Society of Pediatric Psychology Presidential Address: Toward a Social Ecology of Pediatric Psychology

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Although pediatric psychologists have contributed much to the clinical and research literature regarding the effects of chronic illness on children's cognitive and social development, unfortunately we have been less productive in examining the reciprocal influence of children's illness on other systems including peer relationships, schools, and health care providers. There are distinct reciprocal interactions between children with chronic illness and systems surrounding them. In this article, I argue that cultural systems, family systems, peers, schools, and health care providers influence the adjustment and adaptation of children with chronic illness and that children with chronic disease also have reciprocal influences on these systems. For the purpose of this article, I will draw primarily from my own program of research, as well as the programs of research from close colleagues. The literature reviewed here does not represent an exhaustive review of social ecology; rather, the purpose of the article is to provide exemplars to illustrate the notion regarding reciprocal influences of systems on pediatric populations and pediatric populations on systems. I argue for a greater systems approach in pediatric psychology. We should consider in our future research agenda the reciprocal interactions of children's illness on systems and systems' issues on children's adjustment and adaptation to illness. The scope of the article is limited to family systems, broader social systems including peers and school, as well as health care providers. I hope that this article will contribute to pediatric psychologists' broader thinking of systems in both their programs of research and the clinical issues we negotiate daily.

Much of my thinking regarding social ecology has been derived from a program of research in pediatric psychopharmacology (for review, see Brown, Dreelin, & Dingle, 1997; Brown & Sawyer, 1998). Under double-blind conditions, the effects of stimulant medication on children's behavior and learning were that their capacity to deploy attention and their on-task behavior were much improved. Also, teachers who were unaware of the children's diagnosis or whether the children were receiving active medication or placebo reacted in distinct ways (Whalen, Henker, & Dotemoto, 1980, 1981). They reacted with more intensity and control toward boys who were receiving placebos than toward the boys who were medicated. In the midst of engaging in everyday classroom activities, teachers were quite responsive to the stimulant medication status of the children. Thus, a treatment that produces significant behavioral changes in children also produces concomitant changes in those who interact with children.

But pediatric psychologists manage not just one child on medication but a network of other people as well. Based on this research examining the effect of stimulant medication on parents, teachers, and peers with whom medicated children interact, we can now conclude definitively that stimulant medication exerts a significant effect not only on the

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child but also on ecological factors associated with the child's daily life. For this reason, a corollary program of research is needed in pediatric psychology in which we examine the effects of disease and empirically validated treatments in adapting to the disease and the effect of these variables on other systems in the child's life.

Pediatric psychologists should construct a framework to include the reciprocal influences of systems on chronic illness and chronic illness on systems for the organization of empirical and theoretical data on pediatric illness. That framework should emphasize a contextual approach to all our research, similar to programs of research examining the economic impact of medical therapies (e.g., Bradford, Chen, & Krumholz, 1999; Krumholz et al., 2000; Swenson, Randall, Henggler, & Ward, 2000). This should include systematic investigation of the effects of illness and associated medical and psychosocial treatments on families, peers, teachers, and health care providers. In addition, the importance of reciprocal examination of these systems on children and adolescents with chronic illness should be underscored. These are the paths that will be most profitable for our clients.

**Social-Ecological Model**

Social ecology includes the study of the relationship between the developing individual and the setting and context in which the person actively functions (Bronfenbrenner, 1979). Kazak and colleagues (Kazak, 1989; Kazak, Segal-Andrews, & Johnson, 1995; Kazak & Simms, 1996) provide a framework for understanding how childhood illness and the individuals and systems internal and external to the family affect one another, in which the child is designated as the center of a series of concentric spheres. Reciprocity is the hallmark of this contextual theory. Children’s illnesses, their strategies for coping, and their temperament affect the systems around them; in turn, the systems also affect children’s adjustment and adaptation to their illness.

**Contexts and Systems**

A review of the contexts and systems that need greater systematic investigation is appropriate. Clearly, there has been some progress in understanding the reciprocal influence of family, peers, and schools. However, a more systematic study of health care providers and their influence on chronically ill children, and the reciprocal influences of children with chronic illness on health care providers, peer relationships, and the school environment, is the next best step for pediatric psychology.

