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# The Ecology of Human Development: Evolving Models for Cultural Psychology

**Carol M. Worthman**[1]

## Abstract

The Whiting model aimed to provide a blueprint for psychocultural research by generating testable hypotheses about the dynamic relationships of a culture with the psychology and behavior of its members. This analysis identifies reasons why the model was so effective at generating hypotheses borne out in empirical research, including its foundational insight that integrated nature and nurture, its reconceptualization of the significance of early environments, and its attention to biopsychocultural dynamics active in those environments. Implications and the evolution of the ecological paradigm are tracked through presentations of three current models (developmental niche, ecocultural theory, bioecocultural microniche) and discussion of their related empirical literatures. Findings from these literatures converge to demonstrate the power of a developmental, cultural, ecological framework for explaining within- and between-population variation in cultural psychology.

## Keywords

childhood, parenting, embodiment, biocultural anthropology

## Early Environments, Human Development, and Cultural Psychology

The study of human development engages core anthropological concerns regarding not only the what but also the how, the why, and the so what of human diversity. Early work by Boas (1912) and his students "denaturalized" human differences by showing that much of the variation in behavior and appearance among societies was a product of culturally driven dynamics operating during development rather than of innate difference. Consistent with the relative neglect of childhood and development in much of later anthropology, few of Boas's students continued his focus on comparative human development, though Mead was a notable exception.

The work of John Whiting, Beatrice Whiting, and their students dramatically advanced the field by allying a strong theoretical base with rigorous empirical research to build a collaborative comparative tradition grounded in integrated ecological theory (Munroe, Munroe, & Whiting, 1981; J. W. M. Whiting et al., 1966). The Whitings and their colleagues theorized the role of

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culture in human difference as acting through its impact on the proximal conditions for child development, in particular as it shaped early experience. Reciprocally, the child was understood to bring to the developmental project a suite of cognitive, behavioral, and physical dispositions, sensitivities, predilections, and capacities that had been honed through evolutionary processes. Moreover, child development was to be studied as it unfolded within the context of a wider community setting that, in turn, had been shaped by physical environment and the historical forces of cultural evolution (J. W. M. Whiting, 1977).

This integrative framework provides an account for the roles of individual, household, community, population, and evolutionary forces in developmental process that mediate the way culture plays out in human development. Major conceptual advances of this theory are its specification of ecology, its concrete linkage of conditions with developmental processes, and its formulation of how factors at multiple levels of analysis would inform those conditions and processes. Such theoretical specificity moreover generates hypotheses and supports operationalization for comparative research within (e.g., gender) and between (e.g., child care practices) societies (B. B. Whiting & Edwards, 1988; J. W. M. Whiting & Whiting, 1975).

Later developmental ecological frameworks of other disciplines (Bronfenbrenner, 1979) have been effective in mobilizing attention from strictly social factors to the power of ecological forces in development. But these later frameworks neither offer a theoretical core that engages the historical-cultural determinants of the settings in which development occurs nor draw on evolutionary backgrounds that inform design features of developmental processes. Consequently, these frameworks from other disciplines have supported lines of inquiry that, although richly productive, have not generated integrative theory that engages settings and design features. This article discusses the evolution of multilevel models from that of the Whitings. In particular, it reviews progress on the incomplete task of integrating embodied dimensions in bioecocultural models. Four exemplars of frameworks for developmental cultural psychology and related research findings are discussed and compared to identify strengths and differences and to evaluate their effectiveness in probing how development shapes cultural psychology.

## The Whiting Model for Psychocultural Research

The Whiting model aimed to provide a blueprint for psychocultural research by generating testable hypotheses about the dynamic relationships of a culture with the psychology and behavior of its members. Through a cooperative approach unusual for anthropology, it evolved over decades of collaborative conceptual and empirical work by numerous investigators working at multiple field sites and/or with cross-cultural ethnographic databases. Figure 1 represents a redrawn version of the model as published by John Whiting in 1977, with levels of analysis inserted on the right. In this scheme, environment and history both interact and shape the structural characteristics of a society that compose its maintenance systems. Structural factors, in turn, define the child's learning environment, or the sets of experiences and conditions that the child encounters during development. The psychobehavioral patterns manifest in adults who grow up through such culturally constituted rearing environments reflect learned features acquired during development acting along with constitutional features innate from birth. Adult psychology and behavior, in turn, both manifest and generate projective-expressive systems that compose the cultural core of distributed practices, values, beliefs, and meaning.

