

**Strategic Assessment of the State of the Science in Research on  
Employment for Individuals with Disabilities**

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# **Strategic Assessment of the State of the Science in Research on Employment for Individuals with Disabilities**

## **Executive Summary**

Improving employment and other vocational outcomes for people with disabilities is a clear goal of policymakers, advocates, people with disabilities, and our larger society. To achieve this end we need to understand what works—that is, what programs, policies, and actions are effective in reaching the goal of improved employment and related outcomes for people with disabilities.

This report reviews recent research related to employment of people with disabilities. It provides a systematic review of a set of literature across key areas to provide an initial understanding of the research being conducted and to identify limitations and gaps in the research.

### **Methods**

The initial steps for this review involved searching key journals, citation databases, and websites of research organizations to identify recent relevant research. The review focuses primarily on studies for the United States from 2002 to 2007 that contain quantitative analyses answering questions about the employment of persons with disabilities.<sup>1</sup> Studies were included only if they clearly describe the method of analysis and sample used, have sample size of at least 50, and are published in a peer-review journal or have methods that, upon review, are on par with peer-reviewed journal standards. Discussion of limitations in the quality of research is included throughout the report.

It is important to note that it was beyond the scope of this study to provide a comprehensive review for all topic areas. This means that in some research areas where I find little existing research, a more exhaustive search for articles in that content area could turn up additional research. However, it is my expectation that the results of this systematic review are indicative of areas where the research is more limited.

### **Review of Recent Research**

Research in several different areas of employment and disability are reviewed. This summary briefly describes the key content of recent research in each area and some of the limitations of that research.

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<sup>1</sup> A complete description of the methodology is provided in the report.

- **Measurement of disability and employment**

A large literature discusses the differences in measures of disability available in existing data and how employment rates vary across different measures of disability. Significant efforts continue on improving measures of disability, particularly in federally sponsored, nationally representative secondary data sets. Measures of the dimensions of disability, such as severity, functional abilities, chronicity, and support or accommodation needs are also important.

Employment is measured in many ways in the literature, including any work activity, competitive paid employment, full-time or part-time work, contingent or temporary work, and job tenure. Less research focuses on other employment-related outcomes such as wages and earnings, benefits, quality of employment and job stability. In part this reflects measures available in existing survey and administrative data.

- **Supply-side factors influencing employment**

Literature reviewed suggests that being younger at onset, white, more educated, and having less severe disability (measured in multiple ways) are associated with more positive vocational outcomes. There is some evidence that pre-injury employment is positively associated with post-injury employment, and limited evidence that returning to the same job reduces the time until first job post-injury.

Studies examining the relationship of supply-side factors are descriptive. To better understand the relationship between these factors and vocational outcomes it is important to include more controls, such as for service use, benefit use, and work experience prior to onset. Several studies are able to follow individuals for long periods of time. This allows better understanding of the process for reentry to the labor market and measurement of outcomes such as job retention or job stability.

- **Employer attitudes, practices, and workplace discrimination**

A number of studies have surveyed employers about their attitudes toward hiring people with disabilities and related workplace practices. This research shows that employers who have hired people with disabilities have more favorable attitudes and practices although many employers report that people with disabilities cannot perform the work required. Additional research studies the factors related to workers disclosing their disability to employers and measurement of employment discrimination.

The quality of employer survey efforts varies, in particular, whether surveys are representative of a larger group of employers. While evidence on employer attitudes is important, a next step is examining how these attitudes are translated into practice. There is only limited evidence on the relationship between employer

attitudes and practices and actual hiring, retention, promotion, and benefit policies.

- **Labor market changes and organization of work**

Changes in the labor market and organization of work such as globalization, technological change and movement away from physically demanding jobs have the potential to impact employment opportunities for people with disabilities. There is some evidence that the changing nature of work may have a negative impact on employment opportunities. For example, research documents growth in job skill requirements and technological needs but, on average, people with disabilities have lower educational attainment and technical experience. Other studies focus on the role of nonstandard work arrangements (part-time or contingent work) for people with disabilities. These jobs pay less and offer fewer benefits, but studies show they fill a need for some people with disabilities who might not otherwise work.

Although potential benefits of telecommuting and self-employment are discussed, this review found little research on these topics in terms of estimates of relative benefits or impacts for people with disabilities or even prevalence of use in the economy.

- **Work accommodations and assistive technologies**

Existing research shows that only a minority of workers with disabilities report needing or having accommodations, but a higher percentage of non-workers report needs. There is only limited research on which workers are more likely to need and receive accommodations. The type of accommodation needed varies from physical workplace modifications to special work arrangements such as schedule changes.

Surveys of employers suggest cost of accommodations is a concern in hiring people with disabilities. The evidence found in this review suggests actual costs are relatively modest. This evidence comes largely from employer surveys. However, these surveys may not be representative of all employers providing accommodations and it is unclear whether employers can accurately report costs of all types of accommodations, such as changes in work schedules. Although some accommodations may have limited direct costs, indirect costs can be higher and difficult to estimate.

More evidence is needed on the impact of accommodation use on employment and the process of returning to work after the onset of a disability. The research on this topic is older and focused on older workers. The research on factors related to the continued use and effectiveness of assistive technology (AT) specifically tends to be connected with general well-being and independence, with less research directly related to improving vocational outcomes. Additional

research on the effectiveness and cost-benefit of AT in the workplace is important.

- **Progression of disability benefits and disability management**

Research has examined the experience of workers after the onset of a disability and the factors associated with returning to work, job retention, and movement onto public disability benefits. This evidence points out there are often long time periods between onset of disability and receipt of public benefits, leaving open potential for public and private interventions during this period. Some research studies the role of disability management programs in improving job retention and return-to-work.

As returning to work is a process, research in this area benefits from data that follows individuals for longer periods of time. This research seems somewhat disconnected from the research on the impact of vocational rehabilitation (VR), since much of that literature does not take into account timing of onset and receipt of services, even though these periods can be long and varied. Having a better understanding of the characteristics of individuals and jobs that are related to different patterns of return to work is important. In addition, more research on the effectiveness of different interventions, such as disability management, on this process is also necessary. The impact of public disability benefit program structure on the process of return to work and incentives for employees and employers has been studied. More research on ways to improve incentives to keep workers in the labor force is important.

- **Vocational services interventions**

Research on the effectiveness of vocational service interventions on employment outcomes is focused in a few areas. A great deal of research exists around the effectiveness of vocational services (mostly models of supported employment) for persons with psychiatric disabilities, much of it using random controlled trials. In addition there have been several experimental and quasi-experimental studies of vocational services for those receiving public disability benefits and of consumer choice. There is also some research using rigorous quasi-experimental methods to evaluate the effectiveness of the VR program.

A large set of studies correlate the receipt of different VR services to employment outcomes. Although these studies usually do not claim to be causal, the results are difficult to interpret and can be easily misinterpreted. These studies reflect the desire to understand the relative effectiveness of different types of VR services (e.g. training versus job placement) but they generally do not consider the potential for systematic differences in who receives these different services. Efforts to improve research methods, potentially through technical assistance, could add to our knowledge of the effectiveness of interventions. Additional work on useful quasi-experimental designs could also be helpful.

There is some research on access to and use of the public workforce development system, in particular one-stop centers, by people with disabilities. While examination of the role of these centers is ongoing, additional research could be designed to measure the effectiveness of these services for people with disabilities. Additional research on the effectiveness of using public funds to encourage employers to retrain existing workers who experience disability is also needed.

- **Health insurance and employment**

Research on access to private employer-based health insurance and other employee benefits is limited. There is evidence that loss of public insurance is a disincentive to leave public benefits for work. There are also issues about the adequacy of private health benefits for some individuals with disabilities, including prescription drug coverage and mental health benefits. Research into the potential effects of allowing workers to buy into Medicaid is on-going. Additional research on ways to improve health insurance coverage for employed persons with disabilities while limiting employer costs is needed.

## **Conclusions**

This report provides a review of current research related to improving the employment outcomes of persons with disabilities. There are many areas where research is ongoing, some of which are reviewed in the full report. In recent years there has been more attention on the need for demand-side research that focuses on the labor market and employers. This review suggests there is more need for research in those areas, particularly in provision of accommodations. There is also a critical need for additional research on the progression of disability from onset through return to work or receipt of disability benefits. However, the evaluation of possible public sector interventions is critical as well, and needs to be conducted using rigorous methods. The evaluations of vocational services for people with psychiatric disabilities can serve as an example.

Taking into account the breadth of recent research and the limitations and issues discussed in this report, some final general observations can be made.

- Some research literature focuses on specific disability groups and some research literature focuses on broad measures of disability. These two literatures are not well connected. One issue is placing the specific groups (e.g., traumatic brain injury, psychiatric disabilities) in relation to the broader group of individuals with disabilities as context for understanding the disability-specific research. Another issue is understanding the relevance of national data findings for specific disability groups.
- Heterogeneity of disability (in type, severity, functional limitations, support needs, etc.) is an important issue that is much discussed but is not always part of

actual research projects. Research on measurement of outcomes, cost/benefit and effectiveness of accommodations, progression of benefits, and effectiveness of individual vocational intervention could benefit from more analysis on difference across dimensions of heterogeneity. This might take the form of separate study by disability groupings or it might focus on study of differences across severity, functioning, or support needs.

- For some demand-side analysis, information about and from employers is critical. But employer data can be more difficult to access than data on individuals with disability. To increase demand-side research, we may need to improve access to employer data through partnerships with employers and employer groups to access existing data, targeted collection of new data, or new ways to use existing individual data sources. In addition, research on employers needs to recognize the variety of different types of firms, for example, differences across firm size.

Improving the vocational outcomes of people with disabilities is an important goal. Developing new and improved research to expand our understanding in the areas outlined in this report can help us achieve this end.

# Strategic Assessment of the State of the Science in Research on Employment for Individuals with Disabilities

## I. Introduction

Improving employment and other vocational outcomes for people with disabilities is a clear goal of policymakers, advocates, people with disabilities, and our larger society. To achieve this end, we need to better understand what actions the public and private sector can and should undertake. To do this we need to know what works—that is, what programs, policies, and actions are effective in reaching the goal of improved employment and related outcomes for people with disabilities.

The research on employment of people with disabilities spans multiple areas of inquiry and academic disciplines. For example, there is clinical research that attempts to understand the role of different medical treatments in improving work outcomes; policy research that studies the connection of legislation and public disability programs to employment; and rehabilitation research evaluating promising vocational interventions. Multiple methods are used with many different sources of data and with varying research quality.

This report reviews research (primarily since 2002) related to employment of people with disabilities. While a comprehensive review of the entire literature was beyond the scope of this effort, this report provides a systematic review of a set of literature across key research areas. The review provides an initial understanding of the research being conducted in these areas and identification of limitations and gaps in the research. The report also discusses on-going research focusing on employment of people with disabilities in a few key agencies and centers.

### *Methods*

For this report, a systematic review was made across a broad set of literature to capture research in multiple areas related to disability and employment. The review included a search of key journals, citation databases, and websites of research organizations with a focus on disability and employment research. To limit the large amount of material, the search focused on research for the U.S. from the past five years—mainly articles published in journals from 2002 to 2007. The search was focused on quantitative research studies that conducted analysis to answer questions about the employment of persons with disabilities. Some qualitative research, from focus groups for example, was also included. Articles that discuss the importance of different topics, describe program interventions, or give guidance for employers or practitioners but

contain no primary research were not included. Articles that review the results of a set of published papers are included.<sup>2</sup>

The journals searched include: Archives of Physical Medicine and Rehabilitation, Journal of Disability Policy Studies, Journal of Rehabilitation, Journal of Vocational Rehabilitation, Milbank Quarterly, and Social Security Bulletin. In addition, a search on disability and employment was made in the JSTOR database (a primary index for economics, sociology and policy journals)<sup>3</sup>. A broad search on disability and employment in the Ebscohost database uncovered additional articles from journals not already searched, such as *Behavioral Sciences & the Law*, *Disability & Rehabilitation*, *Disability & Society*, and *Rehabilitation Counseling Bulletin*.<sup>4</sup>

Finally, a search was also made of selected websites for relevant published and unpublished articles that were directly related to the search topics. These websites include: Cornell University Institute for Policy Research, Disability Research Institute, the John J. Heldrich Center for Workforce Development at Rutgers University, Mathematica Policy Research, Worksupport.com of the Virginia Commonwealth University, Wright State University RRTC, and University of Iowa's Law, Health Policy and Disability Center. In some areas of research reviewed, key articles that were repeatedly cited but outside the above described scope were included in the review.

After these materials were collected, they were categorized by topic area. As part of the review of individual studies, a determination about the quality of studies was made. Because of the great variety in the types and content of studies, a threshold quality rule for inclusion was made. To be included, (1) a study needed to clearly describe the method of analysis and sample used, (2) have a sample size of at least 50, (3) and be published in a peer-review journal or have methods, upon review, that are on par with peer-reviewed journal standards. Only a few published studies were excluded along these lines. Within the included studies there is a great variety in the quality along the lines of the generalizability of results, the limitations in study methodology, and ability to draw conclusions from results. Because the nature of study limitations and quality issues varies across the topic areas, these limitations are discussed within each section of this report.

It is important to note at the outset that my review of the citations in the articles discussed here indicates that there is a wealth of additional research articles, some for specific disability groups and some in "more specialized" journals that are not reviewed here. From my review, it seems they provide similar types of analyses, likely with similar limitations. However, a comprehensive review would be necessary to determine this. In some research areas where I find little existing research, it may be that a more intensive search for articles in that content area would turn up additional research.