The first level of influence is the “microsystem,” in which the child’s individual development, the disease, and the family experience reciprocal relationships (Bronfenbrenner, 1979). Included in the microsystem are the disease, the ill child, siblings, caregivers, the marital relationship, and the family. As Kazak (Kazak et al., 1995; Kazak & Simms, 1996) has argued, families have particular needs that highlight the importance of family-school relationships and associations with the health care team that are frequently altered in accordance with the demands of treatment. The availability of social networks and utilitarian resources has an effect on children with chronic illness. As Kazak and colleagues note, whether friends and extended family can support caregiving demands affects the chronically ill child and the family’s adjustment and adaptation to the illness.

**Cultural Influences.** The macrosystem considers the effect of cultural and belief patterns on each of the other systems (Kazak et al., 1995; Kazak & Simms, 1996). Professional guidelines suggest that cultural variables be included in our research programs, but investigators frequently neglect this. For example, until recently, the vast combination of psychopharmacology research has failed to examine the idiosyncratic response of cultural and ethnic groups to psychotropic agents. Strickland and associates (Strickland, Lin, Fu, Anderson, & Zheng, 1995) found that African Americans experienced greater toxicities and other adverse effects from treatment with lithium carbonate for the management of bipolar disorder than did Europeans and that Asian Americans metabolize tricyclic antidepressants more slowly than other ethnic groups. Our own research (Brown & Sexson, 1988) demonstrated that hypertension is a particularly frequent adverse side effect of stimulant medication used for African American youngsters with ADHD. We found no other investigation examining differential medication response in a pediatric population as a function of race or ethnicity (for review, see Brown & Sawyer, 1998).

**Family Systems.** The effect of chronic illness on the family system is pervasive, and the family has a profound influence on the child or adolescent with a chronic illness. A number of theoretical ap-
approaches seek to understand children with chronic disease and their families. Risk, resources, and resilience factors, by enhancing coping skills, mediate the association between the demands of chronic illness and adjustment (Kazak, 1989). Family functioning has been conceptualized as an adjustment outcome. Other researchers, particularly Thompson and associates (Thompson, Gil, Burbach, Keith, & Kinney, 1993; Thompson & Gustafson, 1996; Thompson, Gustafson, George, & Spock, 1994) include discussions of the cognitive processes involved in adaptation to illness.

Another model by Rolland (1990) conceptualizes the family systems-illness model by suggesting that chronic illness results in a threatened or perceived loss for the individual who is ill, as well as for the family members. Losses are experienced through role changes among family members and loss of functioning by those who must care for the child with a chronic illness (Barakat & Kazak, 1999). Recent work with Carolyn levers and Dennis Drotar (Ievers-Landis et al., 1999; levers-Landis, Brown, Drotar, Bunke, Lambert, & Walker, in press) has demonstrated that the role of caregivers for a chronically ill child, in addition to other family roles in everyday life, is both demanding and exhausting. These roles include adherence to disease treatment demands, assisting children in coping with pain, helping children to cope with feelings about a chronic illness, aiding with academic problems related to a child's chronic illness, assisting children in sustaining adequate nutrition, as well as general parenting practices (e.g., protectiveness discipline).

An interesting exemplar of the influence of family functioning on children with chronic disease is the investigation by Susannah Allison, who received the 2000 Society of Pediatric Psychology student research award. Allison (2001) examined the association between parent and child psychosocial variables and health outcomes in 124 children who survived cancer. The data were collected in the children's hematology and oncology clinic in my laboratory when I was on the faculty at Emory University. The relationship between psychosocial variables and health outcome was determined using a series of regression analyses, as a follow-up to an investigation by Frank, Blount, and Brown (1997), with the psychosocial variables predicting the number of days the children were hospitalized 2 years following the initial evaluation. Allison's results revealed that, among the children with cancer, only parent variables were associated with the children's subsequent health status. In fact, caregiver variables, including parental coping and attributional style, accounted for over 20% of the variance in the number of days the children were hospitalized (Allison, 2001). Child variables were not associated with subsequent health status. These findings underscore the role of family functioning in children's adaptation to chronic illness.

