

Biography of Leann L Birch, PhD, 25 June 1946 – 26 May 2019

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On 26 May, 2019, the nutrition community lost a visionary ambassador, trusted advisor, and cherished mentor. Leann Birch was a pioneer in bringing a developmental psychology perspective to the study of children's nutrition as a means to respond to real-world questions raised by parents. Leann Elsie Traub was born in Owosso, Michigan 25 June, 1946. She grew up primarily in Southern California and received a bachelor's degree in psychology from California State University, Long Beach, in 1971. She completed her graduate studies at the University of Michigan where she received a master's degree in 1973 and a doctorate in 1975, both in psychology. She subsequently held faculty appointments reflecting affiliations with nutrition as well as human development at the University of Illinois, Urbana-Champaign (1976–1992), the Pennsylvania State University (1992–2014), and the University of Georgia (2014–2019).

Over this time, Leann was a prolific scientist, publishing >250 publications (with >51,000 citations) and receiving >\$30 million in federal research funding. The public health impact and reach of Leann's work is profound. References to her work can be found everywhere: federal dietary guidance, position statements from leading professional organizations, early-childhood education policies, anticipatory guidance given in the pediatrician's office, and popular books on feeding children.

Early Experimental Work

Beginning in the late 1970s, Leann's early research consisted of elegant experimental studies of young children's developing food preferences and regulation of energy intake. Because the evidence base was scant at the time, she invested significant time in designing protocols to measure infants' and young children's food preferences and eating behaviors. One of her early articles published in 1979 highlighted the roles of familiarity and sweetness in influencing children's eating behaviors and contributed methodology for collecting food preference data



Leann L Birch (1946–2019).

from young children directly (1). Her subsequent experimental work made use of these early methodological breakthroughs and continued to underscore the importance of familiarity, identifying repeated exposure as a key process through which foods become familiar and preferred. In one series of experiments, 2-y old children were exposed to 5 novel cheeses or fruits and came to prefer the versions to which they had the most exposure (2). Similarly, when preschoolers were assigned to taste 1 of 3 versions of tofu (sweet, salty, or plain) repeatedly, their preferences for their assigned version increased (3). Now, several decades later, repeated exposure is widely recognized as the key determinant of food acceptance in early development. Leann's experimental studies of influences on children's preferences also encompassed effects of peer modeling (4) and associative conditioning processes (5).

Leann's early work was also the first to provide experimental evidence of self-regulation of energy intake among young children, demonstrating that children could precisely adjust food intake at a meal in response to the energy content of first course preloads (6). Although some subsequent research has suggested that individuals, including children, are not good at such compensation, Leann acknowledged the complex influences on this "natural" process. In a study of preschool children, her earlier finding that children could self-regulate their caloric intake was replicated when children ate in a

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Abbreviations used: CFQ, Child Feeding Questionnaire; EAH, Eating in the Absence of Hunger.

context in which they were given developmentally appropriate messages to focus on internal cues of hunger and fullness. However, in a group focused on external cues, such as the amount of food remaining on the plate and rewards—common strategies employed by caregivers—children no longer showed responsiveness to the caloric density of preloads (7). This work complemented the findings of other studies which showed decreases in children's liking of specific foods when consumption was instrumental to obtaining a reward (8).

These early studies—many considered to be landmark investigations—set the stage for observational, longitudinal, and intervention research to follow, and the conclusions that resulted from this body of research underscore an overarching and ongoing theme of Leann's work: that children's eating behaviors are modifiable in response to experiences in the environment. This tenet became increasingly important to understand and apply with the emergence of the obesity epidemic.

Longitudinal Studies of Development

Shortly after her arrival at Pennsylvania State University in 1992, Leann received NIH funding to lead a 5-y (and subsequently 10-y) longitudinal cohort study examining girls' emerging eating behaviors, with a focus on girls' weight concerns and dieting. This work was groundbreaking because the bulk of the evidence on disordered eating focused on adolescent and young adult populations up to that point. It was also unique in that it continued to reflect Leann's transdisciplinary focus, including the use of measures that bridged the fields of nutrition and human development.

