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## Causes of Caregiver Turnover and the Potential Effectiveness of Wage Subsidies for Solving the Long-Term Care Workforce ‘Crisis’

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# Causes of Caregiver Turnover and the Potential Effectiveness of Wage Subsidies for Solving the Long-Term Care Workforce ‘Crisis’\*

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## Abstract

Detailed data on private providers of long-term community-based residential services for persons with developmental disabilities permit investigation of the causes of frontline worker turnover. The endogeneity of turnover with compensation variables is accounted for in the estimation using instrumental variables. Turnover is determined by resident characteristics, frontline-worker compensation, and establishment characteristics. The share of higher-need residents and agency size predict higher turnover, while compensation and non-profit status are associated with lower turnover. Our findings indicate that public policies to reduce turnover through compensation subsidization can be effective. Our preferred estimates suggest an approximate one-quarter increase in total compensation would cut turnover by one-third.

**KEYWORDS:** turnover, long-term care, Medicaid, wages

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## INTRODUCTION

This paper examines the determinants of frontline worker turnover in the long-term care industry. In particular, we study the causes of high turnover rates of Direct Service Providers (DSPs) at small, community-based residential facilities ('group homes') for individuals with developmental disabilities (DDs). In addition to detailed information about the group home work environment, we possess important information about their operators' organization and compensation practices.

Our paper makes several contributions. First, in contrast to past studies of other sectors, we identify multiple factors strongly predictive of turnover, including employee compensation, resident characteristics, and agency characteristics. In particular, our findings on compensation support the proposition that public subsidies could solve the 'caregiver crisis.' Second, we also introduce a novel instrumental variables (IV) strategy for identifying the exogenous effect of compensation on turnover. Third, using original data collected from agencies operating group homes for individuals with DDs throughout the state of Illinois, we estimate the determinants of turnover, treating compensation as an endogenous variable. We find that this consideration is quite important. Endogeneity-corrected estimates of the effect of compensation on turnover are up to 65 percent greater than their ordinary least squares (OLS) counterparts.

The DD sector is understudied considering its relative importance in the long-term care industry. Public spending for DD services in the U.S. is large in absolute terms (\$34.64 billion in 2002, according to Rizzolo et al., 2004).<sup>1</sup> Although more money is spent on the elderly, spending on individuals with DDs is large relative to total long-term care spending, comprising 20 percent of all long-term care spending and 40 percent of Medicaid spending on long-term care in 2002 (Congressional Research Service, 2006). Further, our findings are likely relevant for the fastest growing segment of long-term care—home- and community-based care—because the DSP job parallels that of other home- and community-based care workers. Both primarily provide custodial care, assisting residents with the 'activities of daily living,' and both secondarily provide developmental services, including helping residents maintain and restore physical and mental skills and assisting residents with social activities. Because home- and community-based care is both cheaper than and preferred by caregiving recipients to traditional nursing home care (Congressional Research Service,

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<sup>1</sup> \$22.60 billion was dedicated to community living arrangements, \$7.66 billion to institutions, and \$4.39 billion to individual and family support services that enable persons with DDs to live on their own or with their families. These public expenditures for long-term care omit public spending on 'traditional' health care for persons with DDs.

2006), it is expected to continue to grow dramatically in the face of the financial pressures created by the increased demand for living assistance due to population aging.

#### TURNOVER IN THE CAREGIVER WORKFORCE

Frontline workers in the caregiving fields are often low-skilled and low-paid, and turnover rates are among the highest of comparable industries in the United States (Stephens and Riley, 2005). Direct-care worker turnover—measured as annual total separations as a percent of annual average employment—is estimated nationally at 50 percent (U.S. Department of Health and Human Services, 2006). Turnover is particularly problematic when the worker is the ‘point of service’ (i.e., there is no intermediation between client and worker). Turnover has been reported to lower the quality of long-term care (see Seavey, 2004, on long-term care in general and Institute for the Future of Aging Services, 2007, on the frail and disabled elderly), including DD services (U.S. Department of Health and Human Services, 2006). In particular, Larson et al. (2004) find that frontline worker turnover in the DD sector severely curtails residents’ opportunities, while Test et al. (2003) report that it decreases resident safety, creates personal problems including sadness, and generally diminishes the quality of life by disrupting resident life and routines.

In addition to its detrimental impact on the quality of long-term care, turnover plays a crucial role in the much-discussed U.S. caregiver shortage ‘crisis’ (Stone with Wiener, 2001, provides an overview). Rather than continually recruiting new workers to fill open positions through increased vocational training, immigration, or other measures, the demand for frontline caregivers in the DD field over the next decade could be met by a less than one-third reduction in the turnover rate corresponding to reduced attrition from the field (U.S. Department of Health and Human Services, 2006).