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<sup>2</sup> Several specific research areas were not included in this review. These include research studying the impact of employment on outcomes such as indices of quality of life or psychiatric measures and research on persons with disabilities attitudes toward employment.

<sup>3</sup> The JSTOR search covered the full-text search of 52 economics journals, 9 health policy journals, 10 population studies journals, 45 sociology journals, and 11 public policy and administration journals.

<sup>4</sup> An initial search was made of the PubMed-MEDLINE database. However, the author did not have direct access to the majority of the journals indexed and seeking access was beyond the timeline of this study.

## **II. Review of Recent Research**

### **A. Research on Issues of Measurement**

#### *Measurement of Disability*

The measurement of disability is an ongoing topic of research. Many issues are involved including what is the underlying conceptual definition being addressed, what are the research questions being asked, and what data are available for measurement. Given the limited sources of national level representative data, there has been much discussion of the disability measures available in these data. Burkhauser et al. (2002); Burkhauser, Houtenville, and Wittenburg (2003); Kaye (2003); and Kruse and Schur (2003) discuss the variety and limitations of these measures and how labor market outcomes vary using different measures. There seems to be broad consensus that simple one-question measures of work limitation should give way to more multidimensional measures of disability. Research is ongoing to develop and refine measures for inclusion in new data and ongoing data collection efforts.

The research reviewed for this study that rely on broad measures of disability (that is measures beyond a particular disability group) use a variety of measures including work limitations, specific functional limitations, and sets of specific impairments or diagnostic categories. It should be noted that all of these measures in secondary data sets are self-reported data (or reports by a designated proxy respondent) and it has been noted in the literature that this can lead to measurement error. Kreider and Pepper (2002) provide a study of the potential impact of these errors in measuring the relationship between disability and employment.

Definitions of disability within administrative data sources also need to be considered. Data from the administration of programs are an important source of information for studies of employment. In this review, studies have used administrative data from vocational rehabilitation (VR) programs, Social Security Administration (SSA) programs, Equal Employment Opportunity Commission (EEOC) data, and Department of Labor (DoL) programs. Depending on the data source, there are also limitations in information available for defining disability (Iezzoni 2002).

The literature on measurement of disability also discusses that important aspects of the heterogeneity of the population of persons with disabilities need to be captured by the measures we use and are often not (Silverstein et al. 2005). Some of these factors most relevant for employment research include variation in severity and capacity specifically related to work; need for and use of assistive technologies and other accommodations; self-perceptions and expectations toward work; barriers to work; chronicity of disability; and need for and use of medical care. These different dimensions can be important to consider in developing measures for specific research projects.

In addition to broad measures of disability, a great deal of research reviewed here focuses on persons with specific disability types or specific diagnoses. This seems natural given the research often comes from medical and rehabilitation practitioners that are working with particular groups of clients and have specialized training around specific disabilities. In addition, groups of clients have some clear differences in service and support needs. Often interventions are created for and implemented for persons with particular disabilities such as those with spinal cord injury (SCI), traumatic brain injury (TBI), severe mental illness, intellectual or developmental disabilities, etc. I did not find in the literature attempts to connect results from studies across these individual groups to understand commonalities and highlight important differences related to measuring disability. It seems possible that this type of effort might identify key dimensions that could inform the development of measures for broader national data, beyond resorting to specific impairment and diagnostic categories.

### *Measurement of Employment*

There are many different ways research studies reviewed here measure vocational outcomes. The measure of employment itself can be varied, with studies defining employment variously as any amount of work, competitive paid employment, full-time or part-time work, contingent or temporary work, and by length of job tenure. In addition, studies have measured other outcomes such as wages and earnings, benefits, quality of employment, satisfaction with employment, attitudes toward employment, intensity and complexity of employment, and unemployment. There are few studies that try to measure productivity. Work loss days or self-reported scales of effectiveness are sometimes used. A scale to measure the on-the-job impact of chronic health problems and/or treatment has been tested (Lerner et al. 2001).

In addition, outcomes can be measured at a point in time, or over multiple periods of time. The studies reviewed here that have multiple follow-up observations from longitudinal data use a variety of methods to make use of these data. Several explicitly formulate outcomes that require longitudinal data, such as time from case closure until first job (Krause 2003). Others conduct analyses of each follow-up observation separately and compare results (Keyser-Marcus et al. 2003). Many studies point out the importance of observing employment outcomes over time, and the problems inherent in focusing on just the first job found, for example, post rehabilitation (Kendall 2003).

This review did not uncover much research on these measures per se or comparisons of different measures of the same concept within studies. An interesting point brought up in discussion in several articles is the definition of what is a successful employment outcome. Martin et al. (2005) discuss the need to think about what are successful outcomes in light of variation in capacity and health of persons with HIV/AIDS. Taking into account multiple factors including environment is discussed as a capability approach in Mitra (2006). Brucker (2004) analyzes the idea of “suitable” employment in a variety of programs. There is also considerable discussion of meaningful competitive employment for persons with intellectual or developmental disabilities (Wehman, Grant, Revell 2003).

## **B. Understanding Employment Trends and Differences across Groups**

Employment rates of people with disabilities are lower than those for people without disabilities. This same finding has been made across many studies using different data sources and definitions. Measures of employment rates for people with disabilities vary substantially across definitions of disabilities. Burkhauser, Houtenville, and Wittenburg (2003) report employment rates of men across differing definitions of disabilities from 24 percent (using longer-term work limitation in the CPS) to 78 percent (using impairment in the National Health Interview Survey [NHIS]). Women show the same variation across measures with lower absolute employment rates. Kaye (2003) shows employment rates of over 70 percent for those who report they are with a disability and able and available to work but employment of about 25 percent for all those with a work limitation. Data from the American Community Survey (ACS) show that 19 percent of working-age persons with an employment disability (difficulty working at a job or business) are employed (Weathers 2005). In general, employment rates for people with disabilities are higher among men, whites, those with more education, and those ages 45 to 61 (compared to workers 25 to 44 or 45 to 61) (Houtenville and Daly 2003; Weathers 2005).

Large differences in employment by disability type or characteristic are reported in the literature reviewed for this report. However, without similar definitions of employment and results from similar data sources, it is difficult to make meaningful comparisons. For example, Meade et al. (2004) found that 66 percent of their sample with SCI was working pre-injury and 14 percent were working one-year post injury. For individuals with TBI, Walker et al. (2006) found that 39 percent were working one-year post-injury. Given these samples have a number of differences, more study is required to know if in general people with SCI have lower employment rates than those with TBI. The ACS data show differences in employment rates across several measures of disability including physical (34 percent), mental (28 percent), or sensory (50 percent) impairment (Weathers 2005). RSA data also include information on disabling conditions and closure status that can be used to measure successful closure across different groups of participants.

In addition to differences in employment across characteristics, studies examine and try to understand the changes in employment of people with disabilities over time. Past research has shown that the employment of people with disabilities varies over the business cycle (Burkhauser, Daly, and Houtenville 2001). A set of papers analyzes various potential reasons for the decline in employment of people with disabilities over the 1990s labor market boom period (Stapleton and Burkhauser 2003).<sup>5</sup> The evidence suggests that the decline is attributable to increases in the severity of impairments and health conditions among those with disabilities, unintended consequences of the ADA, and eligibility and benefit expansions in the Social Security Disability Insurance (SSDI)

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<sup>5</sup> The book also includes analysis of the argument that employment among the relevant group of people with disabilities, those who report they are willing and able to work, did not decline.

and Supplemental Security Income (SSI) programs. While the relative importance of each of these is disputed, they represent three important factors that need to be considered in almost all research on how to improve employment outcomes for people with disabilities: disability and health-related factors, discrimination and the effects of public policy to alleviate it, and the role of public disability benefits.

### **C. Supply-Side Factors that Influence Employment**

There is extensive literature that examines the relationship between what I call here “supply-side” factors and measures of employment or other vocational outcome for persons with disabilities.<sup>6</sup> Supply-side factors are factors that are connected to the individual, including demographic characteristics (e.g. age, race, gender, marital status), human capital characteristics (e.g. education, specialized skills, work history, past earnings), and disability or health related factors (e.g. level of functioning, severity of limitations, psychological factors).

One group of studies reviewed here focuses on groups of individuals with specific disability or impairment status (see Table 1). The majority of this category of literature in my review addressed either persons with SCI or TBI. This could be due in part to the journals that were reviewed.<sup>7</sup> Another potential reason for the numerous articles in the area of SCI and TBI is the availability of national databases in these areas, funded through the National Institute on Disability and Rehabilitation Research (NIDRR)’s model systems program, which makes such research possible.

The general motive behind many of these studies is to understand “supply-side” factors role in employment (or other work outcomes) to eventually inform better targeting of services or development of better vocational rehabilitation programs for these groups. Other studies had specific additional purposes, usually to focus on a particular outcome or covariate (e.g., clinical measures, prior occupation or race).

The studies reviewed used different measures of vocational outcomes. Of the twelve studies reviewed here (one is a review article that includes 75 articles), six use a measure of employment as the outcome (Walker et al. 2006; Crisp 2005; Meade et al. 2004; Krause 2003; Keyser-Marcus et al. 2002; Goldberg et al. 2001), four use a measure of job retention (Phillips and Stuijbergen 2006; Cook 2003; Gold et al. 2003; Salkever et al. 2003), one uses a measure of attitudes toward work (Kendall 2003), and one uses annual earnings (Krause and Terza 2006).

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<sup>6</sup> Some of the studies reviewed examine other non-vocational outcomes as well. In particular, several examine the connection between employment and quality of life measures. There is an additional literature on this topic. These results are not discussed here.

<sup>7</sup> Citations in the studies reviewed here suggest additional literature exists on factors related to vocational outcomes focusing on those (for example) with psychiatric disabilities, myocardial infarction, amputation, and chronic pain.

These studies vary in samples, definition of outcomes, and definitions of control variables. However, even across these differences we observe similarities in the estimated relationship of some factors with vocational outcomes. There was near universal findings that being younger at onset, white, more educated, and with less severe disability (measured multiple ways) are associated with more positive vocational outcomes. Three studies found men had more positive work outcomes than women. Three studies (Crisp 2005; Cook 2003; and Kendall 2003) examine the role of psychosocial factors such as perception of control, self-esteem, and social supports and find significant associations with employment.

Only four of these studies consider aspects of the individual's pre-injury work. Walker et al. (2006), Meade et al. (2004), and Krause (2003) all find that having worked in a higher-skilled occupation (mainly professional/managerial) pre-injury is associated positively with employment outcome. Keyser-Marcus (2002) et al. find that pre-injury productivity (employment or schooling) is positively associated with work.<sup>8</sup> Meade et al. (2004) show significant racial disparity in pre-injury occupational distribution but no significant difference post-injury. Finally, Krause (2002) finds that return to the same job significantly reduces the time until first job post-injury. Only one study includes any explicit measure of vocational service use (Goldberg et al. 2001). Crisp's review of studies (2005) and Cook (2003) are the only articles that explicitly include financial factors post-injury. Crisp finds that being in litigation or with personal injury insurance is negatively associated with employment, particularly found in studies on persons in chronic pain. Cook finds significantly lower employment retention for those receiving public disability benefits.

Another group of studies focuses on broader samples using broad definitions of disability. The two studies of this type reviewed here, Ozawa and Yeo (2006) and Randolph and Andresen (2004), use a multivariate regression model to show the correlation of demographic and human capital factors and disability. This type of study can examine whether there is a difference in vocational outcome for those with disabilities relative to those without disabilities, after controlling for associated factors (Ozawa and Yeo 2006). Alternatively, they can examine among a sample of persons with disabilities, the varying impact of different factors on vocational outcomes (Ozawa and Yeo 2006, Randolph and Andresen 2004). Using varied vocational outcomes (earnings, wages, hours worked, and employment) these studies both corroborate the general conclusions above that individuals with disabilities who are female, nonwhite, less educated (less than high school), and have more children have more negative employment outcomes. Ozawa and Yeo (2006) also find disability severity and older age are associated with negative outcomes.

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<sup>8</sup> Kendall (2003) finds that attitude toward work at discharge is positively associated with attitude toward work at 6 months after discharge.

### *Limitations and Issues*

Most of the studies reviewed here have certain common limitations that are important to consider.<sup>9</sup>

First is the issue of whether the study samples are representative of a broader group and provide generalizable conclusions. Even for studies focused on specific disability groups, it is generally unclear from the articles whether results are applicable to the broader group of individuals with that disability. Some of the articles discuss the issue of nonrepresentative samples due to refusal to participate or exclusion due to data item nonresponse. Several do some analysis of this issue. Not many discuss the broader issue. It is possible that since many of the TBI and SCI studies use data from the national database, evidence on the representativeness is included in other sources not reviewed here that more fully describe data collection efforts. Many of these articles were also for a limited geographic area.

A second limitation is that these studies are not predictive, but are descriptive. Most studies do not have an explicit or implicit model that would suggest the results are beyond correlations. While many of these studies acknowledge this fact, they do not discuss the implications for the broader goals of informing vocational services policy. In addition, there are many factors associated with vocational outcomes and included control variables that have been shown to be important but are not included, for example public disability benefits, use of vocational services, and pre-disability employment, earnings, or occupation. For example, if access to vocational services varies across groups and these services are effective in promoting work, not including this measure can mean findings (e.g. on race, sex, age) are just masking differential access to services by these factors. While information on associations between supply-side factors and employment can be important to understand, discussion of these confounding missing factors would be helpful. There are other studies (reviewed later in this report) that focus on the impact of public benefits on employment and the impact of vocational services on employment directly.

