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Contributions of Research based on the PSID Child Development Supplement

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Abstract

The Child Development Supplement to the PSID (PSID-CDS) began in 1997 with a cohort of 2,394 households including 3,586 children. Since that auspicious start, three waves of the first cohort were collected — 1997, 2002-03, and 2007-08 — and a new cohort was interviewed in 2014. To date more than 400 journal articles, chapters, books, and dissertations that used the data have been collected in the PSID bibliography. This paper brings together founders and early adopters to summarize important contributions to the child development, time use, media, and health literatures. The purpose of this paper is not a detailed literature review but an overview of the literature and knowledge base to which PSID-CDS researchers have contributed. It points out unique methodological and measurement contributions, summarizes the motivation for research on parental investments in children, reviews findings regarding healthy child development, and examines the role of neighborhoods in children's lives.

INTRODUCTION

Begun during Johnson's 1968 War on Poverty, The Panel Study of Income Dynamics (PSID) served to assess American economic well-being and anti-poverty efforts by measuring income, expenditures, and wealth over time, becoming known as a survey of economic trajectories. The investigators soon recognized the importance of family and household structure to family well-being, and thus it also became a demographic survey (Duncan, Hofferth & Stafford 2004). The design of the Panel Study of Income Dynamics (PSID), which collected information on all household members and then followed members and

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descendants of the original sample to new households they established (Hill 1992), was radical. It permitted linking information on the younger generation to households in which they grew up, and, furthermore, to households their siblings established in adulthood, swelling the sample as families formed and divided over time.

Probably one of the most significant contributions of the PSID is in identifying the strength of the parent-child socioeconomic status link, what is often referred to as the intergenerational transmission of income and wealth from parent to child. This indicates the extent to which individuals are able to move across social class categories, a major theme of the Horatio Alger and other stories of American opportunity. A body of literature based on the main body of PSID data shows that family income correlates with children's completed schooling and economic outcomes years later (Duncan et al. 2010; Ermisch et al. 2012; Kendig et al. 2014). What is also documented is that family income during *early* childhood tends to have a larger association with years of completed schooling than income during *middle* childhood or *adolescence* (Duncan et al. 1998), and increased income has a much stronger impact on children from low income than middle income families. The link between income in childhood and health and well-being in adulthood is described in another paper in this volume (Duncan, Kalil, Ziol-Guest, forthcoming).

Until recently children's actual experience in parental households with different income levels during childhood was a black box; although overall household information was available, family process was not. Thus the literature had been unable to explain the actual process whereby family income might influence the long-term well-being of children in schooling, the labor market, health, and general well-being many years later – the how and why. This is critical for policy interventions proposing to improve the long-term well-being of children. Psychological, sociological, and genetic/biological theories had developed to explain the link between family income and child success but the data were simply not available to test them.

From the early 1980s, research community support for efforts to gather population-based data for understanding child health and well-being in the context of families had grown. For example, in 1986, a sister survey, the National Longitudinal Surveys of Youth, had added a Child Supplement to collect detailed child development data every other year on children of female respondents. After a multi-year planning period, PSID staff secured supplemental funding from the Eunice Kennedy Shriver National Institute of Child Health and Human development to interview families with children under age 13 and gather detailed developmental data from up to two children. This was ambitious because it committed to adding child development and family process data to what was a telephone-based economic survey and to following these children until they reached adulthood. This study, the Child Development Supplement (CDS) to the PSID, was begun in 1997 with a first cohort of 2,394 households with 3,563 children. Since that auspicious start, and riding a wave of interest in child development, three waves of the CDS were collected, in 1997 (Wave I), 2002–03 (Wave II), and 2007–08 (Wave III). Once the children reached age 18 or completed high school, they became part of a supplemental study, the Transition to Adulthood (TA). This study interviewed children to update their experiences until they established their own

household and joined the main PSID. Interviews have been conducted with eligible youth every other year from 2005 to 2017.

In the following we describe some of the developments in parental investment literature, children's achievement, health, and behavior, and media influence that would not have been possible without the groundbreaking initiation of the PSID Child Development Supplement. To date more than 400 journal articles, chapters, books, and dissertations that specifically used the PSID-CDS have been collected in the PSID Bibliography. This is a truly impressive accomplishment. This chapter brings together researchers who have used the PSID CDS extensively to summarize some of the important advances in the child development, time use, media, and health literatures on children. The purpose of this paper is not a detailed literature review but a map of the literature and knowledge base to which CDS researchers have contributed. To follow this map, we have developed Figure 1 as a guide. We open with a conceptual framework and then a description of the different types of family inputs to children. Characteristics of families on the left hand side of Figure 1 are first linked to family stress and a stimulating home learning environment, the two boxes to their immediate right. We then summarize research linking family stress and a stimulating learning environment (time and money) to outputs primarily of cognitive development (test scores, attitudes), emotional development (behavior problems), and physical health (health problems), on the right hand side, and the mediational processes (parental depression, parenting, child activities, punishment) that have been identified to date (in the middle of the figure). We close by pointing to future research opportunities.

FAMILY INVESTMENTS IN CHILDREN

Conceptual Framework of the CDS

The overall conceptual framework for the CDS (Figure 1) was based upon an investment or resource framework: parents invest time and monetary resources in the home environment of children, and these inputs together with the unique genetic and psychological inputs of the child and parents and the inputs of the broader society lead to higher scores on cognitive tests, more years of schooling, fewer behavior problems, and better health later on (Haveman & Wolf 1994). Resource theory argues that higher income provides families critical resources for children's learning. To the extent that parents simply have less money to invest in books, educational activities and toys, electronic devices, health care, housing, and other advantages that require financial resources, children's cognitive skills and health will be poorer. Of course, parents may compensate by spending more time with children in stimulating activities; thus, both time *and* money need to be considered. From resource theory we would predict that specific aspects of the children's home environment, including parental-child interaction and positive or punitive parenting practices, would mediate or "explain" the effects of family income on child development. The home environment would be especially critical in the child's early years before entering school. A second perspective is based upon the belief that parents' emotional well-being influences their interactions and support for their children. According to the family stress model (Conger & Elder 1994), low income and family instability result in economic strain, leading to emotional distress such as depression (McLoyd & Wilson 1991). This emotional distress, in turn, compromises

parental ability to remain engaged in the child's activities, schooling, or to engage in preventive health care (Conger & Elder 1994; Furstenberg, et al. 1999). If warmth declines and punitive parenting increases, child behavior problems rise (Yeung, et al. 2002). Poor parenting and child behavior problems, in turn, lead to reduced achievement (Yeung, et al. 2002). An important component of both frameworks is the belief that the early years inform later development, thus justifying the study of the home environment beginning at pregnancy and birth. The task of the CDS was to document as many of the family and child inputs and parenting practices as possible and measure potential outputs over time. Of course, as children grew, the part played by the broader society became more important, and the study added information on child care and the community and school context (Yeung 2004).

The primary goal was a long-term one, one that was designed for researchers who would come later. At the time, there were few U.S. longitudinal studies beginning in childhood that followed children into adulthood and none based on large representative samples from national populations (West, Hauser & Scanlan, 1998). The most common intergenerational studies asked adults about their childhood experiences. We now know that memories of respondents for events long past are notoriously poor, especially for mental health and family difficulties during childhood (Henry, Moffitt, Caspi, Langley & Silva, 1994). Correlations between such intergenerational measures are likely due to common-source measurement and not to actual experiences. Even measures of academic achievement are consistent but not accurate, with the aforementioned study documenting the Lake Wobegon effect that all children are above average. Given the PSID design, children who were assessed in childhood would eventually become eligible to be survey members in their own right, and their childhood data would be linked to adult outcomes. This was an important step.