Leann and her team of graduate students recruited girls (and their mothers and fathers) when the girls were 5-y old, before they started school. With successful funding renewals, the team continued to follow these families closely until the girls were 15-y old. This study resulted in a wealth of groundbreaking articles related to the development of girls' eating behaviors, food preferences, and weight status trajectories from early childhood into adolescence. In addition, findings from the longitudinal study provided some of the first evidence on the early childhood antecedents of disordered eating behaviors demonstrating, for example, that girls who exhibited the phenotype of eating in the absence of hunger at age 7 had higher rates of binge eating in adolescence (8) and that girls were more likely to report dieting as young as age 11 when parents—including mothers and fathers—encouraged dieting over the preceding 2 y (9).

A key focus of Leann's work during this period was on parents' feeding practices (i.e. strategies parents use to shape what, when, and how children eat). To facilitate this work, Leann and her team developed the Child Feeding Questionnaire (CFQ), which was published in 2001 (10). Utilizing this scale, Leann and her research team produced a body of actionable evidence demonstrating, for example, that pressuring children to eat can adversely affect their liking of foods (11), whereas restricting children's access to palatable foods could increase their wanting, liking, and intake of the "forbidden" foods (12, 13) as demonstrated with the Eating in the Absence of Hunger (EAH) protocol developed in her laboratory. EAH has since become recognized as an important behavioral phenotype for obesity and the CFQ is the most widely utilized measure of parents' feeding practices, cited >800 times and translated into multiple languages.

Collectively, this work and earlier studies from Leann's laboratory were highly influential in launching what has become a major field of study on the role of parents and other caregivers in shaping children's eating behaviors and growth patterns—known as "child-feeding" or "food parenting." This body of work has had a major impact on ≥ 2 key areas of public health research. First, early studies on child-feeding practices, much of it led by Leann, drew attention to the critical role that parents play in fostering children's eating behaviors, and broadened the focus of studies on precursors of disordered eating in children and adolescents to consider parenting and the family environment. Second, the timing of her longitudinal research and its focus on child feeding quickly directed attention to food parenting and parents' own behaviors and characteristics (eating style, weight concerns, weight status) as important targets for the emerging field of childhood obesity prevention.

Interventions in Obesity Prevention

In the last decade, Leann's work advanced the science of early obesity prevention. More than 4 decades of seminal experimental and longitudinal findings from her laboratory have been used to develop successful, evidence-based childhood obesity prevention programs.

Working with her Penn State colleagues, Leann completed 2 randomized controlled trials with mothers and their firstborn infants. The trials, known as SLIMTIME and INSIGHT, were designed to prevent rapid infant weight gain and childhood obesity, risk factors for obesity and comorbidities later in life. These interventions were grounded in the developmental literature on parent sensitivity and responsive parenting to develop educational messages and caregiver guidance. Based on decades of developmental science on responsive parenting, the hypothesis was that teaching responsive parenting, defined as responding to child cues contingently, promptly, and in ways that are developmentally appropriate, promotes self-regulatory skills in children, in turn promoting healthy growth and reducing obesity risk. Importantly, these trials viewed parenting influences on infant eating behavior and weight gain in a broader developmental context that included links to sleep and emotional regulation.