High turnover also poses an obstacle to government meeting its statutory mandates to persons with disabilities. The American with Disabilities Act of 1990, its interpretation by the U.S. Supreme Court in *Olmstead v. L.C.*, and the Developmental Disabilities Assistance Act of 2000 recognize and reaffirm a national commitment to offer institutionalized individuals a meaningful choice to reside in the community, including the necessary support to do so. Workforce issues have been central to the judiciary’s interpretation of these federal laws, finding that scarce services inhibit the movement from institution to community with “reasonable promptness.”<sup>2</sup> High turnover outside of state-operated

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<sup>2</sup> For example, a federal district court ordered the state of Arizona to provide a wage to frontline workers sufficient to ensure an adequate supply of the care services to which the plaintiffs were entitled (*Ball et al. v. Biedess et al.*, U.S. District Court of Arizona, August 12, 2004).

institutions likely contributes to guardian resistance to de-institutionalization (Davis et al., 2000).

#### PRIOR RESEARCH

Other fields have produced a plethora of studies on frontline worker turnover, but the questions asked are often fundamentally different from those asked here, and few take an economic perspective. Much of this work emphasizes worker socio-demographic factors (age, sex, race, marital status, and education) and working conditions (type of ownership, size, workload, workplace social supports, and internal job ladders; see, e.g., Wai Chi Tai et al., 1998, for a review of the nursing literature) but often ignores basic factors of greatest interest to economists and policymakers, chiefly compensation. Exceptionally, Mitchell and Braddock (1994) estimate direct-care worker turnover for a sample of agencies providing DD services. They find negative correlations between turnover and a variety of compensation variables, but their univariate empirical analysis is a severe shortcoming.

Studies of worker turnover in the economics literature are either highly aggregated or focus on sectors that have little applicability to the long-term caregiver workforce. When data are pooled across diverse industries, estimated average effects are not particularly informative about specific types of workers. An exception is Howes (2005), who examines the results of a near doubling of wages and the introduction of health and dental care benefit plans for California Bay-Area providers of home- and personal-care services over a 5-year period. She estimates that a \$1.00 per hour wage increase from \$8.85 to \$9.95 reduces the annual turnover rate for new workers by 12 percentage points (from 0.32 to 0.20). She also finds large reductions in turnover associated with the introduction of health and dental benefits. Her findings suggest that turnover is quite responsive to compensation. There are differences between many frontline caregivers and workers in California's homecare system, however. In addition to the work taking place in the resident's private home (true of all homecare workers), about half of California homecare workers are family members of the resident, the resident is the employer, and most of the workers are independent agents. Perhaps most important, in this special setting, wages are set administratively at the county level for all workers, regardless of experience or training. Therefore, Howes (2005) need not consider the potential endogeneity of compensation with turnover.

Research on worker turnover in childcare, nursing, and teaching is relevant to turnover in long-term care to the extent that workers in these occupations also provide custodial care and developmental services, to varying degrees. For a sample of U.S. childcare centers, Powell et al. (1994) find a small

negative wage effect on turnover but fail to find consistent or significant effects of other factors (e.g., center size, non-profit status, and child-staff ratios). For a sample of Canadian childcare centers, Cleveland and Hyatt (2002) find that higher wages and pension benefits, specialized childcare credentials, prior childcare experience, and non-unionization all reduce turnover, as measured by the worker's reported intention to quit. Wages also have a statistically significant, but small, negative effect on registered nursing turnover (see, e.g., Ahlburg and Mahoney, 1996; Schumacher, 1997), although this wage effect is perhaps 50 percent larger holding split-shift work status constant (Holmas, 2002). Hanushek et al. (2004) find that for Texas public schools, a higher salary reduces the propensity to quit, but other school-level factors (large numbers of academically disadvantaged, African-American, or Hispanic students) are much more important. Falch and Strøm (2005), studying the population of public schools in Norway, where there is uniform pay, confirm the importance of student characteristics; teachers are more likely to leave schools with high shares of minority and special-needs students.

Reasons for the small wage effect on turnover found in the related occupations of childcare, nursing, and teaching vary. Given occupation-specific training requirements (particularly in nursing and teaching), workers in these fields may be less mobile and therefore less responsive to wages in the short run. Findings from these studies may also be biased due to the unaddressed endogeneity of compensation with turnover. Institutional features such as collective bargaining (particularly in teaching) may also constrain differential compensation. Findings for the more highly skilled nursing and teaching professions may also reflect an increased importance of nonpecuniary job characteristics at higher income levels.