Monetary Investment in Children

Data collected in the PSID-CDS on financial and time expenditures have allowed scholars to investigate factors (such as employment status, family structure, parental values, family SES, race and other family and caregivers' characteristics, and neighborhood) that shape parental time and money investment in children.

With the addition of child-specific expenditure data to Wave II of the CDS, researchers are now able to use the PSID-CDS data to show more precisely how parents' and children's characteristics affect parental investment behavior in an individual child. Numerous studies have demonstrated that middle-class families have higher expectations for children's attainment and, measured by a range of parental expenditures, invest more than lower income families (E.g., Hao & Yeung 2015; Pienik et al. 2009; Schoeni & Ross 2005). Stafford and Yeung (2005) showed that a high parental value placed on child development, especially when shared, influences a wide set of resources devoted to children. More highly educated fathers spent more time with children, shared more housework, and spent more time on community activities, an indicator of family social capital. This contributed to an increasing divergence of children's development by family socioeconomic status. Beginning in Wave II, the CDS could also address questions such as whether parents invest in proportion to or compensate for children's endowments. Research shows that the degree and

direction of parental responsiveness to sibling differences varies by social class (Hao & Yeung 2015). For example, less-educated and low-income parents invested less in a child with low birthweight, while parents with higher education and income invested as much as, or even more, resources in such children (Hao & Yeung 2015; Hsin 2012).

Time Investment in Children

Besides the focus on measurement and collection of Americans' monetary income and expenditures, one of the legacies of the University of Michigan's Institute for Social Research is its pioneering research on the use of time (Juster & Stafford 1985). What was unique about the CDS was the belief that how children's parents spent time was critical to this development. For example, one child's mother could spend her daytime hours employed and use the money to purchase child care and high quality toys, food, and other items for her child whereas another's could spend her daytime hours with her child in household games and inexpensive hand-made toys rather than expensive out of home care and supplemental stimulation. Which would be the most effective use of her time was widely debated from the 1960s to the 1990s. An additional focus of research in the middle childhood years was organized out-of-school activities. On the one hand, organized and supervised activities served as a source of positive development (Lippman, Moore & McIntosh 2011; Moore & Lippman 2005). On the other hand, overscheduling could potentially harm children. By the time the PSID began following families with children, time-money tradeoffs in families were of major research interest.

The Child Development Supplements collected complete time diaries for one weekday and one weekend day for 82 percent (2,904) of the 3,563 sample children aged 0 to 12 in Wave I, 88% (2,569) of the 2,907 children participating in Wave II, and 86% (1,442) of the 1,506 children in Wave III. By the third wave, children were 10 years and older, limiting cross-cohort comparison. The time diary, which was interviewer-administered either to the parent or to the parent and child, asked questions about the child's flow of activities over a 24-hour period beginning at midnight of the randomly designated day. These questions asked the primary activity that was going on at that time, when it began and ended, and whether any other activity was taking place. It also asked with whom the child was doing the activity and who else was there but not directly involved in the activity. Children's activities were first assigned to one of 10 general activity categories (e.g., sports and active leisure) and then coded into 3-digit subcategories (e.g., playing soccer). Coding was conducted by professional coders employed by the data collection organization; the level of reliability exceeded 90 percent.

Research established the reliability and validity of the 24-hour time diary method used in the CDS. Methodologies devised at the University of Michigan demonstrated the usefulness of time use diaries in assessing how people spend their time (Hofferth 2006; Juster & Stafford 1985; Mutz, Roberts, & Vuuren 1993). The CDS diaries were designed to capture in detail regular daily activities which made them especially well-suited for measuring children's media use. A study performed in the mid-1980s compared estimates of children's television viewing obtained from direct observation (i.e. video camera installed in the home) and parent-reported TV viewing diaries (Anderson, Field, Collins, Lorch & Nathan 1985). The

diary estimates were highly correlated (.84) with the direct observation measure and resulted in weekly viewing estimates that differed by about 45 minutes. The authors concluded that the diaries were valid and relatively accurate measures of children's TV viewing that were more closely related to observational measures than global estimates. Not only was the time use approach verified as a sound approach for estimating total viewing, but, perhaps more importantly, it provided a means to capture the titles of the specific programs watched by children at each viewing session during the day. In contrast to most diaries, the CDS time diary was child-based, permitting calculation of the time each child spent with parents and others rather than requiring the more difficult task of inferring from parental diaries the time a parent spent with each child. Originally administered on paper forms, this technique has been computerized, put on the web, and adapted for hand-held devices in several studies (Bolger et al. 2003). These important developments provide even more precise estimates of time expenditures, their motivation, and contexts. Theoretical and methodological care should be taken in utilizing time diary data, as they represent only two days out of a week (for example, Frazis & Stewart, 2012; Hofferth 2006a).

Trend and Patterns of Parental time investment.—Children's time diary data have uniquely contributed to the field by enhancing the precision of the level of time and quality of involvement between a child and his or her parents or other caregivers (Schoppe-Sullivan et al. 2004). Based on these data, a series of path breaking research studies tracked trends in the time parent and child spent together. Sandberg and Hofferth (2001, 2005) compared parental time investment from 1981 to 1997, distinguishing shifts in family structure and female employment from potential behavioral changes, and concluded that the amount of time a child spent with parents has not decreased, as was expected, but increased over this period. Bianchi et al. (2008) also showed that parents spent as much or more time with a child in 2000 as they did in 1975 despite increased maternal employment because the average number of children in a household had decreased, household work had declined, and fathers spent more time with children. Relevant to the influence of family income, the Sandberg & Hofferth (2001, 2005) paper found a small negative association of family income, a larger negative association of maternal full-time employment, and a large positive association of college education with time spent with either parent. Because income, maternal employment, and parental education are correlated, family income is likely to have an ambiguous association with parental time.

Fathers' time investment.—CDS data contributed to the burgeoning research on father's involvement in children's lives. Yeung et al. (2001) provided the first detailed account of the quantity and quality of time children spent with his or father in two-parent families in the U.S. The authors examined different levels of paternal involvement – direct engagement and being accessible to a child – and distinguished time spent on a weekday from that on a weekend day. They found that, although mothers still shoulder a lion's share of the parenting, fathers' time involvement with children has increased, suggesting an emerging "new father" role with a relatively high level of involvement, particularly on weekend days. With individual fixed-effect analysis based on two waves of data, Hofferth et al. (2013) documented that between 1997 and 2002–03, there was an increase in positive fathering attitudes, monitoring, and teaching behavior on the part of fathers. This research has had

spillover effects, leading to comparable research on fatherhood using other data. For example, using American Time Use Survey data, Gorsuch (2016) and Hofferth and Lee (2015) also reported an increase in fathers' average time in physical care for children during the 2000s.

Yeung et al. (2001) found that a father's income was negatively associated with personal care, play/companionship, and achievement activities with his child on a week day, but positively associated with achievement-related activities on a weekend day. In contrast, having had some college was associated with paternal achievement-related activities on either day.

Research found that the form of paternal involvement differed from maternal involvement. Consistent with patterns in other countries (Lamb 2010), Yeung et al (2001) and Fuligni and Brooks-Gunn (2004) found that American fathers were more likely to engage in activities like playing with young children than to provide personal care. Highly educated parents spent more time on education-related activities, particularly during weekend days. Brooks (2009) found that, as children aged between 1997 and 2002–3, fathers spent more time with them in health-related activities. It was posited that as the gap between mothers' and fathers' relative resources closed, so would the gap in the amount of time mothers and fathers spent caring for children's health needs, and data from the CDS (as from the ATUS: Hofferth & Lee 2015) supported this hypothesis (Brooks, 2009). Several studies also reported that, compared with mothers, fathers exhibit differential parenting towards siblings within the family, depending upon his biological relationship to the child and marital relationship with the partner (Brooks 2009; Fuligni & Brooks-Gunn 2004; Hofferth & Anderson 2003; Kalil et al. 2014; Langton et al. 2011; Megna 2004). A recent study examined father involvement among children with chronic conditions (Ko 2008).