SLIMTIME tested whether a 2-component responsive parenting program focused on teaching parents how to discriminate their infant's hunger from other distress and using alternatives to food to soothe at night beginning 2–3 wk postpartum (sleep/soothe component), followed by teaching parents effective strategies such as repeated exposure to promote liking and acceptance of healthy foods (introduction to solids component). Both of these intervention components were informed by Leann's own earlier experimental research studies. Results from SLIMTIME revealed that infants whose mothers participated in the intervention gained weight more slowly over the first year, slept longer at night, and had fewer nocturnal feeds compared with control group infants (14, 15). INSIGHT expanded on this initial study, addressing bedtime routines, consistent routines and limits around what and when foods are served, interactive play, emotion regulation, and growth chart education (16). Relative to a home safety control, infants in the responsive parenting intervention group gained weight more slowly from birth to 6 mo, were less likely to be overweight at 1 y, and had lower BMI *z*-scores at 3 y (17, 18). Responsive parenting group infants also

had longer night-time sleep duration, more consistent bedtime routines, earlier bedtimes, and were more likely to self-soothe to sleep without being fed at several measurement points during the first year (19, 20). These trials were groundbreaking in demonstrating the promise of responsive parenting-focused intervention for early-life obesity prevention and children's self-regulation.

Continuation of Leann's Work

Leann was active in research up until the last weeks of her life, and colleagues are continuing her work in exciting ways. The INSIGHT trial is currently following children through age 9 y, providing a test of whether the responsive parenting intervention reduces obesity into childhood. Work from the original study is also examining whether intervention effects extend to subsequent siblings. Additionally, following Leann's move to the University of Georgia, she began a new trial

to test whether the sleep/soothe component of her earlier responsive parenting interventions could reduce rapid weight gain among low-income African-American infants (21). This work is fulfilling Leann's goal of investigating whether the responsive parenting intervention she developed is feasible and efficacious in populations who are at high risk of developing obesity.

Recognition

Leann's renowned contributions to behavioral aspects of pediatric nutrition were recognized by a number of prestigious national awards, including the Lederle Laboratories Award in Human Nutrition from the American Institute in Nutrition, which she received in 1992 as Professor and Chair of Human Development and Family Studies at the University of Illinois at Champaign-Urbana. In 2011, Leann was named

TABLE 1 Graduate students and postdoctoral fellows supervised by Leann L Birch

Trainees	Degree date
Master's degree students	
University of Illinois	
M Grace Miller (Human Development and Family Studies)	1980
H H Hind (Human Development and Family Studies)	1981
Mary Deysher (Nutritional Sciences)	1981
Susan S Henderson (Human Development and Family Studies)	1982
M Jane Billman (Human Development and Family Studies)	1983
Lisa Tauss (Nutritional Sciences)	1983
Julie Rotter (Human Development and Family Studies)	1983
Maryam Khan (Human Development and Family Studies)	1985
Linda Mobley (Human Development and Family Studies)	1986
Sally Conway (Human Development and Family Studies)	1986
Susan Salisbury-Richard (Human Development and Family Studies)	1986
B C Shoba (Human Development and Family Studies)	1987
Susan Sullivan (Human Development and Family Studies)	1987
Teresa Pinilla (Human Development and Family Studies)	1988
Brinlee Kramer (Nutritional Sciences)	1989
Lois Steinberg (Nutritional Sciences)	1989
Jana Bryant (Nutritional Sciences)	1991
Debra Kern (Nutritional Sciences)	1993
Jennifer Fisher (Nutritional Sciences)	1993
The Pennsylvania State University	
Tanya Cutting (Graduate Program in Nutrition)	1997
Kirsten Davison (Human Development and Family Studies)	1997
Beth Abramovitz (Graduate Program in Nutrition)	1998
Lori Francis (Human Development and Family Studies)	2000
Susan Foose (Graduate Program in Nutrition)	2003
Jennifer Shunk (Graduate Program in Nutrition)	2003
Meghan Sinton (Human Development and Family Studies)	2003
Melissa Johnson (Graduate Program in Nutrition)	2004
Jennifer Savage (Graduate Program in Nutrition)	2004
Laura Fiorito (Graduate Program in Nutrition)	2004
Alison Ventura (Human Development and Family Studies)	2005
Ashleigh May (Human Development and Family Studies)	2005
Stephanie Anzman (Human Development and Family Studies)	2008
Brandi Rollins (Human Development and Family Studies)	2009
Brittany James (Human Development and Family Studies)	2013
Julia Bleser (Human Development and Family Studies)	2015
Alison Doub (Human Development and Family Studies)	2015

