EARLY FAILURE IN THE LABOR MARKET: CHILDHOOD AND ADOLESCENT PREDICTORS OF UNEMPLOYMENT IN THE TRANSITION TO ADULTHOOD[*]

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We investigate the childhood and adolescent predictors of youth unemployment in a longitudinal study of young adults who have been studied for the 21 years since their births in 1972–1973. We test hypotheses about the predictors of youth unemployment using information about each individual's human capital, social capital, and personal capital. In the human capital domain, lack of high-school qualifications, poor reading skills, low IQ scores, and limited parental resources significantly increased the risk of unemployment. In the social capital domain, growing up in a single-parent family, family conflict, and lack of attachment to school also increased the risk of unemployment. In the personal capital domain, children involved in antisocial behavior had an increased risk of unemployment. These predictors of unemployment reached back to early childhood, suggesting that they began to shape labor-market outcomes years before these youths entered the work force. In addition, these effects remained significant after controlling for the duration of education and educational attainment, suggesting that many early personal and family characteristics affect labor-market outcomes, not only because they restrict the accumulation of human capital (e.g., education), but also because they directly affect labor-market behaviors. Failure to account for prior social, psychological, and economic risk factors may lead to inflated estimates of the effects of unemployment on future outcomes.

The transition from adolescence to adulthood is a critical period in the life course and has important implications for subsequent achievements and behaviors (Hogan and Astone 1986). What factors influence the negotiation of this transitional period? Who has trouble and who succeeds? Although several studies have provided im-

portant accounts of the transition to adulthood (e.g., Hogan 1981; Marini 1987; Modell 1989; Kerckhoff 1993), relatively little is known about the individual-level predictors of different life-course trajectories.

In this article, we examine the childhood and adolescent predictors of individual differences in the transition into the labor force; specifically, we study the precursors of youth

unemployment, a growing concern of policymakers in developed nations. The article has three distinctive features: It focuses on unemployment during the transition from adolescence to adulthood because acquiring a job is a central developmental task of this age period. It tests hypotheses about the predictors of youth unemployment by using data about each individual's human capital and social capital, as well as his or her personal capital (i.e., characteristics that affect the motivation and capacity to work). It examines adolescent, late-childhood, and pre-school predictors of unemployment by using prospective-longitudinal data from a sample of young adults who have been studied since their births in the early 1970s.

THE FUNCTIONS OF EMPLOYMENT AND THE CONSEQUENCES OF UNEMPLOYMENT AMONG YOUTHS

Entering the labor force is one of the most significant role transitions of young adulthood. Employment serves multiple material, psychological, socialization, and social-control functions (Jahoda 1981; Furnham 1994). It provides income, offers training opportunities, and contributes to skill acquisition. Employment also provides a vocational identity for youths, a sense of mastery and purpose, as well as a "stake" in adult institutions. Finally, employment encourages shared experiences with persons outside one's family and structures one's time, thereby exercising social control over the activities of youths. Although these functions of employment may vary with the nature of one's work (Kohn and Schooler 1983; Mortimer, Lorence, and Kumka 1986), they are best served through stable employment.

Studies of youths in the Western world show that unemployment has negative psychosocial and economic consequences (Rutter 1994). Unemployed persons experience more family conflict (Conger and Elder 1994), commit more crime (Farrington et al. 1986; Horney, Osgood, and Marshall, 1995), and suffer diminished mental health and psychological well-being (Warr, Jackson, and Banks 1988). Especially among young adults, there is a strong relationship between duration of unemployment and psychological distress (Winefield and Tiggemann 1990). Moreover, the effects of unemployment on distress may be ameliorated by reemployment suggesting that there are beneficial effects associated with working (Kessler, Turner, and House 1989).

Youth unemployment also appears to reduce the probability of future employment (Ellwood 1982; Lynch 1989), and youths whose work histories are characterized by spells of unemployment are more likely in later adulthood to secure lower wages (Corcoran 1982; Ellwood 1982; Baker and Elias 1991; but see B. Becker and Hills 1983). The strength of these economic effects varies across different studies owing to sample differences, differences in the length of follow-ups, and historical differences in the state of the labor market. However, Baker and Elias (1991) conclude that, whatever the precise strength of these associations, ". . . the view that youth unemployment is a transitory phenomenon with no serious consequences for future employment experiences . . . appears to be refuted by the findings" (p. 242).[1]

WHY STUDY THE PREDICTORS OF UNEMPLOYMENT?

In this article, we are concerned with identifying which personal and family characteristics in the early life course predict who is at risk for unemployment during the transition to adulthood. Knowledge about the predictors of unemployment can inform sound theory, policy, and methodology when studying the effects of unemployment.

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[1] Various theories seek to account for the negative consequences of youth unemployment. Developmental theory predicts disrupted identity formation (O'Brien 1986). Stress theory predicts that the "wear and tear" of unemployment leads to compromised mental health that may interfere with effective job searching (Horwitz 1984). Human capital theory predicts that unemployment reduces opportunities to learn skills, making individuals less competitive in the labor market (Becker 1975). Labor segmentation theory predicts that employers use knowledge of prospective employees' past unemployment as a signal of lesser "worker quality" and track those persons into less desirable jobs (Parcel 1987).

In terms of theory, it is important to establish whether unemployment is a cause or a consequence of the individual-level attributes with which it is correlated. This question is part of a more general tension between social-selection and social-causation perspectives on social structure and personality (House 1990; Dohrenwend et al. 1992). Social selection refers to the process whereby certain persons selectively enter certain life contexts; social causation refers to the process whereby certain life contexts shape subsequent behavior and development. The critical difference between these two processes lies in their loci of causation, yet both perspectives must be incorporated in studies of the life course. To understand life-course development it is necessary to locate individuals in their particular environments and to ask how they got there and how those environments continue to shape their behavior (Kessler and Cleary 1980).

Knowledge of the determinants of unemployment is also relevant to policy considerations and to the design of "proactive preventions" (i.e., programs to reduce unemployment) and "reactive preventions" (i.e., programs to improve people's ability to cope with and exit unemployment) (Dooley and Catalano 1988:9). If youth unemployment—especially of long duration—has negative consequences (e.g., reduced skill acquisition, alienation, delinquent offending), it may be important to create new jobs. However, if preexisting personal characteristics (e.g., poor skills, alienated attitudes, or an antisocial lifestyle) antedate unemployment, only providing jobs may be insufficient. Corcoran and Hill (1980) argue that unless such programs also "identify and alter those skills, attitudes, or habits which influence work stability, they will not lower future unemployment" (p. 54).

Finally, knowledge of the determinants of unemployment has methodological implications for estimating the effects of unemployment. To derive unbiased estimates of the influence of unemployment it is necessary to control for those preexisting differences between individuals that influence their likelihood of becoming unemployed. Failure to account for preexisting personal characteristics that are exogenous to the employment process will yield biased and inconsistent estimates of the effects of prior work histories on future well-being (Manski 1995). Statistical techniques are available for dealing with unobserved population heterogeneity, although they require making strong assumptions. Moreover, as Mortimer (1994) notes, if worker "heterogeneity is defined . . . as standing for a host of *unmeasured* individual factors, the question as to which particular individual attributes account for unemployment is, in effect, bypassed" (p. 178, italics in original). In this article, we seek to specify and *measure* heterogeneity in the population and thereby determine which personal and family characteristics in childhood and adolescence are linked to future unemployment.

WHO IS AT RISK FOR UNEMPLOYMENT?

Economists, sociologists, and psychologists tend to focus on different predictors of labor-market outcomes. Economists focus on the transmission and acquisition of resources that increase employability; sociologists focus on socialization influences on children's attainments; psychologists focus on mental health and behavioral styles that shape each person's approach to the labor market. To capture these different disciplinary foci, we group the individual-level predictors of unemployment into three types of "capital"— human, social, and personal. These three types of capital organize conceptually related individual characteristics and postulate how they might influence unemployment during the transition to adulthood (Piliavin et al. 1996).[2]

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[2] We use the term "capital" to emphasize that people possess different amounts of goods— whether expressed in terms of resources, skills, connections, or personal styles—that can be used to secure other goods. The purpose of our tripartite designation (human, social, and personal capital) is to draw attention to the fact that variables historically favored by different disciplines (economics, sociology, and psychology) may *all* matter and all thus require measurement. The distinctions between different forms of capital are elastic (e.g., IQ is both human capital and personal capital) and heuristic. The results of the multivariate analyses reported in this article, in

Human Capital

Human capital refers to the resources, qualifications, skills, and knowledge that are available to and acquired by individuals to maximize their own employability. In this study we consider several different measures of human capital.

We consider resources of an individual's family of origin to have an important influence on young adults' employment activities. Several longitudinal studies have shown that the economic resources of parents (e.g., their income and occupational status) play an important role in the creation of human capital in children (Sewell and Hauser 1975; Alwin and Thornton, 1984; Corcoran et al. 1992). Most of these studies measure the labor-market outcomes (e.g., earnings, occupational status) of persons in their mid-twenties and older (Haveman and Wolfe 1995), but parental resources probably also influence children's employability as they make the transition from adolescence to adulthood. High-income parents may expend more on their children's skills, health, learning, and credentials (G. Becker and Tomes 1986) and thereby contribute to their children's future employability. Wealthy parents also may provide their children with a better learning environment through which children can secure resources that increase their future employability (McLanahan 1985). Finally, parents who have succeeded in their own work careers may transmit positive attitudes about employment to their children, and their children thus may develop high aspirations for themselves (Mortimer et al. 1986).

