

## OVERVIEW OF THE PROGRAM PROJECT

### A. HISTORY AND PURPOSE OF THE PROGRAM

#### A.1 Program Project Objectives

##### A.1.a Developmentally-driven Policy Research

Ours is a new collaboration, involving economists, developmental psychologists, sociologists and epidemiologists at the University of California, Irvine (UCI) and elsewhere. Addressing a key purpose of the NICHD PO1– to encourage multidisciplinary approaches to the investigation of complex problems relevant to NICHD’s mission – our interdisciplinary network’s mission is to understand why human capital-oriented intervention programs and policies, directed at children in the preschool, middle childhood and adolescent stages of development, have the effects, non-effects and, in some cases, perverse effects that they do. Our application of developmental theory to human capital-related policy interventions is reflected in the name we have chosen for the network – the **Irvine Network on Interventions in Development**.

Policy research on children is heavily balkanized by discipline. Economists bring strong experimental and quasi-experimental methods to their policy research, and recognize in their conception of causation that policies may have heterogeneous treatment impacts. But economic theories make few concrete predictions regarding either the nature of that heterogeneity or the processes by which the black-box policy impacts they estimate come about. Sociologists bring a sophisticated conception of the many contexts (e.g., neighborhoods, schools) in which children develop, but rarely link such conceptions to the diverse circumstances of individual children within a given context.

Developmental psychologists have strong conceptual models of how policy interventions and other environmental conditions may differentially affect children within and across developmental stages – birth to school entry, middle childhood, adolescence and early adulthood. And while they have developed some of the most rigorous and consequential child interventions (e.g., Perry Preschool, Abecedarian), some of which incorporate random-assignment evaluation designs, most of their empirical research relies on nonexperimental data and relatively weak causal empirical methods.

To generate our own hypotheses regarding the likely impacts of these policies across and within children’s developmental stages, we focus on the *congruence* (“fit”) between the developmental needs of children and youth and the design and nature of the intervention policies. In testing our hypotheses, we employ, whenever possible, the strongest experimental or quasi-experimental empirical methods. Thus:

***Our first key objective is to secure an interdisciplinary understanding of how children in different developmental stages, and in different personal and environmental circumstances, are affected by human-capital policy interventions.***

The specific policy interventions we investigate include: i) early childhood programs such as Head Start and Early Head Start (Project I); ii) state standards for health education curricula involving alcohol, tobacco and other drugs (Project II); and iii) school voucher programs and state policies regarding high-stakes exams for grade promotion and/or graduation (Project III). Across these projects we consider a wide range of child, youth and adult outcomes, including achievement, behavior and health (see chart below). A fourth project (IV) complements the first three by addressing the “So what?” question of the possible longer-run consequences of augmenting the skills or improving the behaviors that have been targeted in the intervention studies in these three projects.

Our common conceptual approach is to assume that children and youth profit from interventions to varying degrees, for two fundamental reasons. First, policies may not fit the developmental stage of the children or youth they target. We call this *stage/policy fit*. Second, there is substantial variation in treatment impacts across children within a given stage. We call this *child/policy fit*. We discuss each of these in turn.

##### A.1.b Stage/Policy Fit

Children in different developmental stages vary in their responses to policies because of differences in the fit between policy-induced changes in children’s immediate environments and the accomplishment of stage-salient developmental tasks (Sroufe, 1979; Waters & Sroufe, 1983). For example, the potential for high payoffs to education interventions mounted early in childhood is supported by evidence regarding the critical importance of early childhood for brain development (Knudsen et al., 2006) and formalized in economic models of human capital development (Cunha et al., 2005).

Not all policies fit the needs of the children and youth they target, as seen in Eccles' seminal work. Eccles et al. (1993) argue that the primary/middle-school model of education structure is inferior to an integrated K-8 structure because middle schools are ill-matched to the emerging developmental demands of children as they transition to adolescence. Transitioning children are in special need of close relationships with adults outside of their homes, and yet the transition to middle school involves moving from a single teacher to multiple teachers; heightened concern about their status relative to peers is exacerbated by middle-school tracking; needs for more complex academic tasks are often met by more rote teaching styles; and needs for self-determination, participation in rule making and emotional support are met by increased middle-school regimentation and rigid disciplinary policies. As a consequence of these ill-fitting features of middle school, it is argued, too many students disengage from their school-related work and focus on peers and other non-school priorities.

#### *A.1.c Child/Policy Fit*

Issues of program "fit" can also arise among children *within* the same developmental stage and are a likely source of heterogeneous treatment effects (Imbens & Angrist, 1994). Early childhood interventions such as Head Start and Early Head Start are geared toward providing learning experiences to children whose family environments are unlikely to provide enough of them. Thus, they "fit" better, and likely generate larger impacts, for children from economically disadvantaged than advantaged circumstances – a hypothesis that we test in Project I. Also tested in Project I is the interesting "fit" hypothesis that high-quality child care has particularly positive impacts and low-quality care has particularly negative impacts on children with difficult temperaments (Pluess & Belsky, 2009). Middle- and high-school programs aimed at preventing the onset of or reducing smoking, drinking and drug use are typically geared toward normative rather than problematic development (Project II). Thus they likely "fit" better for students who have not yet experimented with these substances. In the case of deviant students, these programs may even generate unintended negative impacts (Dishion, McCord & Poulin, 1999). Sometimes "fit" issues arise from the nature of the intervention. High-school exit exams (Project III) focus attention on the differential impacts on children with achievement skills near or far from the pass/no pass thresholds.