Some issues for future research are suggested by review of these studies. First is the potential for studying different outcome measures beyond employment. While not a comprehensive review of the literature, the outcomes studied in the reviewed articles suggests that there is less study of wage and earnings than of employment. Krause et al. (2006) is the only one of the articles reviewed here to examine earnings as an outcome. This article discusses earnings as a measure of quality of employment, discussing the literature studying the relationship of economic outcomes on quality of life and longevity (in SCI). He also makes clear that some factors that have repeatedly been shown to be associated with employment, such as age may not be related to earnings in the same way, since younger workers have less employment experience so may have lower earnings. Although studying earnings is important, it should be noted that annual earnings are made up of hours worked and wages. It is important to acknowledge which of the two are being

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<sup>9</sup> Table 1 includes a brief description of the quality and limitations for each study.

impacted, since these two margins call for different interventions. A review of the economics literature on health and labor market outcomes (Currie and Madrian 1999) finds health limitations have a greater effect on hours of work than on wages. These studies use a variety of measures for health (including broad limitations in work or functioning measures). Whether this is true for other specific disability measures could be important. In addition, some studies include schooling, supported work, and other activities with competitive employment in the outcome measure. It is important to separately understand these outcomes, as discussed earlier under disability measures. None of the studies reviewed here examined factors associated with full-time versus part-time employment.

Several of these studies examine job retention (or continuous employment) as an employment outcome. This is also an important dimension of vocational attainment, but requires longitudinal data, which may be more difficult to collect. All of these studies remark on the actual or potential differences in factors associated with initial employment as compared to employment retention. The follow-up times in the four studies reviewed here were six months, one-year, two-years, and seven-years. Additional research on employment stability (using multiple employment observations) could be useful.

A second issue is the timing of follow-up in measuring vocational outcomes. The timing of when the outcome is measured varies across the studies reviewed from six months to 25 years. Keyser-Marcus et al. (2002) compare the same estimation at year 1 through year 5 after injury. Kendall (2003) discusses the limits on cross-sectional analysis and the importance of taking into account the “temporal nature of vocational adjustment.” Obviously data that follow individuals longer can address these issues better. Krause (2003) is able to estimate the timing between onset and first job post-injury (and first full-time job post-injury) using very long follow-up periods. The average time since injury in that study is 24 years. Long follow-up periods can limit the bias when studying those who are working post-injury (e.g. studying earnings). The Krause (2003) study is extremely interesting, but it shows some bias even with long follow-up in those who found full-time jobs. Additional methods for analyzing longitudinal data could be used (such as survival analysis) to be able to include all persons, even those we do not observe finding a job in the sample period. This could be especially helpful for longitudinal data that does not have such a long follow-up.

Finally, I found very little literature that examined the relationship between what could be termed social or community supports (including housing and transportation) and employment or other vocational outcomes. The reviewed articles referenced literature on social supports’ impact on well-being, but these articles were not reviewed.

#### **D. Demand-Side Factors Influencing Employment**

##### ***Employer Attitudes, Practices, and Workplace Discrimination***

One potentially important factor for employment of persons with disabilities is employer perceptions and attitudes. There are a number of review studies on this topic, so

only a brief summary of results is given here. A review prepared by CESSI for the Interagency Committee on Disability Research cites several review studies including a review of the literature representing results from 81 studies.<sup>10</sup> Schartz et al. (2002) review 20 studies from 1992 to 2001. In addition, three other studies were reviewed. Dixon (2003) reports results from a nationally representative survey of private-sector employers (excluding those with less than 5 employees). In 2004, the Employer Assistance Recruiting Network (EARN) conducted focus group research of across 13 metropolitan areas of private sector employers on their concerns around hiring persons with disabilities. Morgan and Alexander (2005) report results from a random sample survey of employers in the Western part of the United States focusing on individuals with developmental disabilities.

These studies examine what types of employers have hired people with disabilities, use of employment practices related to persons with disabilities (specific hiring policies, training of other workers regarding working with or providing accommodations to people with disabilities, accommodations), and employers' perceived barriers to or concerns around employing persons with disabilities. There are some common findings across these studies. Employers who have hired people with disabilities have more positive attitudes (Schartz et al. 2002, Morgan and Alexander 2005) and are more likely to have disability-related employment practices (Dixon 2003). The EARN focus groups as well as survey data show that many employers have concerns (and potentially misconceptions) about the cost of hiring workers with disabilities and providing accommodations. In addition, some employers report discomfort or unfamiliarity with persons with disability, especially specific types of issues such as having a history of substance abuse or serious mental health problems (Schartz et al. 2002). Dixon (2003) reports that about a third of employers nationally report that they feel persons with disabilities could not perform the work required at their company.

Another part of the literature on employer attitudes and practices includes studies of corporate culture of organizations, the "shared beliefs, values, or common understandings" that impact employment policies and practices. A recent review of this literature (Schur et al. 2005) discusses research providing conceptual models of corporate culture and research on supervisor and co-worker attitudes toward employees with disabilities. Other related issues and implications for future study are discussed.

Additional research related to employer attitudes focuses on employees' disclosure of their disability to employers and their related willingness to request accommodations under ADA. Baldrige and Veiga (2001) provide a conceptual framework for the factors that might contribute to an employees' decision to request an accommodation. Conyers and Boomer (2005) analyzed the factors that predict disclosure of HIV status to employers among a sample of workers with HIV/AIDS who used accommodations and those who did not. In this study, only 27 percent of the sample had disclosed their HIV status while more than half used some form of job accommodation.

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<sup>10</sup> This unpublished review study (Ainspan, N.D. 2003. Employer's opinions and attitudes of employing people with disabilities. Washington, D.C.: Office of Disability Employment Policy, Department of Labor) could not be accessed for this review and so those findings are not included in this report.

Severity of illness and holding a managerial/professional job were significantly related to disclosure and use of accommodations. Ellison et al. (2003) report results on disclosure among professionals and managers with psychiatric conditions. They find a high rate of disclosure (87 percent), although half of these could be interpreted as involuntary since they were the result of an unfavorable health-related circumstance (symptoms or hospitalization while on the job).

Finally, there are a number of studies that have tried to directly measure labor market discrimination against persons with disabilities- that is, measure the extent to which attitudes and prejudices are translated into lower employment and wages (DeLeire 2001; Baldwin and Johnson 2000). This literature attempts to attribute differences in wages and employment due to observable demographic factors (including race, gender, education, prior experience) and measures of functioning or work productivity. The remaining unexplained differential is considered an upper bound on the measure of discrimination due to disability. While this is a standard methodology in economics, it is limited by the ability to accurately measure disability related work productivity and other unmeasured impacts of disability on employment. Additional related studies analyze the impact of ADA on reducing labor market discrimination. These are discussed in a later section below.

Another set of studies provides information on employer discrimination across different disability groups. The National Equal Employment Opportunity Commission ADA Research Project, begun in 2003, includes a set of studies examining EEOC complaint filings, investigations, and resolutions for specific disability groups under ADA.<sup>11</sup> The findings point to differing patterns of discriminatory allegations and resolutions across specific disability groups and industries. McMahon and Shaw (2005) provide an introductory overview.

### *Limitations and Issues*

Surveys of employer attitudes provide important information. Although there have been many of these studies conducted, there is considerable variation in research quality. For example, of the 20 studies reviewed by Schartz et al. (2002) only seven were surveys or record reviews that had sample sizes over 50 and response rates of at least 50 percent. The studies vary in geographic area of focus and sampling method. Some surveys rely on organizational affiliations such as the state chamber of commerce, trade association, or connection to state rehabilitation association for an initial contact sample, making it difficult to know whether they are representative of a broader group of employers. The representativeness of surveys is important, since there may be differences in employer attitudes and practices across firm size (Dixon 2003) and it can be harder to survey small firms than large firms. In addition, Schur et al. (2005) point out the need for multiple research methods, including qualitative and quantitative methods and mixed mode studies.

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<sup>11</sup> Sets of these studies have been published in the journal *WORK: A Journal of Prevention, Disability, and Rehabilitation* (vol. 25 2005) and *Journal of Vocational Rehabilitation* (vol. 23 2005).

There is also a need to study actual employer results in addition to and in conjunction with employer attitudes and perceptions. Dixon (2003) provides some information on changes employers have made to the workplace and business practices to better attract and accommodate workers with disabilities. It would also be interesting to have information from a broad spectrum of employers on business practices and benefit policies that have been identified as important for persons with disabilities, regardless of whether the employer views these as accommodations for persons with disabilities. General surveys on business practices might be used for this purpose. More analyses that correlate actual hiring, retention, and promotion of persons with disabilities to different business practices would also be helpful. Models of this type of research using employer surveys exist in the area of low-skilled workers (Holzer 1996).

Finally, additional study of employer attitudes in relation to different disability types, or accommodation needs and how this translated into employment is indicated, especially in light of research pointing to employers' varying levels of discomfort with different types of disability (Schartz et al. 2002) and the results of the EEOC project described above.

### ***Labor Market Changes and Organization of Work***

It has been widely noted that changes in the labor market and the organization and nature of work over time may have an impact on the employment of persons with disabilities. Commonly mentioned factors include globalization, technological change, movement away from physically demanding jobs, and the greater frequency of employer changes over the course of a career. Some of these changes are argued to benefit persons with disabilities while others may make employment more difficult. Evidence on the extent to which these trends have substantially changed the labor market is somewhat limited and mixed. Evidence of their impact on employment of persons with disabilities is even more limited.

Changes in the demand for different types of jobs in the economy might increase employment opportunities for persons with disabilities. Greater flexibility and autonomy, less physical demands, and nonstandard work arrangements could all potentially increase work opportunities. Yelin et al. (1980) showed that flexibility in the pace and schedule of work and autonomy in work is strongly correlated with ability to maintain employment. Greater demand for higher skilled labor (given the lower educational attainment on average of persons with disabilities), more competitive labor markets, and declines in employer provided health insurance might have negative impacts on employment of persons with disabilities.

The nature of work in the economy continues to change. Stapleton et al. (2003) show that between 1985 and 2000, cognitive and specific vocational preparation requirements of jobs in the economy were increasing as were the percent of jobs involving personal interactions and requiring a bachelor's degree. Fewer jobs required repetitive tasks and in general the average physical demands of jobs were declining.

These are long-term trends. The evidence is more mixed on whether job tenures over careers are actually declining and contingent work increasing. Yelin (2002) reports declining average job tenure within some age groups for men, but increases for women. There is little evidence of major changes in the percent of workers in contingent or temporary work or who are independent contractors. Most of these arrangements cover a very small percentage of the labor market (Yelin 2002). And while the workplace literature suggests some movement toward flexibility, teamwork, and autonomy within some sectors of the economy, there is little economy-wide data to measure these phenomena.

There is limited evidence on the impact of these labor market changes on the employment of persons with disabilities. Stapleton et al. (2003) examine whether changes in the nature of work can explain declines in employment of workers with limitations in the 1990s. They measure the nature of work through static characteristics of jobs (cognitive skills required, relations with others, autonomy, range of tasks, physical demands, benefits, hours, nonstandard work arrangements, and size of firms). They find that none of these characteristics alone accounts for a large share of the decline over the 1990s. They also find that the change in the distribution of occupations can explain little of this decline. In part, trends in the nature of work do not explain the large changes in employment in the 1990s because they are gradual long-term trends that have not shifted dramatically in recent years. However, the authors do find evidence of a negative impact on employment from the long-term growth in skill requirements of jobs. Trupin and Yelin (2003) examine whether people with disabilities might be more likely to find employment in growing occupations and industries, but find no evidence to justify this hypothesis.

Several studies have found differences in the percentage of people with disabilities in “nonstandard” work arrangements. Hotchkiss (2004), Schur (2002), Schur and Kruse (2002), Yelin and Trupin (2002), and Yelin (2003) all show that people with disabilities are more likely than those without disabilities to work in nonstandard arrangements including part-time, temporary or independent contractor jobs and this percentage has grown over time. Increases in non-standard work can be positive or negative for people with disabilities. Part-time jobs in particular generally pay less and offer fewer benefits than full-time permanent jobs. Schur (2002) shows that nonstandard workers with disabilities receive lower pay and fewer benefits. This is due both to the nature of these jobs (relative to the rest of the labor market) as well as lower pay and benefits relative to workers without disabilities even within these job types. She also shows that it is not only lower wages, but also lower hours and concentration in lower-paid occupations that leads to worse economic outcomes for these workers.

Despite the lower pay and benefits, Hotchkiss (2004) and Schur (2003) both conclude that these jobs are attractive to many persons with disabilities. Schur (2003) finds that the primary explanation for the greater levels of nonstandard work among persons with disabilities is health problems that make traditional full-time jobs difficult or impossible. Hotchkiss (2004) finds that post ADA, the relative probability of persons with disabilities being in part-time work has increased significantly and suggests this

could be due to greater accommodations for part-time work. It is unclear the extent to which increased availability of medical benefits (either through the employer or the government) and/or allowing public disability benefit recipients to keep more of their earnings might further increase this trend.

Nonstandard work, whether advantageous or disadvantageous, still remains a small part of the labor market. Yelin (2003) shows that across all workers in all types of employment, there are no significant differences in certain working conditions between employed people with disabilities and without disabilities (after adjustment for age and gender). These conditions include being self-employed, working a day shift, with flexible hours of employment, cognitive and physical demands of the job, or the psychological characteristics of the jobs. The one exception is the prevalence of home-based work is somewhat higher among employed persons with disabilities. While this study is for California, many of these results are echoed in national data (Yelin 2002).