In addition to family resources, we consider adolescents' school achievements to represent anticipatory human capital. In this study we examine whether obtaining high school qualifications is associated with improved employment outcomes. Recent labor-market analyses point to an increasing demand on youths to make the transition from school to work with some type of qualification in hand. Baker and Elias

which all variables are given equal emphasis, are unaffected by whether we group the measured variables under one heading or another.

(1991:217) suggest that this rise in "credentialism or new vocationalism" has increased the proportion of unqualified young adults who are unemployed. Educational qualifications represent a fixed capital asset (Meyer 1978)—because they signal skill and motivation to prospective employers, credentials can open up employment opportunities for youths entering the labor market (Gottfredson 1985).[3]

Independent of educational credentials, basic reading skills are important. Young adults who cannot read may have fewer choices in the labor market and may be handicapped in their job search (e.g., reading advertisements, filling out applications). In a follow-up study of men who were retarded readers as children, poor reading was linked with low pay, unskilled jobs, and unemployment in young adulthood (Maughan, Gray, and Rutter 1985).

We also examine the influence of measured intelligence (IQ) on unemployment. This influence may come about through at least three mechanisms. First, cognitive deficits interfere with mastery of reading, writing, and arithmetic, thereby increasing youths' risk of losing out in formal education and limiting their employment opportunities (Lynn, Hampson, and Magee 1984). Second, individual differences in intelligence may influence youths' attachment to educational institutions. Less able children may experience school as stressful and humiliating, fail to form social bonds to this social institution, and increasingly reject its offerings (Lynam, Moffitt, and Stouthamer-Loeber 1993). Finally, because intelligence is associated with problem-solving and skill acquisition, individual differences in intelligence may affect the ability to find and retain a job (Barrett and Depinet 1991).

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[3] Credentials and educational requirements are not necessarily reliable and valid indices of the skill level required in many jobs (Burris 1983; Spenner 1983). As such, the effect of "credentialism" on (un)employment may occur because some jobs may, in fact, require a skill level that is well indexed by education, while other employers use credentials to sort applicants in ways that are unrelated to the actual educational requirements of the job.

Hypothesis 1: Unemployment is greater for young adults who (a) came from low occupational-status families; (b) did not obtain a high school certificate; (c) were poor readers; and (d) had lower IQs.

Social Capital

Social capital refers to those social relationships that provide access and control over various types of resources. Whereas human capital exists in the skills and knowledge acquired by each person, social capital "exists in the relations among persons" (Coleman 1988:S100). We hypothesize that deficiencies in social capital reduce employability. We focus on several different variables that may be organized conceptually under the rubric of social capital.

The presence and strength of relationships between parents and children may provide one of the most valuable sources of social capital (Parcel and Menaghan 1994). Coleman (1988) suggests that social capital may be weakened in single-parent families or in families characterized by frequent changes in parental figures. According to Sampson and Laub (1993, 1994:523), who link Coleman's notion of social capital to social control theory, family disruption "inhibits family processes of informal social control." In a structurally disorganized home, the ability of the parent to monitor, supervise, and bond to the child may be lessened (Patterson, DeBaryshe, and Ramsey 1989), leaving the child free to deviate from socialized behavior.

In addition to these effects of family structure, strong ties to one's family can lead to direct assistance in times of need, including emotional intimacy, financial aid, guidance, and information. Such interpersonal resources may aid youths in locating jobs and, should they fail, buffer them from the stress of unemployment. Attenuated social ties may diminish the availability of these buffering resources, rendering young adults more vulnerable during this "floundering" period of the life course (Mortimer et al. 1986). To capture these various elements of social capital, we measure both structural and qualitative aspects of young adults' families of origin.

Social capital is not limited to one's family of origin and, with increasing age, other social structures may increasingly facilitate social capital. For example, in addition to providing students with education (i.e., human capital), schools are also cultural and social organizations that provide students with opportunities for social interaction and thus expose them to values and norms that can facilitate their employability (Gecas 1990). Schools also provide practical support in the form of vocational guidance, career counseling, and reference letters. Weak ties between adolescents and their schools may impede adolescents' ability to profit from these resources. Moreover, lack of involvement in school may be part of a broader, disillusioned attitude toward social institutions that may generalize to the workplace.

Hypothesis 2: Unemployment is greater for young adults who (a) did not have both parents present in their homes; (b) had conflict in their homes; (c) had weak attachment to their parents; and (d) had low involvement in their schools.

Personal Capital

Personal capital refers to those behavioral characteristics and resources that affect both the motivation and capacity to work. Although these factors are recognized by economists—who allude to personal differences in "tastes" and "preferences" for employment (Corcoran and Hill 1980; Freeman and Wise 1982)—these factors usually are unmeasured in studies of the precursors to unemployment (Spenner and Otto 1985; Mortimer 1994).[4]

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[4] Some studies have explored the role of attitudinal variables in predicting unemployment (Jackson et al. 1983; Feather and O'Brien 1986). However, many of these attitudinal measures are domain-specific variables that refer to attitudes toward employment (e.g., confidence in one's ability to find a job, employment commitment). Moreover, it is unclear whether these attitudes actually motivate and influence behavior (i.e., employment status), whether they reflect accurate estimates of one's likely chance of finding a job, or whether they are the product of dissonance or self-perception processes in which the unemployed come to hold values that are consistent with their status.

In the present study we examine three broad classes of behavioral characteristics that are hypothesized to influence unemployment: antisocial behavior, symptoms of mental illness, and chronic health problems.

Several studies have shown that youths who are involved in illegal activities (Viscusi 1986; Nagin and Waldfogel 1995) and other antisocial behavior (Robins 1966; Maughan et al. 1985; Caspi, Elder, and Bem 1987; Sanford et al. 1994) are more likely to have unstable work lives. For example, Kandel and Yamaguchi (1987) found that drug use in adolescence predicted subsequent unemployment in young adulthood, as well as shorter job tenure. The influence of antisocial behavior on unemployment may reflect a combination of at least three processes (Kandel and Yamaguchi 1987). First, it may reflect a more general underlying behavioral syndrome of nonconformity that is expressed through involvement in deviant behaviors as well as in the rejection of conventional values, such as employment. Second, it may be the product of a matching process in which antisocial youth are selected into jobs that have high rates of turnover. Third, it may be the result of antisocial youths getting into trouble in the workplace because they bring their personal styles of interaction to bear on their job performance and on their relations with coworkers and supervisors.

As with antisocial behavior, poor mental health may increase the risk of unemployment. Poor mental health may influence the motivation to seek employment (e.g., depressed people, who suffer from diminished interest in most daily activities and from loss of energy, may not engage in job-search behaviors). Poor mental health also interferes with the ability to carry out work-related activities. Finally, poor mental health and associated impairments in interpersonal relations may create difficulties on the job by alienating coworkers and supervisors (Hammen 1991). These dynamic relations between poor mental health and employability are not well understood, although evidence suggests that poor mental health impedes productive labor-force participation (Layton and Eysenck 1985; Winefield and Tiggeman 1990; Bartel and Taubman 1986;

Feather and O'Brien 1986; Mullahy and Sindelar 1990; Sanford et al. 1994)

Closely related to concerns with mental health are concerns with physical health (Mullahy and Sindelar 1990). Persons with chronic health problems may be at greater risk for unemployment because they are more limited in the range of employment opportunities they can seek out and in the tasks they can perform. Whether this is attributable to actual physical limitations or to employer perceptions is not always clear (Glueckauf and Quittner 1984). In addition, because chronic health problems are associated with absenteeism, persons in poor health may be more vulnerable to lay-offs (Mortimer 1994).

Hypothesis 3: Unemployment is greater for young adults who (a) were involved in antisocial behavior; (b) had symptoms of mental illness; and (c) had poor physical health.

METHODOLOGICAL ISSUES IN THE STUDY OF UNEMPLOYMENT

Prior studies of youth unemployment have raised methodological issues about the design specification of studies that seek to predict who becomes unemployed and about the measurement of unemployment (Mortimer 1994). We address some of these issues in this section.