A fundamental premise of our program project is that effective policies must fit with individual children's achievement of stage-specific developmental tasks. To formulate hypotheses from this child/developmental stage/policy-fit perspective, we draw upon expertise of developmental psychologists (Burchinal, Vandell, Conley, Odgers, plus advisors and consultants Bergman, Crosnoe, Dodge, Eccles, Osgood, Schulenberg) and criminologists (Wakefield) whose collective expertise on human development spans the life course. Each project benefits from the expertise of several of these individuals.

#### *A.1.d Strong Methods*

Convincing policy-related research also requires using and, when needed, developing strong empirical methods. Where possible, our policy-analytic methods take advantage of random-assignment experiments (Projects I and III). In the case of Projects II and IV we employ the natural experimental and fixed-effects methodologies of applied economics and epidemiology. The economists (Bitler, Carpenter, Duncan and advisors Smith and Ludwig), epidemiologists (Bruckner), sociologists (Domina, Farkas, Penner and advisor Reardon) and public-policy advisor (Bloom) in our Network have considerable experience with quasi-experimental methods.

Some of our policy research questions concern the *distribution* of policy impacts across higher and lower functioning children and youth. Since current methods for understanding distributional impact are problematic, one of our projects (III, Bitler) would develop new methods, apply them to the analysis of several preschool- and school-based policy interventions, distribute accessible software on the Network's website and promote the use of these methods at professional meetings.

Although strong in addressing issues of omitted variable bias in causal models of policy impacts, economists' policy studies often fail to attend to measurement issues. The measurement of achievement, anti-social and health-risk behaviors often raises scaling and reliability issues. To address these problems, we are able to draw upon the considerable psychometric expertise of the developmental psychologists (Burchinal, Conley, Odgers, Vandell, plus advisors Bolt and Reardon) and sociologists (Farkas).

#### *A.1.e An Interdisciplinary Network*

How to turn our diverse disciplinary and methodological expertise into our promised "genuinely interdisciplinary" approach to our policy research topics? All four of our individual projects involve

collaborators from economics, developmental psychology and sociology and one involves a public health Ph.D. (see chart, below). As is clear from our proposal narratives, all of the project-specific research questions and methods in our program project are informed by more than one discipline.

***Our second key program project objective is to create a genuine interdisciplinary research network – the Irvine Network on Interventions in Development – consisting of policy-oriented economists, demographers, sociologists, developmental psychologists and epidemiologists.***

Forged during our months of designing projects, writing and then revising this application, and, if funded, refined during our proposed five-year project period, we structure our network’s proposed activities to maximize the synergy for collaborative science and policy evaluation activity. As described below, the current model of interdisciplinary research networks composed of individuals scattered across campuses and research institutes is seriously constrained by the impracticality of the frequent face-to-face interactions so needed to breach disciplinary boundaries. Our network model draws faculty largely from within a single institution (UC Irvine), which enables us to interact much more frequently and effectively. Of course, the potential value-added of any research network is a function of the collective quality of the faculty participants. By drawing the best relevant junior and senior faculty from seven departments/schools (Education; Economics; Sociology; Psychology and Social Behavior; Criminology, Law and Society; Business; and Public Health), we demonstrate that our group readily passes the required quality threshold.

PI and topic	Developmental stage(s) studied					Key domains				Disciplines of investigators			
	Early childhood	Middle childhood	Adolescence	Early adulthood	Middle adulthood	Achievement	Anti-social/risk behaviors	Health	Teacher behavior	Economics	Sociology	Developmental Psychology	Epidemiology
<b>I. Farkas:</b> Impacts of early childhood interventions	IV, DV	DV				x	x			Co	PI	Co	
<b>II. Carpenter:</b> State school health curricula		IV, DV	IV, DV				x	x	x	PI	Co	Co	Co
<b>III. Bitler:</b> Distributional impacts of school policies	IV, DV	IV, DV	IV, DV	DV		x	x			PI	Co	Co	
<b>IV. Duncan:</b> Middle childhood skills and later-life outcomes		IV	IV	DV	DV	x	x	x		PI	Co	Co	

DV=dependent variable; IV=independent variable; PI=discipline of Principal Investigator; Co=discipline of co-Investigator(s)

***A.1.f An Interdisciplinary Approach to Intervention Program Design***

The best test of a research-based policy network such as the one we propose is whether it can stimulate new ways of thinking about theory and/or policy application and innovation.

***The third key objective for our Network is to engage in a collective effort to promote successful child and youth interventions by getting inside the intervention black boxes to identify key program elements for preschoolers and school-aged children and youth in anticipation of future program design and evaluation.***

The analyses we propose all incorporate elements of person-environment fit, but our Network will also engage in a collective and continuous struggle to understand what this means for the various interventions and childhood stages we investigate. Our efforts to promote cross-project synergy and synthesis include: i) annual seminar presentations by each project, focusing on conceptual and empirical linkages to the overall network themes; ii) network-based authorships of three integrative papers on the conceptual underpinnings, empirical highlights and policy implications of our stage/policy- and child/policy-fit framework over the course of the program project period; iii) close project links with External Advisory Committee members, with significant portions of our annual meetings devoted to the PO1-wide integration; and iv) an annual meeting of the program project’s investigators devoted in part to integrative discussions. We detail our plans for these activities in our explanation of our Administrative Core.