The article proceeds as follows. After providing background on the DD community residential services industry in the second section 'Developmental Disabilities Services,' we discuss the sample and variables in the 'Data and Variable Construction' section. In the section 'Specifications, Estimation Strategies, and First-Stage Results,' we outline our empirical strategy and discuss the first-stage findings from several instrumental variables approaches. Our main empirical findings are then presented in the 'Findings' section, followed by a discussion of their implications in the 'Discussions and Conclusions' section.

## DEVELOPMENTAL DISABILITIES SERVICES

About 4.5 million Americans are developmentally disabled (Rizzolo et al., 2004), experiencing a physical or mental impairment with onset prior to age 22 that has altered or substantially inhibited their capacity to care for themselves or live on their own. DDs are severe, chronic, and likely to continue indefinitely. Examples

of specific conditions that may result in DDs are mental retardation, cerebral palsy, autism, and epilepsy.

Pursuant to a mandate from the Illinois General Assembly, we collected data on group home operations from the non-state agencies that provide DD services in Illinois.<sup>3</sup> Individuals with DDs may receive services in residential or nonresidential settings. Residential services provide both a place to live and personal supports for daily living. Nonresidential services include developmental activities and therapies to maintain and improve functioning, vocational and employment support programs, and respite care or in-home personal assistance.

The foremost policy for maintaining adults with DDs in the community is the group home (few individuals with DDs receive assistance in their private homes). The Community Integrated Living Arrangement (CILA), a Medicaid program, is the chief group home arrangement in Illinois, supporting persons with DDs in residences of up to 8 persons. The state heavily regulates the CILA industry, mandating minimum levels of many inputs, from staffing ratios to square footage per resident. The state also sets *per diem* reimbursement rates for CILA residents. Opportunities for further increasing per resident revenue are severely limited by state-set service caps (CILAs are not for the medically fragile, and allowances for nursing and other specialized care are strictly restricted).<sup>4</sup> While agencies can freely enter and exit the CILA market, state policies ration demand by capping the number of CILA residents at 7,200 and through explicit program expenditure caps. Agencies may not recruit CILA residents; the state distributes residents to agencies through another set of private agencies acting on its behalf.

The DSP is the dominant frontline staff position at CILAs, accounting for 83 percent of all staff hours. The next-most-common position, house manager (also a low-skilled position), accounts for another 9 percent of worker hours (Powers et al., 2006). The state requires that DSPs possess a high school degree or GED; formal training in human services is not required. The state allows a maximum amount of reimbursable training for newly hired staff; agencies are reimbursed for up to 40 hours of classroom training and up to 80 hours of on-the-job training per new worker (Illinois Department of Human Services, 2002).<sup>5</sup> Unlike other settings (e.g., California's personal care/homecare system), agencies have flexibility in wage-setting. There is no statutory obligation on the agencies

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<sup>3</sup> While the state of Illinois provides services directly to a small number of people through its state-operated developmental centers, most DD services are provided through a state-funded network of private and occasionally county-operated agencies.

<sup>4</sup> In the latter respect, CILAs might be considered most similar to "assisted living."

<sup>5</sup> Upon completion, an inexperienced worker is certified as a DSP. The state also recommended 3 days of training annually for every incumbent DSP at the time the survey was conducted but does not fund this additional training.

in this sample to pay a particular wage. Nor are agencies' total payrolls predetermined by the state; 28 percent of revenues are from non-state sources (Powers et al., 2006).

The CILA-DSP job is physically and emotionally demanding. Residents require assistance to varying degrees with the activities of daily living (e.g., toileting, bathing, dressing, hygiene, and feeding). Since Medicaid policy requires nearly all CILA residents to attend a developmental day program, the need for assistance is greatest in the early morning, late afternoon, and evening. DSPs are also needed on weekends to help with shopping, cooking, housekeeping, and social outings. Nonstandard work schedules pose hardships for many workers.

While we lack detailed information on the characteristics of the DSPs in our sample, based on discussions with agency chief executive officers (CEOs), they appear similar to others in the low-skilled caregiving workforce: disproportionately low-educated, female, and members of racial minorities (mostly African-American, in Illinois).

## DATA AND VARIABLE CONSTRUCTION

A state-provided list of all 24-hour-staffed CILA sites in Illinois, identified by agency operator and street address, formed the basis for a sample of specific CILA sites. Agencies were solicited repeatedly by telephone and mail to complete a multiple-module web-based questionnaire on their services, workers, residents, revenues, and costs. To keep the survey manageable for respondents, each CILA-operating agency was asked to provide information on a maximum of 5 randomly selected CILA sites.<sup>6</sup> Despite the five-CILA limit, information about most agencies' CILA sites is fairly complete. Fifty-four percent of the responding agencies reported on all of their CILAs (i.e., 54 percent operated 5 or fewer CILAs), while 77 percent provided information on at least one-half.