Mortimer (1994) identifies three types of research designs that have been used to study the precursors of unemployment. The first design involves community samples of adults who are followed over time to compare persons who are stably employed, stable unemployed, or whose employment status changes (e.g., Kessler, Turner, and House 1988). This design is limited from a developmental perspective because it does not yield prospective information about the early life-course antecedents of unemployment. The second design involves samples of unemployed persons (selected from unemployment registers or from closing factories) who are followed over time to compare persons who become reemployed with those who remain unemployed (e.g., Shamir 1986; Warr et al. 1988). However, this design does not distinguish between the predictors of who

initially becomes unemployed versus the predictors of who does not leave unemployment. The third design involves samples of students at the university or high school level who are followed over time as they enter the labor force to predict who becomes employed versus unemployed (e.g., Mortimer et al. 1986; Kandel and Yamaguchi 1987; Winefield et al. 1991). This design has yielded the most information about the precursors of youth unemployment (Mortimer 1994), but it is not without limitations. Longitudinal studies of precursors to youth unemployment that rely on school-based samples may exclude or underrepresent those segments of the population at greatest risk (e.g., truants, dropouts, youths with disabilities). In addition, several longitudinal studies have suffered from low initial response rates and high attrition; it is not atypical for longitudinal studies of youth unemployment to have lost 25 to 40 percent of their initial samples (for a review, see Sanford et al. 1994). Selective sampling and nonrandom attrition jeopardize external and internal validity (Berk 1983).[5]

To our knowledge, ours is the first study to examine the precursors of unemployment using prospective data from early childhood to young adulthood. We examine the early life-course predictors of unemployment in a longitudinal study of a birth cohort. We have been studying members of this sample since their births 21 years ago. This allows us to test the hypothesis that many of the individual-level predictors of unemployment begin to shape labor-market outcomes in the years before youth enter the work force.

These long-term predictions may reflect two intertwined sources of influence (Caspi et al. 1987). First, some individual-level risk factors—even if they are not stable across time—may set in motion a cumulative chain

of continuity that becomes increasingly more difficult to unfasten with development. For example, poor self-control among temperamentally difficult children may lead them to experience behavioral and academic difficulties at school and to leave high school at an early age. In this scenario, the consequences of early characteristics may be maintained by narrowing options and opportunities that increase the risk of later unemployment. Second, some individual-level risk factors are stable from the early years of life and are resistant to change. To the extent that these risk factors remain stable from childhood to adolescence—and in the absence of sustained interventions directed at eliminating them—we expect prediction from early measures to be about as good as prediction from later measures. Moreover, we expect these risk factors to affect unemployment directly, independent of other life-course contingencies (e.g., education) en route to securing employment.

Most previous studies of the predictors of unemployment have defined their outcome variable as a binary indicator of whether the respondent is employed at the time of the survey. Studies that measure unemployment at one point in time (i.e., the unemployment rate, or whether a given person is in that state) implicitly adopt a static view of the labor market and the life course. However, the youth labor market is not made up of one group "in work" and another group "out of work," but of persons who move in and out of work in response to changing opportunities and needs. Likewise, persons who experience brief periods of unemployment as they move between jobs and activities should be distinguished from persons who remain unemployed for extended periods of time.

The static operationalization of unemployment contrasts sharply with definitions that are used to study the effects of unemployment. These studies show that the *duration* of unemployment has important psychological and economic consequences. More generally, Spenner and Otto (1985: 204) argue that the influence of work on psychosocial development probably arises from *work histories* rather than from conditions at fixed points in time. They encourage researchers to collect event-histories that cover extended

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[5] These problems are not as pervasive in those panel studies that are more "economic" in their orientation and focus on the determinants of children's attainments (Haveman and Wolfe 1995). However, the predictor variables in such studies typically do not include psychosocial and behavioral characteristics but are generally restricted to parental and social background characteristics and to parental and self "investment choices" (e.g., years in education).

periods. Thus, we analyze unemployment data over a six-year period, from age 15 to age 21. We examine the predictors of unemployment beginning with information at age 15—when the study members were in their last year of compulsory education—and then work back in time to test whether we can foretell labor market outcomes using information from the elementary school years, at ages 7 to 9, or even from the preschool years, at ages 3 and 5.

In summary, this article has three goals. Our primary goal is to establish the breadth and depth of selection effects into unemployment during the transition to adulthood. Using variables from complementary economic, sociological, and psychological perspectives, we test which personal and family characteristics place youth at risk for unemployment and how early in the life course these characteristics set in motion a trajectory of risk for unemployment. A second goal is to clarify the parameters of these selection effects. Specifically, do early personal and family characteristics set in motion a trajectory of risk for unemployment because they truncate education? Or do these characteristics directly affect the risk of unemployment above and beyond their relation to education? We thus test whether the process by which persons move into unemployment is independent of the process by which they accumulate human capital. A third goal of this article is to evaluate empirically the consequences for understanding life-course development of measuring the duration of unemployment versus the "state" of unemployment.

DATA AND MEASURES

The Dunedin Study

Subjects were members of the Dunedin Multidisciplinary Health and Development Study. This study has been described by Silva (1990). Briefly, it is a longitudinal investigation of the health, development, and behavior of a complete cohort of births between April 1, 1972 and March 31, 1973 in Dunedin, a city of approximately 120,000 people on New Zealand's South Island. Perinatal data were obtained at delivery. When

the children were traced for follow-up at age three, 1,037 participated in the assessment (52 percent male; 91 percent of the eligible births); this group formed the base sample for the longitudinal study. The social class of the fathers matched that of the general population of New Zealand's South Island. Fewer than 7 percent of the study members identify themselves as nonwhite (e.g., Maori or Polynesian), which matches the ethnic distribution of the South Island.

For readers unfamiliar with New Zealand, cross-national comparisons of social problems support the generalizability of findings from the Dunedin study to other developed, Western nations. New Zealand's infant mortality rate (10.8 per 1,000) equals that of the United States (Department of Statistics 1993). Prevalence rates of psychiatric disorders such as major depression, antisocial personality, and alcohol dependence in the Dunedin sample match rates from national U.S. surveys (Kessler et al. 1994; Newman et al. 1996), as do rates of women victimized by domestic violence (Fagan and Browne 1994; Magdol et al. 1997). The prevalence rates of crime victimization in New Zealand closely match rates in other Western countries (van Dijk and Mayhew 1992), and rates of self-reported property, violent, and drug offending in the Dunedin sample are similar to rates from 14 other developed nations, including the United States (Junger-Tas, Terlouw, and Klein 1994), although the U.S. homicide rate is much higher, reflecting the lethality of firearms. In addition to similarities in these prevalence rates, our own replication analyses suggest that the predictors of problem behavior outcomes are the same in the Dunedin sample and a Pittsburgh, Pennsylvania sample that includes white youths and black youths (Moffitt et al. 1995). Finally, our use of data from New Zealand to study the precursors of unemployment parallels previous profitable analyses of unemployment data from outside the United States, such as those from England and Australia (Petersen and Mortimer 1994).

The Dunedin sample was assessed with a diverse battery of psychological, medical, and sociological measures with high rates of participation at age 3 (N = 1,037), age 5 (N = 991), age 7 (N = 954), age 9 (N = 955),

age 11 (N = 925), age 13 (N = 850), age 15 (N = 976), age 18 (N = 1,008), and age 21 (N = 992). At age 21, 65 percent of the sample members were residing in Dunedin, 27 percent resided elsewhere in New Zealand, 7 percent in Australia, and 1 percent elsewhere in the world.

The basic research procedure involved bringing four sample members per day (including emigrants living overseas) to the research unit within 60 days of their birthday for a full day of data collection. Each research topic was presented, in private, as a standardized module by a different trained examiner in counterbalanced order throughout the day. In addition to the day-long assessment of the study members, data were gathered from sources such as parents, teachers, peer informants, schools, and courts.

Predictor Variables

The predictor variables in our longitudinal analyses span the period from birth to age 15 and are grouped to reflect three distinct developmental periods: (1) age 15, the last year of compulsory education, (2) ages 7 to 9, the elementary school years, and (3) ages 3 to 5, the preschool years. Within each age period, we grouped the predictor variables according to three types of capital (human, social, personal).

Because children undergo remarkable developmental changes during this 15-year period, so, too, do the measures used to capture differences among children. Accordingly, we group somewhat different measures under the same conceptual labels during different ages. There are four reasons for this. First, some psychological constructs change their behavioral expression with age. For example, "antisocial behavior" in adolescence may be expressed in criminal offending, whereas in early childhood it may be expressed in rough, uncontrolled behavior. Second, different data sources are often needed to assess similar constructs at different ages. For example, self-reports can be reliable and valid during adolescence, but are not an option in early childhood. Accordingly, we rely on age-appropriate data sources at different ages (e.g., observers, parents, teachers, and self). Third, some constructs are not devel-

opmentally appropriate—or their developmental significance ("meaning") is ambiguous—and cannot be measured at certain ages. For example, attachment to school is an important feature of adolescent culture, but it is less integral to the social lives of 7-year-olds. Fourth, some measures were not gathered at every age. For example, IQ tests were not administered at age 15, and attachment to parents was not assessed in childhood.

Predictor variables at age 15: The last year of compulsory education. Human capital at age 15 was operationalized with the following variables about study members and their family of origin. Family *occupational status* measures the socioeconomic status of the higher of the father's or mother's occupation on a six-point scale designed for New Zealand (Elley and Irving 1976). The scale ranges from 1, "unskilled laborer," to 6, "professional." *School Certificate* indicates whether study members took the national School Certificate exam (1 = yes, 0 = no). These optional examinations, the first of a series of secondary school examinations, are administered after three years of secondary education, at around age 15, and taking them has important implications for subsequent social and economic achievement in New Zealand society (Department of Statistics 1993). *Reading achievement* was measured by the Burt Word Reading Test (Scottish Council for Research in Education 1976). This is a word-recognition reading test, normed for New Zealand children, that resembles the American Wide-Range Achievement Test of reading.