### *A.1.g A School Policy Database*

Our second project (Carpenter, PI) evaluates the effects of state regulation of curricular standards for health education pertaining to alcohol, tobacco and other drugs on the actual delivery and instructional content of those topics, on school health and safety environments and on youth risk behaviors regarding substance use and abuse. In the course of conducting this research, the project will create a comprehensive database that tracks the implementation of the school health-education curriculum standards in each U.S. state since 1976. This database will be compiled from a variety of primary and secondary sources, including: the National Association of State Boards of Education (NASBE) School Health Policy Database, the National Center for Education Statistics State Education Reforms Database, state education websites, actual texts of state education laws, and the National Council on State Legislatures (NCSL). If funded, we will compile and make this database publicly available for research on our project's website. Thus:

***A fourth objective, stemming from Project II, is to develop, document and make publicly available a comprehensive set of state school policies related to academic standards and school health-education curriculum standards, including those pertaining to alcohol, tobacco, and other drugs, in each U.S. state since 1976.***

### *A.1.h Software on Distributional Methods*

Our third project (Bitler, PI) develops and implements a complementary approach to testing child/policy-fit hypotheses: quantile treatment-effect estimation and other distributional estimators. In addition to analyses based on these methods, we propose a series of outreach activities designed to promote the use of these techniques more broadly in education evaluations. Newly created software will be distributed on the Network's website. In addition, we will host instructional seminars, develop best practices for analyzing the distributional effects of human capital interventions and publish several methodological papers to illustrate these methods. Thus:

***A fifth objective, stemming from Project III, is to promote the use of distributional methods among education-policy researchers through the creation and distribution of new software applications, hosting instructional seminars, and developing best practices for analyzing the distributional effects of human-capital interventions.***

## **A.2 Background**

### *A.2.a Developmental Policy Research*

The process of human development provides abundant avenues for interventions aimed at promoting healthy cognitive, social, behavioral and physical development. Our program project is focused on educational interventions designed to augment human capital and promote positive behavior, particularly for individuals raised in economically disadvantaged families.

Ecological systems theory (Bronfenbrenner, 1979) emphasizes that children's development is influenced by multiple interacting contexts in which the child is a member, including the family and classroom and the network of contexts in which the family and classroom are embedded. Using this conceptual framework, this study emphasizes the importance of the individual characteristics of the child in determining the likelihood that the intervention will be successful for that child (Bronfenbrenner & Morris, 1998).

This contextual model sets a broad-based approach for the transactional developmental model used here. This model assumes that child development is determined not by a single factor, but by the interplay between child, family and environment across time. These factors interact in continuous feedback loops that determine developmental trajectories for individual children (Sameroff, 1994; Sameroff & Seifer, 1995). A developmental-systems perspective stresses the dynamic relation between the individual and his or her context; thus, the fit between the child's characteristics and the type of intervention being offered should be crucial in determining whether that intervention is appropriate and successful for that child.

An important principle of human development is that although beneficial changes are possible at any point in life, interventions early on may be more effective at promoting well-being and competencies compared with interventions undertaken later in life. Emerging evidence from human and animal studies highlights the critical importance of early childhood for brain development and for establishing the structures that will shape future cognitive, social, emotional and health outcomes (Knudsen et al., 2006; Sapolsky, 2004). Cunha,

Heckman, Lochman, and Masterov (2005) propose an economic model of development in which preschool cognitive and socio-emotional capacities are key ingredients for human-capital acquisition during the school years. In their model, “skill begets skill”; for example, school-entry capacities can affect the productivity of school-age human-capital investments. If most K-12 schooling is geared toward boosting the skills of children meeting normative developmental milestones, and if many children growing up in disadvantaged circumstances begin school well behind their peers, then the potential payoffs to preschool programs boosting early skills may be large indeed (Project I). For these reasons, the “fit” between high-quality center-based child care and the preschool developmental period may generate exceedingly high payoffs for children’s long-run well-being.

Child/policy-fit issues also arise with individual characteristics such as temperament. Animal research has shown a remarkable interaction between temperament and parenting quality in rhesus monkeys (Suomi, 1997). Highly reactive neonate rhesus monkeys randomly assigned to mothers with typical parenting grew up to have behavioral problems and a low ranking in their adult status hierarchy. But these same types of infants assigned to highly nurturing mothers grew up showing superior social skills and ended up at the very top of their hierarchies. Nonexperimental evidence from the NICHD Study of Early Child Care shows similar patterns: infants with difficult temperaments and low-quality child care exhibited the most behavior problems around the point of school entry, while similarly ill-tempered children receiving high-quality child care showed the fewest behavior problems (Pluess & Belsky, 2009). Project I will test for these kinds of temperament by child care quality interactions using data from several random assignment experiments.

Sometimes, well-intentioned policies provide ill-fitting environments for development. A growing literature on delinquent behavior provides disturbing evidence of unintended (“iatrogenic”) effects if programs bring together deviant youth who do not already know one another (Dishion, McCord & Poulin, 1999; Dodge, Dishion & Lansford, 2006). Project II provides opportunities to explore person-fit issues in the context of school-based anti-smoking, drinking and drug-use policies directed at adolescents. We hypothesize that the effects of policies will vary with the biological age and personal characteristics (e.g., gender, self-control) of students; characteristics of the student’s school and peer groups (e.g., prevalence of substance use, peer use); and characteristics of the programs themselves (e.g., duration, approach).

Developmental theories also posit that children will be differentially affected by experiences depending on their personal characteristics and prior experiences (Bronfenbrenner & Morris, 2006; Sameroff & Chandler, 1975). If ignored, variation in child/policy fit will result in treatment heterogeneity. Project I tests a number of hypotheses regarding the fit between early-childhood intervention quality (both global quality measures and specific curricula that focus on early math and literacy) and both child and family characteristics. Project II’s focus on alcohol, tobacco and drug curricula in schools includes testing a number of hypotheses regarding child and school circumstances that may lead to the largest positive impacts. In Project III, we test hypotheses that preschool, school vouchers and exit exam policies have *differential* effects for students at different points in the achievement distribution. Our expectation here is that impacts will be larger for those with low skill levels when policies (preschool, vouchers) fit them best and larger for higher-achieving students in the case of accelerated curricula.