The model was not intended as a serenely homeostatic account of how culture produces competent adults who reproduce viable culture. Rather, and more ambitiously, it was intended to explain cultural variation as a product of local contextual and structural conditions that shape early experience, produce distinctive intrapsychic conflicts, drive cultural change, and consequently underlie cultural configurations. Furthermore, the model included assumptions that

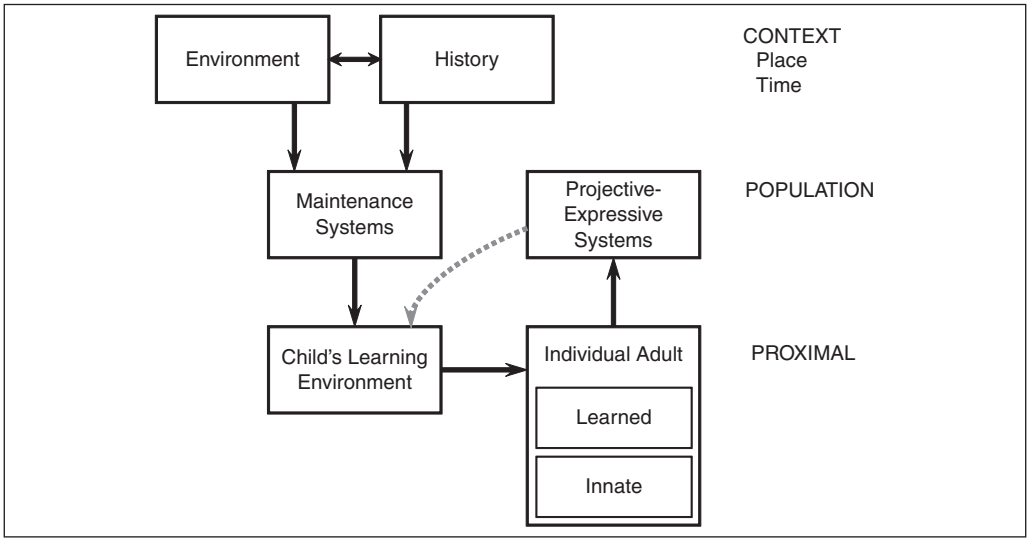


**Figure 1.** The Whiting model for psychocultural research, redrawn and with the addition of levels of analysis along the right side of the figure
Source: J. W. M. Whiting (1977).
Note: Solid lines indicate causal relationships; the dotted line indicates possible but uncommon direct feedback.

projective-expressive systems are penetrated by the roots of distress, dysfunction, and social pathologies (violence, suicide) emerging from seeds sown during development. In this view, the psychobehavioral challenges in adulthood reflect tensions and conflicts engendered by the heavy, competing demands for development of social competence and compliance to cultural demands and expectations imposed on the young during their early formative years. In line with Freudian concepts, the Whiting model proposed that such early burdens produce enduring intrapsychic conflicts and tensions that must be accommodated by other cultural arrangements. This process of cultural accommodation is effected through the motives, understandings, and behaviors of the adults themselves.

Thus, the tensions triggered by early learning conditions were thought to directly influence the beliefs, values, and practices that compose a culture as well as its characteristic psychobehavioral epidemiology. Indeed, projective-expressive systems were viewed as defensive responses to persistent psychic conflicts established early in life. Consequently, the model suggested that cultural differences could be explained in terms of the impact of distinctive early learning environments on adult psychology and behavior. Therefore, it could be used to generate hypotheses about what the key features of early experience might be and how they operate in adulthood. As a result, identification of such early-adult linkages and their relationship to cultural differences became a goal of cross-cultural research.

## *Nature and Nurture: Something More and Something Less Than "Natural"*

The Whiting model included a set of assumptions about human nature that drew on several sources in the learning, psychodynamic or Freudian, attachment, and stress literatures (J. W. M. Whiting & Child, 1953; J. W. M. Whiting & Whiting, 1975). But the evolved, innate aspects of human nature were understood to be inherently nurtured as they emerge through development. Thus, John Whiting pointed out that many branches of anthropology subscribe

to a "natural man" approach, presuming psychic unity and a shared human nature whereby "adult members of all societies have the same psychobiological needs, motives, and capacities" (J. W. M. Whiting, 1977, p. 31). Although Whiting also subscribed to these assumptions, he went on to make the following vital distinction: "that events occurring in infancy or early childhood . . . make a person something *more* or something *less* than a natural [hu]man" (J. W. M. Whiting, 1977, p. 31).

By this view, human nature is essentially nurtured insofar as the ecology of human development is inherently a cultural ecology. Thus, the "innate" features of adults in the Whiting model (see Figure 1, lower right) were needs, drives, motives, and capacities formed by the interplay of constitutional and psychobiodevelopmental processes with the contexts under which they occur. With this integrative move, the nature–nurture divide was breached, smoothly and without fanfare. Furthermore, this was the critical foundational insight that arguably fueled both the power and the durability of the Whiting model. If human nature is nurtured by design, then old understandings of human development—in terms of a fragile and variably effective process of grafting or imposing culture on an autochthonous natural substrate—are reordered. Such a shift in approach liberated the anthropological study of human development from invidious and unproductive distinctions. But more importantly, it reimagined the significance of early environments as well as the kinds of biopsychocultural dynamics at play in those environments. A theory-driven, empirically oriented project to explain cultural diversity and identify universals thereby yielded a valuable conceptual advance with wide scientific leverage and, consequently, importance well beyond the discipline of anthropology.