Self-employment has also been discussed widely as a possible opportunity for workers with disabilities. Ipsen and Arnold (2005) discuss the desire of small business development centers (SBDCs) and VR agencies to collaborate to promote self-employment services, although pointing out that few have such relationships in place. Arnold and Ipsen (2005) show that an increasing number of states have put in place “model” self-employment policies and programs. Walls et al. (2001) provide a discussion of the possibilities for microenterprise and interest among persons with disabilities. However, there appears to be little study of longer-term outcomes and success of self-employment for persons with disabilities, or of the effectiveness of service interventions on self-employment outcomes.

Finally, the advantages of telecommuting or working from home for people with disabilities have also been discussed, but I found few studies on this topic. West and Anderson (2005) discusses telecommuting as a potential work accommodation, but state that estimates of the number of teleworkers with disabilities are not available. While earlier cited literature shows that workers with disabilities are more likely to work from home, it is unclear whether this could be expanded and whether options for telework might improve employment outcomes for persons with disabilities. In addition, other labor market literature finds evidence that temporary work can serve as a stepping-stone to permanent employment for some groups. This might be explored further for people with disabilities.

### ***Work Accommodations and Assistive Technologies.***

Some persons with disabilities require accommodations to work. These accommodations can vary from changes in the physical structure of the workplace to flexibility in work scheduling to assistive technologies. There are limited sources of data on the number and types of accommodations needed and used by workers with disabilities. Zwerling et al. (2003) and Loprest and Maag (2003) both report data from the NHIS Disability Followback.

Of all workers with functional limitations or impairments, only 16 percent reported needing accommodations and 12 percent reported receiving at least one accommodation (Zwerling et al. 2003). Loprest and Maag (2003) report that 32 percent of “work-oriented” non-workers with disabilities reported needing an accommodation.<sup>12</sup> The most commonly reported accommodations needed by nonworkers and workers and received by workers were changes in worksite features including accessible parking or transportation and physical workplace modifications. A significantly larger percentage of nonworkers than workers report the need for special work arrangements (reduced work hours, increased breaks, job redesign) suggesting this may be a more difficult accommodation to receive. Both studies show there are differences in accommodation use and need across type and severity of disability. Burkhauser and Daly (1996) using a sample of older workers 51 to 61 found that 22 percent received employer accommodations around the time of onset of a health impairment. Better-educated and older workers were more likely accommodated, but there was no difference by gender or firm size. The most common reported accommodation in this sample was a change in job duties or schedule and someone to help.

One concern for employers and potential obstacle to employment of persons with disabilities is the cost of worker accommodations. Dixon (2003) reports that in a national survey of employers, 40 percent said it would be difficult or costly to accommodate employees with disabilities, although only 35 percent of employers who had hired someone with a disability reported this.

A fairly widely cited source of information on the costs of accommodation comes from the DoL’s Office of Disability Employment Policy Job Accommodations Network (JAN). One study interviewed 778 employers who had contacted JAN in 2004 and 2005 to ask about their provision of accommodations and cost of doing so (Hendricks et al. 2005). Of employers interviewed, about 43 percent had implemented or were in the process of implementing an accommodation solution. About three-quarters of these were able to report costs. In almost half of these cases the reported cost of accommodation was zero. An additional 42 percent of employers said the accommodation was a one-time cost with a median report of \$600. Scharz et al. (2006) make the important contribution of recognizing there can be additional costs to accommodations (what they label indirect costs) such as staff time for training or implementing an accommodation. They report (from the same survey as above) that 152 employers provided estimates of indirect costs and more than three-quarters report no indirect costs. This study also asks employers to quantify direct and indirect benefits of the accommodations, finding that most employers in the survey felt accommodations were cost beneficial and effective.

My review uncovered few studies of the effectiveness of accommodations (broadly defined) on employment, productivity, or job retention. Burkhauser and Daly (1996) report on earlier work using data from the 1970s that found that receipt of an accommodation from an employer after work limitation onset increased tenure on the job substantially. Burkhauser et al. (1999) found using data from the Health and Retirement

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<sup>12</sup> This definition excludes non-workers on disability benefits, those who are retired, and those who report they could not work even with accommodations.

Study on workers ages 51 to 61 that the time to the beginning of SSDI payments was significantly delayed by the provision of workplace accommodations. Allaire, Li, and La Valley (2003) examined the factors associated with accommodation use by people with work disabilities due to arthritis and other rheumatic diseases. Using a tested scale for measuring self-efficacy in managing the job accommodation request process, they found greater functional limitations and greater self-efficacy to be significantly related to accommodation use.

Assistive technologies (AT) are one type of accommodation that could potentially improve the employment possibilities for persons with disabilities. A literature discusses how rehabilitation professionals can help choose appropriate assistive technologies for clients' use generally, how to ensure initial and continued use of technology, and how to properly match assistive technology to consumers' individual situations (see for example Sherer et al. 2005). Much of this literature is not focused specifically on use of AT in the workplace. A number of studies focus on the use of AT in post-secondary educational settings. Several articles reviewed do discuss specific assistive technologies and barriers to use of assistive technologies in work, including funding for these technologies (Strobel et al. 2006; Inge 2006).<sup>13</sup>

My review found limited evidence on the impact of AT use on vocational outcomes. As part of a discussion on choosing the right AT for the workplace, Gamble et al. (2006) report briefly on the use of AT in successfully closed VR cases in Rehabilitation Services Administration (RSA) data and report on use of AT by rehabilitation professionals who called the JAN network. Hedrick et al. (2006) report results from a survey of working age adults with SCI on AT use, ownership, cost and whether the AT they were using was important to them for employment. The vast majority of AT users (about 80 percent) said it was important to them for work. The article has no specific analysis of the effect of AT on productivity or employment. Wehmeyer et al. (2006) present a meta analysis of studies on the impact of technology use on employment by persons with intellectual and developmental disabilities. The focus of most studies in their review is use of technology in training and in integrated supported employment. Their comprehensive review from 1977 to 2003 uncovered 13 data-based, quantitative, single-subject articles, representing a total of only 42 unique participants. Across varying types of technology and vocational outcomes, the authors conclude these technologies were "fairly effective" (in the mid-range of the statistical scale of effects used) in increasing vocational outcomes. The authors conclude that there are few empirical evaluations of technology use by persons with intellectual and developmental disabilities in the literature.

### ***Limitations and Issues***

Although commonly cited, the results on cost of accommodations from the JAN survey need to be qualified. Only employers that take the step to call up JAN for assistance are included. These could overrepresent employers that are willing to consider

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<sup>13</sup> The review found only one study focused on personal assistance services in the workplace, and this was a discussion article (Barcus and Targett 2003).

accommodations and perhaps those with specific existing employees they want to retain. Results in Hendricks et al. (2005) and Schartz et al. (2006) suggest the sample of workers being accommodated is not representative. Most inquiries were for existing employees (not new hires) and on average these employees had been with the company for seven years and almost half had a college degree or higher.

It is also a concern whether employers can accurately estimate costs of accommodation. As has been suggested in the literature, it is important to measure not just costs of special equipment or physical modifications but also the time of other employees and supervisors, as well as the time of the employee. For example, Schartz et al. (2006) cite a study that found accommodations for individuals with psychiatric disabilities were more likely to require human assistance (such as job coaches) with additional time put in by coworkers and supervisors. Estimating the cost of these types of accommodations could be difficult.

In addition, employer survey results on effectiveness of accommodations reported above have limitations. The results cited above from the JAN data suggest the sample of callers might be biased toward finding an accommodation is effective. Other evidence on the impact of accommodations on employment is old and from data that are not representative of the entire population of workers. In general, my review found limited evidence on the effectiveness of different types of accommodations on a variety of employment outcomes including hiring and retention. Similarly, studies reviewed here report little evidence on the use of assistive technology in the workplace and the impact on employment outcomes. This review uncovered no studies that had random controlled trials attempting to analyze these issues.

## **E. Progression of Disability Benefits and Disability Management**

Researchers have examined the experience of individuals after disability onset in an effort to understand ways to retain employment, keep individuals in productive activity, and reduce or put off application for public disability benefits. Existing literature describes patterns of wages and employment after disability onset. A progression of benefits is described, involving movement from short-term disability to long-term disability and/or workers compensation programs to Social Security benefits and the incentives for employers to move some employees toward the next level of benefits. Research reviewed here studies the factors that delay movement onto disability benefit programs and impact the progression of benefits. This includes studies of disability management strategies that attempt to improve the retention of workers and delay the progression of benefits.

Several studies examine earnings and employment after the onset of disability. Two of these use a unique longitudinal data source (the Panel Study of Income Dynamics) that allows researchers to observe participants for 20 years. Burkhauser and Daly (1996) show a substantial decline in work and earnings in the years after onset, but also find that the majority of workers maintain a link to the labor force for several years

after disability begins. A majority of young workers and almost one-half of older workers continue to work in the five years after onset. The authors show that there is a recovery of income for many households over time after onset, in part due to receipt of disability benefits. They conclude that the period between disability onset and exit from the labor market or entry onto public benefits is relatively long and could potentially be impacted by employee, employer, or government interventions. Charles (2003) finds similar results on earnings and also shows that workers who are older at onset, nonwhite, more chronically disabled, and less educated experience greater wage losses and economic impacts in the long-run. He also finds that a large proportion of the differences in earnings after onset across workers can be attributed to the industry and occupation of employment. Krueger and Kruse (1995) show that the occurrence of an SCI causes a steep decline in employment, hours, and earnings, but relatively little change in wage rates for those who work. In addition, this study shows that those individuals with SCI and computer skills have higher earnings and faster return to work than others with SCI, holding constant education. In fact, they found no earnings gap between SCI and non-SCI computer users. However, the study also finds that individuals with SCI are less likely to use computers than the rest of the population.

Another set of studies analyzes the factors influencing application for disability benefits and the timing or process by which individuals move toward application for disability benefits. Burkhauser et al. (2002), using data on a cohort of older workers from the HRS, find that most workers do not apply immediately for DI benefits with first onset of a work-limiting condition. The probability of application is highest in the first year after onset, but median time to application is 7 to 8 years. The time until application is lower for those living in states with disproportionately high allowance rates, those eligible for higher benefits, and those with more severe health problems. Higher pre-onset earnings, education, and lower state unemployment rates all increase time to application, as does receiving accommodations from employers. Bilder and Mechanic (2003) examine factors influencing benefit application for individuals with mental disorders and find that more serious limitations increased likelihood of application as did being older, male, and having less education.

There are a number of actions that employers can take to promote job retention and/or return to work of employees who have developed work limitations. Habeck et al. (2007) refer to these actions as “back door factors” as opposed to “front door factors” which include actions to promote hiring of people with disabilities. These back door factors include disability management activities and provision of accommodations and workplace supports. Drawing from a “small set of intensive, on-site qualitative employer studies in process”, Habeck et al. (2007) put forward four preliminary findings on employer actions to promote employee retention. They are (1) return-to-work activities are not one-time events, but long-term efforts; (2) effective accommodations are most often provided internally from knowledgeable support staff in the work environment; (3) many organizations have a significant disconnect between their diversity efforts for hiring people with disabilities and health and productivity efforts (e.g., disability management, return-to-work); (4) efforts to improve employer hiring and retention of people with disabilities must take into account employers’ needs to enhance productivity

and limit costs for business survival. These preliminary findings provide hypotheses that can and should be tested. Public funds can also potentially be used to provide incentives for employers to provide retraining and return-to-work activities. Stapleton et al (2007) provide a number of examples of potential policy options to use public funds to leverage private sector activities. However, research is needed to test the impact and effectiveness of such policies.

Many large employers (and insurers) have put in place disability management programs that seek to support employees with work limitations in multiple ways, often to help them return to work and previous levels of productivity more quickly. Calkins, Lui, and Wood (2000) discuss developments in the field of disability management and review some research on the use of disability management by private-sector rehabilitation practitioners. Harvey and Berkowitz (2006) review private and public programs designed to divert persons from becoming dependent on disability benefit programs by either reducing the circumstances for eligibility (e.g. safety and wellness programs) or by allowing or persuading them to return to work rather than access the benefit program. This suggests models for early intervention to limit progression onto disability benefits. Mitra and Brucker (2004) describe efforts by SSA to implement an early intervention project for SSA disability beneficiaries.

Results from the Progression of Disability Benefits (PODB) project at Virginia Commonwealth University show factors that influence the progression of workers from short-term to long-term disability claims and to public benefits and the association of disability management practices with this progression. This project uses a sample of persons filing short-term disability (STD) claims who were insured for long-term disability (LTD) from a private sector insurer. The sample is large employers, who the authors recognize are more likely to have disability management programs and provide accommodations than smaller firms. The study found that there is a systematic progression from STD to LTD to public benefits, and that cases only move one-way (McMahon et al. 2002). Using employer-specific experience ratings for the progression of disability benefits developed by the authors for a subset of 42 employers, Danczyk-Hawley, McMahon, and Flynn (2002) find that employers with higher levels of integrated disability management activity experienced reduced progression of disability benefits ratings. While this sample is small and the broader sample is limited in its generalizability, this study uses a unique method to quantify the impact of disability management strategies on work retention.

Other research examines how to reduce the costs of long-term disability claims, in part from quicker return to work and increased worker retention as an outcome of disability management efforts. Salkever et al. (2000) examine the connection between disability management and rates and costs of claims for psychiatric disorders. They also use insurer data on employers with long-term disability policies, overrepresenting large employers. They find that some employee-disability management strategies such as front-line manager involvement and provision of alternative jobs upon return can predict lower claims rates and costs among LTD programs. They also discuss the limitations of their

data in terms of sample size and limited measures of severity. Both of these papers generate additional hypotheses to be tested.