#### *A.2.b Research Networks*

Interdisciplinary research networks have the potential to provide transformative experiences for their members. Such was the case for this program project’s PD, Greg Duncan, who has been a member of four major networks, including the NICHD Network on Child and Family Well-Being; the Network on Successful Pathways through Middle Childhood; the Network on Families and the Economy; and the Working Group on Communities and Neighborhoods, Family Process and Individual Development. Sustained, research project-based collaborations among researchers who come from different disciplines and are schooled in different empirical methods can open up new ways of formulating interesting research questions and new methods for answering them. But the very diversity that opens up these new opportunities brings with it the confusing jargon and babble that network members need to overcome before taking advantage of them. How to design a network that maximizes the gap between benefits and costs?

The past 25 years have produced a number of possible models for child-policy research networks. The MacArthur Foundation has the longest history of supporting networks engaging in social and behavioral research. These networks typically drew members from different disciplines, ran for 7-10 years, involved roughly three annual meetings, and developed an assortment of research projects. The NICHD Family and Child Well-being Research Network, in operation from 1993 to 2004, followed a different model in which

prospective members submitted five-year research proposals that included both individual and collective projects; a review panel then selected network members on the basis of their research plans and likely ability to function in a network setting.

Two additional members of our proposed network (Vandell and Burchinal) were long-time members of the NICHD Early Child Care Research Network, a network spanning a 20-year period (1989-2009). Vandell was one of the original project PIs and was responsible for designing core measures of child care quality, quantity and type and protocols to assess out-of-school time and peer relations in middle childhood and adolescence. Burchinal joined the Network in Phase 2, serving as the Network's methodologist and chief statistician.

We have gleaned a number of lessons from these networks in designing our program project application, and expect to accomplish as much in five years as several of these other networks did in twice that time. First, because there is no substitute for frequent face-to-face interactions, we have drawn most of the Investigators from a single institution – the University of California, Irvine. All of the networks described above owed their relatively slow roll-outs to the fact that six or seven days per year of intensive, face-to-face interactions were not enough to overcome the distractions of the intervening months, when no more than email or telephone contact was possible. An enormous advantage of a single-campus model is the feasibility of frequent face-to-face interaction. As described in our Administrative Core, we intend to take advantage of this proximity by expecting all key personnel to attend biweekly seminars and other program project meetings.

Second, we have used the incentives afforded by the prospect of program project funding to condense a good deal of the “get acquainted” mutual education period into our proposal development activities. A key decision, taken when we began to form our PO1 group, was that each subproject we developed must embody a genuinely interdisciplinary approach to framing and accomplishing its key aims. Stage/policy- and child/policy-fit perspectives provide an overarching conceptual framing for our projects. And, with economists, developmental psychologists and sociologists involved in all four projects, our goals of within- and across-project interdisciplinarity will be met.

### **A.3 The Irvine Network on Interventions in Development**

Our proposed research Network, which we call the Irvine Network on Interventions in Development, includes members from different disciplines and career stages. A short biography of the Network's leader, Greg Duncan, is provided in section B.1 of this Overview portion of the PO1. Other members, all of whom are faculty at the University of California, Irvine, include:

*Marianne Bitler* (Ph.D., Economics, MIT, 1998) is Associate Professor of Economics and Faculty Research Fellow, NBER. She is an expert on the effects of cash assistance and food assistance programs on families and children, as well as on the effects of various social policies on fertility-related behaviors.

*Tim Bruckner* (Ph.D., Epidemiology, University of California, Berkeley, 2007) serves as Assistant Professor of Public Health and Planning, Policy and Design. He examines biological and behavioral responses to ambient stressors.

*Margaret Burchinal* (Ph.D., Quantitative Psychology, University of North Carolina-Chapel Hill, 1986) is Professor in the Department of Education. Prior to her 2007 appointment at UC Irvine, Dr. Burchinal was the Director of the Design and Statistical Computing Unit at the FPG Child Development Institute and a Research Professor in the Psychology Department at the University of North Carolina-Chapel Hill. Burchinal has published extensively on issues of child care, poverty and child development.

*Christopher “Kitt” Carpenter* (Ph.D., Economics, University of California, Berkeley, 2002) is Associate Professor of Economics/Public Policy at the Paul Merage School of Business, Research Associate at the National Bureau of Economic Research, and Managing Editor and Co-Editor at the *Journal of Policy Analysis and Management*. He is an expert in health economics and evaluation of public policies pertaining to workplace health programs and youth risk behaviors.

*AnneMarie Conley* (Ph.D., Psychology & Education, University of Michigan, 2007) is Assistant Professor of Education. Dr. Conley is an educational psychologist who researches how students are motivated to learn. She has investigated how the will to learn develops during adolescence, and how this motivation influences how much students learn and achieve.

*Thurston Domina* (Ph.D., Sociology, City University of New York, 2006) is Assistant Professor of Education and Sociology. Domina studies the relationship between educational policy and social inequality. He has published on the intergenerational implications of college access, the effectiveness of programs designed to smooth the transition between high school and college for disadvantaged students, the influence of higher

education admissions and financial aid policy on the behavior of high school students, and the consequences of educationally selective migration in the United States.