## *The Power of a Cultural-Ecological Approach*

The power of the ecological approach central to the Whiting model is demonstrated by the substantial body of distinguished empirical and theoretical work that it has generated across several generations of scholars (e.g., D'Andrade & Strauss, 1992; LeVine & New, 2008; Moore & Mathews, 2001; Weisner & Edwards, 2001; this special issue). The Whitings and their colleagues tested the model extensively on multiple dimensions of each its components. Dimensions they explored included climate, flora, fauna, and terrain (for *environment*); migrations, cultural borrowings (Galton's problem), and inventions (for *history*); economy, settlement patterns, household type, and social structure (for *maintenance systems*); tasks assigned to older children, frequency and intensity, rewards and punishments, disciplinary techniques, salience of mother and father, number of caretakers, and infant stress (for *child learning environment*); behavioral styles, skills and abilities, values and priorities, conflicts, and defenses (for *learned adult outcomes*); and, finally, magic beliefs, religious dogmas, ritual and ceremony, art and recreation, games and play, and rates of crime or suicide (for *projective-expressive systems*; reviewed in J. W. M. Whiting, 1977).

What made the Whiting model so useful? Among the manifest advantages, several stand out as relevant to the purposes of the present discussion. A major source of its utility was the insight at its core. The resolution of nature–nurture antagonisms by an integrative approach supported a more comprehensive account that significantly increased the empirical traction of the work it informed. In moving beyond nature–nurture distinctions by recognizing the significance of interactions between them, the Whiting model opened the way to myriad new hypotheses about the nature and impact of those interactions. Then, the focus on development proved an ideal context for studying such dynamics. Indeed, advances in other fields, from psychophysiology to neuroscience, have highly galvanized productive lines of research by demonstrating the pervasiveness and centrality of individual–environment, or nature–nurture, interactions that drive development (see, e.g., West-Eberhard, 2003). Anthropologists repeatedly have noted that human ecology *is*

largely social-cultural ecology (Super & Harkness, 2002). Therefore, if we are interested in human diversity and the role of culture in its genesis and consequences, then the study of development becomes imperative.

Furthermore, by pointing to the child's learning environment, the model identified a target for investigation that effectively concentrated the scope of observation. Rather than comprehensively consider all actors or aspects of culture that might influence child development, attention was directed to the actual proximal envelope of conditions and experiences that children in a population would expectably encounter, framed in probabilistic terms (by gender, age, social status, etc.). Furthermore, the concrete emphasis on practices and tasks, social and material resources (including power, prestige), actors and companions, and physical and social demands led to direct engagement with infant and child experience to study social development from the ground up, not only top-down. Consequently, culture was brought down to earth and operationalized in terms of the child's lived experience during development. Although a focus was cross-cultural comparison, the model explicitly supported within-population analyses that sit well with contemporary emphases on social positionality and marginalization, disparities in life chances and outcomes, and ethnic diversity. Convergent lines of inquiry in psychology have pointed to the importance of context (Bronfenbrenner, 1979; Cole, 1985) and practices (Goodnow, Miller, & Kessel, 1995) in child development.

A final conceptual strength of the model was not only the inclusion of multiple levels of analysis but also the systematic attention to the relationships among them. Notably, the model was not hierarchically organized to explain individual outcomes; rather, the experiences in early life and adulthood resided at the center of pathways that led from history and environment to structural factors, through formative experiences to individual adults, and on to living culture. This scheme framed dynamics between individual and society in objective and structural as well as affective and behavioral terms. Thus, the world of emotion and meaning were placed at the heart of "objective" social phenomena such as behavior and structure.

Complementing the conceptual strengths, the foundations of psychocultural research rested on approaches to the conduct of research that since have become widespread among many branches of the social sciences (Kessel, Rosenfield, & Anderson, 2003). These include a cooperative collaborative approach, where research is done by cooperative teams rather than individuals or hierarchically organized groups. In addition, and related to this approach, the effort was multidisciplinary, including not only cultural anthropology but also developmental and cognitive psychology, education, and even biological anthropology. Further allied to the multidisciplinary approach was the use of multiple forms of data, from direct field observation to historical ethnographic databases. With features that the other social sciences have been much slower to pick up until recently, the work was also comparative, cross-cultural, and multisited. The comparative approach supports both hypothesis testing and hypothesis generation. Multisited research permits both comparisons among populations that differ in construction of early experience as well as study of the effects of variation in childhood experiences within populations.

## *Stress in Early Experience*

A particularly instructive example of the power and evolution of the Whiting model is provided by tracking the place of early stress in the work of Whiting and his students into the present. Related to its nature–nurture integration and grounded materialist stance, an unusual feature of the model was the incorporation of adaptationist-functionalist and biological dimensions. The inclusion of stress in the concept of early learning environment reflected this stance and set Whiting and colleagues on a path of inquiry well in advance of today's vibrant research on stress and development (Caspi & Moffitt, 2006; Gunnar, 2000).

Stimulated by experimental studies with rodents that identified enduring and cross-generational effects of early physical or psychological stress on growth and behavior development (Denenberg & Whimbey, 1963; Levine & Lewis, 1959), Whiting and his students first attempted to extend these findings to the ethnographic literature. They found that the presence of practices that subject infants to physically (e.g., circumcision, piercing, immunization) or psychologically (maternal separation) stressful experiences was associated with increased height in adulthood (Gunders & Whiting, 1968; Landauer & Whiting, 1964). They then replicated these findings with data from two longitudinal studies in the United States showing that individuals immunized before age 2 years were taller as adults than were those not immunized in infancy (J. W. M. Whiting, Landauer, & Jones, 1968). Finally, Landauer and Whiting (1981) undertook a field experiment with random assignment of infant inoculation for smallpox in an area of Kenya where it had been eradicated and found the inoculated group was taller as children.