(Continued)

TABLE 1 (Continued)

Trainees	Degree date
The University of Georgia	
Nicole Motoyasu	2017
PhD students	
University of Illinois	
Graciela Andresen (Psychology)	1989
Teresa Pinilla (Human Development and Family Studies)	1992
Susan Sullivan (Human Development and Family Studies)	1992
Susan Johnson (Nutritional Sciences)	1993
Lois Steinberg (Nutritional Sciences)	1993
The Pennsylvania State University	
Jennifer Fisher (Graduate Program in Nutrition)	1997
Jyoti Chhabra (Graduate Program in Nutrition)	1998
Kirsten Davison (Human Development and Family Studies)	2001
Gerard Hoefling (Human Development and Family Studies)	2001
Lori Francis (Human Development and Family Studies)	2003
Meghan Sinton (Human Development and Family Studies)	2006
Jennifer Savage (Graduate Program in Nutrition)	2007
Laura Fiorito (Graduate Program in Nutrition)	2008
Alison Ventura (Human Development and Family Studies)	2008
Ashleigh May (Human Development and Family Studies)	2008
Kathleen Leahy (Graduate Program in Nutrition)	2008
Stephanie Anzman (Human Development and Family Studies)	2011
Brandi Rollins (Human Development and Family Studies)	2012
Katherine Balentekin (Human Development and Family Studies)	2014
Chelsea Rose (Human Development and Family Studies)	2015
Postdoctoral fellows	Dates of supervision
The Pennsylvania State University	
Susan Johnson	1993–1994
Jennifer Fisher	1997–2000
Yoonna Lee	1999–2001
Amy Galloway	2000–2003
Kirsten Davison	2001–2003
Elsa Addressi	2003–2004
Lori Francis Stauffer	2003–2005
Laura Fiorito	2008–2010
Jennifer Savage	2009–2010
Stephanie Anzman	2011–2012
Brandi Rollins	2012–2016
The University of Georgia	
Paige Berger	2015–2016

a Fellow of the American Society for Nutrition and shortly thereafter received the E V McCollum award, recognizing her as a major creative force for generating new concepts in nutrition. The profound impact of Leann's work on the science of early obesity prevention was also recognized in The Obesity Society's 2010 Oded Bar-Or Award for excellence in pediatric obesity research. Leann also received a number of top research awards from her home institutions of the University of Illinois at Champaign-Urbana and Penn State University, highlighting her remarkable achievements in science among the faculty.

Leann's work almost single-handedly launched an entire field of study on the development of eating behaviors—a remarkable accomplishment that few scholars will ever achieve. Her influence on the science, clinical practice, and policies of feeding young children are profound. Leann, however, was more than a researcher and scientist. Over her >40-y career, she mentored over 70 graduate students and junior faculty as both

a trusted advisor and an inspiration (**Table 1**). Her concern for guiding individuals into successful careers, while helping them maintain healthy and balanced lives, made her a beloved teacher, colleague, and friend. Leann's legacy will continue through her research family and the many scientists whose work has been shaped by the full life that she lived.

Leann is survived by her husband, Karl Newell, and their 2 children, Charlotte and Spencer. Many of her favorite times were spent traveling with family and at her beach home in North Carolina with her beloved Labrador retrievers Violet and Elsie. Leann had a wide range of interests outside of academia that she approached with the same curiosity and engagement as she approached science, including food and cuisine, horticulture, interior design, photography, and dog-training methods among many others. Leann will be deeply missed for her phenomenal sense of humor, warm smile, brilliant and creative intellect, compassionate nature, and invincible spirit.

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