### ***Limitations and Issues***

These studies clearly show some potential for interventions (employer and public) after disability onset that might increase job retention and reduce movement onto public or private long-term disability benefits. As mentioned above, several testable hypotheses have been generated and more study is needed. In particular, my review turned up little evidence on differential experiences across disability groups after onset, or perhaps more importantly, across employees with different needs after onset. The literature on effectiveness of accommodations is closely related here and studies of the impact of accommodations on job retention or return to work are limited.

Studies of the evaluation of disability management strategies are promising, although focused on large employers. It would be interesting to know more generally about the experiences of workers in small firms after an onset of disability. Evaluation of the effectiveness of other models of early intervention is also needed. A critique has been made that waiting until individuals are applying to SSA disability to try to intervene or after they are already on benefits to return-to-work can mean less success. This literature suggests that more immediate intervention could be successful, although the evidence on effective interventions is minimal.

## **F. Impact of Public Policy on Employment**

There are multiple different public policies and programs that have the potential to impact the employment of persons with disabilities. Two key policies/programs that have been studied are the impact of the Americans with Disabilities Act (ADA) and the impact of Social Security Administration (SSA) disability benefit programs. Because both are reviewed elsewhere, I only provide a brief overview here.

### ***ADA Impact on Employment.***

One of the goals of the ADA was to reduce discrimination by employers (in hiring and retention after a disabling incident) thus improving employment opportunities for people with disabilities. The requirement for reasonable accommodation was also seen as a way to improve work opportunities. However, some argue that the potential for increased cost through provision of accommodations or the risk of future employee complaints under ADA may have led employers to be less likely to employ people with disabilities. A growing literature tries to estimate the employment impact of ADA. Barnow (2006) in his white paper for the Interagency Committee on Disability Research (ICDR) Summit on Employer Perspectives on Workers with Disabilities summarizes this literature. In brief, several papers find that some portion of the downward trend in employment of people with disabilities is due to the ADA (Acemoglu and Angrist 2001; DeLeire 2000). Critics argue that these studies are using the wrong definition of disability (Kruse and Schur 2003; Silverstein et al. 2005), but it is difficult to implement the ADA

definition using existing data. Some argue that evaluations should only examine the impact of the ADA on the covered population. While conclusions on the impact of ADA are far from certain, Barnow (2006) notes that it may take improvements in available data to make additional progress.

### ***Social Security Benefits Impact on Employment.***

There is a relatively large literature on the negative impact of SSDI and SSI programs on labor supply. A review of early results is found in Haveman and Wolfe (1999) and Bound and Burkhauser (2000). More recent results include the role of disability benefits in declining employment trends. Studies included in these two reviews almost unanimously find that benefits are related to lower employment rates. In recent research, Goodman and Waidmann (2003) and Autor and Duggan (2002) both find that changes in disability benefit program generosity have increased DI rolls and decreased employment. They argue this is an important factor in explaining declining employment for person with disabilities in the booming labor market of the late 1990s. These findings on disincentives are an important context for understanding SSA return-to-work initiatives for beneficiaries.

### **G. Vocational Services Interventions to Improve Employment**

One of the important questions for how to improve employment outcomes for persons with disabilities is what vocational service interventions lead to increases in work, job retention, and improved economic outcomes. There is a great deal of discussion of different types or models of vocational rehabilitation services in the literature, for example the importance of consumer choice or the benefits of supported employment. Fraser et al. (2004) review categories of rehabilitation programs' employment outcomes research from NIDRR's 2002 conference "Bridging Gaps". Additional articles report evidence on access, use, and cost of rehabilitation services by different disability groups (for example, Meade et al. [2006] for SCI, Capella [2003] for hearing loss, and Johnstone et al. [2003] for TBI).

A broad literature exists attempting to show the impact on employment outcomes of vocational service interventions. This literature varies in type of disability studied, type of intervention studied, and method of analysis. Some of the research reviewed here can be categorized as predictive, that is, uses experimental or quasi-experimental methods to ascertain the causal impact of an intervention on vocational outcomes. In addition, there is a set of studies that use multivariate statistical analysis to look at the association of interventions with outcomes, but do not use methodologies that would allow for conclusions on causality. Most of these studies focus on analyzing different vocational rehabilitation services provided by state VR agencies using administrative data. Table 2 includes details for the studies reviewed here.

Generally, we would like to measure effectiveness of an intervention as the outcomes after intervention relative to what outcomes would have been for the same individuals if they had not received the intervention. Since we cannot observe outcomes

for the same individuals with and without the intervention, it is necessary to find appropriate comparison groups to the intervention (or treatment) group. Hopefully, this group is as similar as possible to the intervention group on observed and unobserved characteristics. The “gold standard” for estimating the impact of interventions is experimental or random controlled trial methods, that randomly assign individuals to treatment or comparison. In the absence of this, other matched comparison groups may be used, such as applicants or drop-outs or eligible non-participants. Statistical methods are also used to adjust for observed and unobserved differences in the intervention and comparison groups. Studies using these approaches are often called “quasi-experimental.”

A good discussion of these issues for evaluating vocational rehabilitation impacts is found in Dean et al. (2002).<sup>14</sup> Reviewing earlier efforts funded by the U.S. Department of Education to assess the feasibility of conducting an impact study of the VR program, Dean et al. (2002) report that “the major threat to internal validity in quasi-experimental evaluations of employment and training programs is selection” and “it is imperative that efforts be made to correct for this issue of “selection bias” when using comparison rather than control groups.” This bias is a particular issue in studies comparing outcomes across individuals in different VR service types and trying to draw conclusions about the varying efficacy of these types. Characteristics that determine who is selected to receive different types of services almost certainly also directly impact outcomes. This means one cannot assert that differential outcomes by service types are causally due to that service and not due to uncontrolled for factors (observed or unobserved) such as disability severity or capacity, pre-disability experience, or motivation and expectations.

There seems to be fairly strong agreement in this literature that few existing vocational interventions for people with disabilities can be viewed as evidenced-based practices. The exception is the individual placement and support (IPS) model of supported employment for persons with psychiatric disabilities. My review of the literature on vocational service interventions first briefly summarizes studies on IPS and why it is considered an evidenced-based practice. Then I review predictive studies on a variety of vocational interventions, including state vocational rehabilitation services. I then review the broader descriptive literature on interventions and vocational outcomes that do not use experimental or quasi-experimental methods. Finally, I discuss evaluation of service interventions targeted to public disability income beneficiaries

### ***Studies of Vocational Intervention Effects using Experimental or Quasi-experimental Methods.***

The IPS supported employment model is described in Bond (2004) and Bond et al. (2005). Both of these publications discuss what the components of evidence-based practices should be and review the evidence on why IPS qualifies. Briefly, they argue that evidenced-based practices need to be (1) operationally defined in detail and have a validated fidelity scale to make sure the practice has been implemented as intended, (2)

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<sup>14</sup> There is a large economics literature on these issues relative to estimating impacts of public programs on vocational outcomes for non-disabled populations.

evaluated by multiple rigorous research studies with consistent results of effectiveness; (3) research should be conducted by multiple investigators or groups; (4) and studies should show generalizability across settings and populations. Expert panels are often convened to determine what is an evidenced-based practice. Bond et al. (2005) cites 12 randomized control trials on IPS by different authors in different parts of the country showing its effectiveness on improving competitive employment for persons with psychiatric disabilities. The authors argue that no other vocational intervention meets the level of evidenced-based practice.

Within the psychiatric rehabilitation field there have been other experimental studies. Bond et al. (2005) report there have been over 24 randomized controlled trials on other (non-IPS) models. One study is the Employment Intervention Demonstration Program (EIDP) designed to test effective approaches for enhancing employment among adults with severe mental illness. The sites tested different models of supported employment including IPS. Eight sites across the country randomly assigned over 1600 participants to treatment and control groups and were followed for at least two years (Cook et al. 2005). Studies from this program found that those in supported employment with integrated clinical and vocational services were more likely to find competitive employment and work full-time. Higher amounts of services were associated with better vocational outcomes (Cook et al. 2005). Studies also examined the relationship of specific elements of supported employment and vocational outcomes using these experimental data (Leff et al. 2005). However, as is true for most randomized experiments, to examine components of the treatment, non-experimental methods need to be used. This article examines the potential effects of selection bias on the results, it cannot rule out this possibility.

Several other smaller experimental (or quasi-experimental) studies focused on persons with severe mental illness were reviewed. Kopelowicz et al. (2005) use random assignment to different types of training for a sample of participants with schizophrenia to test relative effectiveness. Although this is a relatively small sample (N=120) and the outcome is not a “real-world” vocational outcome, it shows the creative use of an experimental method. McGrew et al. (2005) use an experimental design to test the impact of different funding mechanisms (results-based funding versus fee-for-service funding) across vocational rehabilitation programs for persons with severe mental illness in Indiana.

This review found a small number of studies outside of the psychiatric rehabilitation area that tested the effectiveness of vocational interventions using experimental or quasi-experimental methods. Bond et al. (2005) echo this observation that there is little rigorous intervention research for other groups. An exception is the work by Dean et al. (2002) and Kregel and Dean (2002) that uses rigorous quasi-experimental methods to estimate impacts of VR in Virginia for different disability groups. The authors state that these studies are meant to serve as templates for other states to carry out rigorous impact studies for VR. While not without limitations, these studies demonstrate methods using RSA administrative data linked to state employment data that carefully consider appropriate comparison groups, tests for selection bias, and

fixed effect statistical methods to limit unobserved individual differences. They also conduct empirical tests that point out the necessity of separately considering VR impacts for different disability types, severity, and gender. Dean et al. (2002) carefully discuss the limitations of RSA-911 data and how to best use these data. One limitation of the estimates in Dean et al. (2002) is they do not separately consider the different types of VR services that different disability groups receive. Kregel and Dean (2002), using similar methods, compare results for supported employment versus sheltered employment, findings significant positive impacts of supported employment on earnings for those with cognitive disabilities in Virginia across severity and gender.

Additional quasi-experimental studies of vocational services reviewed include the Consumer Choice Demonstrations funded by RSA. Hartnett, Collins, and Trembley (2002) report results from one site (Vermont) of this broader initiative. Using random assignment of VR participants, they find enhanced services around consumer choice improved vocational outcomes. O'Neill et al. (2004) provide an example of a study of a vocational intervention using a quasi-experimental design. New York's Program Without Walls provides individualized community-based services for VR participants with TBI. Lacking random assignment, the authors use a matched control group design. However, the method of individual matching is relatively weak and the study population is small. Another randomized control trial funded by the National Institute of Mental Health examines the impact of a vocational intervention for people with HIV/AIDS (Martin et al. 2005). This study is just getting under way.

### ***Other Studies Linking Vocational Service Interventions and Outcomes.***

There is a large set of additional literature that estimate the connection between vocational interventions and employment outcomes. Nine of these studies were included in this review (see second panel of table 2). Studies focus on different disability groups including people with orthopedic disabilities, epilepsy, autism, serious mental illness, TBI, and mental retardation.

Seven of these studies correlate VR services to employment outcomes (Chan et al. 2006; Mount et al. 2005; Schaller and Yang 2005; Johnstone et al. 2003; Gamble and Moore 2003; Malec and Degiorgio 2002; and Moore, Feist-Price, and Alston 2002). Outcomes are successful VR case closure (employment), weekly earnings at VR case closure, competitive employment at VR case closure, and community-based employment at one-year follow-up. Except for Malec and Degiorgio, all of these studies use VR administrative data (RSA-911 records). These data suffer from limitations that are described in Dean et al. (2002), including varying time spent in VR services. Most studies choose the sample as those closed in a specific year (or over a period of time), but do not take into account the fact that those individuals may have spent very different periods of time in VR. The main limitation of these studies is most of them report which services were significant predictors of positive vocational outcomes, but they lack controls for selection into type of VR service. Few even discuss selection as a potential issue in interpreting results. For example, Chan et al. (2006), Johnstone et al. (2003) and Moore, Feist-Price, and Alston (2002) all find certain services are negatively correlated

with employment outcomes. This is potentially due to who is receiving these services versus other VR services. Gamble and Moore (2003) allude to this possibility when they separately estimate the service-outcome relationship for only those with severe TBI and find that the negative correlation disappears. In addition, some of these studies find that job placement and college are significantly correlated to outcomes, which may also be indicative of who receives these services (e.g. more job-ready or with higher education) rather than the impact of these services. While most of these studies do not claim to be measuring causal connections in the description of the study, the discussions of study implications sometimes use language suggesting results show some services are more effective than others.

Two other studies included in this review do not measure specific vocational services interventions, but study the connection between VR counselor characteristics and vocational outcomes. Cartwright and Kim (2006) examine counselor education, attitudes, and cultural competency while Donnell, Strauser, and Lustig (2004) examine clients' perceptions of the "working alliance" or relationship between counselor and client. Results on counselor characteristics connection to case closure outcomes are mixed. However, this study is the only one reviewed to explore medical coverage at closure as an outcome. A positive working alliance is positively related to employment. The study discusses the possibility of bias because other factors are not controlled for.

### ***Return-to-Work Interventions for Public Disability Beneficiaries.***

Several studies evaluate the effectiveness of efforts focused on return to work of public disability beneficiaries funded by SSA (see table 3). Over the past two decades, SSA has increased its efforts to promote returns to employment among benefit recipients and has carried out (or is carrying out) a number of demonstration projects along these lines.<sup>15</sup> Most of these interventions have provided services to improve access to vocational and rehabilitation services, increase information and planning around SSA work incentive programs, and in some cases waive some program provisions that might be disincentives to work. Some include full-scale evaluations using random assignment methodology.