Children's Time

In 1997 little was known about children's time other than a small 1981–82 study (Timmer, Eccles & O'Brien 1985). Based on the PSID time diary Hofferth and colleagues wrote a series of papers describing the time use of American children in 1997, and changes over time in children's time use between 1981–2 and the CDS Wave I (1997, and eventually between Wave II and Wave III (Hofferth & Sandberg 2001a; Hofferth & Sandberg 2001b; Hofferth 2009; Hofferth 2010; Hofferth & Moon 2012b) Although children's activities tended to be stable over time, notable was the decline of 12% in free or discretionary time as a proportion of total weekly time between 1982 and 1997, due largely to increased time in school and in child care. This decline continued between 1997 and 2002–03, but was slightly smaller, 4%, again primarily due to increased time spent in school. One major change between 1997 and 2002–03 was that the composition of children's play changed, becoming more focused on electronic play and away from nonelectronic play (Hofferth 2010). The research showed few links between family income and nonelectronic aspects of child time, except that children from higher income families spent more time in day care because their mothers were more likely to be employed.

Children's Time in School and Child Care.—One of the unknowns about children's activities is the content of the school day. The child diary simply marked the time children were in school as one large undifferentiated block of time. Although children spend a large fraction of their waking time in school during the school year, we know little about what is going on in the classroom. In Wave I only, the CDS took the innovative step of linking to the child's teacher and school. Interviewers conducted an interview with the children's teacher and attempted an interview with the administrator of the school. Teachers described classroom activities and resources in general; in addition, they provided a classroom time diary for the target child's activities on the designated day. The administrator interview provided overall characteristics of the school environment. The response rate, based upon eligible children, was respectable at 52% for the teacher questionnaire and 57% for the teacher-reported time diary (Hofferth, Davis-Kean, Davis & Finkelstein 1999). The response rate for the administrator was only 32%; however, in later work the PSID supplemented survey data with information from publicly available Education Department data bases. Roth and colleagues published detailed findings from the teacher survey in the Teachers College Record (Roth, Brooks-Gunn, Linver & Hofferth 2003).

The CDS was innovative in that it also attempted to obtain information about child care and preschool arrangements by requesting from the parent contact information and permission to call the child care provider/teacher and administrator (of a center-based program) to conduct a short interview. Response rates of only about 33% of eligible children were due more to the hesitancy of parents to provide this information than to lack of cooperation of the teacher.

Children's Electronic Media Use

The growth of the media environment has provided an opportunity to explore social change among the first generations to have been raised completely in a digital environment. For previous generations, television was the primary electronic media device. Variation in total amount of TV viewing was less significant than viewing habits, which led researchers to focus on divergent programmatic content. Educational television viewing was thought to enhance academic achievement and violent TV use to increase aggressive thoughts and behaviors. In the past researchers wanting to investigate these and other content-based hypotheses used program check-list methods to capture exposure to specific TV shows, but these techniques were not included in large, longitudinal, nationally representative studies. Scientists at the University of Texas were working to identify the differential effects of TV viewing according to the content of the program viewed. Using time use diaries to measure viewing, they found that watching entertainment TV was associated with less social interaction, fewer educational activities, and lower performance on subsequent vocabulary and math tests (Huston, Wright, Marquis, & Green 1999). Viewing educational/informative programming, on the other hand, was not associated with non-TV activities and predicted higher performance on academic skills (Wright, Huston, Murphy, et al. 2001). These studies along with others in the field solidified the understanding that content of the televised message dictates the outcome, or, as these scientists and their colleagues concluded "The medium is not the message, the message is the message" (Anderson, Huston, Schmitt, Linebarger, & Wright 2001).

The developers of the PSID-CDS time use diaries made a critical decision that ensured that the resulting data would be a unique and enduring resource — they included a column in the diary for parents to record the title of the TV show or computer program that their child was using. The PSID-CDS, therefore, became the first freely available, longitudinal, nationally representative study to collect title-level media use data from which researchers could extract the overall duration of media use as well as estimates of the amount of exposure to different types of media content. Considering that the PSID-CDS assessed academic achievement, memory, behavior, and beliefs, the study opened the door to answering a vast array of questions regarding longitudinal associations between the use of different types of media and the development of various cognitions and behaviors.

Of course considerable work is necessary to convert raw title-level exposure data into meaningful measures of different types of media use. Using a system based on one devised for their own diary studies, Drs. John Wright, Aletha Huston, Elizabeth Vandewater, and their team of graduate students at the University of Texas assigned category codes to every title reported on the time use diaries (Wright et al. 2002). Television broadcast schedules were used to obtain show title information when the information provided by the respondent was ambiguous. The coded data were provided to the PSID-CDS team for general distribution; researchers could then create valid measures of daily exposure to different types of media content.

By utilizing the full-day time diary methodology, the PSID-CDS provided data that can describe both the amount of media children used as well as the associations between media use and other activities. Children aged 6–12 spent between 12 and 13 hours a week watching television in 1997 (Hofferth & Sandberg 2001a). This amount was fairly stable between first two waves, but declined (among 10–18 year olds) between the second and third waves as other types of media use increased (Hofferth 2009; Hofferth & Moon 2011).

Family Income and Media Time.—One consistent finding across all studies is that children whose families have higher incomes spend less time watching television (Attewell, et al. 2003; Hofferth & Sandberg 2001; Hofferth 2010). And, of even more importance, family income per se was not directly linked to watching educational television, but lower family conflict was (Vandewater & Bickham 20014). Research generally finds stronger associations of parental education with children's time; higher education was associated with more time children spend reading and doing homework, and less time watching television.

Media Displacing other Activities.—A primary concern of increasing use of screen time for young children is the possibility that this use displaces other more developmentally appropriate activities such as reading, learning opportunities, and homework (Mutz, et al. 1993). Although survey research cannot prove that time in one activity directly reduces another, it can document positive and negative associations. A study using Wave I found no relationship between reading and TV viewing (Vandewater, Bickham, & Lee 2006), but others, including one that pooled the first and second waves, found that more TV viewing and more video game play were associated with less time spent reading for pleasure (Hofferth 2010; Shin 2004). On the one hand all these studies found that more TV viewing

was linked to less homework time. The more participants used computers to study, on the other hand, the more time they spent reading. In a comparison of video game players and non-players using Wave II, gamers spent less time reading (30% less) and doing homework (34% less) than non-gamers (Cummings & Vandewater 2007). This evidence suggests that while entertaining pursuits including TV viewing and video game play may displace learning opportunities, computer use, and especially computer use in the service of academics, may actually encourage reading.

Considering that childhood play has been shown to relate to physical and mental health (Ginsburg 2007), there is also concern that media use has been displacing play. Evidence from the PSID-CDS confirms that as young people use more screen media, they spend less time playing; more TV viewing, video game play, and computer use were associated with less play. From Wave I to Wave II, non-screen play for 6- to 12-year-olds declined from 7 hours 51 minutes to 6 hours and 20 minutes a week (a 20% reduction) while all forms of media use increased (Hofferth 2010). The time diaries allow for a finer grade investigation of the relationship by capturing specific types of play. When nonscreen creative play and active play were distinguished, TV viewing was negatively associated with creative play but not active play (Vandewater, et al. 2006). An hour spent watching TV was associated with about a 10% reduction in creative play. These findings are consistent with the idea that the entertainment draw of electronic screen media pulls young people away from non-screen play experiences.