The final data consist of 61 agencies and 200 associated CILA sites.<sup>7</sup> Based on the few variables available for the population, the responding CILA sites appear representative. Fifty-six percent of the responding sites are located in the densely populated Chicago metropolitan area, as are 55.5 percent in the

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<sup>6</sup> To be perfectly clear, the sample contains only information on the CILA sites that were pre-selected by the authors. In no case did the agency determine the sites it would report on, and therefore there are no sample-selection problems arising from this source. In a few cases, selected CILAs were found to have ceased operating. In this case, we asked the agency for an up-to-date list of its sites and randomly re-selected sites for sampling.

<sup>7</sup> The response rate of CILA-operating agencies was 33.3 percent (61 of 183 agencies operating CILAs responded). The response rate of CILA sites was 33.2 percent (200 of the 603 CILA sites responded). Surveys were completed by the agencies' chief financial officers. The survey and instructions are available upon request.

population. Thirty-seven percent of the responding sites are located in Cook county (the core of the Chicago MSA), compared with 41 percent of the population.

#### VARIABLES AND DESCRIPTIVE STATISTICS

Information was collected about the entire agency, about the agency's aggregated CILA operations, and about individual CILA sites. For purposes of estimating worker turnover (available at the agency level), explanators that are CILA characteristics are constructed by averaging the individual site-level characteristics within agency. Due to the random sample design of CILA-site data collection, these variables are unbiased estimates of the average characteristics of an agency's CILAs.

Table 1 presents the descriptive statistics of the agency-level sample used for the turnover analysis. Turnover is measured as the share of the agency's employees on June 30, 2004 hired during state fiscal year 2004. Note that this is not CILA-DSP-specific turnover. For now, we assume that turnover at CILA-operating agencies is dominated by turnover of CILA-DSPs. Evidence presented below indicates that this assumption is well supported by the data. Although sources of turnover (quits, fires, layoffs, and retirements) are unavailable, our discussions with agency officials indicate that new-worker quits are overwhelmingly the prime driver of turnover.<sup>8</sup>

Table 1 indicates that, on average, 26.7 percent of workers employed on June 30, 2004 were with an agency fewer than 12 months. This understates the turnover rate for CILA DSPs because more-skilled workers with longer tenure are included in the total and because this measure does not account for the same position turning over multiple times during a year.<sup>9</sup>

There is considerable variation in average CILA resident characteristics (see Table 1). A majority are males (54.1 percent) and 38 percent are older than age 49 (21.4 percent of all residents are males older than age 49).<sup>10</sup> In addition to

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<sup>8</sup> Discussions with agency executives indicate that the typical pattern is for new hires in the DSP position to quit quickly after finding the job is not to their liking. Firings are rare and this is a stable industry without layoffs.

<sup>9</sup> See U.S. Department of Health and Human Services (2006) and Stone with Wiener (2001) for surveys of the literature and expert consensus estimates. Turnover rates comparable to ours are provided by Larson and Lakin (1999), who determine that 35 percent of Minnesota frontline group home workers are on the job for less than a year in the mid 1990s, and Howes (2005), who finds a 32 percent turnover rate for homecare workers in the late 1990s-early 2000s, which falls to 27 percent after eliminating resident-originated service terminations.

<sup>10</sup> Residents are relatively old because many adults with DDs live at home until their parents become infirm or die. While age 49 is not the standard cutoff for 'elder' in the general population, many residents with DDs experience accelerated aging due to Down's syndrome.