These studies were among the earliest investigations into the long-term effects of early stress, particularly psychosocial stress, on human development. The issue has since become an intensely active field of investigation that is delineating the interplay of constitutional and contextual factors during development. Most of this work is proceeding within psychology (Gunnar & Donzella, 2002; Meaney, 2001; Suomi, 1991), neuroscience (Caspi & Moffitt, 2006), pediatrics (Boyce & Ellis, 2005), and psychiatry (Heim et al., 2002). It has borne out the early findings of Levine and Denenberg while also identifying the epigenetic, neuroendocrine, behavioral, and contextual factors that forge relationships among maternal care and early experience with enduring patterns of emotion regulation and behavior that also carry forward across generations.

The impact of both John and Beatrice Whiting's pathbreaking work is exemplified in that of their students who have gone on to make major theoretical and empirical contributions on the cultural ecology of human development and who, notably, also have been concerned with the formation of emotion regulation in early experience and child care practices. We turn to three exemplars. Although the published exemplary models are discursive and empirical, the diagrams presented here have been prepared from published material for heuristic purposes and to facilitate comparison with the Whiting model.

## *The Developmental Niche*

A substantial expansion from the Whiting model was formulated by Sara Harkness and Charles Super in terms of the developmental niche (Super & Harkness, 1986). The model is wholly congruent with the parent version but focuses on the dynamics creating the experiences that a child actually encounters while growing up. The developmental niche is produced by an interacting micro-system of settings, customs, and actors that compose the daily experience of the child (see Figure 2; based on Harkness & Super, 1994). Reciprocally, the child is viewed as an active agent vis-à-vis the niche who shapes the specific micro environment she or he inhabits and, of course, embodies the lived experience itself. Thus, the interface between the child and the developmental niche produces individual experience and constitutes the micro-environment for the child. Viewed as centering in the household, the system composing the niche includes homeostatic elements to accommodate conditions or changes in the child, the three niche components, and the societal and physical macro-environment. The model builds on concepts from biology, including epigenesis, the view of development as produced through person–environment interactions, and development as a process of adaptation (Super & Harkness, 1999).

The niche concept advances the goal to bring culture down to earth by examining its play in the construction of everyday experience during development and then tracing the resultant outcomes. That it does so in concrete terms has permitted Super and Harkness as well as a wide network of colleagues to translate the model into empirical cross-cultural research on the impact of culturally

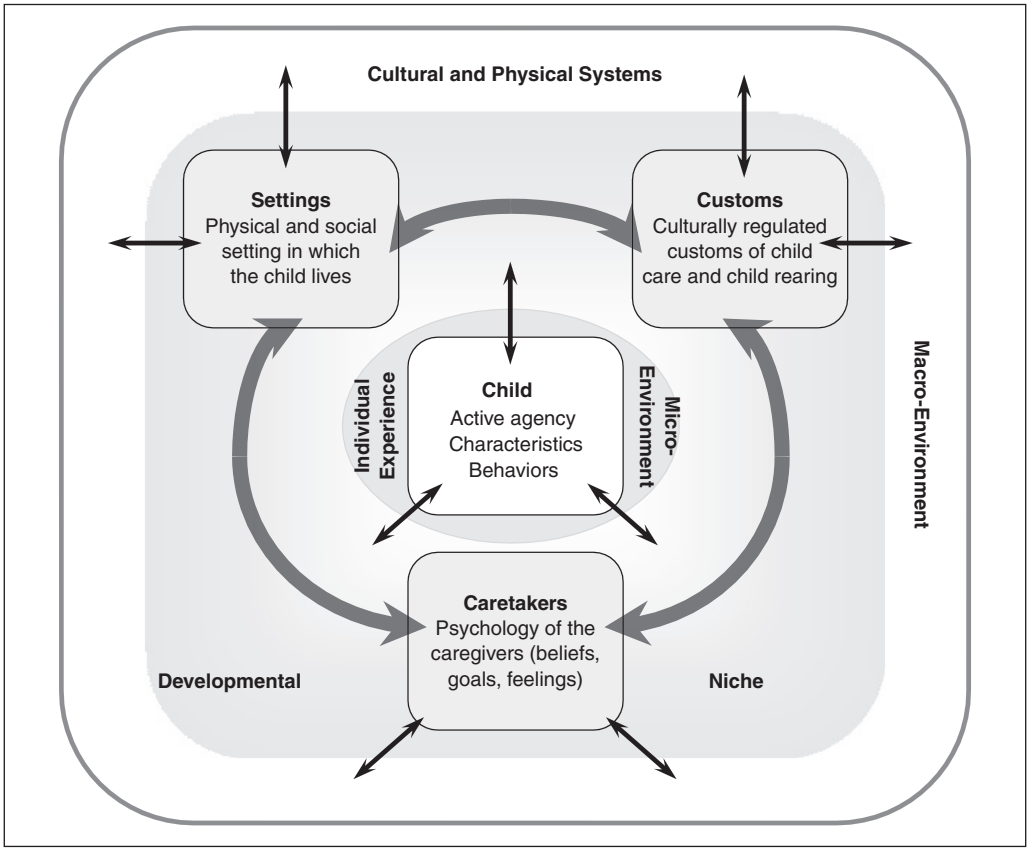


**Figure 2.** Harkness and Super model for the developmental niche
Source: Based on explications in Harkness and Super (1994) and Super and Harkness (1986).
Note: Black arrows indicate interactions. Wide grey arrows indicate systems dynamics among components of the developmental niche. The oval area (center) delineates the zone of proximal development, including the child's individual experience and micro environment. Note the focus on household as the locus for developmental niche.