CHILD OUTCOMES

The CDS focused on three important outcomes for children during their childhood years: cognitive skills measured by achievement on standardized tests of reading comprehension, vocabulary, and math; emotional health measured by behavior problems; and physical health, represented by overweight/obesity and chronic health problems.

Measures of Developmental Outcomes

Cognitive Development.—Behavioral and social science researchers who study children are interested in the role that various contexts (SES, family structure, neighborhood) play in the development of cognitive skills. One of the goals of the 1997 CDS was to collect achievement data and measures of cognitive ability in order to assess growth and development across contexts of development. The Woodcock-Johnson Achievement Test-Revised (WJ-R) (Woodcock 1989) was chosen because it had recently been re-normed, thus providing better standard scores across the population, and it was also being used by the NICHD Study of Early Child Care and Youth Development (SECCYD) and the Fragile Families Study, which would potentially facilitate comparison and replication. The subscales chosen were the Letter-Word test, a test of children's ability to identify and respond to letters and words; the Passage Comprehension test, a test that measures reading comprehension skills; and the Applied Problems test, a test of skill in analyzing and solving practical numerical problems. A Math Calculation test was included in the 1997 wave only. Achievement tests are only one aspect of cognitive development and so other relatively easy to administer but good indicators of cognitive development were also selected to complete

the cognitive battery of the CDS. The additional measures included a subscale from the Wechsler Intelligence Scale for Children-Revised test called the Digit Span which assesses working memory (Wechsler, 1974) and a self-report scale on self-concept of ability that assesses the individual's beliefs in their own cognitive skills (Hofferth et al. 1999). These measures provided both objective and subjective measures of cognitive ability and allowed for a well-rounded examination of indicators of educational success across time (though only for children of appropriate age) with data collected in 1997 (age 3–12 at Wave I), 2002–03 (age 5–18 at Wave II), and 2007–08 (age 10–18 at Wave III) for all children that were selected in 1997. The survey also captures current grade in school, schooling completed, and educational expectations.

The CDS has been prominent in examining how various forms of achievement matter across time, specifically in understanding overall math achievement. Seigler and colleagues (2012) extracted the components of math skills from the WJ-R to show that fractions and division were primary skills needed to be successful in high school algebra. Importantly, this finding was replicated in a national population study in the U.K.

Social/Emotional Development.—In the CDS a child's socio-emotional development was measured by the parent-reported Behavior Problems Index, a 30-item scale which measures the existence and severity of child behavior problems. This scale, drawn from the Achenbach scale and designed for survey administration, was designed to measure the constructs of internalizing (withdrawn) and externalizing (aggressive) behavior problems in a representative sample of children (Peterson & Zill 1986). Reliability for the item in this sample was .91. It had been widely used in the Child Supplement to the 1979 cohort of the National Longitudinal Survey of Youth and its validity and reliability proven. The Children's Depression Inventory (CDI) was included in the second and third wave to quantify depressive symptomatology of children 12 to 17 years of age during the two weeks prior to interview. It is an established measure, validated with normal populations of children.

Health.—In the CDS the parent reported the child's health in five categories – excellent, very good, good, fair or poor. In Wave I interviewers measured height and obtained parental report of child's weight; in the second and third waves weight was directly measured during in-home interviews. The CDS also assessed whether the child had any limitation on activities, school attendance, or school work, and obtained a list of any conditions that a health professional said the child had. This included chronic physical conditions and emotional, developmental, or behavior problems. The survey asked the total number of doctor contacts and whether the child had a routine checkup last year, was in the hospital at all, and was covered by insurance. Finally, for all children the survey asked about conditions surrounding birth, including birth weight, whether the child was in neonatal intensive care, general health at birth, medical coverage and public assistance receipt during pregnancy and at birth, participation in parenting classes, and whether and how long the mother breastfed.

PATHWAYS BETWEEN PARENTS' AND CHILDREN'S LIVES

The models linking family income and child outcomes are very broad reduced form models that do not explicate what it is about family income that matters. Multiple pathways through

which parental income and investments could be related to achievement and cognitive and social development include stimulating materials, activities, and parenting style; parental expectations; parental time; paternal involvement; and media time. A fairly recent literature is also using the CDS to examine child behavior as a potential consequence of early poverty and low income, with parental psychological distress and punitive parenting as mediating constructs. We begin with a comprehensive model that addresses multiple mediators. We then review research that has examined components of this model.

How Money Matters: a Comprehensive Mediational Model.

In a comprehensive structural model of cognitive development (test scores) and social emotional health (behavior problems), Yeung et al. (2002) tested two pathways to explain how family income (from birth) affects child development during early childhood (age 3–5): 1) through monetary resources investment, and 2) through family stress. Representing the consensus of the literature, Yeung et al. (2002) found a direct positive association between family income and child cognitive achievement that was primarily mediated by the family resources pathway (physical home environment, cognitively stimulating materials, and activities with the child).

In contrast, the pathway from family income to children's externalizing behavior was primarily mediated by family stress (through maternal depressive affect and punitive parenting) (Yeung et al. 2002). Other researchers have investigated the link between poverty, parental mental health and child mental health in middle childhood, adolescence and young adulthood. Butler (2014) found that the more persistent the poverty during childhood (i.e., birth through age 12), the higher white adolescents scored on the CDI and the higher their parent rated them on internalizing behavior problems. The positive relationships between poverty persistence and adolescent depressive symptoms were largely explained once the mother's childhood depression was controlled. Family instability was also an important mediator, suggesting that the greater risk was not due to economic hardship but to maternal depression and, in addition, family instability. In an interesting structural model using the CDS and the TA, Lee et al (2013) documented an association between poverty, economic strain and later cigarette smoking among adolescents and young adults; although positive parenting was associated with lower risky behavior, the poverty to risky behavior association was not partially mediated by parenting practices but, rather, by youth self-control, a subscale of the behavior problems scale. Instead of poverty, Huang et al. 2010 focused on the association of food insecurity with child behavior problems among a low income sample of children. Consistent with the previous research using poverty, economic hardship, or low income, food insecurity was associated with children's parents reporting more behavior problems, both externalizing and internalizing. Kahn et al. (2004) found that children with a mother in poor mental health had elevated levels of externalizing and internalizing behavior problems, and the effect was stronger if both parents had mental health problems than if only the mother reported them.

Other Potential Mediating Variables

Although the above is a comprehensive model, it does not include several aspects of the home environment which developmental psychologists and sociologists now suggest should

be included: parental education, parental expectations, achievement beliefs, parent-child time, and home media use.

Parental expectations.—In examining the role of parental expectations for schooling and cognitive stimulation of the home in mediating the influence of parental socioeconomic factors on children's achievement, Davis-Kean (2005) shifted the developmental focus from family income to parent educational attainment differences as the primary socioeconomic influences.

Achievement Beliefs.—The CDS cognitive battery included measures of achievement beliefs. Recently, these measures have shown that achievement is a multifaceted construct that involves both ability and perception of ability (Watts, et al. 2015). In a new study using the CDS, Susperreguy and colleagues (2017) demonstrated that ability belief had a unique contribution to achievement at all levels of achievement ability. They found that at no matter what quantile of achievement, if children had positive beliefs about their ability, they had slightly higher scores than their comparable cohort. This finding was replicated in two additional longitudinal studies, providing a rigorous test of the finding and fulfilling the goal of the CDS to be used with other studies for comparison and replication.