Table 1: Descriptive statistics

<u>Turnover</u>		
Turnover	Share of workers hired within the last year	0.267 (0.126)
<u>Resident characteristics</u>		
Share male residents	Site-average share of residents male	0.541 (0.234)
Share elder residents	Site-average share of residents over age 49	0.380 (0.204)
Share residents elder male	Site-average share of residents male and over age 49	0.214 (0.148)
Share nonambulatory residents	Site-average share of residents nonambulatory	0.102 (0.137)
Share dually-diagnosed residents	Site-average share of residents with developmental disabilities and mental illnesses	0.357 (0.302)
Share blind/deaf residents	Site-average share of residents blind, deaf, or both	0.058 (0.081)
ICAP score	Site-average Inventory for Client and Agency Planning score	47.501 (9.069)
Log of ICAP score	Natural logarithm of ICAP score	3.842 (0.201)
<u>Job characteristics</u>		
Average wage	Site-average hourly pretax wage for DSPs	9.970 (1.646)
Log of average wage	Natural logarithm of DSP Average wage	2.286 (0.168)
Entry wage	Site-average entry-level hourly pretax wage for DSPs	8.590 (1.089)
Log of entry wage	Natural logarithm of DSP Entry wage	2.143 (0.125)
Wage schedule	Site-average ratio of Experienced wage for DSPs to Entry wage for DSPs	1.179 (0.176)
Log of wage schedule	Natural logarithm of DSP Wage schedule	0.156 (0.131)
Health insurance	Share of sites offering DSPs a health insurance plan	0.854 (0.342)
Retirement plan	Share of sites offering DSPs a retirement plan	0.636 (0.473)

Powers and Powers: Causes of Caregiver Turnover

Table 1 (continued): Descriptive statistics

<i>Job characteristics (continued)</i>		
Total compensation	Site-average hourly pretax wage and fringe benefits for DSPs	11.065 (1.979)
Log of total compensation	Natural logarithm of DSP Total compensation	2.387 (0.185)
Work load	CILA residents per full-time equivalent DSP	1.172 (0.482)
Log of work load	Natural logarithm of DSP Work load	0.095 (0.348)
Union	Share of sites with any unionized workers	0.180 (0.363)
County unemployment rate	County unemployment rate	0.065 (0.009)
Log of county unemployment rate	Natural logarithm of County unemployment rate	-2.741 (0.138)
Home health aide (HHA) wage	Median hourly wage for Home health aide (HHA) by Economic Development Region (EDR)	8.717 (0.311)
Log of home health aide (HHA) wage	Natural logarithm of Home health aide (HHA) wage	2.165 (0.036)
Nursing aide (NA) wage	Median hourly wage for Nursing aide (NA) by Economic Development Region (EDR)	9.661 (0.662)
Log of nursing aide (NA) wage	Natural logarithm of Nursing aide (NA) wage	2.266 (0.073)
Local average wage	Site-average hourly pretax wage for DSPs at neighboring, non-relative CILA sites	10.165 (1.000)
Log of local average wage	Natural logarithm of DSP Local average wage	2.314 (0.101)
<i>Agency characteristics</i>		
For-profit	Binary variable = 1 if the agency is for-profit	0.180 (0.388)
Private nonprofit	Binary variable = 1 if the agency is private nonprofit	0.705 (0.460)
Public nonprofit	Binary variable = 1 if the agency is public nonprofit	0.115 (0.321)

Table 1 (continued): Descriptive statistics

<i>Agency characteristics (continued)</i>		
Size	Total employees	198.499 (164.510)
Log of size	Natural logarithm of Size	4.836 (1.121)
Any MH services	Binary variable = 1 if the agency provides any mental health (MH) services	0.311 (0.467)
Number of agencies		61

Notes: Means reported with standard errors in parentheses beneath.

having a DD, 35.7 percent are diagnosed with mental illness (termed ‘dually diagnosed’), 10.2 percent are nonambulatory, and 5.8 percent are blind and/or deaf (‘blind/deaf’). These incidences are substantially higher than in the similarly-aged general population. Residents’ Inventory for Client and Agency Planning (ICAP) score, ranging in value from 0 to 100, is intended to indicate the intensity of required supervision as determined by both the frequency and severity of maladaptive behavior (although agency CEOs dismissed its usefulness in conversation). The CILA residents of the average agency have an average ICAP score of 47.5.

The mean of site-average CILA-DSP (nominal) hourly earnings is \$9.97 circa 2004. The average ‘entry’ wage offered to an inexperienced worker is \$8.59. The ‘experience’ wage is that paid to a worker with 5 years’ experience. The average ratio of experience-to-entry wage is 1.18, and the ratio of the average wage to the entry wage is 1.16.

Most DSPs are offered fringe benefits; 91.5 percent of all CILA sites offer a health insurance plan and 67.5 percent offer a retirement plan (figures not reported in tables). Most agencies that offer DSPs health insurance make an employer contribution for health insurance. Only 7 of the 183 CILA sites offering DSPs health insurance do not. All agencies offering retirement plans contribute to them. On average, employer contributions to health insurance and retirement benefits constitute 9.4 percent of total DSP compensation (not reported in table).

The resident-to-DSP ratio, an indicator of the DSP work load, averages 1.17 CILA residents per full-time-equivalent (FTE) DSP (Table 1). The average agency unionization rate (i.e., the average of agencies’ share of CILA sites with any union workers) is 18 percent (Table 1). Twenty-four percent of the CILA sites are unionized (not reported in a table), indicating that smaller agencies are less likely to be unionized.