informed differences in the child's early environment on emotional, social, and behavioral development. Their ongoing comparative study of parents, children, and schools represents perhaps the strongest manifestation of the Whiting legacy of multisited comparative field research but greatly enriched in depth, methods, comparability, and specificity (Harkness, Blom, et al., 2007; Harkness et al., 2006). Following the footsteps of another distinguished Whiting student, Robert LeVine (1997), Harkness and Super have studied the cultural forces that shape caregivers. Following the Whiting dictum of replication as the ultimate test of generalizability, they have repeatedly demonstrated across several societies that parents and other caregivers hold ethnotheories about child development and attempt to apply them in their care of infants and children, with effects on child outcomes (Harkness & Super, 1996, 2005; Parmar, Harkness, & Super, 2004).

Super and Harkness furthermore have maintained and advanced the Whiting emphasis on emotion processes at the interface of child and culture during development, particularly the socialization of affect and emotion regulation (Harkness & Super, 1983). Both their incorporation of current concepts from biology in conceptualizing the developmental niche and their thorough familiarity with the emerging psychobiological literature on child temperament, early stress, and

psychobehavioral development promoted their interest in linking the two lines of research (Super & Harkness, 1994). An early study of Dutch parents' ethnotheories and the construction of daily infant schedules and care identified specific goals for infant emotion regulation (even-tempered calmness, equanimity, stability) and concomitant parenting behaviors to achieve those goals (rest, tranquility, and regularity; Super & Harkness, 1996). With colleagues in their multisited study of Western societies, they applied the paradigm and demonstrated that parents in these societies indeed valued different temperamental styles with concomitant goals for child emotion regulation and caregiving strategies toward those goals (Harkness, Super et al., 2007). From these findings, the scope of inquiry has expanded to include biomarkers of emotion and emotion regulation that probe the biocultural management of arousal in infancy by relating patterns of sleep to development of a key neuroendocrine axis linked to arousal (Blom, Super, & Harkness, 2006) as well as to pursue a comparative study of maternal stress (Sutherland et al., 2006).

The developmental niche demonstrably provides a valuable framework for launching comparative cross-cultural research on the role of culture in child development that is universally applicable in virtually any setting.

## *An Ecocultural Theory*

As proposed by Tom Weisner, ecocultural theory taps the emphasis in psychocultural research on cultural ecology, daily routine, and activity settings and their effects on psychosocial development (Weisner, 1996, 1997). Here, too, a target of inquiry is the socialization of mind and heart. An important addition—also included in the developmental niche—is a grounding in cultural models and logics (D'Andrade & Strauss, 1992; Shore, 1996).

Weisner argues for the centrality of an ecological orientation for understanding child development, anywhere. He points out that a critical gap is created when developmental research leaps from a background of presumed universals in brains, minds, actors (especially mothers), and settings (e.g., feeding) directly into investigation of individual differences within a specific population. What is missed, he suggests, is the real stuff of daily life where development happens and life histories are built, with the meanings and logics that animate them (Weisner, 2002a). Child development is never generic, always located in time and place. Ecocultural theory (see Figure 3) is predicated on the proposition that the single, universally most important contextual influence on child development is the child's participation in activities situated in a local ecology infused with cultural logics. Such activities include practices, along with their settings, that make up the daily routine. Situated activities, and the family's manner and ability for enacting them in everyday routines, are in turn framed by the ecocultural context (see Figure 3, outermost frame) that presents both resources and constraints in the mundane life of the household (box on right; Weisner, 1984).

Child development, indicated by the striped arrow (left half of Figure 3), proceeds through and with daily activities and the routines into which they are organized. Actual and perceived developmental status and maturational states influence activities and practices in which the child participates (lower curved arrow, center). Such activities, in turn, shape development (upper curved arrow, center). Taken together, the complex of culturally situated daily practices, settings, and routines makes up the ecocultural developmental project that builds pathways through the life course. Throughout, the shared purpose for families is cultural well-being, defined as cultural competence for engaged participation in appropriate and satisfying activities valued by the community (Weisner, 1997), and this shared purpose is pursued as a common adaptive project for the social unit (family). The theory predicts that family production and child participation in sustainable routines with meaningful activities increase child well-being (Weisner, 2002b). It aims for universal cross-cultural applicability to within- and between-population variation.