Parental time.—Some studies relate parental time investment to children's cognitive and psychological outcomes. The time-money tradeoff described earlier led to concerns as to whether maternal employment would harm children by reducing the time children spent with their mothers. In general, any effects appear to be minimal. Hsin & Felfe (2014) provide an interesting explanation of why this is the case. They showed that although the amount of unstructured time children spend with employed mothers is lower than that spent with nonemployed mothers, their educational and structured time does not differ. Furthermore, only educational and structured time contributed significantly to children's cognitive development. Unfortunately, women with a high school degree and no college were less able than those with some college to protect their educational and structured time with children when employed. In addition, family sizes have declined. Sandberg & Rafail (2014) found that large family size can influence cognitive outcomes through diluting the resources and parental attention provided to a child. Similarly, Milkie et al (2015) found that small variation in overall maternal time does not matter for child and adolescents' behavior, emotions, or academics. However, for adolescents, greater maternal time was associated with fewer delinquent behaviors and time engaged with both parents is related to better outcomes. The authors later acknowledged that more careful attention is needed to distinguish between the quantity and quality of time or activities, to consider alternative time use arrangements, differences by social class and family circumstances, and to address measurement and selection issues (Nomaguchi et al. 2016).

Based on three waves of CDS data, Sonchak (2014) showed that maternal time with a child, particularly active engagement, is associated with a child's socio-emotional competence and fewer behavioral problems, though little evidence was found for a significant impact on a child's cognitive skills. Time diary data were used to compute time an adolescent 13–18 spent in joint activity with a parent and link it to the adolescent report on the CIDI, and his/her report of parental acceptance and parental control. Results suggested that parent-

child joint time was associated with lower parental distress (girls only) and with lower adolescent depression through greater parental acceptance (boys and girls), but parental psychological distress and warmth were not linked to adolescent depression (Desha et al. 2010).

Father involvement.—Fathers make unique contributions to children's schooling (McBride et al. 2005; Yeung et al. 2000), behavioral outcomes (Hofferth 2006b), and lifestyle formation (Isgor et al. 2013). Father's education, income, co-parenting behavior, and fatherhood behavior have all been found to be positively related to a child's test scores. Paternal engagement time explained some of the differences in behavioral problems across family types (Hofferth 2006b). McBride et al. (2005) reported a significant relationship between father involvement and their children's education and proposed that father's involvement in school activities mediates the relationship between contextual resources (at school, neighborhood and family levels) and children's school achievement. Isgor et al. (2013) examined the relationship between father's and child's physical activities. They found that the father's past recommendation of vigorous physical activity (VPA) was positively associated with youths' VPA participation. This study suggested that environmental and/or family based interventions that increase fathers' VPA may help improve youths' VPA (Isgor et al. 2013).

Scholars who assessed the role of the non-residential father reported mixed findings on different indicators of child development (Harper 2005; Harper & Fine 2006; Mason 2011). For non-residential fathers who have regular contact with children, emotional distress and inter-parent conflict are negatively associated with the overall quality of their children's lives (consisting of indicators of health, friendship, and family relations), with daughters being more affected than sons (Harper 2005; Harper & Fine 2006). In addition, paternal warmth and quality of father-child relationship are positively related to child's quality of life among African-American (Harper 2005). However, Mason (2011) showed that neither nonresident father's warmth nor participation in the child's school was significantly associated with problem behaviors or positive behaviors during childhood and adolescence. One recent study (See 2016) used the time diary data to construct parental supervised time for each child and linked it with data from the TA supplement; paternal supervision, especially through more time in meals and organized activities, was found to be associated with less cigarette smoking in late adolescence.

Media Time.—Media is a component of the home environment that reflects the type of investment made by parents and may serve as a pathway through which these investments translate to child outcomes. Across the years that the PSID has assessed the time-use of children, the media landscape changed dramatically. Research using the PSID-CDS has documented potential effects of these newer media on children's development that are widespread and varying (Hofferth 2010). While moderate amounts of computer use (less than 8 hours a week) were associated with more reading as well as better reading and math skills, heavy computer use predicted less time spent on sports and outdoor activities (Attewell, Battle, & Suazo-Garcia 2003). Using a cell phone to text was shown to be associated with better reading skills while using it to talk was linked to worse letter and

word identification (Hofferth & Moon 2012a). Online communication was linked to more cohesive friendships, but less time interacting with parents (Lee 2009) and worse vocabulary and reading skills (Hofferth & Moon 2012b). Video game play was shown to be associated with more reading and better math problem solving skills (Hofferth & Moon 2012b; Suziedelyte 2015). Together these findings point to differing associations depending upon both the specific medium, how it was used, and the outcome being evaluated.

Family Conflict and Media Violence.—Of all media effects on children, the impact of media violence on aggressive thoughts and behaviors is likely the most studied (Bushman & Huesmann 2006). Using the PSID-CDS, researchers have examined the individual and environmental characteristics that predict children's violent media use as well as the association of that use with multiple behavioral and cognitive outcomes. For younger children, the level of family conflict they experience is predictive of the higher levels of viewing violent media. As with educational media, children's violent media use is associated with family conflict, but the relationship is the opposite expected; more family conflict is linked to higher levels of viewing violent media for younger children (Vandewater, Lee, & Shim 2005). Is exposure to violent content, in turn, linked to increases in antisocial behavior among boys? Capitalizing on the strengths of the PSID-CDS, one study controlled for a wide variety of potentially confounding variables including maternal depression, parental coping problems, child being spanked before the age of 2, and baseline antisocial behaviors (Christakis & Zimmerman 2007). The findings revealed that non-violent and educational TV viewing were not associated with negative behaviors whereas exposure to violent content was. In a separate study examining the potential social consequences of media use, researchers found that violent TV viewing, but not non-violent viewing, was associated with lower levels of peer interaction (Bickham & Rich 2006). Finally, research showed that the more time children spent viewing violent TV, the higher their attentional problems (Zimmerman & Christakis 2007). Together, this set of studies emphasizes the value of assessing exposure to media violence rather than only overall viewing. The results are consistent in their finding that violent media use is predictive of multiple negative outcomes ranging from the behavioral, to the social, to the cognitive. Even though these studies were well specified and used the sophisticated measures available through the CDS, the correlational nature of this work requires us to consider their findings in context with other research in the area in order to fully understand the complex relationship between exposure to violent media and these outcomes. Caution has to be stated here because we can usually not determine which is cause and which effect.

The comprehensive measures of the PSID-CDS together with the media content exposure it captures allow for scientists to examine media effects within a broader social context. In one such study, researchers tested a model positing that informational television could serve as an educational opportunity for children when other such opportunities were less available because of family stress. Results showed that family stressors, including lower income and maternal depression, were linked to a lower quality home learning environment, but were unrelated to the child's time spent watching educational television (Vandewater & Bickham, 2004). Family conflict, in contrast, predicted lower levels of educational television viewing—a finding that has been shown to be evident for both European-American and African-

American children in the PSID-CDS sample (Bickham et al., 2003). Educational TV viewing predicted children's reading skills with an association similar to the overall educational environment of the home. It seems, therefore, that educational TV is not only a valuable educational resource but one that can be accessed even when a family is facing other difficulties.