Another recent investigation conducted by Madan-Swain et al. (2000) is salient here. Madan-Swain et al. investigated identity formation among adolescent survivors of childhood cancer. Participants were 52 adolescent survivors and their mothers and 42 healthy adolescent counterparts and their mothers. Several variables were associated with a foreclosed identity status (i.e., an enduring tendency to internalize the value system of significant adults in their lives), including family functioning characterized by greater levels of conflict.

Family functioning is influenced in subtle and not-so-subtle ways by chronic illness, and chronic illness in children and adolescents affects family functioning. Nevertheless, the means by which the health care system (i.e., nurses, physicians, psychologists, hospitals, social workers, home care providers) mediates or moderates family functioning have been largely unexplored. As pediatric psychology embarks on empirically validated treatments, some investigators have called for an examination of these interventions not only as they affect children's functioning but also as they influence parental and family coping adaptation. Clearly, the family systems literature is a model of a social ecological approach to the study of pediatric psychology, with the seminal work of Kazak (Kazak et al., 1995; Kazak & Simms, 1996). This is one of the first programs of research in pediatric psychology to acknowledge the influence of chronic illness on systems including the family and health care providers (e.g., nursing staff). Researchers argue, however, that family systems-based research can be expanded even further by systematic examination of health care systems as they interface with families.

Peers. Given the stressors associated with any chronic illness, the effect of physical disease on children's and adolescents' peer relationships would seem logical. Considerable research examines peer relationships among children with chronic disease. In a careful review of this literature, Schuman and La Greca (1999) found some recent evidence that children with chronic health conditions are at risk for peer relationship difficulties, although these
data vary. Alterations in physical appearance may place children and adolescents with chronic illness at risk for peer difficulties. In addition, diseases that limited physical activity and mobility were associated with peer social difficulties and gender for children with sickle cell disease (SCD). Peer perceptions of social competence in children and adolescents with SCD were particularly vulnerable, with girls being perceived by peers as less social and less well accepted than boys.

The available evidence on comorbidity of cognitive impairments and children with chronic illness clearly indicates that cognitive impairments place children at elevated risk for difficulties with peer relationships (for review, see Nassau & Drotar, 1997). An investigation, conducted with Ken Whitt and other colleagues at the University of North Carolina, supported this notion that comorbidity of cognitive impairments places children at elevated risk for social impairments (Levin-Newby, Brown, Pawletko, Gold, & Whitt, 2000). Social skills and psychological adjustment were examined for survivors of childhood cancer. Cancer survivors included children and adolescents who ranged in age at evaluation from 6 to 18 years. Dependent measures included teacher and parent rating of social skills and adjustment and parent ratings of family functioning. Social skills and psychological adjustment, as rated by both parents and teachers, were primarily associated with academic functioning. Family cohesiveness was found to account for nearly a third of the variance in survivors’ adjustment when rated by teachers. The length of time off treatment accounted for a significant percentage of the variance in survivors’ adjustment when rated by parents. The findings demonstrate the role of cognitive and learning impairments and, more important, family functioning in influencing social skills and adjustment for children and adolescents who survive cancer.

We recently investigated children with SCD who demonstrated cognitive impairments as evidenced by magnetic resonance imaging. Findings revealed that those children with cerebral vascular accidents (strokes) were at significant risk for deficits in decoding emotions of African American children and adults relative to their counterparts, who had a milder degree of disease (Boni, Brown, Davis, Hsu, & Hopkins, 2001). In addition, children with SCD who sustained cerebral vascular accidents also encountered particular difficulty in decoding of subtle emotions, suggesting that these decoding deficits may play a role in their difficulties with social situations. This may explain, in part, why children with SCD have difficulties with peer relationships.

Within the ecological framework is the role of peer relationships in the process of disease adaptation. Not surprisingly, findings have revealed that children and adolescents who are isolated from peers generally encounter more difficulties with the acceptance of their own disease. To make things worse, support from peers is a critical component of disease adaptation.