Social capital at age 15 was operationalized using measures of various social ties relevant to adolescents. *Family structure* assesses whether study members lived with both parents at age 15 (1 = yes, 0 = no). *Family conflict* measures the degree to which the family is characterized by conflictual relations. Mothers of sample members completed the Moos Family Relations Index (Moos and Moos 1981) which contains items such as, "In our family, we believe you don't ever get anywhere by raising your voice," and "Family members sometimes hit each other" (for details, see Parnicky, Williams, and Silva 1985). *Parental attachment* mea-

sures the attachment of sample members to their parents as assessed by a 12-item self-report taken from the Inventory of Parent Attachment (Armsden and Greenberg 1987). The items tap if adolescents feel they can trust their parents, communicate with their parents, and are not alienated from their parents. Each item is rated on a 4-point scale ranging from 1 "almost never" to 4 "almost always or always" (for details, see Nada-Raja, McGee, and Stanton 1992). *School involvement* measures involvement in school activities with a visual analogue scale. Study members were shown a card with five concentric circles. They were asked to suppose that "the circle represents the activities that go on at your school" and then: "How far from the center of things are you?" A value of 1 indicates little involvement in school activities, and a value of 5 indicates "the center of things."

Personal capital at age 15 was operationalized with the following variables. *Delinquency* measures self-reported delinquency using an instrument with good psychometric properties described by Moffitt et al. (1994). This variable is a "variety" score indicating how many of 29 different illegal acts were committed during the past 12 months. The illegal acts include vandalism, aggression, theft, and controlled-substance offenses. In private interviews, study members reported how many times they had committed each act (0 = did not commit the act, 1 = once or twice, 2 = three times or more). Variety scores are less skewed than frequency scores, and they reliably predict future antisocial outcomes (Robins 1978). *Mental illness* assesses symptoms of mental illness during the previous 12 months using the Diagnostic Interview Schedule for Children (DISC) (Costello et al. 1982). The DISC covers most forms of child and adolescent psychopathology contained in the Diagnostic and Statistical Manual (DSM-III) classification system for children and adolescents, including depression, anxiety, and attention deficit (American Psychiatric Association 1980). The DISC was administered privately to the 15-year-olds by interviewers with postgraduate training in clinical psychology (see McGee et al. 1990). (Excluded from the mental illness scale were items tapping con-

duct disorder because these items overlapped with the illegal activities in the delinquency variable.) *Poor physical health* measures the primary caregiver's assessment of the study member's overall physical health using a 4-point Likert scale (1 = very good, 2 = good, 3 = fair, 4 = poor).

Predictor variables at ages 7 to 9: The elementary school years. Data on all these measures, unless otherwise noted, were gathered at age 7 and again at age 9. We combined information for these two ages because they represent a meaningful ontogenetic period. Combining data from two assessments also increased the reliability of our measures.

Human capital at ages 7 to 9 was operationalized using two measures. Family *occupational status* in late childhood was measured using the same scale as was used at age 15 (Elley and Irving 1976). *Intelligence* was measured with the Wechsler Intelligence Scale for Children-Revised (WISC-R) (Wechsler 1974) administered by trained psychometrists according to the standard protocol (see Moffitt et al. 1993).

Social capital at ages 7 to 9 was operationalized with two measures. *Family structure* assesses whether the sample member lived with both parents during the late childhood period (1 = yes, 0 = no). *Family conflict* was measured with the Moos Family Relations Index, as it was at age 15.

Personal capital at ages 7 to 9 was operationalized with two measures. *Behavior problems* was assessed with independent parent and teacher ratings of each child's behavior. The ratings used items from the "antisocial" and "hyperactivity" subscales of the Rutter Child Scales (Rutter, Tizard, and Whitmore 1970). Items were scored 0 = does not apply, 1 = applies somewhat, 2 = certainly applies (for details, see McGee, Williams, and Silva 1985). We combined the parent and teacher ratings into a single score to improve the reliability and validity of this measure. *Poor physical health* was assessed by caregiver reports of whether the child had any chronic or recurrent illness at age 9 (0 = no, 1 = yes, 2 = more than one).

Predictor variables at ages 3 and 5: The preschool years. *Human capital* was operationalized with two variables. Family *occupational status* during the child's preschool

years, like its corresponding measures at age 15 and in late childhood, measures parental occupational status with a six point scale (Elley and Irving 1976). *Intelligence* at age 5 was assessed with the Stanford Binet Intelligence Scale (Terman and Merrill 1960), which was administered and scored according to standard protocol.

Social capital at ages 3 to 5 was opertionalized using two measures. *Family structure* at birth, ascertained from hospital records, assesses whether the child was born to a married mother (1 = yes, 0 = no). *Deviant interaction* between mother and child was assessed at age 3 (Henry et al. 1996). The mother was observed during a one-hour testing session and rated by an observer on eight categories. A point was assigned for each category on which the interaction appeared negative or inappropriate (e.g., if the mother's expression of affect was consistently negative or harsh, if her evaluation of the child was constantly critical or derogatory, or if she was rough or inconsiderate in physically handling the child). Points were summed across the eight categories.

Personal capital at ages 3 to 5 was operationalized with one measure, *difficult temperament*, which was assessed by psychological examiners. At ages 3 and 5 children participated in a testing session involving cognitive and motor tasks that lasted approximately 90 minutes. At each age, each child was tested by a different examiner who had no knowledge of the child's prior behavioral history. Following the testing session, the examiner rated the child's behavior on a range of behavioral characteristics (e.g., fleeting attention, emotional lability). Based on factor analyses of the examiners' ratings, Caspi et al. (1995) have identified a developmentally robust dimension that reflects individual differences in reactions to stress and challenge, in impulse control, and in the ability to persist in problem-solving. Children who scored high on this factor were emotionally labile, irritable, negativistic, rough, inattentive, and had difficulty concentrating.

The intercorrelations between predictor variables are provided in Appendix A. Reliabilities (internal consistency, test-retest, or inter-rater) exceed .70 for all the scales reported.

Dependent Variable: Unemployment

Background. As a prelude to describing our measure of unemployment, we offer background information about the New Zealand labor market, which has undergone dramatic changes during the lifetimes of our study members (Prime Ministerial Task Force on Employment 1994; Statistics New Zealand 1994). Until 1977, the unemployment rate in most Organisation for Economic Cooperation and Development (OECD) countries was between 3 percent and 6 percent whereas in New Zealand it remained below 1 percent. The period between 1977 and 1986 was characterized by employment stagnation, prompted in part by reductions in trade agreements between New Zealand and Europe, and the New Zealand unemployment rate climbed to 5 percent. The period between 1986 and 1991, which saw New Zealand struggle to enter new international markets, produced dramatic labor-market changes in terms of job loss, types of jobs available, and technological development. During this period, the government changed and new deregulation and restructuring policies—combined with the crash in the share market in 1987—conspired to raise the unemployment rate to record levels. In 1989, New Zealand's unemployment rate surpassed the OECD average, and by 1992–1993 New Zealand's unemployment rate (for all ages) was 10.1 percent, more than 2 points above the OECD average.[6] As in other countries, the unemployment rate among New Zealand teenagers and young adults exceeds the rates for prime-age adult. In 1993–1994, when the study members were interviewed at age 21, the national unemployment rate among 15- to 24-year-olds was about 18 percent. Among the Dunedin sample members, at the time of the age-21 interview the unemployment rate was 14 percent.

When the Dunedin study members were entering the labor force, the manufacturing sector employed 23.5 percent of all workers

[6] By way of comparison, using the 1993 OECD Employment Outlook report (table K), we find that whereas the 1992 New Zealand unemployment rate was 10.3, in Australia it was 10.7, in the United States it was 7.3, and in the United Kingdom it was 9.9.

in New Zealand, a figure comparable to other developed countries such as Australia (23.7 percent), the United States (25.3 percent) and the United Kingdom (28.6 percent). The percentage employed in the services sector (65.7 percent) was slightly less than in the aforementioned comparison countries (71 percent, 71.8 percent, and 69.1 percent) whereas the percentage employed in agriculture was higher (10.8 percent vs. 5.3 percent, 2.9 percent, and 2.3 percent). The transition from school to work in New Zealand is not "smoothed" for young adults—there are no large-scale fully subsidized work schemes, and New Zealand's expenditure on "active" labor market programs (e.g., training for the unemployed, subsidized employment programs) falls slightly below the OECD median at around .7 percent of GDP. In general, the process of labor-market entry in New Zealand is similar to that in developed nations such as the United States, where young adults must rely primarily on their own initiative to secure employment (Prime Ministerial Task Force on Employment 1994).

Life history calendar on unemployment. During the interview at age 21, sample members provided data about their monthly employment histories using a life history calendar (LHC), a visual method that facilitates the accurate recall of life events and their timing and duration (Freedman et al. 1988; Caspi et al. 1996).[7] The LHC is a large grid in which rows refer to different trajectories (e.g., employment trajectories) and columns denote time units (months) during which particular events may have occurred (e.g., becoming unemployed). It yields continuous, monthly information about events over several years.