*George Farkas* (Ph.D., Sociology, Cornell, 1973) is Professor of Education and Sociology. He is an expert on quantitative methodology, with a particular focus on experimental and quasi-experimental program evaluation, fixed and random coefficient models, and structural equation modeling.

*Candice Odgers* (Ph.D., Psychology, University of Virginia, 2005) is an Assistant Professor of Psychology and a William T. Grant Foundation Faculty Scholar. Odgers is trained as a developmental and quantitative psychologist, but has also received training in psychiatric genetics and criminology. Her research focuses on the developmental course of externalizing (i.e., disruptive) disorders, with an emphasis on physical-health outcomes and early initiation of substance use.

*Andrew Penner* (Ph.D., Sociology, University of California, Berkeley, 2008) is Assistant Professor of Sociology. He is an expert on gender differences in mathematics achievement, and has received awards for his distributional research on this topic.

*Deborah Lowe Vandell* (Ph.D., Psychology, Boston University, 1977) is Chair and Professor of Education, and holds a joint appointment in the Department of Psychology and Social Behavior. Vandell's research has focused on the effects of developmental contexts (early child care, schools, after-school programs, families, neighborhoods) on children's social, behavioral and academic functioning.

*Sara Wakefield* (Ph.D., Sociology, University of Minnesota, 2007) is Assistant Professor of Criminology, Law and Society and Sociology. She is an expert on the effects of incarceration on inequality outcomes, especially as they relate to children and the family.

An even more diverse array of researchers contribute efforts to our various projects: *Lars Bergman*, developmental psychologist, Stockholm University; *Kathryn Duckworth*, education expert, University of London; *Hilary Hoynes*, economist, UC Davis; *Katja Kokko*, developmental psychologist, University of Jyväskylä (Finland); *Katherine Magnuson*, developmental psychologist, University of Wisconsin-Madison; *Thomas McDade*, biological anthropologist, Northwestern University; *Patrick O'Malley*, psychologist, University of Michigan; *Cornelia Pechmann*, marketing expert, University of California, Irvine; *John Schulenberg*, developmental psychologist, University of Michigan; *Sharon Simonton*, epidemiologist, University of Michigan; and *Aaron Sojourner*, economist, University of Minnesota.

## **B. ADMINISTRATION, ORGANIZATION, AND OPERATION**

### **B.1 Program Direction**

Our program project is directed by Greg Duncan and draws its key research personnel from several schools within the University of California, Irvine.

Duncan is Distinguished Professor in the Department of Education at the University of California, Irvine. After earning a Ph.D. in Economics in 1974, Duncan spent the first two decades of his career at the University of Michigan working on, and ultimately directing, the Panel Study of Income Dynamics (PSID) data collection project (Duncan, 2002). Beginning in the late 1980s, Duncan engaged in a number of interdisciplinary research networks and began to focus on the impacts of family and neighborhood conditions on children's cognitive and behavioral development. Duncan's participation on the Social Science Research Council's Committee for Research on the Urban Underclass led to the 1997 two-volume book *Neighborhood Poverty*, co-authored with Brooks-Gunn and Aber. Duncan served on the NICHD Network on Family and Child Well-Being between 1993 and 2005, among other things coordinating (with Brooks-Gunn) 12 groups of researchers working with 10 different non-experimental but longitudinal datasets to estimate income effects on child well-being (Duncan & Brooks-Gunn, 1997). In conjunction with the MacArthur Foundation Network on Successful Pathways through Middle Childhood, Duncan, with Huston and Weisner (2007), began a decade-long effort to evaluate the short- and longer-term impacts of the Milwaukee New Hope work support program on child achievement and behavior.

Duncan was President of the Midwest Economics Association in 2004 and President of the Population Association of America in 2008. He is currently (2009-2011) President of the Society for Research in Child Development. He was elected to the American Academy of Arts and Sciences in 2001, the National Academy of Education in 2009 and the National Academy of Sciences in 2010.

### **B.2 Other Key Personnel**

Biosketches detail the backgrounds of other key personnel involved in the project. We provide a list of

them and their connections to our Administrative Core and four projects in Table B.1 on the next page.

**B.3 Institutional Resources**

Founded in 1965, the University of California, Irvine, is the youngest of the nation’s major research universities. The specific institutional home for the program project is the UC Irvine Department of Education, which was initially established in 1971 as the Office of Teacher Education. Beginning in 2004-05, the University has committed significant resources to strengthen and expand the size and scope of the Department of

Table B.1: Key Personnel

	Project Role	Core	P I	P II	P III	P IV
<b>UC Irvine</b>						
Greg Duncan	Program Director, PI Project IV	X	X			X
George Farkas	PI Project I	X	X			
Christopher Carpenter	PI Project II	X		X		
Marianne Bitler	PI Project III	X			X	
Deborah Vandell	Co-Investigator	X	X			
Margaret Burchinal	Co-Investigator	X	X			
Sara Wakefield	Co-Investigator	X		X		
Tim-Allen Bruckner	Co-Investigator	X		X		
Thurston Domina	Co-Investigator	X		X	X	
AnneMarie Conley	Co-Investigator	X			X	
Andrew Penner	Co-Investigator	X			X	
Candice Odgers	Co-Investigator	X				X
Cornelia Pechmann	Advisor			X		
Andrea Karsh	Project Administrator	X				
<b>UC Davis:</b>						
Hilary Hoynes	Co-Investigator				X	
<b>Stockholm University:</b>						
Lars Bergman	Consultant					X
<b>University of Michigan:</b>						
John Schulenberg	Consultant					X
Sharon Simonton	Co-Investigator					X
Patrick O'Malley	Consultant			X		
<b>University of London:</b>						
Kathryn Duckworth	Co-Investigator					X
<b>University of Jyväskylä:</b>						
Katja Kokko	Co-Investigator					X
<b>Northwestern University:</b>						
Thomas McDade	Consultant					X
<b>University of Wisconsin:</b>						
Katherine Magnuson	Co-Investigator					X
<b>University of Minnesota:</b>						
Aaron Sojourner	Co-Investigator		X			