Pediatric psychologists have examined the association between peer relationships and management of disease, and peer interactions were found to serve either a protective or risk factor in facilitating adherence to disease regimens. If peers fail to support a child’s regimen, the child’s attempt at peer conformity may lead to poor compliance with treatment demands. Parental restrictions and overprotectiveness for a youngster with a chronic illness may restrict opportunities for children’s peer interactions (Schuman & LaGreca, 1999). Finally, the impact of children with chronic illness on their healthy peers also needs systematic and careful investigation.

In summary, peer relationships are important mediators of disease management. Additional research is sorely needed, particularly investigations that extend beyond correlation methodology and allow for the systematic study of specific bidirectional influences of peers, children’s adaptation to their disease, and the effects of chronic illness on classmates and peers (Schuman & La Greca, 1999).

La Greca and Bearman (2000) have argued for additional research on peer relationships in youngsters in addition to the traditional study of peer acceptance. They suggest that research specifically examine close friendships and the manner in which close friends provide support for children and adolescents with a chronic illness. This attention to close friendships and influences on health-risk behaviors is certainly overdue.

Schools. Chronic illness has a disruptive effect on academic achievement. This risk is particularly apparent for children who experience cognitive impairments as either a direct effect of an illness (e.g., SCD) (for review, see Bonner, Gustafson, Schumacher, & Thompson, 1999) or, exemplified in our research, as a consequence of treatment (e.g., toxic effects associated with radiation or chemotherapy...
for the treatment of childhood leukemia) (Brown et al., 1996, 1998; Brown, Sawyer, Antoniou, Too-good, & Rice, 1999). Other variables associated with school functioning, including absenteeism, emotional difficulties related to returning to school, treatment-related effects, and attitudes of parents and school personnel that are associated with the school reentry process are important areas for research. In particular, research on the role of these variables as either mediators or moderators of academic functioning would be helpful in understanding points and types of intervention.

School reentry was described by Madan-Swain, Fredrick, and Wallander (1999) as a “dynamic, ongoing process” requiring significant partnering between the family and school personnel. Given the high interest among pediatric psychologists in coping with disease stress, it is curious that there is so little research related to school reentry. General issues pertaining to school reentry for children and adolescents with cancer and burns have appeared in the extant literature (Madan-Swain & Brown, 1991; Sexson & Madan-Swain, 1993, 1995), but additional data are needed to extend current knowledge on school reentry and other chronic illnesses.

Another important question that needs to be addressed is how schools might accommodate the specific needs of children with chronic illness. For example, relapsing illnesses such as asthma and SCD require ongoing adjustments from families and schools (Madan-Swain et al., 1999). Schools will need to modify attendance policies and organize home instruction so that the child who misses several days from school can achieve academic success (Kazak et al., 1995; Madan-Swain et al., 1999). Families must make reciprocal assurances that the child does the work. Particularly as the prognoses of illnesses continue to improve, more children and adolescents will face the task of school reentry.

Teachers clearly need additional training and preparation in the management of children with chronic disease. In several surveys of public school teachers, the majority has reported they had taught children with chronic illnesses (Espersat, Moss, Roberts, Kerr, & Green, 1999; Johnson, Lubker, & Fowler, 1988; Liptak & Weitzman, 1995; Lynch, Lewis, & Murphy, 1993). However, less than half of these teachers reported they had received adequate training for working with children with chronic illness. School personnel will need additional preparation in the management of children with chronic illness.

Finally, the impact of children with a chronic illness on the school environment is another important area worthy of careful investigation. In particular, the role of significant others, including principals, teachers, and caregivers, in assisting children and adolescents to accept the physical and cognitive limitations of some children who suffer from chronic disease will be an important research agenda for the next decade. Thus, careful attention to reciprocal influences as they affect adjustment of healthy and chronically ill children is an important next step for future research efforts in pediatric psychology.