One of SSA's early demonstrations was Project NetWork which provided case management referral services on return to work for DI and SSI beneficiaries. Volunteers for the program were randomly assigned to treatment and controls. The evaluation found the project led to a significant increase in receipt of vocational and rehabilitation services and a small net increase in earnings, coming from increases in amount of work, not wage rates. The study found no significant impacts on receipt of benefits and only 5 percent of eligibles volunteered for the program (Kornfeld and Rupp 2000).

Another project funded by SSA and RSA was the State Partnership Initiative (SPI). SPI included projects in 17 states to increase employment and earnings of beneficiaries. RSA funded 6 programs focused on broad systems change and SSA funded

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<sup>15</sup> The SSI and SSDI programs have a number of programmatic work incentive features whose goal is to improve return-to-work. These are reviewed elsewhere.

12 projects focused on direct services to beneficiaries. Ten of these 12 states conducted separate evaluations and SSA funded a national core evaluation to bring together results across the projects. Although state projects varied, most targeted those with serious mental illness. Different approaches were used in the state evaluations. Three states used random assignment evaluation methods and several others used carefully selected comparison groups. A study synthesizing early state results (Peikes and Sarin 2005) included findings from five state projects that were judged to have quality evaluations (reliable comparison group, large enough size, reasonably complete data). Two states used random assignment methods while the other studies used matched comparison designs. Most projects increased the proportion of participants who attempt work and three states found statistically significant positive effects on annual earnings, although NY found a significant decrease in earnings from benefit counseling. Small impacts on benefit receipt were found. For three states which employed random assignment methods and considering a longer follow-up period, Peikes et al. (2005) report that employment increased in NY and OK, but fell by 30 percentage points in NH. There was a statistically significant decline in earnings in NY and NH, with an insignificant increase in OK.<sup>16</sup> As part of the national core evaluation of SPI, attempts were made by a single evaluator to create comparison groups for all state projects using federal data. However, this method was abandoned when results using the matched comparison groups were found to differ substantially from results found in states that had used random assignment methods (Peikes et al. 2005).

The Ticket to Work and Self Sufficiency program (TTW) is SSA's largest effort to increase access to and quality of rehabilitation and employment services for disability beneficiaries. The program introduced a new financing system for providers (including milestone payment and performance incentives) and gives beneficiaries who voluntarily choice in which provider to use. Since the program is available to virtually all adult SSI and DI recipients, the evaluation is designed to use comparison group analysis. As the program was rolled out in phases across the country, possible comparison groups to estimate impacts include individuals in states in which TTW had not yet been implemented or individuals in parts of states where TTW had not been fully implemented. Factors affecting participation in the program are also of interest, and non-participants will be used in this analysis. A recent report describes the progress of TTW implementation and the evaluation (Thornton et al. 2006). The major findings so far, are that participation in the program is very low, only 1 percent of eligibles have decided to participate (use their "ticket" to gain employment services). Most participants are receiving services from state VR agencies, rather than non-traditional providers the program hope to encourage. The reports lay out the difficulties in recruiting and retaining other providers due to program payment rules and complexity. Preliminary analysis of survey data show that observed trends in participant outcomes are consistent with TTW's having a small effect on behavior (working and leaving benefit rolls). The authors point out that these results cannot be interpreted as causal until more rigorous analyses from the full evaluation are conducted.

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<sup>16</sup> See state reports on results in Cloutier et al. (2006); O'Brien, Ford, and Malloy (2005); and Tremblay et al. (2004).

Finally, a pilot project in the United Kingdom, the Job Retention and Rehabilitation Pilot, tested three interventions to increase return to work on a group who were on public benefits due to “sickness absence” and were screened in as unlikely to return to work without assistance. Using random assignment evaluation, participants were put into one of four groups: an intervention promoting health services, an intervention promoting workplace services, a group receiving both, and a control group. The resulting evaluation found no impact of any of the three interventions relative to the control group on return to work lasting 13 weeks or more (Purdon et al. 2006).

### *Limitations and Issues*

There are many obstacles to estimating impacts of vocational interventions. While random assignment experimental methods are the “gold standard”, there are practical reasons why this may not be possible. Sometimes it is found that legal and ethical concerns make implementing random assignment infeasible. While this review suggests that legal and feasible ways to test supported employment models using random assignment have been found, quasi-experimental methods are important. Several studies implemented these rigorous methods while many did not. Efforts to make the use of these methods better understood and more widespread are important. However, critiques remain of quasi-experimental studies.

None of the return-to-work efforts for public beneficiaries have had more than moderate impacts on employment or earnings and there has been very little impact on leaving the benefit programs. There has been critique of SSA’s demonstrations (GAO 2004), in particular, that SSA lacks a formal process for overall planning of demonstrations, has been too narrow in its interventions, and could do better in publicizing results to impact policy. In general, results also have to be seen in light of the fact that the goal of these efforts has been to return to work those who have gone through a formal process (sometimes lengthy) of proving they are unable to work at a substantial level. The target audience for these demonstrations therefore has fairly high levels of severity and potentially related barriers to work. Of course, in some of the other studies of interventions described earlier a high percentage of recipients are public disability beneficiaries as well.<sup>17</sup>

Finally, movement toward evidenced-based practices means more than multiple rigorous evaluations. It requires replicable, detailed intervention models be implemented in a variety of places. Identifying these models and validating fidelity needs to occur even before rigorous evaluation can take place.

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<sup>17</sup> For example, in EID, almost three-quarters of participants received SSI or DI benefits or both (Cook 2005).

## **H. Other Factors in Employment of Persons with Disabilities**

### ***Job Search and Workforce Development Activities***

One important question recognized in the literature is what the needs of job seekers with disabilities are. Loprest and Maag (2003) find that in a national sample of persons with functional limitations and impairments, commonly reported barriers to looking for work include lack of transportation, appropriate information about jobs, inadequate training, and loss of public health insurance or income benefits.

A primary public resource for linking workers with the job market and providing employment and training services is One-Stop Centers created under the Workforce Investment Act. These centers bring a variety of public partners together in one place and provide job seekers information, counseling, and job search assistance as well as connection to education and job training. The centers also serve employers seeking workers. One principle of the centers is universal access and VR is a mandatory partner in these centers.

Several studies have studied the access of people with disabilities to the One-Stop System. A nationwide survey of one-stop centers found that many One-Stops are working toward accessibility for people with disabilities, but need to improve their outreach to people with disabilities and to employers to hire people with disabilities. They also found that they need additional training on serving people with disabilities and need to increase options (versus quick referrals to disability partners) for those clients with disabilities (John J. Heldrich Center for Workforce Development 2002). Holcomb and Barnow (2004) also point out barriers to serving people with disabilities in One-Stops including too quick referrals to VR, and disinclination to use training resources for persons with disabilities. Using system administrative data, they show that clients with disabilities exiting the One-Stop system have lower employment and earnings than others but larger changes in earnings pre-post. Other state-specific studies for Kansas (Hall and Parker 2005) and a county in New Jersey (Gervey, Gao, and Rizzo 2004) also find need for improved services for persons with disabilities.

The federal government has funded several initiatives to improve the One-Stop service delivery system for people with disabilities. These include a joint effort by the Department of Labor (DoL) and SSA to create disability program navigators (DPNs) at One-Stop Centers. These are individuals located at the center who serve as an expert on workforce development issues for persons with disabilities and facilitate access to services and supports. Colorado was one of the early grantees evaluating their DPN program experience (Emery et al. 2005). While Colorado's experience suggests some progress using the DPN, the study points out issues around identifying persons with disabilities and limitations in the administrative data that make evaluation of outcomes of these services difficult.

In general, additional study on the specific effectiveness of intermediaries in helping persons with disabilities find employment could be important. This relates to one

of the roles of One-Stops and relates to the preliminary findings in some of the VR research that job placement is an important service among the services VR provides.

### ***Health Insurance and Employment.***

While important for all adults' health, health insurance is a critical benefit for many people with disabilities who have high health-related expenditures. Since the US has an employer-based system of health insurance for working-age adults, the connection between employment and health insurance is strong and can be a potential incentive to work for persons with disabilities. However, recipients of public disability income benefits qualify for public health insurance. Losing these public health benefits can be a disincentive to moving into the labor market, since employer-based health insurance benefits are not guaranteed and there is high labor market turnover. Hill, Livermore, and Houtenville (2003) find evidence of rising prevalence of high-cost chronic conditions and decline in employment for people with these conditions. Economic studies have tried to estimate the impact of health insurance on employment and program participation. These are reviewed in Gruber and Madrian (2002) and generally find some connections, although there are many methodological problems.

In general, my review found little information on access to private employer-based health insurance and other benefits for employees with disabilities and interventions to improve access. One public option for health insurance for workers with disabilities is buying into Medicaid coverage (for those with incomes too high to be eligible). Goodman and Livermore (2004) review existing state efforts and find considerable variation across states in eligibility rules, premiums charged, and enrollment. There is some evaluation evidence that buy-in enrollees increase their earnings, but the authors conclude more rigorous evaluation is necessary. In general, additional research on ways to improve health insurance coverage for employed persons with disabilities while limiting employer costs is needed.

### **III. Conclusions and On-going Research Efforts**

This report provides a review of completed recent research related to improving employment of persons with disabilities. In addition to completed research, there is much on-going study. Continuing efforts to measure the impact of vocational interventions for people with disabilities and understand factors related to employment are being funded by SSA, DoL, and NIDRR. SSA is just beginning demonstrations (and associated evaluations) on efforts to improve employment of beneficiaries through changing the reduction in benefits for earnings (Benefit Offset Demonstration) and through focused services on persons with mental health disabilities (Mental Health Treatment Outcomes). DoL continues to fund research projects investigating how telework could open up employment opportunities for people with disabilities and evaluating workforce development services for individuals with disabilities. They also are funding ongoing research on health insurance options that can promote employment of people with disabilities.

NIDRR employment Research and Rehabilitation Training Centers (RRTCs) have on-going research in a variety of areas. Virginia Commonwealth University (VCU) is continuing work on public/private partnerships, disability management strategies, and factors related to employment retention with a special focus on supported employment. Cornell continues to estimate the impact of policy (including the ADA) on employment and understanding the role human capital plays in determining economic self-sufficiency of adults with disabilities. Wright State is examining VR services and individuals with disability who have coexisting substance abuse issues, including the role of substance abuse in unsuccessful VR closures. They are also conducting a randomized control trial of the IPS model of supported employment for individuals with substance abuse and other disabilities such as TBI. Hunter College is analyzing the effectiveness of integrated disability service provider networks and their role in job enhancement and retention.

In recent years there has been a growing interest in “demand-side” research—research that focuses on changes in labor markets and the role of employers. In September 2006, ICDR held a meeting “Employer Perspectives on Workers with Disabilities” to help develop the research agenda on these topics. While this review of research shows there is a body of literature on demand-side topics, this literature is more limited than supply-side literature. A brief review of trends in on-going federally-funded disability employment research and programs conducted by CESSI found that there appears to be more activity on the supply-side than the demand-side.<sup>18</sup>

While it is difficult to summarize here all of the limitations and gaps described in this review, areas where additional research is needed are highlighted here:

- Key factors related to improved earnings, job retention and stability in particular the role of supports such as transportation, housing, and family and job quality such as employer benefits and practices.
- The cost and effectiveness of employer accommodations in returning to work and the impact on the timing of return to work. Also, who receives accommodations for what type of jobs and what are the relative cost/benefits and effectiveness of different types of accommodations.
- Individual and employer characteristics that differentially impact the timing of return to work after onset or movement onto disability benefits. Also, the effectiveness of interventions, such as disability management, on return to work.
- What interventions are effective in improving vocational outcomes; in particular what types of services have what impact, such as what is the role of job finding and placement services versus training and rehabilitation services.

Taking into account the breadth of recent research and the limitations and issues discussed in this report, some general observations can be made.

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<sup>18</sup> This review, “Trends in Federally Funded Disability Employment Research and Programs”, August 2006, was prepared by CESSI for ICDR.

- Some research literature focuses on specific disability groups and some research literature focuses on broad measures of disability. These two literatures are not well connected. One issue is placing the specific groups (e.g. TBI, SCI, etc.) in relation to the broader group of individuals with disabilities as context for understanding the disability-specific research. Another issue is understanding the relevance of national data findings for specific disability groups.
- Heterogeneity of disability (in type, severity, functional limitations, support needs, etc.) is an important issue that is much discussed but is not always part of actual research projects. Research on measurement of outcomes, cost/benefit and effectiveness of accommodations, progression of benefits, and effectiveness of individual vocational intervention could benefit from more analysis on difference across dimensions of heterogeneity. This might take the form of separate study by disability groupings or it might focus on study of differences across severity, functioning, or support needs.
- For some demand-side analysis, information about and from employers is critical. But employer data can be more difficult to access than data on individuals with disability. To increase demand-side research, we may need to improve access to employer data through partnerships with employers and employer groups to access existing data, targeted collection of new data, or new ways to use existing individual data sources. In addition, research on employers needs to recognize the variety of different types of firms. For example, we need research on large and small firms, since most workers in the labor market work for small firms.
- For many studies reviewed here, it is not clear how representative the results are of broader populations, for example, the group of all individuals with the same disability or populations in other geographic areas. Greater discussion of the issue and some analysis of the sample studied vis-à-vis a broader group would be helpful in interpreting results. Carefully interpreting findings of many similar studies together could aid in this effort.
- Although there are examples of appropriately applied quasi-experimental methods in the literature reviewed, many non-experimental studies are not structured to understand the effectiveness of interventions. Trying to improve the methodological rigor of studies will add to our understanding of the effectiveness of interventions. Efforts already exist around improving evaluation of VR services.