Using the LHC, study members were asked if there were any periods of a month or more when they were not employed but were seeking employment, thus excluding

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[7] For example, in the Dunedin study we compared monthly data collected retrospectively with the LHC in 1993–1994, when the respondents were 21 years old, to events reported during the month in which they were last interviewed, in 1990–1991, when they were 18. There was 95-percent agreement between the three-year retrospective reports (at age 21) and the contemporaneous reports (at age 18) about unemployment during that month (Caspi et al. 1996).

periods when they were full-time students or homemakers. Study members reported if they had been unemployed, and if so, when (i.e., which months). We obtained employment data across a six-year (72-month) period, from each sample member's fifteenth birthday to the date of their interview at age 21. We chose age 15 because, for this birth cohort, that age was the end of compulsory schooling. Turning 15 thus offered youth in our study the first opportunity to leave school and enter the labor force. Members of recent New Zealand age cohorts do not finish their education at age 15, however, just as most Americans do not finish their education at age 16, the usual end of compulsory schooling in the United States. Approximately 12 percent of the Dunedin study members left school by age 16, and nearly 30 percent left school by age 17, but the majority of the study members remained in school through age 18. Compared with the United States, which historically has had relatively open access to tertiary education, the rate of tertiary education enrollment in New Zealand is low; by the time of the age-21 interview, 19 percent of the study members had enrolled in tertiary education.

At age 21, 954 study members provided complete employment histories on the LHC.[8] Our outcome of interest is the number of months of unemployment from age 15 to age 21. Of the Dunedin study members, 50.8 percent experienced at least one month of unemployment between ages 15 and 21. The duration of unemployment varied considerably: Nearly one-third (30.7 percent) of the study members were unemployed for six months or more, and 17.1 percent were unemployed for one year or longer.

MODELS

We tested the precursors of unemployment using a tobit model (Tobin 1958) because the skewed distribution of unemployment dura-

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[8] Life history calendars were missing for 83 sample members: 17 had died since age 3, 9 were not located, 19 refused to participate in the entire study, 7 did not come to the research unit but were interviewed with a shorter version of the protocol. Those completing the life history calendar were not statistically different in sex or social

tion made using least-squares regression biased and inconsistent (Winship and Mare 1992:335)—nearly one-half of the study members had zero months of unemployment. The tobit (censored regression) model allows for analysis of dependent variables that cannot take values beyond a certain point, for example, below zero (Roncek 1992:503). For censoring at a lower bound, as is the case here, the tobit model is:[9]

$$Y_{li}^* = \mathbf{X}_i\beta + \varepsilon_i , \qquad (1)$$

$$Y_{li} = Y_{li}^* \quad \text{if} \quad Y_{li}^* > 0, \qquad (2)$$

$$Y_{li} = 0 \quad \text{if} \quad Y_{li}^* \le 0. \qquad (3)$$

For each observation, i, Y_{li}^* is an unobserved latent variable representing propensity for unemployment, $\mathbf{X}_i$ is a vector of independent variables, β is a vector of coefficients, ε_1 is a normally distributed error term, and Y_{li} is the observed length of unemployment between ages 15 and 21. The tobit coefficients separate the effects of exogenous variables into two parts: (a) a nonlinear effect on the probability that a person will be unemployed, and (b) a linear effect on the duration of unemployment among the ever-unemployed (Paternoster 1989:303).

A difficulty arises, however, in interpreting tobit models because they estimate one coefficient that represents two types of effects. Thus, to interpret the coefficients, we use a method presented by Roncek (1992) as adapted from McDonald and Moffitt (1980). Specifically, the expected value of Y_{li} for all cases is:

$$EY_{li} = \mathbf{X}_i\beta \times F(z) + \sigma \times f(z). \qquad (4)$$

$\mathbf{X}$ and β are the same as in equation 1, $F(z)$ is the function of the cumulative normal distribution associated with the proportion of cases above the limit, σ (written as *sigma* in Roncek [1992:504]) is the standard deviation of the error term, as commonly reported in tobit programs, and $f(z)$ is the unit normal density. The first-order partial derivative can be taken of equation 4 and rearranged into

separate equations for the two types of cases in a tobit model. For cases with no unemployment, the change in the cumulative probability of having any unemployment is:

$$\frac{F(z)}{\delta \mathbf{X}_i} = \beta_i \times \frac{f(z)}{\sigma} . \qquad (5)$$

For cases with one or more months of unemployment, the change in expected value of Y_{li} (i.e., the number of months unemployed) is:

$$\frac{\delta EY_{li}}{\delta \mathbf{X}_i} = \beta_i \times \left[1 - \left(z \times \frac{f(z)}{F(z)} \right) - \left(\frac{f(z)^2}{F(z)^2} \right) \right]. \qquad (6)$$

where β_i is the tobit coefficient for a given independent variable and z is the z-score associated with the area under the normal curve.[10]

PREDICTORS OF YOUTH UNEMPLOYMENT

Adolescence: Last Year of Compulsory Education

Table 1 presents analyses predicting unemployment during the transition to adulthood.

[10] Respondents in the Dunedin study could opt not to answer blocks of questions by topic. Also, the data were gathered from multiple sources, including trained observers, parents, teachers, and school records. As a result, many variables had some missing data, varying from 0 to 22 percent (family structure in late childhood), with most variables missing data for 3 to 9 percent of the sample. These missing data made listwise deletion undesirable. Instead, we utilized missing-data indicators (Little and Rubin 1987). For each variable that was missing some data, we created a corresponding dummy variable that indicated which cases were missing (1 = missing; 0 = observed). We then recoded study members who were missing the variable to the mean of that variable so that they would not be ejected from analysis. Both variables (i.e., the recoded variable and the missing-data indicator) were included in our multivariate equations. To interpret these variables, each substantive variable applies only to its observed cases. Each missing-data variable, when statistically significant, indicates that respondents missing data on this measure have different rates of unemployment than those not missing data.

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class (at $p = .05$) from those sample members of the original birth cohort not completing it.

[9] We adapted this discussion from Winship and Mare (1992:334–35).

Table 1. Tobit Coefficients from the Regression of Months Unemployed between Ages 15 and 21 on Selected Independent Variables Measured at Age 15: Dunedin Study, New Zealand

Independent Variable	Pearson Correlation	Bivariate Regression			Multivariate Regression		
		Tobit Coefficient	Percent Change in Probability of Unemploy-ment	Increase in Number of Months of Unemploy-ment	Tobit Coefficient	Percent Change in Probability of Unemploy-ment	Increase in Number of Months of Unemploy-ment
Male	.09***	.043*** (.016)	7.5	1.1	.029+ (.015)	5.7	.8
Human Capital							
Parents' occupational status	−.15***	−.024*** (.007)	17.3	2.6	−.006 (.006)	—	—
School Certificate	−.33***	−.174*** (.022)	31.8	4.6	−.089*** (.025)	17.4	2.4
Reading achievement	−.23***	−.003*** (.000)	23.0	3.4	−.002*** (.000)	12.1	1.7
Social Capital							
Family structure	−.18***	−.082*** (.018)	14.5	2.2	−.034+ (.018)	6.7	.9
Family conflict	.14***	.007*** (.001)	13.9	2.1	.003 (.002)	—	—
Parental attachment	−.20***	−.007*** (.001)	18.3	2.8	−.001 (.001)	—	—
School involvement	−.14***	−.038*** (.009)	20.2	3.1	−.021 (.009)	12.7	1.7
Personal Capital							
Delinquency	.30***	.013*** (.001)	15.2	2.2	.007*** (.002)	8.9	1.2
Mental illness	.06	.001 (.000)	—	—	−.000 (.000)	—	—
Poor physical health	.09***	.044* (.017)	6.6	1.1	.008 (.016)	—	—

Note: Numbers in parentheses are standard errors; N = 954.

+*p* < .10 (marginally significant, two-tailed tests)

*p < .05   ***p* < .01   ****p* < .001 (two-tailed tests)

The predictor variables in these analyses were measured at age 15, before the study members entered the labor force. The left-hand column shows the bivariate (Pearson) correlation coefficients between each of the independent variables and the number of months spent unemployed between ages 15 and 21. The next three columns show the results from bivariate tobit regression equations in which each independent variable was entered by itself to predict number of months

spent unemployed. These columns indicate the *total predictive power* associated with each independent variable; they allow us to estimate the risk of unemployment for individuals at any given level of a certain characteristic. Such information is especially valuable for policymakers and service agencies who work with types people (e.g., the mentally ill) rather than variables (e.g., mental illness net of other variables). The final three columns present results from a multi-

variate tobit regression equation in which all the independent variables were entered simultaneously to predict number of months unemployed between ages 15 and 21. These columns provide information about the *unique effects* associated with each independent variable net of the effects of the other predictor variables in the model.