The influence of chronological age and developmental age as these variables mediate school reentry has not been systematically examined for children with chronic illness. A significant interaction of development with both the phase of school reentry and the child’s specific type of illness seems likely. As noted in the review of peer relationships, peers may play a particularly salient role in children’s adjustment and adaptation to stress at school and home related to autonomy and disease management. These are exciting research areas destined for the next several decades, and as there is greater unification among the child practice divisions within the American Psychological Association (i.e., clinical child psychology, pediatric psychology, school psychology, neuropsychology), I invite your collaboration. These are some of our next best steps.

Health Care Providers

Surprisingly, there has been minimal research examining the effect of children with chronic disease and their families on the health care system. Although surveys have examined the influence of the health care system on families (Kazak et al., 1995), few studies have examined interrelationships among these systems, including the effect of children’s behavior on health care providers, including physicians, nurses, and psychologists. Studies examining the interrelationship of providers on children and families primarily have been in pain management and HIV/AIDS.

Pain Management. That provider attitudes might influence treatment decisions as well as treatment outcome has been well documented in the pediatric pain literature. Some seminal studies in this area warrant review. Armstrong and associates (Armstrong, Pegelow, Gonzalez, & Martinez, 1992) developed and evaluated a conceptual model designed to
understand the influence of mediating factors, such as professional knowledge, attitudes and beliefs about pain, and learning history, on the interpretation of objective data and subsequent treatment decisions. They evaluated the effect of disease history on pain assessment and treatment decisions in an experimental study of children with SCD. Results revealed that nurses, although not pediatric residents, provided lower doses of narcotic analgesics to children with histories of frequent hospitalizations for pain as opposed to occasional hospitalizations for pain. The nurses did not differ in their ratings of pain for children with these histories. Neither professional experience and training nor reported attitudes and beliefs about pain in children were associated with the pattern of decision making. Providers’ concerns about addiction far exceeded mandated practice guidelines and other indications for the management of pain in children and adolescents with SCD.

In a similar investigation, Ross and associates (Ross, Bush, & Crummette, 1991) investigated postoperative PRN analgesic medication decisions for children in over 100 hospital nurses using an analogue pain task. They found that nurses with greater narcotics knowledge reported that they would administer more medication. Nurses provided more analgesics to children exhibiting greater pain on the first postoperative day in comparison to the third postoperative day. Prognosis of the child’s condition also influenced nurses’ decisions on administration of medication. On the first day, nurses administered less medication to the child with permanent sequelae, but on the third postoperative day, they provided more. The data were consistent across both high- and low-pain conditions. Again, this study underscores problems with undermanagement of children’s pain. Interestingly, the adult oncology research documents that more liberal attitudes toward pain management were associated with younger age of the physician and more experience with specialized oncology units.

In a longitudinal investigation of children with leukemia designed to examine the efficacy of a family-oriented intervention program for procedural pain, employing both psychological and pharmacological therapies (for review, see Kazak, Blackall, Himmelstein, Brophy, & Daller, 1995), Kazak et al. (1996) evaluated the impact of the intervention on medical, nursing, and psychosocial staff. Findings revealed significant increases over time in the perceived efficacy of the intervention. Although enthusiasm for the intervention decreased at the initial follow-up evaluation, enthusiasm increased at later follow-up, underscoring the importance of the impact of such a treatment program on staff over the course of time. In addition, significant decreases over time were found in staff depersonalization. This study is important because it demonstrates the influence of an intervention not only on the family system but also on larger systems including health care staff.

Brockopp and colleagues (1998) conducted research designed to examine barriers associated with the management of pain in acute-care settings. Specific barriers were identified by their data, including lack of knowledge, nonfacilitative attitudes, inconsistent leadership, poor working relationships with coworkers, cultural and religious biases, physicians’ fear of legal repercussions, and a lack of available resources. Weinstein et al. (2000) coined the term "opiophobia" to describe failure to use opiate analgesics because of fear about toxicities and addiction.

Regardless of the terminology, providers clearly influence decisions about treatment and the intensity with which treatment is implemented. In a similar study of nearly 500 AIDS care providers, Breitbart, Kaim, and Rosenfeld (1999) indicated that the most frequently endorsed barriers to the management of pain were the lack of knowledge among clinicians about pain management and concerns about substance abuse or addiction. Interestingly, experience in the management of pain in patients with AIDS was inversely associated with the endorsement of barriers related to pain management expertise and concerns about substance abuse. Pediatric psychologists may have fears and biases as well as individual experiences that may influence attitudes and decisions in assessment and intervention techniques. Given the recent focus in pediatric psychology on empirically validated treatments, attitudes and decision making for treatment remain important areas in need of systematic research.