Improving the vocational outcomes of people with disabilities is an important goal. Developing new and improved research to expand our understanding in the areas outlined in this report can help us achieve this end.

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**TABLE 1: Studies of Supply-Side Factors on Vocational Outcomes**

Study	Main Purpose	Sample	Outcome	Controls	Results	Quality/ Limitations
<b>Specific Disability Groups</b>						
Krause and Terza (2006)	To identify differences in earnings after SCI attributable to demographics, injury severity, and education	Adults with traumatic SCI of at least 2 years in 1998, age 18-65 from midwestern and southern US rehabilitation hospitals. N=615	Annual income from own earnings	Sex, nonwhite, years since onset, severity, education,	Find that 43 percent of sample working. Relation of all variables to employment in expected direction. Conditional earnings estimates (for workers) find only male, nonblack, college education positively related. Unconditional estimates (for all) find higher earnings for male, nonblack, <age 34, ambulatory, and greater than high school education.	81% response rate; test of nonrespondents vs. respondents shows some differences. Careful modeling. No consideration of public benefits. No discussion that annual earnings combines amount of work and wages. No controls for prior experience, vocational services.
Phillips and Stuijbergen (2006)	Examine predictors of continued employment among persons with multiple sclerosis (MS)	Persons w/ MS in an ongoing longitudinal study (in southwest) who had paid employment and were <55 in year 1, and had data at year 7. N=176	Employment status in year 7 (full or part-time)	Age, gender, education, years of MS, functional limitation scale, health-promoting behavior scale, secondary conditions, economic adequacy scale, job satisfaction and importance	More years of education, lower functional limitations, and greater health-promoting behaviors increased the likelihood of employment. All else not significant, potentially pointing to differences in factors related to employment versus job retention.	Initial study sample is for one geographic region selected with assistance of MS society (non-probability sample). Many factors not available. Limited use of interim years of data.
Walker et al. (2006)	To evaluate determinants of return to work after TBI focusing on preinjury occupational category	Patients age 18-62 hospitalized w/TBI in 17 NIDRR TBIMS, received acute and rehab services, employed before injury, with 1 year follow-up. N=1341.	Competitive employment one year post-injury (excludes students, retired, specially employed)	Preinjury occupation group (professional/managerial, skilled, manual labor). education, marital status, sex, age, duration of unconsciousness, length of inpatient stay, discharge score on scale of independence (FIM)	Competitive employment 1 year after injury associated with professional/managerial job preinjury, skilled job preinjury, high school graduate, younger, shorter inpatient stay, higher FIM score at discharge, female, married	Potential non-representativeness of sample for persons with TBI. Paper discusses limitation of only having patients admitted for inpatient rehab who gave consent. Shows limited bias due to non-response on employment.

Study	Main Purpose	Sample	Outcome	Controls	Results	Quality/ Limitations
Crisp (2005)	Literature review of empirical studies on the key factors related to vocational outcome for six disability groups, SCI, TBI, Chronic Pain, MI/CABG, SMI, and amputations	Included studies: focus on one of 6 groups, well-designed, used multivariate analysis with generalizability and reliability (10+ sample) or univariate analysis (50+ sample); reviews 75 articles (1987 to 2003) from “prominent rehabilitation and disability journals”	Return to work or employment status after disability; some discussion of long-term employment outcomes compared with shorter-term	Vary—focus on severity and type of disability (perceptions and clinical measures); age, education, race/ethnicity, litigation/financial compensation, psychosocial factors (coping strategies, social activities, interpersonal relationships, social support, perceptions of control); psychological factors (depression)	Severity, negative self-perceptions of disability, negative psychological factors, minority race/ethnicity had worse employment outcomes; younger age, with more education had better employment outcomes; psychosocial factors important in some studies such as perception of control and social supports; in litigation and with personal injury insurance coverage had worse employment outcomes (particularly for chronic pain)	Few studies include measures of access to vocational services or directly measure impact of vocational programs (especially in longer-term outcomes). Review limited to specific disability groups. Cannot assess (and study does not address) the extent to which these studies are representative for these groups.
Meade et al. (2004)	To examine racial disparities between whites and African Americans in employment for persons with SCI	Whites or African Americans part of the MSCIS project injured between 1972 - 2002 and 18-65 at injury w/ complete employment information N=5925	In paid employment	Year since injury, education, category of neurologic impairment at discharge, gender, race.	Find that more years since injury, higher education, lower category of severity, lower age at injury, male, and white were significantly associated with higher employment. Also finds growing racial disparity in employment post-injury and sig. difference in occupational distribution by race pre-injury but not 1-year post-injury.	

Study	Main Purpose	Sample	Outcome	Controls	Results	Quality/ Limitations
Cook (2003)	To examine the one-year employment retention rate and nature of jobs held by clients with severe psychiatric disabilities	All IL Dept. of Rehab Services clients with severe psychiatric disabilities who had successfully closed cases from '91-'93 and who were engaged in community employment at closure. N=315 (71% response)	Employment at one year post-closure follow-up	Demographic characteristics (age, ethnicity, education), receipt of public benefits, family support, receipt of services in follow-up year, client rating of if job "useful to them personally"	Of those working at closure, 71% working one year later, average wage sig. higher, hours worked the same. Controlling for demographics, those not receiving public funding 4 times as likely to be employed; having family support, not receiving outpatient mental health services, and rating job as useful all associated with higher probability of employment.	Compared to results of RSA's national longitudinal VR data studies for context. While tests of controls for diagnosis and severity were insignificant, author points out that other factors may be proxying for functionality. Points out limited generalizability because one state.
Salkever et al. (2003)	Examine socio-demographic, clinical, functional, and treatment status on job retention for persons with schizophrenia.	Data from SCAP (longitudinal study of adults with schizophrenia from systems of behavioral health care in 6 regions. Participants in paid non-assisted jobs in four weeks prior to baseline interview. N=159.	Employment status 6 month after baseline: 1) any employment 2) non-assisted employment	Gender, age, race, education, clinical/functional status scale, region, psychiatric hospitalization in year prior to baseline and in 6-month follow-up period, drug treatment following baseline, living independently, depression scale.	About 70% employed at follow-up, 56% in non-assisted jobs. Findings focus on treatment. Age and education are positively associated with any and paid employment. Atypical antipsychotic drug treatment and psychiatric hospitalization in follow-up less likely any or paid employed. Race and living independently not significantly related.	Potential bias in sample of large exclusions for missing data including employment at baseline. Author points out choice of drug therapies may be influenced by unobserved factors related to employment retention. Limitations of generalizability discussed, doesn't cover all treatment settings.
Kendall (2003)	To test the role of psychosocial factors on vocational adjustment after TBI.	Inpatient rehabilitation TBI patients in one metropolitan hospital. N=90 (91% response)	Vocational Adjustment Scale of PAIS—measures attitudes toward work, and emotional distress	Severity of injury, location of lesion, measure of cognitive functioning, functional disability at discharge, psychosocial factors (self-esteem and perceived social support) and perceived stress and self-efficacy	Find that neurocognitive and physical factors are significantly related to outcomes at 6 months. Better psychosocial factors also related to improved outcomes at 6 months (controlling for outcomes at discharge) through impact on subjective appraisal (perceived stress and self-efficacy)	Mentions variation in rehabilitation services received and financial compensation across the sample but not part of analysis. Outcome is attitudes toward work not work. Offers a model of vocational adjustment and multiple factors. Limited sample.

Study	Main Purpose	Sample	Outcome	Controls	Results	Quality/ Limitations
Krause (2003)	To identify factors related to length of time between SCI injury onset and return to work	Persons 18+ with SCI from two hospitals in a midwestern metro area at least 2 years post-injury and employed since onset. N=259.	Years from injury onset to first post-injury job and to first post-injury full-time job	Gender, race, age at injury, education at time of injury, years of education post-injury, severity of injury, preinjury occupation, return to preinjury job	Factors that significantly shortened time to first post-injury job: return to same job, lower severity of injury, worked in professional occupation at time of injury. Factors significantly shortened time to first full-time job: three above, total years of education post-injury; male	Survey response rate high (83%). Sample only includes those who returned to work, could be a biased sample (some others may return later), paper indicates potential bias for full-time job. Geographically limited.
Gold et al. (2002)	Examine the extent to which cognitive performance correlates to competitive employment and longer-term outcomes of vocational rehabilitation	Random sample of participants in Baltimore sample of EID program who agreed to a neuropsychological assessment (in one of four programs serving persons with serious and persistent mental illness and unemployed for at least 3 months prior to start of demonstration.) N=150	Total hours worked over 24-month follow-up (job tenure)	multiple specific cognitive performance measures	Very brief discussion of connection between multiple demographic and other factors on employment. Focus discussion on finding of significant connection between multiple specific cognitive performance measures and “job tenure” for those who found jobs. No connection between cognitive measures and finding employment. Suggests that lack of cognitive competencies makes sustaining employment difficult.	Article discusses limitation of sample in being representative. Acknowledges no comparison to assess job tenure results for this group in general (vis-à-vis the interventions).
Keyser-Marcus et al. (2002)	To investigate the relation between injury, patient characteristics and return to work	Patients 18–55 admitted to acute care within 8 hours or TBI with 1 and 5 year follow-up in TBIMS. N=451 at yr 1; 120 at yr 5 (retired excluded)	Employment and productivity, including competitive, supported, sheltered workshop, in school	Age, education, preinjury employment and productivity, functioning scale at discharge (DRS); scale of independence at discharge (FIM); severity at admission, length of stay.	Separate findings reported for outcome in each year post-injury. In almost all years, preinjury productivity and being younger is positively associated with outcome. Other factors vary in significance, with higher education and shorter LOS positively related to outcome in year 1 only.	Study finds little bias due to sample reduction from missing data over follow-up. Generalizability of data sample not clear. Inclusion of schooling in outcome not tested separately.

Study	Main Purpose	Sample	Outcome	Controls	Results	Quality/ Limitations
Goldberg et al. (2001)	To identify demographic, clinical, and vocational correlates of long-term unemployment among a sample of adults with severe mental illness.	Random sample of participants in Baltimore sample of EID program (in one of four programs serving persons with serious and persistent mental illness and unemployed for at least 3 months prior to start of demonstration.) N=219	Not worked in past 5 years versus worked some in past 5 years but not in prior 3 months.	specific diagnosis, age, gender, education, race, clinical measures (symptoms, hospitalization), neurocognitive measures, past substance use, some job skills or job-finding training in past 5 years	Clinical measures of severity and neurocognitive deficits increase the probability of 5-year continuous unemployment. Older was associated with long-term unemployment. Finds no impact of gender, race, education, substance use or job training.	Study uses mix of current and past measures to predict past employment history. Could be timing issues for direction of causation. Not clear if representative of persons with severe mental illness.
<b>General disability populations</b>						
Martz (2003)	Connection of “invisible disability” to employment	Random sample of students in one community college in CA enrolled in a disability services program. N=86	Paid work	Education, prior paid work experience, marital status, age, age of onset, visibility of disability, psychosocial reactions to disability	Those with invisible disabilities 16 times more likely to be employed. Work history correlated with employment. Other variables not significant (potentially because limited variation within this sample).	Not representative of students with disabilities b/c do not know selection into program—argued to be broad. Survey response rate of about 50 percent.
Ozawa and Yeo (2006)	Examine impact of demographic and education factors on employment and earnings by degree of disability.	Nationally representative sample ages 18 to 61. SIPP data.	Monthly earnings, Hourly wages, Hours worked per week	Education, gender, marital status, race, ethnicity, children, occupation. Disability severity (none, mild, severe) defined based on activity limitations. SS disability recipients in severe.	After controls, disability (both mild and severe) has a statistically significant negative correlation with earnings, wages, and hours worked. Within disability type, female, older, nonwhite, less than high school, more children negatively associated with employment.	No direct controls for public benefit receipt.

Study	Main Purpose	Sample	Outcome	Controls	Results	Quality/ Limitations
Randolph and Andresen (2004)	Examine impact of gender and disability on unemployment.	Representative data from 11 states and DC. Ages 18 to 64. BRFSS data.	Unemployed = not working for wages or self-employed	Gender, race, marital status, education, children under 18. Disability defined 3 ways (1) limited in any activity (2) limited in work activity (3) specific functional limitations	Among those with disabilities (by all measures) women, nonwhite, less than high school, unmarried, or with children are more likely to be unemployed.	No statistical comparisons across different disability definitions. All comparisons within disability categories.

Note: All studies in this table fall into the predictive category of research using multivariate estimation techniques.

