) and non-profit organizations (e.g., shelters and volunteer organizations), and transportation resources all have important influences on development, at meso and macro levels. Similarly, loneliness and social isolation, often affected by language barriers, contribute to negative consequences on a child's development (see, Thurston & Vissandjee, 2005), especially among immigrant families. These factors can operate, not only at the micro- level, but also at the meso and macro levels. More specifically, if ethnic minorities are marginalized as a result of meso level services and institutions and macro level policies available to them, it can have potentially negative consequences on individual families. In the proposed model, social cohesion is considered as a potential factor influencing child development at a neighborhood level.

There are theoretical reasons to believe that individual and area-level socioeconomic statuses (SES) interact. The availability of health food stores, for example, varies by area-level SES, consequently, the opportunity to spend an individual's or family's income to buy healthy foods varies by area-level SES. However, inclusion of both the individual and area level SES is often not possible because of lack of data. Thus, investigations often involve studying the impact of SES at the macrosystem level (Ackerman & Brown, 2010; Kershaw, Irwin, Trafford, & Hertzman, 2005).

Since individuals' income can alter areas income, area-level socioeconomic status can be equally important as individual level socioeconomic status in explaining children's development. Evidence to date suggests that socially and economically disadvantaged areas are more likely to have proportionately large numbers of developmentally at-risk children (Evans, 2004; 2006). Developmental studies routinely control SES as a way of accounting for the variation in environmental stressors. Rather than using various abstract variables in the form of numbers or proportions, a single index quantifying the complex conditions or circumstances can be more meaningful in understanding the conditions that shape children's development.

The present model uses such neighborhood variables as, social cohesion, physical environment (e.g., safety, parks, church, and voluntary organizations) collected from primary and secondary sources. It also incorporates SES and dissimilarity indices, computed using the 2006 Census data. The SES summarizes various socio- economic and cultural variables and the dissimilarity index provides a measure of unevenness in which

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<sup>3</sup> Social capital has been defined as the “ability to secure benefits through membership” and social relations (Portes, 1998, cited in Hawe & Shiell, 2000).

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major ethnic groups are distributed across communities that make up the larger structures.

A graphical representation of the relationships between variables is presented in Figure 2. This model builds on the theoretical discussions above, and incorporates influences in each of the five major domains of EDI. In addition, it represents a multi-level conception of how the different factors influence each other. A time element is also included, recognizing the very fact that development is dynamic and each child is likely to experience a unique developmental trajectory.

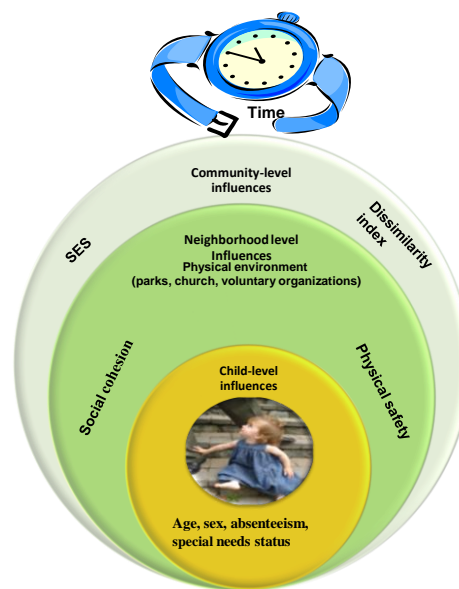


Figure 2: Child, neighborhood and community influences of child development

## Empirical Challenges in Undertaking a Bioecological Analysis

It is clear that the interactions involved in understanding development are complex and, as yet, a bioecological research design is rarely attempted. The tendency has been to focus on determinants on the basis of their closeness to the child. Investigations based on bioecological theory are limited due to paucity of data. It is also important to note that there is a lack of primary data to fully understand interactions at all levels of social ecology; data are largely drawn from a secondary source, thereby limiting the availability of variables. The absence of variables pertaining to individual responses is a notable limitation. In addition, data are mainly cross-sectional, and therefore, hard to establish causal relationships. In cases where longitudinal data are available, they are collected within a short span of time, as is the case with the EDI for the province of Alberta. Under

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these circumstances, the ecological model appears to be a paradox with little or no opportunity for researchers to replicate earlier designs, if any, and also to utilize the model to its fullest potential.

Among other things, an aspect not addressed in the proposed model but critical to children's development is that of physical environment, including exposure to toxins and pesticides in a variety of contexts. Perhaps the most pressing need for modification on the model is the testing of influences of a child's and family's health behaviors on development. It is also important to test the effectiveness of the model for culturally distinct groups, such as Aboriginals.

With all these limitations, one can hope that the model proposed here will prove to be useful for interventions at the local and community level and will likely contribute to studying child development within a complex ecological framework. Although simplistic in terms of multi-level factors, it will provide the platform to expand characteristics of the environment including meso-level services and institutions and macro-level policies.

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