HIV/AIDS. A barrier to providing care to persons with HIV and AIDS is another exemplar of the importance of examining the influence of physician behavior on children’s health. Few studies on pediatric HIV and AIDS could be located, so for this reason studies with adult participants will be reviewed. McDaniel, Carlson, Thompson, and Purcell (1995) examined medical student attitudes as they affected care for patients who were HIV-positive or had AIDS. These investigators administered to 63 medical students a 25-item survey specifically designed
for health care professionals. Results of factor analysis revealed three major groups of medical students with regard to attitudes. Specifically, the largest group generally endorsed positive attitudes about patients with HIV/AIDS. Despite these positive attitudes, two of the subgroups reported that they would refer such patients to another physician. Interestingly, one subgroup reported being more uncomfortable with homosexual behavior and with HIV-seropositive patients than they did with patients with other infectious diseases. This group also expressed discomfort with taking a patient’s sexual history. Finally, and more important, one of the groups expressed discomfort with physically touching patients who are HIV-seropositive.

The McDaniel investigation (McDaniel et al., 1995) clearly showed how physician attitudes and beliefs can impede even simple diagnostic screening and result in a failure to treat. The findings show that personal attitudes of physicians may interfere with their willingness to manage and treat certain diseases. These data have significant implications because many individuals suspected of or diagnosed with HIV or AIDS come to the attention of primary care providers (Epstein et al., 1993) who will be responsible for their care. In addition, these findings suggest that intervention on the level of providers as well as patients in pediatric psychology is wise. For example, Dimick, Levinson, Manteuffel, and Donnellan (1996) found that nurse practitioners’ exposure to HIV-positive patients was associated with less anxiety and fear in caring for individuals with HIV or AIDS. This certainly supports intervention programs that provide support and reduce anxiety for health care providers who care for persons with HIV or AIDS. Similar programs are warranted for diseases that do not instill the anxiety that HIV does.

Providers’ Roles, Stressors, and Strains. Our nursing colleagues may be the most progressive in looking at their own profession, behaviors, and attitudes and how these variables affect clinician decisions. Many of the innovative features in nursing have been impressive, including the establishment of their own institute at the National Institutes of Health and their licensing act that mandates uniform requirements across the 50 states and territories and allows for reciprocity of licenses across all of these jurisdictions. As pediatric psychologists, we might strive for some of their professional accomplishments. The profession also does a great deal for their members in examining their own social ecology. Topics include grief, burnout, and stress among members and how these factors may influence the care of patients (Hinds et al., 1994; Marino, 1998). Although the effects on children of the loss of a family member have been examined, coping with the death of a pediatric patient has yet to be examined by pediatric psychologists. Our grief at the loss of our patients needs to be examined systematically and is an important area for future research.

On a similar note, pediatric psychologists are well aware of role-related stressors associated with being the caregiver of a child with a chronic illness (Ievers, Drotar, Dahms, Doershuk, & Stern, 1994; Ievers-Landis et al., 1999; Ievers et al., in press), but role-related stressors and occupational hazards among pediatric psychologists are unclear. Occupational hazards of airline pilots, pharmacists, and coal miners are well documented, but pediatric psychologists who manage many professional (teacher, therapist, researcher, administrator) and personal (mother, father, baseball coach) roles are almost uninvestigated. Role-related strains and occupational hazards in our profession are vitally important in the care of our patients. Olson and colleagues (1998) examined peak experiences and “nadir” role-related experiences and the consequences of such experiences on professional work. Peak experiences included patients dying, close relationships between nurses and patients, and seeing patients recover and lead normal lives. Nadir experiences included nurses’ regrets over a perceived inadequacy in managing a situation and feelings of inadequacy in relieving suffering or providing comfort to patients. Similar research should be conducted on other health care providers, including pediatric psychologists.