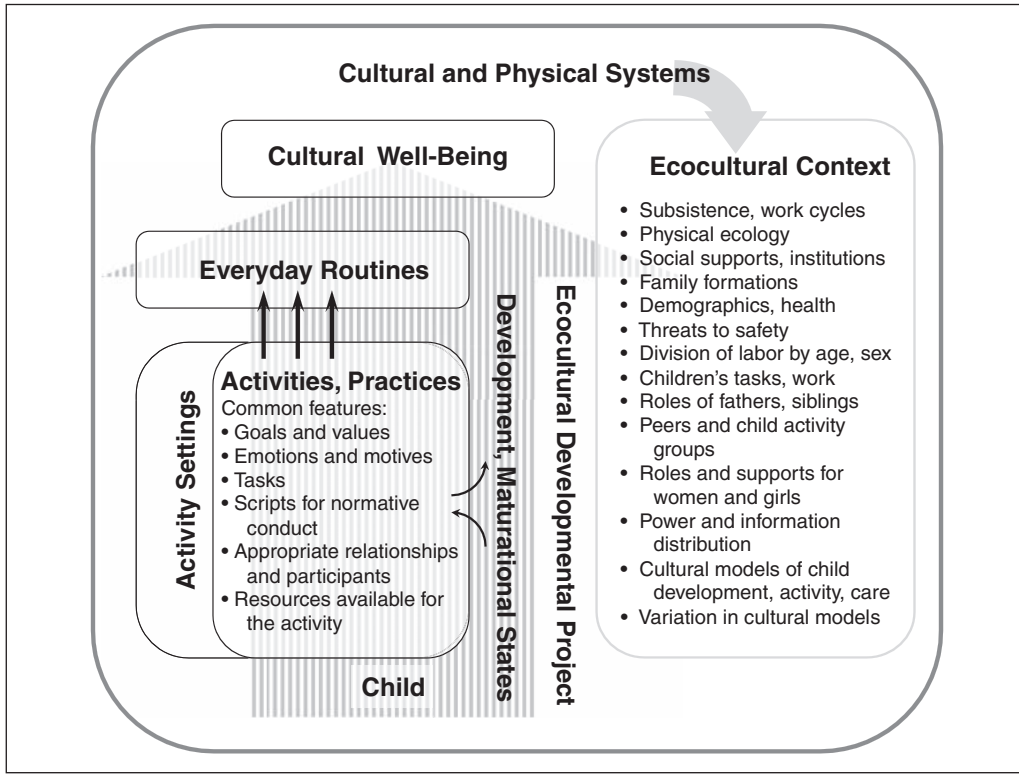


**Figure 3.** Schematic representation of the ecocultural theory of child development developed by Tom Weisner

Source: Drawn from several written descriptions (Weisner, 1996, 1997, 2002b).

Note: The wider cultural and physical systems (outer box) comprise the ecocultural context for the activities, activity settings, and everyday routines in which development (striped arrow) occurs and inform the ecocultural developmental project that extends across the life course. Actual and perceived developmental-maturational states of the child both influence (inward arrow, center) and are shaped by (outward arrow) daily activities. The shared goal is cultural well-being, or cultural competence for meaningful participation in activities expected and valued by the community.

As with all models in the cultural ecological tradition, ecocultural theory treats the individual, including the developing child, within ambient social phenomena at the household, community, and macro-societal levels. Developmental transitions represent good moments for observing these dynamics and have yielded insights into the child's development in relation to others. Hence, a comparative analysis revealed that societies reorganize the ecocultural niche (Gallimore, Weisner, Kaufman, & Bernheimer, 1989) around ages 5 to 7 years in response to a developmental transition in cognitive and social capacities that occurs in children during these years (Weisner, 1996). Similarly, a longitudinal study of American counterculture families identified parallel transitions in parental midlife and offspring teen to young adult periods (Weisner & Bernheimer, 1998). His collaborative studies of families of children with disabilities (Weisner, Matheson, Coots, & Benheimer, 2005) and of families in a welfare-to-work intervention (Duncan, Huston, & Weisner, 2007) have convinced the social science community, from economics to psychology, of the power of an ecocultural, family routines, mixed-methods approach to understanding key factors in vulnerability and resilience for children and families.

Consistent with others in the cultural ecological school, Weisner and his students have probed the cultural ecology of emotion and arousal regulation, including stress. In a study of reactivity to vaccination in Italian infants, Axia and Weisner (2002) found that caregiver behavior and domestic ecocultural conditions (respectively, more maternal soothing and infant-oriented home cultural ecology) were associated with greater infant response and latency to quiet at ages 5 and 12 months. Notably, home cultural ecology was the strongest predictor of infant regulation at 12 months. In response to debates about the impact of parent–child cosleeping on mental and physical health, analyses of their longitudinal data on American families found neither harmful effect nor any benefit (Okami, Weisner, & Olmstead, 2002). Beyond concepts of stress, ecocultural theory also includes the concept of accommodation in terms of how established family daily routines respond to the inevitable perturbations and challenges of everyday life. Such mundane accommodations are thought to markedly influence development and well-being.

Overall, ecocultural theory, with its focus on families and routines, has proven effective in unpacking the sources and meanings of variation in development and well-being not only of children but also of their families.

## A Bioecocultural Theory

The effective integration of nurture and nature in the Whiting model for psychocultural research has proven valuable also for anthropologists with a biocultural focus. Significantly, a Whiting-trained biological anthropologist, Melvin Konner (2002), has contributed pathbreaking works that complicate accepted views of human nature. Although the adaptationist-evolutionary traditions espoused by biological anthropologists concentrate on ecological dynamics and person–environment interactions, they are thin in cognitive-psychological and ethnographic orientations. Strong on physical ontogeny, they are weak on psychobehavioral development. Trained in basic science and a student first of Konner, then of Whiting, I have found the developmental, cultural-ecological, and psychocultural grounding invaluable for forging a biocultural research program.