Education. The number of ladder-rank research faculty has increased from nine filled FTE in 2005 to 21 filled FTE in 2010. Newly added faculty include a Distinguished Professor (Duncan), a Department Chair (Vandell), two additional full professors (including Burchinal and Farkas), two associate professors and eleven assistant professors (including Conley and Domina), all from top-tier programs at institutions like Northwestern, Michigan, Wisconsin, Yale, Penn State, Stanford, Vanderbilt, UCLA, and Princeton. Some 57 students were enrolled in the Department’s Ph.D. program as of September, 2010. The Department of Education is housed in its own building on the UC Irvine main campus. Assignable square footage is 33,392 and includes seminar and meeting rooms for P01 activities and temporary office space for visiting co-Investigators and consultants.

Department of Education faculty have been highly successful in competing for grants from federal (NSF, NIH, IES, DOED, DHHS), state (CDE) and local (Orange County) agencies. In 2009, the total volume of funded projects per faculty member was comparable to top-tier Schools of Education, according to *U.S. News and World Report* rankings. The Department of Education research support services include an eight-person Business Services Office with two full-time contract and grant analysts, and a dedicated Director of Research.

The contracts and grants analysts, as part of the larger business office, provide investigators with individual grant-administration support services including budgeting, proposal preparation, forecasting, accounting and financial management. Each proposal is coordinated by one analyst. A Personnel Manager and an administrative assistant hire and administer payroll and other human resource services for the department, including all extramurally-funded positions.

On the larger UCI campus, the Office of Research Administration (ORA) consists of Sponsored Projects, Human Research Protections, Research Assurances, Conflict of Interest and an ORA Training group. ORA is the office of record for extramural proposals and awards supporting research, education and public service activities of UCI faculty, staff and students. Staff members manage faculty-based regulatory review functions as required by federal and state regulations and UC policy. ORA personnel act as administrative officials in dealings with external sponsors, regulatory agencies, higher education organizations and professional societies regarding regulatory changes, institutional policy developments and implementation of regulatory requirements and enhancements. ORA staff members are expert resources for obtaining policy and program information. Post-award administration is provided primarily by Contracts & Grants Accounting under the direction of the campus Controller. The Contracts & Grants unit is responsible for financial reporting and the administration of extramural funding.

Population research has grown very rapidly at UCI. In 2007, the campus-wide Center for Demographic and Social Analysis (C-DASA) was founded under the direction of Judith Treas (Sociology). With 47 highly productive faculty affiliates in a dozen departments, including all of the UCI-based key personnel on this PO1 application, the center has built a cohesive community of population researchers across the campus. Remarkably, 72% of C-DASA affiliates are 21<sup>st</sup> century hires.

### C. RESEARCH PROGRAM

Our program project addresses a key purpose of the NICHD PO1– to encourage multidisciplinary approaches to the investigation of complex problems relevant to NICHD’s mission – by developing an interdisciplinary research network focused on understanding why education-oriented intervention programs and policies, directed at children in the preschool, middle childhood and adolescent stages of development, have the effects (or non-effects) that they do.

*Our four specific projects are the following:*

**Project I** (George Farkas, PI) employs both a stage/policy- and child/policy-fit perspective and largely experimental data to derive and test hypotheses about which combinations of child, family, and child care program characteristics lead to larger child care treatment effects on cognitive and behavioral outcomes for young children. Specifically, the *compensatory hypothesis* holds that high-quality child care benefits environmentally disadvantaged children; the *skill begets skill hypothesis* posits the opposite – that the most skilled children profit the most from high-quality education-oriented investments; the *protective hypothesis* argues that supportive family factors protect at-risk children from the negative effects of low-quality care; and the *differential susceptibility hypothesis* holds that children with fragile temperaments are at once hurt the most by low-quality care and helped the most by high-quality care. These hypotheses are tested using four experimental and one quasi-experimental intervention projects.

**Project II** (Christopher Carpenter, PI) employs a developmental perspective to understand the conditions under which state health-education curriculum requirements regarding alcohol, tobacco and other drugs have protective or harmful effects on youth substance use. Developmental theory suggests that the effects of these policies will likely vary with the biological age and personal characteristics of students; characteristics of the students’ school and peer groups; and characteristics of the programs themselves. The project’s test of these theories will be the first comprehensive quasi-experimental analysis of state curriculum requirements for education on alcohol, tobacco and other drugs. The project will also create and maintain an ongoing, comprehensive database of state requirements adopted since 1976 regarding these and a variety of other policies pertaining to health education and academic content.

**Project III** (Marianne Bitler, PI) develops and applies new methods for examining the distributional impacts of a variety of preschool and school-based policies. Existing intervention work has focused primarily on average impacts, and yet some of the hypotheses tested in Project I (e.g., skill begets skill) lead to expectations that effects will differ for different groups. The new empirical strategies provide estimates of intervention effects across the distribution of each outcome. Interventions include Head Start and pre-kindergarten programs and the provision of vouchers for private schools to poor children. A host of

dissemination activities involving presentations at professional meetings and the Network's website are proposed in order to promote best practices by the research community.