The importance of a social ecological approach is shown in an investigation of the association between chronic professional stress in nurses and immune functioning. Psychoimmunology has been of widespread interest among health psychologists, but we have examined immunologic functioning only in our patients, not in ourselves.

De Gucht, Fischler, and Demanet (1999) studied 60 nurses who were selected on the basis of high and low scores on measures of professional stress and psychopathology. The investigation revealed that chronic professional stress was associated with immune dysfunction, including signs of immune activation and immune suppression. Immunosuppression was most pronounced in the group that had high stress and few symptoms of psychopathol-
ogy, whereas a decrease in immune functioning was highest for the group that had high stress and a high frequency of symptoms of psychopathology. The findings suggest that psychopathology is a significant mediator of specific immune dysfunctions. Stress as a strong predictor of psychopathology is all the more reason to study us as health care providers. These findings have significant implications for pediatric, child, and adolescent psychologists who endure high stress. With all the changes in the health care system, most pediatric psychologists likely would admit to significant stressors and strains.

More systematic investigation of health care providers is necessary. How attitudes and other areas of functioning influence provider treatment and care decisions is a crucial direction for us. It is only fair to recognize and examine the influence of provider variables on the behavior of the children and their families whom they serve. This is the next best step for pediatric psychology, a step toward social ecology.

Conclusions

In this article I have argued that there are reciprocal interactions between children with chronic illness and their systems around them, including cultural systems, family systems, peers, schools, and health care providers. To date, the field of pediatric psychology has had its most productive research endeavors in studying children affected by illness. Given the number of systems that influence children and how children influence systems, there has been far too little study of these issues in pediatric psychology. System issues are so relevant for the study of children that the examination of these systems should be the standard in studies of chronic disease and its impact on adjustment and adaptation, similar to traditional variables that have been included in research studies of children, such as social class, chronological age, and intellectual functioning.

I hope that several lines of research will emerge over the next decade including the careful examination of families as they interact with health care systems and the mediating and moderating effects of these interactions on children's adaptation and adjustment to disease. Clearly, peers serve an important role in providing support to children and adolescents with chronic illness that, in turn, influences adaptation to illness and enhances disease management. Greater research focus is needed on the influence of illness on peers, as well as the influence of peers on health-risk behaviors in both chronically ill and healthy children and adolescents. The systems in which children with chronic illness interact with peers also need careful study, particularly as these systems influence pediatric populations. Little research has examined important issues, including school reentry of children with chronic disease as well as the capacity of the educational system to accommodate to the needs of children with chronic illness. Further, a critical gap exists in the pediatric psychology literature related to the role of health care providers in the treatment outcome of children and adolescents from pediatric populations. These include providers' attitudes and biases that may influence decision making and the management of illness and ultimately their influences on treatment outcome.

Finally, given the economic forces that have significantly influenced delivery of health care, pediatric psychologists will need to examine carefully the economic impact of empirically validated treatments as we try to enhance adaptation and adjustment to disease in children and their families. For example, it has become fairly well recognized that when children and their caregivers employ more active coping strategies in managing pain, they rely less on providers and the health care system for pain management (for review, see Tarnowski, Brown, Dingle, & Dreelin, 1998). Given that adequate adjustment and active coping are associated with less utilization of health care resources (e.g., outpatient physician visits, emergency room visits, hospitalizations), we have neglected to consider the economic implications of this important work. As we are increasingly challenged to provide psychological services for pediatric populations and in many cases must vigorously advocate for these services on behalf of our clients and their families, we should also examine financial systems and economic impact as dependent variables in treatment outcome studies.

The study of systems and their impact on psychological functioning has been the standard of many specialty practice disciplines in psychology, including industrial and organizational psychology, family psychology, school psychology, and community psychology. I hope that the reciprocal examination of systems and pediatric populations will emerge as a high research priority over the next decade. As greater research emerges in this area, these influences should be embraced as part of the practice domain of pediatric psychology. The end result
will hopefully enhance the quality of life for the children and adolescents with whom we work.

Acknowledgments

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References