The working bioecocultural model (see Figure 4) clearly substantially overlaps with the developmental niche and ecocultural frameworks and complements them while emphasizing and expanding embodied elements and biodesign. Only the distinctive aspects of this model are highlighted below. Developmental science is being revolutionized by discoveries about how biological design anticipates and integrally relies on environment for successful development (Eisenberg, 1998; Weaver, 2007). This model attempts to integrate those insights into the cultural ecology of human development, building also on literatures in life history theory (Stearns, 1992; Worthman, 2003), stress and allostatic load (McEwen & Wingfield, 2003; Sapolsky, 2004), and cognitive science (Barsalou, Niedenthal, Barbey, & Ruppert, 2003). In a bioecocultural view, the developmental microniche comprises the zone of proximal development representing the lived experience and actual operating conditions of the child *in relation to* the child's characteristics and capacities. Analogous to allostatic load, the microniche includes the momentary and ongoing sum of fit, affordance, and burden between the developmental niche (resources, demands, experiences) and the child's needs, capacities, and sensitivity to environmental input (endogenous factors). It is through the microniche that culture gets under the skin and thereby becomes embodied, composing the inside–outside dynamics of developmental processes. The microniche therefore also is the primary site for adaptation, vulnerability, and resilience.

By way of the microniche, cognition and behavior are formed through and in tandem with physical development as nature is nurtured. Thus, emotion regulation, learning and adaptation, cultural competence, physical function, and the foundations of mental and physical health arise through a bioecocultural process that also builds life history. Through this "natural" nurturing

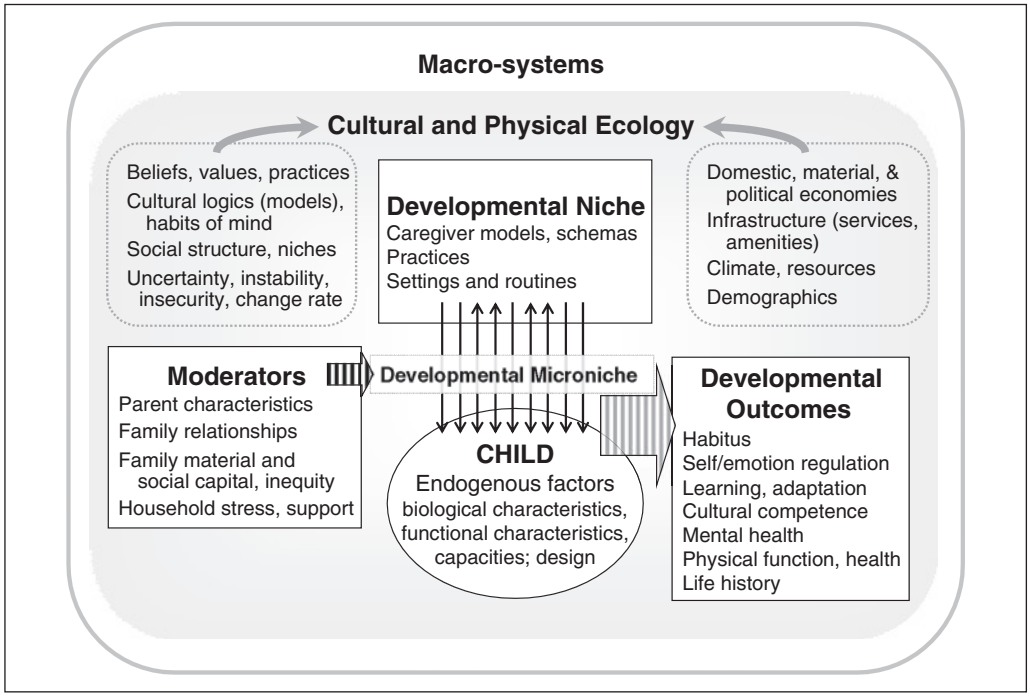


**Figure 4.** Diagram of a bioecocultural model that highlights elements and pathways of embodiment in child development
Source: Described in Worthman (2003, 2009).
Note: The large arrow from the child/microniche complex to developmental outcomes indicates the combined ongoing impact of dynamics in that complex on individual outcomes across the life course.

process, culture becomes embodied. Implications of this view of development accord with Bourdieu's (1977) influential concept of *habitus* as ingrained practical competence and social capital acquired and actuated through practice in social context, but put embodiment at its core. The ecoculturally formed systems of attention and arousal regulation play central roles in producing an individual's lived experiential world by driving selective attention, differential impact, and differential response to daily life. Hence, these systems ground individual and cultural differences and underlie the phenomena that psychocultural research seeks to explain. Uncertainty, instability, insecurity, and rate of change in cultural and physical ecology are known to influence both development and activity of these systems (Sapolsky, 1998; Weaver, 2007) and merit more systematic attention in cultural psychology.