We begin with a global interpretation of the results of the tobit regressions. The quantities in parentheses in equation 6 represent the estimated fraction of the total effect of each independent variable on those unemployed more than zero months. Conversely, 1 minus the quantities in parentheses in equation 6 is the effect of the independent variable upon those cases with scores of zero months. With our data, equation 6 solved to yield .3687. Substantively, this suggests that an estimated 63 percent of the effect of each independent variable was on increasing (or decreasing) the probability of experiencing unemployment. Conversely, 37 percent of the effect of each independent variable was on increasing (or decreasing) the number of months unemployed among those study members who had some unemployment. These figures represent the average effect of the predictor variables on unemployment.

Consider the results associated with "male" in Table 1. The results from the bivariate tobit model show that, relative to females, males had a 7.5 percent greater probability of becoming unemployed and averaged 1.1 more months of unemployment when unemployed. This represents the *total predictive power* associated with knowledge about whether an individual is male or female. The results from the multivariate tobit model show the *unique effect* of being male; that is, after controlling for all other variables in the model the results show that, relative to females, males had a 5.7 percent greater probability of becoming unemployed and averaged .8 more months of unemployment.[11] We now turn to a fuller discussion of the results.

As shown in Table 1, variables representing each of the three sources of capital were significant predictors (at $p < .05$) of future unemployment. In the human capital domain, low family occupational status, lack of the School Certificate, and poor reading achievement predicted unemployment. Adolescents whose parents were employed in low social-status jobs, relative to those from high status families, had a 17.3 percent higher probability of becoming unemployed and averaged 2.6 more months of unemployment.[12] Adolescents without the School Certificate, relative to those who had it, had a 31.8 percent higher probability of becoming unemployed, and when unemployed they averaged 4.6 more months of unemployment. Adolescents with low reading scores (i.e., $\leq$ sixth-grade level), relative to those with high scores (i.e., $\geq$ twelfth-grade level), had a 23 percent higher probability of becoming unemployed and, when unemployed, averaged 3.4 additional months of unemployment. In the social capital domain, living in a single-parent family, family conflict, weak parental attachment, and lack of school involvement were all predictive of future unemployment. Finally, in the personal capital domain, delinquent behavior and poor physical health were both predictive of future unemployment.

The multivariate tobit regression results show that having a School Certificate, reading achievement, school involvement, and delinquency all made statistically significant unique contributions to predicting unemployment after all other variables were controlled.[13] In addition, male and family struc-

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[11] We calculated these numbers as follows. From equation 5, we get $\delta F(z)/\delta X_i = \beta \times .3989/.2052 = \beta \times 1.9440$. From equation 6 we get $\delta EY_{li}^*/X_i = \beta \times \{1 - [(.02 \times .3989)/.5084] - [(.3989 \times .3989)/(.5084 \times .5084)]\} = \beta \times .3687$. For "male," $\beta = .0295 \times 1.9440 = .0574 = 5.7$ percent. Equation 6 solves to be .0295 $\times$ .3687 =

.0109. We multiplied this by 72 to convert to months and get .8 months.

[12] To illustrate the association between family occupational status and unemployment we compare study members in the tenth percentile of family occupational status (occupational status = 1) with those in the ninetieth percentile (occupational status $\geq$ 5). We use this 10-percent-to-90-percent comparison strategy for all the continuous variables discussed in this section and presented in the tables. This approach is relatively conservative because it drops the 20 percent most skewed, extreme values on the continuous variables.

[13] Our measure of mental illness symptoms does not have a significant relation to unemploy-

Table 2. Tobit Coefficients from the Regression of Months Unemployed between Ages 15 and 21 on Selected Independent Variables Measured at Ages 7 to 9: Dunedin Study, New Zealand

Independent Variable	Pearson Correlation	Bivariate Regression			Multivariate Regression		
		Tobit Coefficient	Percent Change in Probability of Unemployment	Increase in Number of Months of Unemployment	Tobit Coefficient	Percent Change in Probability of Unemployment	Increase in Number of Months of Unemployment
Male	$.09^{***}$	$.043^{***}$ (.016)	7.5	1.1	$.036^{*}$ (.016)	6.7	1.0
Human Capital							
Parent's occupational status	$-.18^{**}$	$-.032^{***}$ (.006)	20.2	3.0	$-.017^{**}$ (.006)	11.7	1.7
Intelligence	$-.22^{***}$	$-.003^{***}$ (.000)	20.6	3.1	$-.001^{**}$ (.000)	11.6	1.7
Social Capital							
Family structure	$-.19^{***}$	$-.087^{***}$ (.024)	15.4	2.3	$-.062^{**}$ (.023)	11.5	1.7
Family conflict	$.14^{***}$	$.008^{***}$ (.002)	13.3	2.0	$.004^{+}$ (.002)	7.2	1.0
Personal Capital							
Behavior problems	$.21^{***}$	$.011^{***}$ (.002)	17.7	2.6	$.004^{*}$ (.002)	7.7	1.1
Poor physical health	.04	$-.007$ (.025)	—	—	$-.012$ (.024)	—	—

Note: Numbers in parentheses are standard errors; N = 954.

$^{+}p < .10$ (marginally significant, two-tailed tests)

$^{*}p < .05$ $^{**}p < .01$ $^{***}p < .001$ (two-tailed tests)

ture made marginally significant ($p < .06$) unique contributions to predicting unemployment.

Late Childhood: Elementary School Years

Table 2 presents our analyses predicting number of months unemployed using predictor variables measured in late childhood—at ages 7 to 9. Variables representing each of the three sources of capital were significant predictors of future unemployment. In the human capital domain, low family occupational status and low intelligence predicted unemployment. In the social capital domain, living in a single-parent family and family conflict predicted unemployment. In the personal capital domain, behavior problems was a significant predictor of future unemployment.

ment duration. We performed additional analyses to verify that this was not due to the diffuse nature of this scale, which included symptoms of diverse mental health problems. We reestimated the model in Table 1 using the depression, anxiety, and attention deficit symptom scales separately. None of these scales significantly predicted unemployment duration. However, this does not mean that mental health and unemploy-

ment are unrelated. First, we observed strong links between unemployment duration and our measure of delinquency, which in psychiatric nosologies is treated as a conduct disorder (American Psychiatric Association 1980). Thus, specific adolescent mental health problems (e.g., conduct disorders) do predict unemployment duration. Second, other forms of mental illness (e.g., psychoses) may increase vulnerability to unemploy-

Table 3. Tobit Coefficients from the Regression of Months Unemployed between Ages 15 and 21 on Selected Independent Variables Measured at Ages 3 to 5: Dunedin Study, New Zealand

Independent Variable	Pearson Correlation	Bivariate Regression			Multivariate Regression		
		Tobit Coefficient	Percent Change in Probability of Unemploy-ment	Increase in Number of Months of Unemploy-ment	Tobit Coefficient	Percent Change in Probability of Unemploy-ment	Increase in Number of Months of Unemploy-ment
Male	.09***	.043*** (.016)	7.5	1.1	.040* (.016)	7.4	1.1
Human Capital							
Parent's occupational status	−.17***	−.028*** (.006)	20.1	3.0	−.021*** (.006)	15.5	2.3
Intelligence	−.21***	−.003*** (.000)	20.0	3.0	−.002** (.000)	12.1	1.8
Social Capital							
Family structure	−.08*	−.066+ (.038)	11.5	1.8	−.108' (.055)	19.7	2.9
Deviant maternal interaction	.07*	.005 (.004)	—	—	.000 (.004)	—	—
Personal Capital							
Difficult temperament	.14''	.019** (.005)	22.9	3.5	.011' (.005)	14.6	2.2

Note: Numbers in parentheses are standard errors; N = 954.

$^+p < .10$ (marginally significant, two-tailed tests)

$^{!}p < .05$ $^{**}p < .01$ $^{***}p < .001$ (two-tailed tests)

In the multivariate tobit equation, five variables were statistically significant: male, occupational status, intelligence, family structure, and behavior problems.[14] In addition, family conflict had a marginally significant effect ($p = .06$).

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ment but do so during different developmental periods in the life course. This is because although children and adolescents suffer illnesses such as depression, anxiety, attention deficits, and conduct disorders, they rarely manifest psychoses, which tend to onset after age 20. As such, adolescence is too early to study and detect the effects of psychoses on labor-market outcomes.

[14] The missing-data dummy variables for intelligence and occupational status were both statistically significant in this equation ($p = .03$ and .05, respectively). Study members with missing IQ test information were more likely to be unemployed than were those not missing information, and those missing information on parental occupational status were less likely to be unemployed.

Early Childhood: Preschool Years

Table 3 presents our analyses using predictor variables measured in early childhood—at ages 3 to 5. Low family occupational status, low intelligence, and a difficult temperament were all significantly associated with more unemployment. Being born to an unmarried mother was marginally significant ($p < .09$). In the multivariate tobit equation, five variables were statistically significant: male, occupational status, intelligence, family structure, and difficult temperament.[15]

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[15] In addition to controlling for the effect of gender, we also tested whether the predictors of unemployment differed between the two genders. We reestimated each of the regression equations show in Tables 1 to 3 by adding gender-interaction terms to the equations. We evaluated the fit of the gender-interaction models using the Bayesian Informal Criterion (BIC) statistic (Raftery

Is the Risk of Youth Unemployment Stable from Childhood to Adolescence?