EID = Employment Intervention Demonstration

SIPP = Survey of Income and Program Participation

BRFSS = Behavioral Risk Factor Surveillance System

TBIMS = Traumatic Brain Injury Model Systems

ICRC = Injury Control Research Center

MCSIS = Model Spinal Cord Injury Systems Project

PAIS = Psychosocial Adjustment to Illness Scale

SCAP = Schizophrenia Care and Assessment Program

**TABLE 2: Studies of Vocational Services Interventions on Vocational Outcomes**

Study	Main Purpose	Sample	Intervention / Outcome	Method	Results	Quality/ Limitations
<b>Vocational Services Interventions—Predictive Methods</b>						
Kopelowicz et al. (2006)	Test the impact of cognitive demands of work tasks on vocational success	With diagnosis of schizophrenia, clinically stable, 18 to 64, and receiving outpatient treatment at community mental health centers in north LA County (some other restrictions). N=120	Participation in work training (WT) on specific tasks or occupational training (OT) focusing on creative activities/ Change in performance on three work tasks designed to represent entry-level job skills	Participants randomly assigned to WT or OT, tested before training, and at weeks 4, 12, and 24.	No significant differences between groups at baseline in task performance. Significantly greater improvements in WT group than OT groups for all tasks, sustained for 2 of three tasks. Age negatively correlated with performance.	Unclear whether work task performance translates to real world jobs and whether group is representative of broader diagnostic group.
Cook et al. (2005)	Test effective approaches for enhancing employment among adults with severe mental illness	EID participants who were not working at baseline and had vocational outcome data. From seven sites across the country. N=1273.	Employment Intervention Demonstration Program with varying models of supported employment/ Competitive employment; works for 40 or more hours in a month.	Random controlled trial.	Supported employment models with highly integrated vocational and psychiatric services had better vocational outcomes. More hours of vocational services led to better outcomes	Subjects not a representative sample of adults with severe mental illness, limiting generalizability.
Leff et al. (2005)	Determine impact of specific supported employment services (job development and job support) on employment outcomes for people with psychiatric disabilities.	EID participants who were not working at baseline and had follow-up vocational outcome data. From seven sites across the country. N=1340	Employment Intervention Demonstration Program with varying models of supported employment/ Competitive employment; duration in months and total hours of first competitive job; whether job retained for a month	Data from random controlled trial. Analysis uses random-effects meta-analyses models.	Find that job development is positively associated with competitive employment controlling for other factors. Job support is positively associated with duration and number of hours of first competitive job. However, timing of this intervention did not rule out the possibility of reverse causality.	Non-experimental design to examine components of supported employment. Study examines possible effects of selection bias, but it is not ruled out. Not representative of all adults with severe mental illness and only studies first competitive job.

Study	Main Purpose	Sample	Intervention / Outcome	Method	Results	Quality/ Limitations
Martin et al. (2005)	Clinical trial funded by NIMH of return to work program for people with HIV/AIDS.	Not specified	Harbor-UCLA program “Work Positive Assistance Project” addresses motivation/ job finding skill needs/ etc. using structured plan of group work & individual vocational counseling including disability benefits counseling/ Full or part-time work, education program leading to employment;	Randomized control trial	No results yet—in progress	
McGrew et al. (2005)	Tests impacts of results-based funding (RBF) on supported employment outcomes	Meets Indiana Division of Mental Health and Addictions criteria for severe mental illness and VRS criteria for supported employment. N=122 total (81 RBF, 41 FFS)	RBF- payments for hitting 5 employment milestones/ Payments at employment milestones- consumer plan, 5 <sup>th</sup> day of work, 1 month of work, VR eligible case closure, 9 months continuous employment d FFS).	9 supported employment provider sites—1 site randomized control trial, 4 sites matched between-sites design. Control sites used traditional fee for service funding, test sites new clients used RBF	Compared to FFS, the clients under RBF had better vocational outcomes—more likely to achieve all milestones. (21 percent of RBF clients had 9 months continuous employment). Advantages of RBF did not extend to vocational outcomes outside of milestones— e.g., wages, hours, job satisfaction, and benefits. No impacts on clinical outcomes.	Tested for sample equivalence on demographics, and clinical measures. Tested for similarity of SE implementation across sites (fidelity ratings). Conducted survival analysis to take into account different follow-ups periods. Small sample sizes, especially in 1 randomized control site. Provide evidence on representativeness of tested SE programs.

Study	Main Purpose	Sample	Intervention / Outcome	Method	Results	Quality/ Limitations
O'Neill et al. (2004)	Test impacts of person-centered, community-based approach to VR services for persons with TBI	Participants in 2 VR districts in NY with TBI who volunteered for PWW . N=42	“Program Without Walls” (PWW) participants received individualized community-based services from a team of consultants and were not referred out to services/ Case status at closure, weekly earnings and hours at closure, and cost of case services	Matched control group design using state VR data on individuals in traditional VR— individual match on gender, age, ethnicity, education	PWW clients worked more hours per week and earned more per week without increasing cost of services.	Individual match is a weaker design relative to using a broad control group of traditional VR recipients controlling for demographic factors. Used a mean difference comparison without any controls. Small sample. Since consumers chose PWW, results may not be generalizable to other clients with TBI.
Dean et al. (2002)	Estimate impact of VR services across different disability groups	Virginia VR participants in 1988 from RSA-911 data	VR services in Virginia	Fixed effect model with “internal” control group of those who were accepted for VR but never began program	Find large differences in VR impact on earnings across types of disability and gender and over time post-treatment	Tests for validity of control group; uses statistical methods to correct for selection; separate results for gender and type of disability. Disability factors may be changing over time; small samples for some disability types
Hartnett, Collins, Trembley (2002)	Test effectiveness of strategies to increase choice for recipients in state VR on outcomes	Vermont VR participants 20 or older. Treatment N=270; control N=4,281	Vermont site of Consumer Choice Demonstration— enhanced services/ Successful rehabilitation (competitively employed); earned income, employment retention, cost of rehabilitation	Randomly assigned state VR participants to experimental group or traditional service control group	Those in the treatment had a higher rate of successful rehabilitation and higher first-quarter earnings. Cost of services (both in number receiving services and cost per person) were higher for treatment group.	High percentages of both groups dropped out of the program (45% control and 30% of choice). Vermont results may not be generalizable to other areas. Strong experimental design.

Study	Main Purpose	Sample	Intervention / Outcome	Method	Results	Quality/ Limitations
Kregel and Dean (2002)	Estimate impact of supported versus sheltered employment on VR participants with cognitive disabilities	VR service recipients in VA with diagnostic label of cognitive disability and closed into sheltered or competitive emp. in 1988 N=877	VR services in sheltered or supported employment/ earnings 5-years post close	Fixed effect model controlling for pre-program earnings, demographics, and changes in economic conditions	Supported employment services had a significant positive effect on earnings relative to sheltered employment for all across severity in 1 <sup>st</sup> year. Results diminish over time for women w/ mild or moderate and men with moderate or severe	Uses statistical methods to correct for selection into type of services, testing pre-VR earnings differences; separates results by severity and gender. Uses five years of outcome data. Only one state so may not be generalizable.
<b>Vocational Services Interventions—non-experimental and non-quasi-experimental methods</b>						
Cartwright and Kim (2006)	To address relationship between VR counselor attributes and employment outcomes	Closed VR cases in small western state for 32 counselors in 2000-2002 and surveys of counselors (82% response rate). N=882.	Education, cultural competency, and attitudes of counselors measured using several scales/ weekly earnings, hours worked, employer medical coverage	Multivariate statistical analysis controlling for demographics and severity of disability.	Found mixed results on the impact of perceived multicultural awareness and skills on outcomes. No significant relationship between counselor attitudes and outcomes.	Used post-analysis focus groups to try to interpret findings. Limited sample size of counselors. No “selection” issue with choice of counselor.
Chan et al. (2006)	Examine service and demographic factors affecting employment outcomes for people with orthopedic disabilities in VR	Using RSA-911 data for people with orthopedic diagnosis closed in 2001. N=74,861	Services studied include: assessment, restoration; college; training (vocat., adjustment, on-the-job, other); counseling; job-finding and placement; transportation; maintenance; personal assistance; rehab. engineering; AT/ closed into competitive employ.	Chi-squared automatic interaction detector analysis—tests for subgroups with highest outcomes (includes demog, financial, and severity measures)	Find job placement services most significant predictor of outcome (positive), second most important predictor was public benefit disability receipt (negative)	No correction for selection into services. RSA-911 data limitations.

Study	Main Purpose	Sample	Intervention / Outcome	Method	Results	Quality/ Limitations
Mount et al. (2005)	Examine factors associated with successful VR outcomes for persons with epilepsy	Using RSA-911 data for people diagnosis of epilepsy in Missouri, N=156	Services studied include: assessment; training; counseling; job-related; transportation; job referral; maintenance; personal assistance; rehab. and AT/ employed at case closure	Multivariate statistical methods correlating services with outcomes controlling for demographic & financial factors	Find that only training and job-related services (including job search, placement, on-the-job support) are significantly correlated with outcome	No correction for selection into services. RSA-911 data limitations. No information to control for severity.
Schaller and Yang (2005)	Determine correlates of successful closure for those with autism receiving supported employ. services	Using RSA-911 data in 2001 for people with autism. N=450 supported employment services, N=365 other services	Types of services considered include all services listed under Chan et al. above/ successful closure	Separate logistic analysis for those with supported services and those with competitive services	Find significant correlation of job-finding, job placement, and maintenance services for competitive employment and job placement for supported employment	Tested and found sig. differences in customers receiving services for competitive employment versus receiving supported employment services.
Donnell, Strauser, and Lustig (2004)	Relationship of “working alliance” to VR outcomes for persons with SMI.	Tennessee VR clients with SMI. N=305	Working alliance with counselor measured by client telephone survey/ whether client employed or unemployed at interview	T-test of differences with tests for controls on race and secondary disability	Find significant relationship between positive working alliance and employment.	Additional controls needed. Discusses potential selection into relationship (choice of counselor possible).
Johnstone et al. (2003)	Predictors of successful outcomes for individuals with TBI who request VR services	Persons with TBI requesting VR services in Missouri. N=78	Services studied include all listed under Chan et al. above./ case successfully closed	Logistic analysis controlling for severity, demographics, financial, and vocational services	Only on-the-job training and counseling were significantly correlated to closure. No other factors or services.	Small sample size and in just one state. No correction for selection into type of service.

Study	Main Purpose	Sample	Intervention / Outcome	Method	Results	Quality/ Limitations
Gamble and Moore (2003)	Relationship between 6 VR services and employment outcomes for people with TBI	RSA-911 data on people with TBI closed between 1992 and 2000 in one state. N=1,073	Services include assessment, college, counseling, job placement, restoration, work adjustment/ Competitive employment at closure and weekly earnings	Multivariate analysis controlling only for six services. Subanalysis for those with severe TBI	College, counseling and job placement had significant positive correlation to outcomes; work adjustment services had negative outcome. For severe subsample, college positively correlated and work adjustment insignificant	RSA-911 data limitations. Lack of additional controls (other than severity). No correction for selection into type of service.
Malec and Degiorgio (2002)	To determine whether successful participants along different rehab pathways have different outcomes for those with brain injury	Persons with brain injury in MN, ages 18 to 65, receiving one of three service treatments. N=114	Two groups: (1) participants receiving specialized vocational services (SVS) with nothing else or limited intervention (LI) or SVS with comprehensive day treatment/ CBE at 1 year follow-up	Logistic regression for first group controlling for severity, months since injury, and education.	Find that months since injury and severity scale predict successful outcomes.	Cannot compare results for two different interventions since participants differ and sample size too small for separate analysis of second intervention.
Moore, Feist-Price, and Alston (2002)	Analyze correlation between VR services and employment outcomes for those with mild/moderate mental retardation	RSA-911 data for one mid-western state. Persons with mild or moderate mental retardation. N=838	Services studied include bus/vocational, on-the-job, and adjustment training; maintenance; transportation; placement/ Closed to competitive employment, weekly earnings	Multivariate analysis of services controlling for demog., secondary psych. disability	Find job placement significantly positively associated with closure, adjustment and transportation negatively correlated. No significant predictors of earnings.	Discuss issues with potential quality of VR services. No control for selection into services. Limited geographic area.

**TABLE 3: Studies of Return to Work Interventions for Public Disability Recipients**

Study	Main Purpose	Sample	Intervention / Outcome	Method	Results	Quality/ Limitations
Kornfeld and Rupp (2000)	Test the effectiveness of Project NetWork	DI and SSI beneficiaries who volunteered to participate.	Treatment provided case management referral services on return to work/ Service use, earnings, benefit receipt	Random assignment to treatment and control (waived work rules but no case management)	Significant increase in service use, small increase in earnings (\$220 per year) for first two years. No significant impacts on receipt of benefits. Only 5 percent of eligibles volunteered.	Only those who volunteered included, not representative of all recipients.
Peikes and Sarin (2005)	Synthesize impact of State Partnership Initiative (SPI) studies	Findings from 5 SPI state studies (NY, NH, VT, WI, CA) with quality evaluations	Specific interventions varied across states—all focused on direct services to SSA beneficiaries, mostly benefit counseling/ employment, earnings, and benefit receipt.	NH and NY used random assignment; others used matched comparisons	Most found positive impact (some sig.) on employment. VT, WI, CA found statistically significant positive impacts on annual earnings, NY found sig decrease in earnings. Small insignificant impacts on benefit receipt.	Not all state evaluations had large enough samples or appropriate comparison groups. Different interventions across states makes it hard to interpret reasons for different results.
Peikes et al. (2005)	Create joint estimates of impact of State Partnership Initiative studies	Findings from 3 SPI states with random assignment, NH, NY, OK	Specific interventions varied across states—all focused on direct services to SSA beneficiaries, mostly benefit counseling/ employment, earnings, and benefit receipt.	All used random assignment	Employment increased in NY and OK, fell by 30 percentage points in NH. Significant decline in earnings in NY, NH, and insig. increase in OK.	Unable to use matched comparison site methodology at national level—failed to replicate random assignment results. Different interventions across states makes it hard to interpret reasons for different results.
Thornton et al. (2006)	Estimate impacts of Ticket to Work program	Adult SSI and DI recipients	Vouchers (“tickets”) provided for rehabilitation services. New service financing mechanisms.	Matched comparison analysis using individuals in states or parts of states before implementation	Only early results available. Use of tickets low, only about 1 percent of eligibles. Preliminary results on matched groups shows small positive effects on work and leaving rolls.	Only small samples using tickets. Problems in new financing mechanisms may limit options of service providers. Matched groups even with controls may leave room for selection bias.