Racial Disparities in Achievement

As expected from the fact that the original sample contained a low-income, minority oversample, some of the research using the 1997 CDS and subsequent waves focused on the issue of the Black-White achievement gap (Yeung & Conley 2008; Yeung & Pfeiffer 2009; Robinson & Harris 2013). Much of the gap was explained by important demographic variables such as occupation and education, as well as maternal vocabulary. Once included in the model, parental home environments and choosing private schools, but not income or wealth, were important predictors of the gap (Yeung and Conley 2008). In a recent study, Hao and Yeung (2016) found that significant race differences in parental financial investment in children remained even after a large set of family and child characteristics were held constant, so financial resources (which influence home environment and school choice) play an important indirect if not direct role in black-white achievement differences. A follow-up study on the achievement gap by Yeung and Pfeiffer (2009) was able to show that these demographic variables appeared to have the strongest associations in early childhood and the predictive power decreased across time, with prior achievement being the primary predictor. This suggests that demographic and parental characteristics set the achievement trajectories and, once set, they unfold across development and throughout schooling. Using multiple waves of data on multi-generational family background and test scores in the PSID, researchers contributed to this body of literature by explaining the black-white achievement in an intergenerational stratification and developmental framework (Yeung, 2011). Differential resources available to black and white grandparents affect parental neighborhoods, mother's cognitive skills, parental socioeconomic status, and parenting behavior. These early disparities lead to black children having lower cognitive skills before entering school, with long-term implications for cumulative achievement trajectories (Yeung 2011). One focus of recent research has been the SES/racial minority gap in computer use and how that may increase the disparity in children's achievement, the "digital divide" (Ono & Tsai 2008). Research consistently shows that children from more racial minority and economically disadvantaged families spend less time in computer activities (Ono & Tsai 2008; Hofferth 2010). Research suggests that such children benefit more than do advantaged children when they attain access (Hofferth 2010; 2012b). As internet access has broadened and schools have incorporated computers, the gap has declined (Ono & Tsai 2008), though differential access and benefit remain important research questions. Although research using other data (Davis-Kean and Jager 2014) found that achievement trajectories rarely change across time, research needs to examine periods during the early years to see whether and when trajectories can be modified.

HEALTH: OBESITY RESEARCH

Children tend to be healthy, with one exception. Portending an increase in later health problems, the prevalence of obesity among 2- to 19-year-olds in the US is about 17% (Ogden, et al. 2016).¹ Considering that it is physically sedentary, screen use has been repeatedly investigated as a potential contributor to childhood obesity (Gortmaker et al. 1996). Longitudinal measures of height and weight, translated into body mass index (BMI), as well as the media measures previously mentioned make the PSID-CDS especially well-suited to explore the links between screen use and weight. However, results based on the 1997 wave were inconsistent. One study found very limited associations—no associations with TV and a curvilinear relationship between video game play and BMI most evident in younger children and girls (Vandewater, Shim, & Caplovitz 2004)—and another found a small but significant link between TV viewing and weight status (York 2016). In the 2003 data, media use was unrelated to BMI (Forshee, Anderson, & Storey 2009).

The richness of the PSID-CDS data provide for much more than examining simple associations and researchers have utilized it to investigate the potential processes through which media may impact obesity, particularly physical activity. Testing this hypothesis with the 2003 PSID-CDS data, researchers found no association of overall media use with physical activity. However, they did find a link between obesity and TV viewing that was at least partially mediated through the time participants spent with their friends (Vandewater, Park, Hébert, & Cummings 2015). Overweight youth, researchers concluded, may use more media because of social factors, including fewer opportunities for interactions. Research has found a negative association between specific types of media use, such as computer play and video game play and sports and outdoor time (Hofferth 2010). Advertising provides another explanation by which media use can impact obesity; exposure to commercials selling unhealthy food impacts children's food preferences and nutritional understanding (Borzekowski & Robinson 2001). By separating broadcast/cable entertainment TV viewing from video/DVD and educational viewing, researchers found that viewing TV with commercials predicted later BMI but other viewing did not (Zimmerman & Bell 2010). Lastly, researchers investigated longitudinal associations between media use in 1997 and BMI in 2011. Relationships were small and indirect but significant with more childhood TV linked to more adolescent/young adult TV, which in-turn predicted higher BMI scores (York, 2016). Although this work does not definitively answer how media and obesity are related, it certainly broadens our understanding of this complex association and suggests new avenues of research.

NEIGHBORHOODS

Resources affect not only educational materials but also residential location, neighborhood, and schools. Although characteristics of neighborhoods are not independent of family finances, variation in neighborhoods may influence children independent of family characteristics. Social science has long examined whether, and in what ways, neighborhood residence matters for development (e.g. Shaw & McKay, 1942). Theoretical, ethnographic,

¹Asthma, also about 11% at school age, is the only other major health condition among children.

and historical observations highlight communities and neighborhoods as contexts that influence individuals' behaviors, preferences, and beliefs (Bronfenbrenner & Morris 1968; Wilson 1987; Anderson 1978), and debates continue about the size of such effects and the conditions under which they occur (Sampson 2012). A series of reviews and research compendia are indicative of the interest in how neighborhoods might matter for the development of children, youth and families (e.g. Brooks-Gunn, Duncan, & Aber 1997a, 1997b; Chen & Brooks-Gunn 2012; Leventhal & Brooks-Gunn 2000; Jencks & Mayer 1990). This interest was fueled, in large part, by the concentration of poor families within urban neighborhoods and clustering of youth in such neighborhoods (who often engaged in problem behavior and seemed immune to the prevailing norms of the day). Given how segregated neighborhood residence is in the U.S. (Massey & Denton 1993), the concentration is often racial as well as economic. It extends to schools as well (Coleman 1966; Chen & Brooks-Gunn 2012). High poverty neighborhoods have been characterized as having low social support, social cohesion, and collective action, as well as few institutional resources (see Sampson 2012, but also Small 2006 for a conflicting opinion).

Several models have been proposed to account for the ways in which neighborhoods might influence individuals. Jencks and Mayer (1990) considered epidemic-contagion, collective socialization, relative deprivation, institutional resource, and competition-for-scarce-resource pathways. Leventhal and Brooks-Gunn (2000) identified institutional resources, norms/collective efficacy, and interpersonal relationships as important mediating pathways.

Study Designs

Neighborhood studies typically use Census tracts or Census tract clusters and data collected by the U.S. Bureau of the Census, which provides aggregate economic and demographic data about households at the level of the block, Census tract, zip code and SMSA in which the respondent resides. In considering pathways through which neighborhoods influence residents, this information may not suffice. At least four designs have been used in neighborhood research (over and above ethnographic approaches). These include (1) national or multisite studies (both cross-sectional and longitudinal), (2) city or regional data collection, (3) neighborhood-based efforts, and (4) experimental or quasi-experimental approaches (this last approach is not discussed here; Leventhal & Brooks-Gunn 2000). The PSID-CDS falls into the first category, as do the National Longitudinal Study of Youth-Child Supplement (NLSY-CS), the Fragile Families and Child Well-being Study (Fragile Families), and the National Longitudinal Study of Adolescent Health (Add Health). All have repeated measurements of children and youth development, have extensive information on family characteristics and processes, collect data on intergenerational processes (the PSID and NLSY having queried three generations), and are nationally representative (Fragile Families being representative of urban births at the millennium, about 60 percent of births) (Brooks-Gunn, Fuligni, & Berlin 2003).

More generally, issues about the size of neighborhood influences on development have been debated. The PSID has been used to address design and inference issues. Aaronson (1997) compared neighborhood effect estimates on educational attainment in a sample of PSID participants using a sibling sample and an individual sample. The estimates were similar for

both. Another approach is to examine how neighborhood effects (coefficients) are altered by adding in more and more family characteristics. In general, neighborhood effects are reduced by the addition of such characteristics, as seen in a follow-up to the Brooks-Gunn, Duncan, Klebanov, & Sealand (1993) paper also using the PSID (Ginther, Haveman, & Wolfe 2000). Concerns about the heterogeneity of neighborhood effects have been raised as well, with possible explanations including time spent on the streets versus with the family and social networks (Harding 2009; Harding et al. 2011). The time use issue may be partially addressed using the PSID-CDS, but, to date, no such analyses have been conducted

Respondent Reports of Neighborhood Processes

Recent research on children and youth focuses on examining neighborhood processes rather than just examining demographic characteristics of particular geographic areas. Constructs such as social cohesion, social control, friendship ties, distrust of police, and safety of neighborhood have been hypothesized to be linked to child and youth outcomes (Sampson, Morenoff, & Earls 1999). The ideal method for obtaining this information is to draw a sample of individuals within neighborhoods, which is the approach used in the Project on Human Development in Chicago Neighborhoods (PHDCN). However, two samples have to be recruited (one for the study of children, youth and families and another for the neighborhood social process data), which is expensive. Instead, the PSID-CDS (along with other studies such as Fragile Families in Donnelly, McLanahan, Brooks-Gunn, Garfinkel, Wagner, Jacobsen, Gold, & Gaydos 2016 and the Canadian Longitudinal Child Study in Kohen, Leventhal, Dahinten, & McIntosh 2008) have asked children's mothers to report on their neighborhoods.