This evolving model has generated testable hypotheses about the sources of within- and between-culture differences in biocultural processes determining differential mental and physical well-being. Gender ideology and differences in well-being proved a powerful tool for examining production of difference within populations: Early analyses traced sources of gender differences in well-being to biocultural processes at puberty (Worthman, 1998), to ecocultural formations of rearing conditions (Worthman, 1996), and to trade-offs in parental resource allocation (Worthman, 1999). In line with the literature on intergenerational transmission of emotion regulation, we predicted and then demonstrated effects of gestational stress on vulnerability to stress and risk for depression at puberty (Costello, Worthman, Erkanli, & Angold, 2007; Worthman & Kuzara, 2005). Most recently, Jason DeCaro and I tested the proximal bioecocultural

model in a study of parenting models, daily activities and schedules, and child development of emotion and arousal regulation before and after a normative social challenge (return to school). Using daily diaries, biomarkers of parent and child stress, ethnographic interview, and child psychophysiology measures, we found that parents do hold and attempt to enact clear if somewhat conflicting models of child development and appropriate parenting (DeCaro & Worthman, 2007a). Acting on these models did not always yield the expected benefits for a child's psychobehavioral development: Tactics for minimizing young child stress were undermined by a factor disregarded in working cultural logics, namely, maternal stress (DeCaro & Worthman, 2007b). Indeed, maternal and family functioning, rather than child schedule, predicted child self-regulation in response to mild acute social challenge (DeCaro & Worthman, 2008).

The model and preliminary evidence suggest that bioecocultural processes are prime movers behind cultural psychology via their construction of embodied habitus through development and thence over the life course.

## Cultural Psychology and the Ecology of Human Development

What can be learned by comparing the Whiting model with a sample of those produced by his students, and what does that tell us about the maturation of the psychocultural research agenda it represented? First, the models do reflect an absence of nature–nurture tension and seamlessly incorporate biological dimensions (adaptation, evolved design, physiology, ontogeny) as relevant to their purposes. Second, the persistence of interest in stress among all three suggests the value of the stress paradigm for tracking the cultural ecology of human development. I suggest that the reason for this is that the paradigm requires us to attend to the physical changes wrought through experience during development that carry forward as embodied knowledge, or habitus, that underlies cultural psychology. The embodied nature of the "learning" that goes on in the developmental niche or in the routines highlighted by ecocultural theory taps Whiting's insight that there is "something more and something less" than natural in human development.

All of the models share a concern for how the cultural ecology of affect and affect regulation drive psychobehavioral development, competence, and well-being or health. Whoever has looked has found linkages among cultural practices, stress physiology, and emotion regulation. Note that each of these models foregrounds the development of emotion and emotion regulation and de-emphasizes classic knowledge acquisition. Although there are important reasons for this emphasis (Damasio, 2005), a reconsideration of what constitutes "knowledge" and more systematic investigation of the linkages between knowledge and emotion might prove valuable.

On a more contrastive note, the recent models sharply differ from the earlier one in how cause and association are conceptualized. The Whiting model was pared down to its leanest, linear causal pathway, with the goal to push construction of a set of propositions that could be tested, refined, or discarded. The purpose was explanation and detection of universal forces in the field of human diversity. The later models, on the other hand, are notable for the absence of linearity. Although all are concerned with process, the first model was concerned with generalizable law-like relationships, whereas the later ones largely are concerned with processes in themselves. In the later models, the dynamics may be universal but the contents and outcomes are not. The goal is to identify key loci for these dynamics (developmental niche, routines, microniche/embodiment) and the core elements in them (activity/settings, settings/customs/caretakers, niche/moderators/endogenous child factors). Although the parent model is highly expansive and global in scale, the later ones aim to pare down the scope of inquiry to the study of core proximal processes that readily lend themselves to efficient field protocols and within- or cross-cultural study. All share the goal to understand how culture "works" in human experience but differ in the locus through which understanding is sought.

A final contrast is notable: Although the Whiting model put development along a path between macro-systems (maintenance systems, history, environment) and working culture (projective-expressive systems), the later ones do not. Rather, the main outcome of interest rests with the developing individual (or sometimes parent–child dyad) in cultural context. No attempts are made to explain cultural differences as a product of bio/eco/cultural developmental formations. This is a major shift away from a grand vision to explain cultural diversity top-down to bottom-up, to a more proximal, experience-near project aimed at midlevel explanations, theories, and understandings.

## Conclusions

This review has engaged an empirically and conceptually powerful, coherent, yet evolving and diverse set of models and modes of research in anthropology that address the grounds of cultural psychology. There are practical as well as academic reasons why such review merits our attention. The breadth and depth of cultural influences on human development and experience are old concerns for anthropology that have gained fresh urgency from current challenges including health disparities and ethnic diversity. The tradition reviewed here is deeply engaged in meeting such challenges on diverse fronts, from social and economic policy to systems of health, education, and welfare. Whiting articulated the commitment thusly: "We believe in Thoreau's 'better mouse trap' theory of social change" (J. W. M. Whiting & Child, 1953, p. 279). Social science has learned to be more modest while aiming to be more effective, yet the tradition reviewed here arguably has led the way in providing nuanced, firmly contextualized, methodologically innovative avenues of inquiry that illuminate the urgent project for constructive human development, understanding of diversity, and cultivation of social relationships.

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