Forty-three agencies (70.5 percent of agencies), representing 160 CILA sites (80 percent of CILA sites), are private non-profit, while 18 percent of agencies (10.5 percent of CILA sites) are for-profit, and 11.5 percent of agencies

(9.5 percent of CILA sites) are county-operated (public non-profit). The average agency has a workforce of nearly 200. Most agencies provide diverse services; 75.4 percent provide nonresidential DD services (typically CILA-complementary day programs; figures not reported in Table) and 31.1 percent provide mental health services (Table 1). Nearly 40 percent of all state payments made to these agencies are reimbursements for the provision of CILA services (not reported in table). We use variation in this measure of ‘CILA intensity’ (i.e., the dominance of CILA operations, as measured in relative revenue from that activity) to explore the robustness of our estimates below.

Additional variables were either merged from government sources according to geographic location of the agency’s headquarters or constructed from the sample. The average county unemployment rate (obtained from the Bureau of Labor Statistics, BLS) is 6.5 percent (Table 1). As discussed below, we use two wage measures—one for home health aide (HHA) and another for nursing aide (NA)—in our assessment of the validity of other instruments for total compensation. HHAs provide routine personal care in the resident’s home. NAs include certified nursing assistants and hospital aides who provide routine personal care under the direction of nursing staff. The median hourly wages for these two similar occupations are obtained from the Illinois Department of Employment Security by Economic Development Region (EDR), a broad designation of Illinois counties into 10 geographic areas. The averages of these wages are \$8.72 and \$9.66, respectively. Finally, as described in detail below, we use address information to construct a ‘local wage’ for each CILA site, defined as the average DSP wage at nearby competitors’ CILA sites. The average value of this wage is \$10.17.

## SPECIFICATIONS, ESTIMATION STRATEGIES, AND FIRST-STAGE RESULTS

In this section, we motivate and present the empirical specifications for employee turnover. Potential problems of endogeneity and simultaneity with regard to turnover and employee compensation are outlined. Instrumental variable (IV) strategies to address these issues are explained, and empirical findings related to the first stage, including tests of endogeneity as well as validity and weakness of the instruments, are presented. Although the sample of agencies is small, the preferred estimates account for the small sample size biases associated with two-stage least squares (2SLS).

There is an extensive theoretical literature on job search and its implications for turnover. The major determinants of turnover are the worker’s appropriately discounted stream of perceived pecuniary and nonpecuniary benefits and costs flowing from the current position relative to the expected

streams from alternative jobs, considering also the costs of search and of learning about the current employer through experience. Key results are that wages increase with tenure, quit rates fall with tenure, and firms may reduce turnover by back-loading the wage schedule (Rogerson et al., 2005).

We specify turnover as a function of four types of variables influencing these flows: compensation, the immediate CILA work environment, agency personnel practices, and employer-employee relations. We lack information on the personal characteristics of the DSP workers that may influence turnover. To the extent that these characteristics are systematically correlated with included variables, estimates are biased by this omission. The IV approach, however, helps eliminate biases from this source with regard to the key explanator, total compensation.

A higher wage reduces the benefits of job search. Fringe benefits additionally contribute importantly to binding employees to employers, both through ‘job lock’ (especially in the low-wage sector, where alternative jobs may not offer fringe benefits) and because workers with a preference for job stability may also have a strong taste for fringe benefits.

Higher total compensation is predicted to reduce turnover. There are several potential ways to express compensation, and in principle it would be desirable to break it down into its wage and fringe benefit components. We do not present findings based on this approach. As a practical matter, promising candidate instruments for the fringe benefit component (analogues of the ‘local’ average wage approach we develop below) have little explanatory power for fringe benefits. When fringe benefits are treated as endogenous, the findings with respect to the wage are stable and similar in magnitude to the findings for total compensation presented below. Most importantly, reliable estimation and diagnostic tests that allow for possible weakness in the instruments have been developed for the case of a single endogenous explanator only; adding a second troublesome explanator leaves one with no reliable inferential tools (Murray, 2006a, 2006b). In our judgment, given the current state of knowledge, it is preferable to obtain reliable estimates for the total compensation case, as opposed to entering a no-man’s-land of inference by expanding the specification.