Thus far we have examined the predictors of unemployment separately in each age period using conceptually related variables from a series of three cross-sections. We performed these analyses separately by each age period to test how early in the life course personal and family characteristics set in motion a trajectory of risk for unemployment. However, this multi-phasic analysis does not answer the question of whether the independent variables in each age period explain the same variance or different variance in the unemployment outcome. To answer this question we conducted two analyses. First, we calculated for each study member three "general risk scores" by predicting their duration of unemployment using the significant covariates in each of the three age periods, respectively. We then correlated these three risk scores with each other to determine whether the "risk" for unemployment was stable from early childhood to mid-adolescence. The correlation between the preschool and the late-childhood risk factors was .63; between the late-childhood and mid-adolescence risk factors, .53; and between the preschool and mid-adolescence risk factors, .44. All correlations were statistically significant ($p < .001$) and "large," using Cohen's (1988) descriptive labels for effect sizes. Second, we estimated a single multivariate model incorporating all the variables from Tables 1 through 3. In this model, all the previously significant pre-

1995). In each age period, the main-effects model yielded a much lower BIC than did a model including gender-interaction terms: In the preschool period, −11 versus 21.7; in the elementary school period −10.3 versus 22.6; in mid-adolescence, −45.3 versus 1.5. These comparisons indicate that, at each age, the gender-interaction terms do not explain enough variation to justify the number of parameters they use. In addition, across the 21 gender-interaction terms we examined in all three models, only two yielded reliable differences between males and females: In the age-15 equation only, family conflict and delinquency predicted unemployment more strongly for males than for females. These various findings and tests suggest that the results reported in this article are best viewed as similar for males and females.

Table 4. Tobit Coefficients from the Regression of Months Unemployed between Ages 15 and 21 on Selected Independent Variables Measured at Age 15: Dunedin Study, New Zealand

Independent Variable	Tobit Coefficient
Duration (in months) of education between ages 15–21	−.089* (.047)
Earned Sixth Form Certificate	.000 (.023)
Male	.029+ (.015)
Human Capital	
Parent's occupational status	−.003 (.006)
Earned School Certificate	−.066* (.027)
Reading achievement	−.001* (.000)
Social Capital	
Family structure	−.032+ (.017)
Family conflict	.002 (.001)
Parental attachment	−.001 (.001)
School involvement	−.019* (.009)
Personal Capital	
Delinquency	.007** (.002)
Mental illness	.001 (.000)
Poor physical health	.006 (.016)

Note: Coefficients are from the multivariate model with education controlled. Numbers in parentheses are standard errors; N = 954.

+$p < .10$ (marginally significant, two-tailed tests)

*$p < .05$ **$p < .01$ (two-tailed tests)

school (Table 3) and late-childhood (Table 2) effects failed to achieve statistical significance at conventional levels, suggesting that the effects of the childhood variables on unemployment are mediated by the later adolescent variables. These analyses suggest that risk factors occurring in childhood explain variance in the unemployment outcome during the transition to adulthood because they are associated with increased risk factors during mid-adolescence.

Education Enrollment, Unemployment, and the Transition to Adulthood

The significance of the childhood predictors of unemployment appears to reside in their initiation of a process of cumulative disadvantage and risk, such that by mid-adolescence deficiencies in human, social, and personal capital increase the risk of unemployment and jeopardize later success in the labor market. For both theoretical and applied reasons, it is important to establish whether these "deficiencies in capital" set in motion a trajectory of risk for unemployment directly or indirectly. One possibility is that personal and family characteristics predict later unemployment because they restrict the accumulation of education. In turn, truncated education may increase the risk of later unemployment. Thus, the predictors of unemployment may only be predictors of the predictors of the absence of education.

To test this, we examined the predictive links between age-15 variables and unemployment duration, after controlling for the effects of education duration (measured on the LHC by the number of months spent in education between ages 15 to 21). In addition to sheer amount of time spent in school, we also controlled for whether the study members obtained further educational qualifications beyond a School Certificate (i.e., whether they earned a Sixth Form Certificate, which is comparable to a high school degree in the United States) (Kennedy 1981). Table 4 shows the results of this multivariate model. These results can be compared to the multivariate tobit coefficients in Table 1, which do not include the two additional education variables. As expected, the results show that dropping out of educa-

tion significantly increased the risk of unemployment. However, the results also show that, net of the effect of truncated education, School Certificate, reading achievement, school involvement, and delinquency continued to make statistically significant contributions to predicting unemployment. In addition, male and family structure continued to make marginally significant ($p < .06$) contributions to predicting unemployment. Some of the effects in Table 4 are attenuated by the introduction of controls for further education, but all effects remain at roughly the same level of statistical significance.[16]

Predicting the Duration of Unemployment Versus the State of Unemployment

A life-course perspective on the study of youth unemployment shifts attention from the fact of unemployment to the duration of unemployment. The practical significance of this conceptual distinction can be documented by comparing analyses in which we measured the duration of unemployment versus the "state" of unemployment. We repeated our analyses to predict unemployment at the time of the age-21 interview, instead of the cumulative duration of unem-

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[16] Adjusting for the duration of education effectively controls for the possibility that some persons may not have been unemployed because they remained in school. Another approach is to exclude from analysis those study members who were continuously enrolled in education and therefore were out of the labor force. Accordingly, we reanalyzed the multivariate models in Tables 1 to 3 using the LHC to exclude those study members who were never in the labor force for more than summer holiday months. The findings were unaffected. This may be because the rate of tertiary education enrollment in New Zealand is relatively low (19 percent among Dunedin study members by the time of the age-21 interview). Thus, relatively few study members were out of the labor force by virtue of remaining in school. Another transition that can take people out of the labor force for varying amounts of time is childbirth, which is especially relevant to young women. We excluded those women in our sample who had given birth by age 21 (9.8 percent), and again reestimated the models in Tables 1 to 3. The results were unchanged.

ployment from ages 15 to 21, and we found that the predictors of unemployment attenuated considerably. Redoing the models presented in Tables 1, 2, and 3 resulted in only five significant predictors of current unemployment status: Male, school involvement, family structure (at age 15), family structure (at ages 7 to 9), and intelligence (at ages 3 to 5).[17] Comparing these results to those in Tables 1 to 3 suggests that research on youth unemployment that gathers "snapshots" of employment circumstances at a single point in time—and neglects to measure the cumulative duration of unemployment—may underestimate the significance of early characteristics in determining variations in the transition into the labor force.

DISCUSSION

This study supports the hypothesis that personal and family characteristics begin to shape labor-market outcomes years before youths enter the labor force. We brought together variables that have been studied in relative isolation by different social scientists in their efforts to predict a common social problem: Who is at risk for becoming unemployed? Economists, sociologists, and psychologists have tended to focus on different individual-level predictors of unemployment. As a result, each discipline's "error term" has been the others' substantive concern. The present study documents the importance of taking into account variables that have been the purview of different disciplines. Whether measured in adolescence, late childhood, or early childhood, variables that index each person's human capital, social capital, and personal capital make unique contributions to the prediction of future unemployment. In the human capital domain, we found that lack of high school credentials, poor reading skills, limited parental resources, and low IQ scores significantly increased the risk of unemployment. In the social capital domain, we found that growing up in a single-parent family, family con-

flict, and lack of attachment to school also increased the risk of unemployment. Finally, in the personal capital domain, children involved in antisocial behavior were at increased risk of unemployment.

Adolescent indicators of human, social, and personal capital remained significant after adding controls for duration of education, suggesting that individual differences in human, social, and personal capital affect unemployment in at least two ways. One path is indirect. Given that truncated education explained some of the effects of the predictor variables on unemployment, it appears that some personal and family characteristics affect later labor-market outcomes because they affect other life-course contingencies en route to securing employment. For example, about one-third of the effect of earning a School Certificate was accounted for by duration of education, suggesting that adolescents who did not obtain a School Certificate were at risk for unemployment, in part, because they exited school at an earlier age. A second path is more direct. Given that all the personal and family characteristics that had unique and statistically significant (or near significant) effects on unemployment without the control for duration of education continued to have significant effects net of duration of education, it appears that these characteristics confer risk on unemployment above and beyond their relation with truncated education. Adolescents who lacked high school qualifications, had poor reading skills, who were uninvolved in school, who grew up in single-parent households, and who were involved in antisocial behavior were at risk for unemployment regardless of when they exited educational settings. It is possible that these characteristics are brought to bear more directly on job-search behavior and on job performance, and thereby influence the ability to locate and retain stable employment during the transition to adulthood. In sum, it appears that many early personal and family characteristics affect labor-market outcomes, not only because they restrict the later accumulation of human capital (e.g., education), but also because they may have direct, possibly proximal effects on labor-market behavior (e.g., job-search behavior and job performance). Understand-

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[17] To predict unemployment at age 21, we tested the same models as those in Tables 1 to 3 using logistic regressions. Results are available from the authors on request.

ing the specific process by which human, social, and personal capital affect labor-market outcomes, independent of education, merits special attention in future studies of youth unemployment.