**Project IV** (Greg Duncan, PI) addresses the "So what?" question of the possible longer-run consequences of augmenting skills and improving behavior at various points in childhood and adolescence. Specifically, it assesses the extent to which achievement, behavior and attention skills in middle childhood and adolescence are predictive of adult labor market and health outcomes, and of avoiding serious adult crime. Data are drawn from six population-based developmental datasets from the U.S., Great Britain, Sweden and Finland. By seeking convergent findings across populations and countries, this project complements the other three in the program project by showing which skills and childhood stages targeted by the various education-related interventions they evaluate matter most for adult well-being.

*Our four projects share the resources of a single Administrative Core.* The purposes of the Administrative Core are to:

- Unite UCI-based faculty supported by the program project into a true interdisciplinary research network through Network-based collaboration among the researchers within and across the four projects.
- Provide administrative support for all projects.
- Conduct the management tasks of the PO1, including monitoring the progress of each project.
- Facilitate the dissemination of the results of the research to the broader research community and the policy world.

Details of our plans for providing administrative support for the four projects and monitoring and managing their substantive and financial progress are provided in our discussion of the Core itself. Here we summarize our proposed efforts to disseminate our results and, especially, to unite individual project efforts into a coherent whole. First, dissemination:

*Dissemination to the wider academic and policy communities will occur in six ways.*

- We will develop a Network website that will provide information on the Network itself and its various products.
- Chief among the products posted on the website will be webinars of speakers in the seminar series and a working paper series featuring the integrative review papers (see below) as well as project-specific papers that are written as part of this program project grant.
- Data on state ATOD policies from Project II will be posted on our website, as will software on the distributional methods developed in Project III.
- We will disseminate our results and methods through presentations at professional organizations.
- We will work with the newly formed University of California Educational Evaluation Center (UCEC) to influence the design and, especially, evaluation of PK-20 education policies. Duncan heads the UC Irvine node of the UCEC.
- Our findings on preschool interventions will be disseminated through the National Forum on Early Childhood Programs and Policies, which Duncan co-chairs and which has close links with the National Governors Association and the National Conference on State Legislatures.

The quintessential challenge of any program project is to make its whole much more than the sum of its individual project parts. In our case, our interdisciplinary Network's goal is to understand why human capital-oriented intervention programs and policies, directed at children in the preschool, middle-childhood and adolescent stages of development, have the effects, non-effects and, in some cases, perverse effects that they do. To accomplish this goal, we combine developmental and economic perspectives and a host of empirical methods to understand the heterogeneous nature of an assortment of human capital-related policy interventions. How will we integrate our efforts?

*First, our four individual projects share the following features:*

- All of our projects involve interdisciplinary teams of investigators. Specifically, all four include economists, developmental psychologists and sociologists as PIs or co-Investigators; one involves an epidemiologist.
- To generate hypotheses regarding the likely impacts of the policies we investigate, we employ a common developmental framework of the congruence between the developmental needs of children

and youth and the design of the intervention policies.

- To the extent possible, the projects use data from random assignment experiments or strong quasi-experimental designs. When this is not possible, strong analytic methods (e.g., fixed effects) are applied to longitudinal data.

*Throughout the PO1 project period, all projects will engage in activities that connect each project with the common program project themes.* The most important of these activities include:

- Writing three Network-authored papers across the five-year program project period on the conception, results and policy implications of our child/policy and stage/policy fit perspective.
- Attending every-other-week seminars that will mix presentations from outside speakers selected for their breadth and expertise on PO1 themes with project presentations of plans and results. Specifically, each project will be responsible for two seminar presentations per year, one of which will be a substantive presentation of research papers coming out of the project and the second a more general discussion of how emerging findings relate to other PO1 projects, the Network as a whole, and links to interventions.
- Expanding and restructuring the annual External Advisory Committee meetings to provide opportunities for feedback on both individual projects and whole-Network activities, with every member of the Advisory Committee linked to a specific project.

Members of our newly-constituted External Advisory Committee have been carefully selected to supply the needed conceptual, methodological, measurement and concrete intervention expertise to our individual projects and to the Network as a whole. To help us formulate hypotheses from our child/developmental stage/policy-fit perspective, we draw upon expertise of developmental psychologists Ken Dodge, Jacque Eccles and Wayne Osgood and sociologist Robert Crosnoe. Four members have extensive experience with actual interventions – Howard Bloom, Doug Clements, Dodge, Dale Farran and Jens Ludwig. Jeff Smith and Ludwig provide econometric expertise; Smith has extensive experience with the distributional technique employed in Project III. Susanna Loeb has conducted numerous education policy studies, and Daniel Keating’s cross-national health research experience is well matched to Project IV. Ludwig, Bloom and Sean Reardon have worked on some of the instrumental variables techniques to be employed in Project I. Finally, Dan Bolt specializes in the psychometrics of measurement, which will be useful for all of our projects, particularly Project I.

*How then will individual projects link to each other, the members of the External Advisory Committee and the interdisciplinary and policy goals of the program project as a whole?*

**Project I** (George Farkas, PI)’s closest link is to Project III’s examination of distributional impacts identified by the Head Start Impact Study (HSIS); see below for more details. And since its achievement and behavioral outcomes are key independent variables for Project IV’s analyses of the role of middle childhood skills and behavior for adult attainment, health and behavior, analyses in Project IV will provide guidance in determining which of the measured outcomes matter the most for children’s long-run success.