In Wave II the PSID-CDS asked the primary caregivers (usually the mother) to answer questions about safety and order in the neighborhood (often referred to as neighborhood quality) and about social cohesion and control (often referred to as neighborhood collective efficacy, following Sampson et al. 1997). The latter included 8 items such as whether neighbors would do something if a child was disrespecting an adult, stealing something, or if a fight broke out in front of your house; alpha .93) and social cohesion (3 items tapping the number of children and youth in the neighborhood they know by name; alpha .79) (Kowaleski-Jones, Dunifon, & Ream 2006). The social cohesion measure is quite different from that used in the PHDCN, where control and cohesion were so highly related (over .80) that they were one factor, social efficacy. In the PSID, the two measures were only correlated at .25 (Kowaleski-Jones, et al. 2006).

Several studies have used these maternal report measures. In a study of 6- to 12-year-olds from the PSID-CDS, achievement test scores and classroom behavior were examined vis-à-vis three Census tract dimensions and two maternal reports of neighborhood social control (Kowaleski-Jones, Dunifon, & Ream 2006). Interestingly, in these analyses, neighborhood SES and social control were associated with reading score and mathematics score, with simple controls (child age, gender, race). Adding in other self-report measures from the mother (maternal depression, perceptions of neighborhood size, and education) reduced the social control effect to nonsignificance. These findings do not corroborate PHDCN results for collective efficacy (Sampson, Sharkey, & Raudenbush 2008). Possibilities include shared

method variance (maternal report), differences in the measure of control/efficacy, and the use of hierarchical linear modeling in the PSID where 68% of all Census tracts have only one household and 6% have three or more households. More analyses need to be done to determine the utility of the PSID social control and cohesion measures.

In another study using the CDS Wave II, maternal reports of neighborhood quality and collective efficacy as well as Census tract level data on poverty and affluence were linked to parental knowledge of children's friends and parental monitoring and control of children. A three level model was used even though nesting within neighborhood (level 3) did not occur frequently. Perceptions of neighborhood quality and low neighborhood poverty were associated with parental knowledge about the child's friends while perceptions of collective efficacy were related to parental monitoring/control (Zuberi 2016). The author controlled for child behavior problems in these analyses, a welcome child covariate.

A third study did not use the Census tract level data, instead including only maternal reports of neighborhood quality. Externalizing behaviors at all three waves were the outcomes with links seen between maternal perceptions of neighborhood quality and maternal ratings of externalizing behaviors, starting in middle childhood (Li et al. 2017). The use of Census tract level data and/or the observer ratings of neighborhood conditions would have been beneficial, given concerns about shared method variance.

Attaching Secondary Data to the PSID-CDS

The geocoded Census tract level data are available for the CDS just as they are for the larger PSID. Several of the studies just reviewed incorporated Census data as well as the caregiver reported neighborhood information. One notable analysis used only Census data. In an early study, Turley (2003) examined links between median neighborhood income and children's test scores and behavior from Wave I data. Neighborhood income was linked to test scores for White but not black children. However, for black children living in neighborhoods with a high percentage of blacks, links between neighborhood income and test scores were found. The author speculated that the highly segregated nature of neighborhoods partially explained her findings.

Using the Wave II data for elementary school students, Dearing and colleagues (2009) looked at links between neighborhood affluence (Census tract data) and neighborhood safety (interviewer observations of the block on which a family lives) and child participation in activities such as athletics, community centers, the arts. Their premise is that associations between family income and child participation, which were found, would be mediated in part by neighborhood affluence and safety. Neighborhood affluence was a direct mediator and neighborhood safety was an indirect mediator acting through its influence on home cognitive stimulation (neighborhood affluence also had an indirect effect via the home pathway).

An especially innovative approach was taken by Grafova (2008) who used five geocoded data sources to examine aspects of what is called the built environment. She was able to generate neighborhood level measures of economic disadvantage, population density, restaurant density, convenience and grocery store density, pedestrian fatalities from motor

vehicle accidents, street connectivity, and urban design indicators. Links with children and youth being overweight at the Wave II interview were examined. Maternal report of social control and the interviewer observation of physical disorder were also included. A number of individual, family, and neighborhood variables were used as controls, including whether a family had moved since 1999. The reduced likelihood of being overweight was associated with low observed physical disorder in the neighborhood, lower convenience store density, more perceived neighborhood social control, less economic disadvantage, and more walkable neighborhoods.

Modeling Change in Neighborhoods

Perhaps the most exciting PSID-CDS research being done on neighborhoods exploits the longitudinal geocoded data (see also the Leibbrand & Crowder chapter in this volume). Three efforts are highlighted here, having to do with residential movement during the transition to young adulthood (Sharkey 2012), the durations of exposure to poor neighborhoods by the time of high school graduation (Wodtke, Harding, & Elwert 2011), and the variability in mobility across families and regions of the country (Jackson & Mare 2007). Using the PHDCN and the PSID, Sharkey (2012) explored mobility during the transition to young adulthood, a period in which many move out of their parent's home and some out of the city or region of origin. Schooling and employment presage such movement. Three groups of young adults were identified based on their movement patterns—the stayers, the home-leavers who stay in the same city/county, and the home-leavers who move to another city-county. In the subsample of youth in concentrated poor and highly segregated neighborhoods (over one thousand from the PSID sample were primarily African-Americans), the stayers lived in the poorest and most racially segregated neighborhood while those who moved ended up, at least in the short term, in less racially segregated and poor neighborhoods. Over time, though, youths who moved within the city/county ended up in more segregated and poor neighborhoods, in part because the neighborhoods to which they moved changed. These findings underscore the disturbing continuity for African-Americans residing in poor segregated neighborhoods.

An analysis of how much residential mobility across types of neighborhoods (defined by income) actually exists used the LA FANS and PSID-CDS (Jackson & Mare 2007). Residential movement was greater in the national than in the city sample, as was neighborhood change. In the PSID, mobility was associated with mathematics scores. What was interesting is that estimates from single measures of neighborhood income were not that different from those of longer-term measures, perhaps underscoring the continuity in types of neighborhoods where children reside.

In an analysis of the relationship between the duration and timing of exposure to poor neighborhoods and the high school graduation of over 4,000 PSID respondents with geocoded tract data from age one to age 17, sustained exposure to poor neighborhoods was found to be linked to lower graduation rates. For example, for those in the bottom quintile of neighborhood income compared to the top quintile, 76% versus 96% of African-American youth graduated and 87% to 95% of the white youth graduated from high school (Wodtke, Harding, & Elwert 2011).

Besides looking at timing, investigators are starting to consider the influence of living in high-poverty neighborhoods for multiple generations. Using test score information from the children in Wave II of the CDS as an outcome, Sharkey and Elwert (2011) found that living in high-poverty neighborhoods for two generations (the CDS children's parents and grandparents) was associated with test scores that were more than a half a standard deviation lower than children who did not experience multigenerational neighborhood poverty.