The wage schedule (ratio of experience to entry-level wage) is included in the turnover specification because back-loaded pay may attract more stable workers to the agency and increase retention generally. The unemployment rate controls for alternative job opportunities. Agencies located in counties with low unemployment rates are expected to experience more turnover.<sup>11</sup>

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<sup>11</sup> The unemployment rate poses two potential limitations. First, to the extent that the county unemployment rate does not adequately capture all of the influence of outside job opportunities and such remaining influences are correlated with the instruments for total compensation, the instrumented variables’ effect incorporates the influence of unmeasured outside job opportunities.

Resident characteristics principally control for the intensity of care and corresponding worker effort required. Turnover is expected to be higher when more residents are male, non-ambulatory, and dually-diagnosed with mental illness. Male residents are on average stronger and heavier. Caring for non-ambulatory residents is physically arduous and lifting poses significant injury risk. Dually-diagnosed residents may be less cooperative, more unpredictable in their behavior, and experience more frequent stressful crises. Turnover is expected to be lower when residents are older or the average resident ICAP score is higher, because caring for relatively inactive residents or residents with more predictable behaviors is easier (aging residents who develop serious medical problems are relocated from CILAs), and these residents may provide more self-care. The share of blind/deaf residents may be associated with lower turnover, because the DSPs who care for these residents possess unusual skills (e.g., sign language) that make their retention a priority. We also include the work load (resident-to-worker ratio), which is expected to increase turnover.

Agency personnel practices and worker-management relations may also affect turnover. Economies of scale in recruiting should make higher turnover rates more tolerable for larger agencies. Larger agencies may be more impersonal and bureaucratic, and workers who cannot effectively voice their concerns are more likely to address them through exit. On the other hand, larger agencies may be more able to offer internal career ladders that aid retention.

We expect lower turnover at non-profit than for-profit agencies if non-profits place greater priority on both resident and worker well-being, both of which are presumably reduced by turnover. A sense of shared mission with a non-profit employer may also engender worker loyalty. Unionization may reduce turnover if unions and management work together to effectively voice and address workplace concerns. In the general population, unionized workers tend to experience longer tenure, *ceteris paribus* (Freeman, 2005). On the other hand, the union itself may constitute a network for informally or formally sharing information about alternative job opportunities, increasing turnover. Finally, we include a variable indicating whether the agency offers mental health (MH) services. Recall that our turnover variable is agency-wide. MH workers are more highly skilled, specialized in their training, and better compensated, and we wish to control for the depressing effect their presence may have on the overall turnover rate.<sup>12</sup>

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Second, if the market is tighter for an agency than the county unemployment rate suggests, they may pay a higher wage but still face greater turnover. In this case, our estimated wage effect is conservative.

<sup>12</sup> Note that the DSP workers we study provide specific DD services at CILA sites. There should be no systematic variation in DSP-CILA worker characteristics with respect to activities in

Total compensation is a potentially troublesome explainer for several reasons. First, agencies likely determine total compensation and turnover simultaneously. Unobservable turnover-reducing shocks may result in the agency choosing lower total compensation, generating a positive correlation between total compensation and turnover. If so, the ordinary least squares (OLS) coefficient of total compensation *understates* its effect on turnover. Second, omitted variables may be correlated with total compensation. Workers' unobserved characteristics may make them both high-quality and long-tenure. A positive correlation between unobserved worker characteristics and total compensation implies that the OLS coefficient for total compensation overstates its turnover-reducing effect. Given that the primary compensation variable is based on the average wage and there is no measure of tenure, higher compensation may simply reflect a longer-tenure workforce with its associated lower turnover. The direction of the net bias to OLS estimates resulting from these two concerns is ambiguous. While random measurement error in total compensation would bias towards understatement, this is not a concern; measures of hours and compensation come directly from payroll records and should be quite accurate.

IV strategies are employed to address the potential biases outlined above. Two alternative instruments for total compensation are proposed—the agency's entry-level DSP wage and the 'local' average DSP wage. In both cases, the home health aide (HHA) and nursing aide (NA) wages for the agency's EDR are used to implement Anderson-Rubin overidentification tests. We describe the entry-level and local-average wage IV approaches and the first-stage results in turn.

#### INSTRUMENTING AVERAGE TOTAL COMPENSATION WITH THE ENTRY-LEVEL WAGE

Rationales for using the entry-level wage as an IV are that it is based on the prevailing wage for low-skilled workers in the agency's local labor market and population attributes that affect worker quality secularly (e.g., the quality of local high school education); that it is offered to inexperienced new hires prior to the agency obtaining idiosyncratic information about worker quality through monitoring; and that it is unrelated to the tenure distribution of the current workforce. Under these assumptions, the entry-level wage is a valid instrument for total compensation. It is likely highly correlated with an agency's total compensation while actual compensation (and not entry-level wage) claims the direct influence on turnover.