The design of our study offers several advantages for studying the precursors of youth unemployment. First, investigating the predictors of unemployment in a representative birth cohort of young adults allowed us to examine a wide range of variation in both antecedent conditions and unemployment outcomes and to overcome potential biases introduced by analyzing more select samples (e.g., high school students) that restrict the range of characteristics hypothesized to be related to unemployment. Second, the longitudinal-prospective design of our study avoided the limits of inference from cross-sectional studies and showed that personal and family characteristics measured early in life can predict unemployment during the transition from adolescence to adulthood. Third, because of relatively low attrition over 21 years (only 8 percent), our results were not markedly biased by selective missing data. Fourth, in contrast to most studies of unemployment that use a binary indicator of whether the respondent is *currently* unemployed, we measured the amount of time our study members were unemployed during the transition to adulthood. We measured (un)employment histories for conceptual and applied reasons. Life-course researchers have noted that the influence of work on psychosocial development is more likely to arise from work histories than from conditions at fixed points in time (Spenner and Otto 1985). In addition, because the incidence of long-term unemployment has increased over the past decade in OECD countries, including New Zealand, policymakers increasingly need to know who is at risk for lengthy periods of unemployment (Organisation for Economic Cooperation and Development 1994).

Nevertheless, our study also has limitations. Our goal was to test hypotheses about the *predictors* of unemployment. This leaves unexamined the many potential causal mechanisms that generated these predictions, although clearly the observed effects are independent of the effects of accu-

mulated formal education. Thus, although antisocial behavior predicted unemployment, we do not know whether this reflects the influence of antisocial behavior on job-search behavior, the likelihood that antisocial youth are selected into high-turnover jobs, or the possibility that antisocial youth are fired because they generate conflict in the workplace. Similarly, although measures of social capital predicted unemployment, we do not know whether these effects reflect, for example, limited access to monetary assistance (e.g., loans from parents) or to nonmaterial resources (e.g., encouragement and advice from family and/or nonfamily members). If our findings withstand the rigors of replication, future research can test the causal mechanisms by which early personal and family characteristics shape future labor-market outcomes. In addition, our study focused on unemployment outcomes during one segment of the life course—the transition to adulthood—and we do not know whether the same factors will continue to influence the risk for unemployment in later life. Finally, although our sample is heterogeneous, it is limited to a single birth cohort growing up in one part of the world, and caution should be exercised in generalizing our findings to other cohorts in other regions.

Our findings about the predictors of unemployment have implications for methodology, policy, and theory. With respect to methodology, the results show that there are "selection" effects that may create problems for estimating the consequences of unemployment. To the extent that unemployment is influenced by antecedent variables that are omitted in studies of the consequences of unemployment, those studies may overestimate the individual-level effects of unemployment on social, psychological, and economic outcomes. Although selection effects into unemployment are recognized by social scientists (Lynch 1989), the present study highlights the breadth and depth of these effects. As such, the present study underscores the need to apply and develop existing models that have been used to control for the influence of unobserved heterogeneity. But theory-building must progress beyond controls for population heterogeneity

to specify and measure those factors that increase the risk of joblessness. Along with other recent longitudinal projects (Kandel and Yamaguchi 1987), this study helps to identify those substantive variables (e.g., antisocial behavior, access to social capital) that should be incorporated and measured more routinely in future studies of labor-market outcomes.

With respect to policy, our results yield two implications. First, our findings suggest that the preschool years are not too early to intervene to prevent future employment problems. Our findings underscore the importance of those types of preschool "Headstart" programs that have significant social and economic benefits that can endure through young adulthood (Schweinhart, Barnes, and Weikart 1993). Second, the finding that adverse experiences in different domains of life uniquely predict employment problems suggests that preventive measures may be most effective if they influence more than one domain. Our findings thus underscore the importance of implementing multimodal prevention programs that combine comprehensive family and educational supports early in the life course (Yoshikawa 1994).

With respect to theory, our longitudinal study offers an opportunity to examine how recent birth cohorts in a developed nation have adjusted to changing economic conditions (Summers 1990, chap. 9), and to identify those personal and family characteristics that increase the risk of joblessness among youths as they make the transition into adulthood. Although we did not address the intergenerational transmission of poverty and welfare dependence, we have offered data that call into question mechanistic models of such transmission. For example, we are fairly confident that the young adults in our sample did not simply model their parents' unemployment. The participants in our study confronted high unemployment rates when they entered the job market, but as children they observed their parents' work lives at a time of very low unemployment. As such, unemployment per se is unlikely to be directly transmitted across generations (e.g., via modeling). Rather, our results point to the familial transmission of vulnerability factors that increase the risk of unemployment, sug-

gesting that what is transmitted across generations are the mechanisms that may produce unemployment.

In addition, our results suggest that it is not simply lack of skills that makes youth vulnerable to unemployment (Nickell and Bell 1995). Rather, a constellation of psychosocial and family characteristics emerging early in the life course is implicated in a turbulent school-to-work transition. Developmental factors such as insufficient human capital, broken or vulnerable social ties, and aversive behavioral styles join to foretell unemployment. The problem of unemployment—its prediction, explanation, and possibly its resolution—requires interdisciplinary collaboration. Economic, sociological, and psychological perspectives yield complementary rather than competing accounts of how individual-level characteristics give rise to and shape different life-course trajectories.

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Appendix A. Correlations between the Independent Variables Used in the Analysis: Dunedin Study, New Zealand (N = 785–1,037)

Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
(1) Male	1.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Preschool Years: Ages 3 to 5																						
(2) Occupational status	–.00	1.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(3) Intelligence	–.08*	.32*	1.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(4) Family structure	.00	.13*	.02	1.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(5) Deviant interaction	.04	–.07*	–.21*	–.02	1.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(6) Difficult temperament	–.01	–.08*	–.46*	.00	.23*	1.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Elementary School Years: Ages 7 to 9																						
(7) Occupational status	–.02	.74*	.35*	.04	–.10*	–.09*	1.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(8) Intelligence	.03	.34*	.70*	.02	–.19*	–.42*	.38*	1.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(9) Family structure	.04	.12*	.18*	.27*	–.12*	–.12*	.15*	.16*	1.00	—	—	—	—	—	—	—	—	—	—	—	—	—
(10) Family conflict	.04	–.12*	–.10*	–.03	.04	.07*	–.14*	–.17*	–.15*	1.00	—	—	—	—	—	—	—	—	—	—	—	—
(11) Behavior problems	.24*	–.19*	–.33*	–.13*	.14*	.35*	–.23*	–.34*	–.22*	.27*	1.00	—	—	—	—	—	—	—	—	—	—	—
(12) Poor physical health	.00	–.00	.03	–.03	.00	.03	–.01	–.01	–.05	.01	.00	1.00	—	—	—	—	—	—	—	—	—	—
Last Year of Compulsory Education: Age 15																						
(13) Occupational status	.04	.53*	.30*	.04	–.08*	–.07	.62*	.34*	.14*	–.15*	–.22*	–.04	1.00	—	—	—	—	—	—	—	—	—
(14) School certificate	–.07*	.28*	.37*	.10*	–.17*	–.23*	.30*	.40*	.21*	–.15*	–.35*	.06	.23*	1.00	—	—	—	—	—	—	—	—
(15) Reading achievement	–.12*	.29*	.47*	.03	–.05	–.26*	.30*	.57*	.11*	–.13*	–.35*	.02	.29*	.44*	1.00	—	—	—	—	—	—	—
(16) Family structure	.00	.15*	.12*	.30*	–.07*	–.04	.14*	.08*	.69*	–.08*	–.13*	.01	.13*	.20*	.06*	1.00	—	—	—	—	—	—
(17) Family conflict	.01	–.11*	–.07*	–.01	.06	.03	–.06	–.04	–.08	.46*	.18*	.04	–.12*	–.14*	–.04	–.09*	1.00	—	—	—	—	—
(18) Parental attachment	–.00	.12*	.14*	.06*	–.15*	–.09*	.10*	.12*	.14*	–.13*	–.15*	–.01	.08	.28*	.08*	.15*	–.37*	1.00	—	—	—	—
(19) School involvement	.10*	.11*	.11*	.01	.00	–.02	.09*	.15*	.03	–.06	–.08*	.01	.13*	.14*	.11	.03	–.11*	.21*	1.00	—	—	—
(20) Delinquency	.11*	–.10*	–.07*	–.05	.07*	.00	–.08*	–.06	–.17*	.08*	.15*	.01	–.12*	–.32*	–.13*	–.23*	.17*	–.40*	–.09*	1.00	—	—
(21) Mental illness	–.14*	–.05	–.12*	.00	.00	.12*	–.07*	–.17*	–.12*	.06	.18*	.02	–.11*	–.17*	–.11*	–.11*	.04	–.27*	–.10*	.23*	1.00	—
(22) Poor physical health	–.05	–.08*	–.10*	–.02	.11*	.05	–.11*	–.09*	–.06	.08*	.07*	.10*	–.08*	–.18*	–.14*	–.04	.14*	–.16*	.06	.09*	.12*	1.00

*p < .05

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