SUMMARY AND NEW DEVELOPMENTS

This chapter has described research using the PSID-CDS to study parental time and monetary inputs to children, their home environment, and their neighborhood context. After describing these child development inputs we summarized the research linking them to outputs of children's achievement (math, reading, vocabulary), socioemotional development (behavior problems), and physical health (obesity). The findings described here represent a fraction of what has been learned from the many studies conducted using the CDS to date. Because of its longitudinal and ongoing data collection on the same families, the CDS continues to play an important role in disentangling the complex contributions of early childhood context to achievement, cognitive development, and the mental and physical health of children over time. Researchers study differences in child outcomes as a function of socioeconomic and demographic experiences such as family economic status, parental educational level, and family structure across childhood, beginning in the earliest years.

In 2014, a new Child Development Supplement was initiated to represent children who were ages 0–17 in that year. Several unique features of CDS-2014 will expand research opportunities to analysts. First, many of the CDS-2014 children were born to members of the original CDS cohort, providing unique opportunities to examine intergenerational connections in parenting, economic stress, and child development and behavior. Second, because the CDS children's parents are also participants in PSID, as with the first CDS, an enormous amount of data are available from previous waves of Core PSID on many aspects of their lives—as well as the lives of parents' parents (the CDS-2014 children's grandparents). These data can be combined to study intergenerational transmission of human and social capital as well as health status. Information is available in CDS-2014 on siblings and cousins, providing unique research opportunities. Third, the original CDS and the new CDS-2014 will allow researchers to study cohort differences in development between children born from 1985 to 1996 and those born from 1997 to 2013, as well as differences between younger and older members of these cohorts. Unlike the initial waves of the CDS, the 2014 data on achievement and cognitive development are restricted to 50% of the sample chosen at random and not the full sample of children. However, the genetic markers from CDS-2014 will allow researchers to address a number of important and novel scientific questions that span the interests of population geneticists and social scientists.

Strengths of the CDS for Policy Research

It is important to broadly link early childhood demographic and economic characteristics to later young adult successes as has been done in the past using the core PSID. However, from

a policy perspective it is critical to also understand the precise mechanisms that link them over several decades and *that can only be accomplished using the CDS*.

Mechanisms.—In an ideal world the best policies would operate by selectively intervening to dampen or bolster linkages along the pathway in order to boost later health and well-being. Those linkages with the largest associations would provide the most promising and efficient opportunities for intervention. It is not just the *what*, but the *why* that matters. In order to understand *why* family and personal characteristics influence individuals' later lives, path-oriented research using the *primary strength of the CDS*, its detailed family process variables across time, seeks to link structural variables to outcomes. The often-studied potential family investment pathway in child development work includes a rich home environment, parental provision of learning resources (materials, opportunities, and activities), and positive and nurturing parenting. Having a record of child behavior over the course of childhood also facilitates the exploration of an alternative pathway, that of family stress, parental emotional problems, and punitive parenting. In addition, the PSID began with an oversample of low-income families. Having a comprehensive cognitive battery *and* a health/behavior problems history *and* a substantial sample of low income and minority families has allowed researchers across all disciplines to trace potential mediators between family characteristics and adolescent/young adult success, and to explore the intersection and interaction of family influences within and across social and economic groups. Treating fathers' parenting similarly to mothers' in the design of the CDS has facilitated identifying domains and strengths of fathering and has contributed to program initiatives to promote father involvement.

Economic and Social Disparities.—An additional contribution of the CDS is having access to indicators of socioeconomic status concurrently measured at regular intervals in the core that can be easily integrated with child data. Aspects that can now be explored include parental education, race/ethnicity, parental and family income, receipt of various types of public and private transfer income, family wealth, and family expenditures. Because of the relatively large number of families and children followed relative to other developmental studies, researchers can examine the intersection between these measures of SES. Research projects have examined paternal involvement by income, education, and neighborhood within racial/ethnic group (Hofferth 2003), have compared media use across racial and ethnic groups (Bickham et al. 2003), have examined pathways to young adulthood across immigrant groups (Hofferth & Moon 2016; Tang 2015), and examined children's time with parents in low income families (Kalil et al. 2016; Yeung & Glauber 2008). The CDS data enable researchers to better identify *which* aspects of SES are most critical for later child success for different groups of children.

Media Disparities.—The CDS is unique in providing high quality data on the *what*, *where*, and *with whom* of children's time. A goal of this review was to highlight key areas in which researchers have used the PSID-CDS time diaries to examine the role of media in the lives of children. While this diary-based research has contributed to the study of media effects, it is far from the only focus. The CDS has, for example, enabled scientists who may not otherwise have included media to include them in their inquiries regarding family

functioning and the ecological forces shaping child development. Investigations of shared family time and the influence of maternal work time on child educational and unstructured activities have used PSID-CDS data and included measures of children's media use (Crosnoe & Trinitapoli 2008; Hsin & Felfe 2014). Furthermore, the PSID-CDS has demonstrated the feasibility of capturing media content in a nationally representative, longitudinal study of youth. Seeing the exceptional value of including time diaries as measures of media use, other large nationally representative studies (Roberts, Foehr, & Rideout 2005) as well as smaller more intensive studies have followed the PSID-CDS's methodological lead (Rich, Bickham, & Shrier 2015). Large-scale longitudinal studies currently being designed to assess the developmental impact of media also plan to employ aspects of the PSID-CDS measurement techniques. Overall, the PSID-CDS has built an unprecedented resource for scientists studying the role of media on children. The study's impact is seen in the high quality research it has facilitated and the changing methodologies it has inspired. It has shaped the field of media effects, assisting as it has moved toward more fully specified models of the forces impacting children's use of technology and how this use influences their development. Going forward, future research must continue to recognize that media use is far from uniform and employ methods that allow researchers to distinguish between subtly different uses of the same device.

Potential Future Research Opportunities

Neighborhood Effects.—Somewhat surprisingly, the PSID-CDS has not been widely used to examine neighborhood effects. The data are well suited to explore neighborhood influences on children and youth; because geographic location is available every year, length and timing of neighborhood poverty can be modeled. In addition, indicators of neighborhood residence of parents and siblings are available, allowing for research on the interactions of neighborhood and family effects; the latter might mediate or moderate the former (see Browning, Leventhal, Brooks-Gunn 2005 as an example using the PHDCN).

Out-of-School Time.—A number of analyses documented children's activities after the school day ends (Mahoney, Harris & Eccles 2006; Hofferth & Curtin 2005; Hofferth, Kinney & Dunn 2009; Linver, Roth & Brooks-Gunn 2009; Ono & Sanders 2010; Dunn, Kinney & Hofferth 2003; Weininger et al. 2015), whether they are overscheduled (only a small fraction), and whether engaging in multiple activities is stressful for children (to the contrary, fewer activities are associated with more emotional problems). How the number and types of after-school activities link to later achievement as young adults is an important area for future research.

Adult Outcomes.—The comprehensive model of child development that has been tested, expanded, and is still widely used, was limited to outcomes measured when the child was under age 18 by the nature of the data set. Now that the 1997 cohort of CDS children has grown up and are in their twenties, we expect that the information gathered concurrently throughout their childhoods will be used to help explain the young adulthoods they experience. The data obtained in the Transition to Adulthood Supplement should help researchers explain why children whose families have greater incomes when they are very young will complete more schooling, work more hours, have higher earnings, and be

healthier as adults. Understanding this process will inform public policymakers in improving the delivery of services to needy families. We see this potential in the new research focus on physical and mental health and in the interest in documenting neighborhood experience throughout childhood. The CDS data and its children have come of age.

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Figure 1:
Conceptual Model of Family Resources/Family Strain and Child Health/Development