Project I also draws heavily on the intervention and statistical expertise of External Advisory Committee members. Ludwig, Bloom and Reardon have experience using the proposed instrumental variables techniques. Farran and Clements bring a wealth of experience in early childhood interventions, including the PCER (Farran) project used in this subproject, while Dodge has developed the Fast Track and other interventions spanning childhood and adolescence.

**Project II** (Christopher Carpenter, PI) relates the developmental issues in Project I to late adolescence, providing a useful contrast between parent- and child care teacher-dominated early childhood with peer-dominated adolescence. This project also complements Project IV’s examination of the long-run health consequences of adolescence substance use, providing further insight and highlighting a policy-relevant outcome of interest that is amenable to manipulation. Adding to these perspectives, it examines an important aspect of the influence of adolescent policy environment on contemporaneous (i.e., during adolescence) risk outcomes.

Project II will also benefit greatly from the External Advisory Committee, especially the three experts who will work most closely with this project: Dodge, Ludwig and Osgood. Dodge has expertise in developing interventions aimed at the developmental stage of adolescence that is the focus of Project II’s study. Ludwig is well versed in the strengths and weaknesses of quasi-experimental methods such as those used here, and has

considerable substantive expertise in deviant criminal behaviors. Osgood brings area knowledge in youth substance use and delinquency, as well as methodological expertise from his familiarity with several large-scale evaluations of prevention programs. Project II will also benefit from John Schulenberg, a consultant on Project IV, who is a co-PI on the Monitoring the Future survey – a key dataset in Project II. In addition, Project II will draw on the insights of Project IV’s local expert on adolescence, Candice Odgers.

**Project III** (Marianne Bitler, PI) brings new methodological tools to bear on the questions of child/policy fit that motivate the Irvine Network on Interventions in Development. Traditionally, researchers have investigated issues related to child/policy and stage/policy fit by estimating mean effect sizes for theoretically interesting population subgroups or estimating linear interaction terms. Projects I and II propose to undertake many analyses of this sort. Project III approaches these questions somewhat differently, estimating the effects of interventions on the distribution of continuous outcomes, or the distribution of underlying latent probabilities for dichotomous measures.

In linking other projects, this project will use methods for assessing the ability of subgroup-specific impact approaches to capture overall heterogeneity to test whether the subgroup means analyses substantially capture the important variations in outcomes across the distribution. This will be particularly useful for Project I, which shares a common dataset with Project III – the HSIS. Senior personnel for Projects I and III will collaborate on a paper comparing the results of distributional analyses with the results of more traditional group-based and interaction analyses. In addition, Project III will benefit from the subject-matter expertise of Duncan, Farkas and Vandell in understanding findings generated by this project. Burchinal has agreed to spend two days per project year to help guide the performance of a key aim (Aim 1).

Project III will benefit greatly from the External Advisory Committee. Smith is a leading expert on the proposed distributional methods. Loeb has general expertise on the school intervention literature and specific expertise on the New York City school system, from which data used in Project III are drawn. Reardon, a quantitative sociologist, has a great deal of experience working with the California test score data to be used in another of the analyses. And Bolt will advise on some of the test measurement issues that will arise in all of Project III’s work.

**Project IV** (Greg Duncan, PI) complements the other three by helping to provide perspective on their education-intervention results. For example, in linking middle-childhood skills and adult outcomes, Project IV will provide a valuable perspective on the possible adult consequences of the pattern of heterogeneous treatment impacts, most of which are not measured beyond middle childhood, estimated for high-quality preschool programs in Project I. Project II’s focus on early and later adolescent behavioral outcomes will be informed by Project IV’s look at links between various kinds of adolescent behaviors and adult achievement and behavior. Project III’s focus on boosting elementary student achievement through vouchers will also profit from Project IV’s look at the longer-run consequences of higher achievement in the early grades.

It is through these project-to-project and project-to-network synergies that we will accomplish our ambitious interdisciplinary goal of understanding why human capital-oriented intervention programs and policies, directed at children in the preschool, middle-childhood and adolescent stages of development, have the effects, non-effects and, in some cases, perverse effects that they do.

#### **D. DESCRIPTION OF ASSURANCES AND COLLABORATIVE AGREEMENTS**

Although based largely at a single institution, the University of California, Irvine, a number of our projects involve collaborators from other institutions to add to our base of expertise. As documented in Table B.1 above, we will work with co-Investigators and consultants at the University of Minnesota (Project I, which draws upon Sojourner’s expertise with the Infant Health and Development data set); the University of California, Davis (Project III, which takes advantage of the econometric expertise of Hilary Hoynes); the University of Michigan (Project II, to draw on Patrick O’Malley’s expertise with the Monitoring the Future dataset; and Project IV, with the expertise of adolescent researcher John Schulenberg and NCDS expert Sharon Simonton); the University of London (Project IV, which capitalizes on Kathryn Duckworth’s expertise with the British Cohort Study); the University of Wisconsin-Madison (Project IV, which draws on Katherine Magnuson’s experience with the NLSY data); the University of Jyväskylä (Project IV, which draws on Katja Kokko’s expertise with the JYLS data); Northwestern University (Project IV, to capitalize on Thomas McDade’s expertise in health research); and Stockholm University (Project IV, which draws on Lars Bergman’s expertise with the Individual Health and Adaptation dataset). Letters of collaboration from the co-Investigators at the subcontract sites, and letters of support from the consultants, are included as part of the Research Project description for each applicable

project. Letters documenting institutional support from the subcontract sites are included with the budget pages for those sites. A letter documenting support for the program project from within UC Irvine, written by Executive Vice Chancellor and Provost Michael Gottfredson, is appended to the end of this overview.

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