Table 2 presents the first-stage findings. Column 1 reports the coefficient of the (natural log of the) entry wage when it is regressed on (the natural log of) average total compensation alone (a finding of possible interest to some readers),

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unrelated service areas (like mental health) that their agencies may offer. In short, we do not expect DSP-CILA-worker variables to be collinear with the MH service variable.

while column 2 presents the first-stage regression using entry-level wage as the instrument for total compensation.<sup>13</sup> The coefficient for entry-level wage is positive, as expected. Entry-level wage also largely overcomes the ‘weak’ instrument problem that biases 2SLS estimates of the coefficient and its standard error (Murray, 2006a, 2006b). The first-stage F-statistic ( $F(1,52) = 12.19$ ) indicates that the true significance level of the hypothesis test based on 2SLS is below 15 percent when the nominal level is 5 percent (Stock and Yogo, 2002).<sup>14</sup> Nevertheless, some might still reasonably argue that this instrument is potentially weak, and this possibility is accounted for in the calculation of preferred estimates below.

While compelling to us, some may reasonably doubt whether the entry-level wage is indeed a valid instrument. Additionally, the entry wage could also conceivably reflect agencies’ unobserved characteristics. If it is possible to differentiate workers prior to hire by offering a higher entry wage, then it is a relevant explainer of turnover. We are skeptical of this argument, however, given our conversations with agency CEOs about their entry-level hiring strategy, which is to cast a wide net, knowing that most new hires have no experience in long-term care and will not find the DSP job to their liking. Given this situation, it seems futile to offer a higher wage to inexperienced applicants in hopes of making a better match.

To address the validity concern further, we employ a version of the Anderson-Rubin over-identification restrictions test that permits an assessment of the validity of a subset of instruments whose validity is in doubt, conditional on other instruments whose validity is not in doubt (Murray, 2006b). Because HHA and NA wages are aggregated over wide geographic areas and because entry-level DSPs select from a broad menu of alternative low-wage jobs spanning assorted industries, there is a strong case that HHA and NA wages do not belong in the turnover equation. DSP wages nevertheless should be correlated with HHA and NA wages due to the similar skills required and shared industrial sector.

The Anderson-Rubin overidentification test statistic for HHA and NA wages is  $X^2(1) = 0.003$  ( $p$ -value = 0.9583), supporting the notion that HHA and NA wages are not relevant explainers in the turnover equation. HHA and NA wages are ‘weak’ instruments (the first-stage F-statistic is  $F(2,51) = 2.19$ ). This is likely due to geographic aggregation over large areas (up to 19 counties), which breaks down the correlation with particular agencies’ wages. Unfortunately, more disaggregated wage data are not available. They are nevertheless useful for assessing whether the entry-level wage, a stronger potential instrument whose

<sup>13</sup> Throughout the paper, small-sample corrections are made to all test statistics.

<sup>14</sup> The Stock-Yogo test for the reduction of OLS bias achieved by 2SLS cannot be calculated because this test requires at least three instruments when there is one endogenous variable (Stock and Yogo, 2002).

Table 2: First- stage regressions for Turnover equation (Instrumenting Log of total compensation)

Variables	(1)	(2)	(3)	(4)
Log of entry-level wage	0.595**** (0.176)	0.584**** (0.167)		
Log of local average wage			0.536*** (0.227)	0.660**** (0.205)
<i>Covariates</i>				
<i>Resident characteristics</i>				
Share elder residents		0.252**** (0.101)		0.211*** (0.101)
Share non-ambulatory residents		0.041 (0.158)		0.086 (0.164)
Share dually- diagnosed residents		-0.071 (0.067)		-0.093 (0.068)
Share blind/deaf residents		-0.303 (0.249)		-0.295 (0.252)
<i>Other job characteristics</i>				
Log of county unemployment rate		-0.114 (0.147)		-0.250* (0.152)
<i>Agency characteristics</i>				
Private nonprofit		0.080* (0.054)		0.054 (0.054)
Log of size		0.042** (0.023)		0.054*** (0.022)
F-test, instrumental variables	F(1,59) = 11.40 <i>p</i> -value = 0.001	F(1,52) = 12.19 <i>p</i> -value = 0.001	F(1,59) = 5.54 <i>p</i> -value = 0.021	F(1,52) = 10.28 <i>p</i> -value = 0.002
F-test, all controls	--	F(8,52) = 5.43 <i>p</i> -value = 0.000	--	F(8,52) = 5.08 <i>p</i> -value = 0.000

Notes: Entries are estimated coefficients with standard errors in parentheses beneath. (\*, \*\*, \*\*\*, \*\*\*\*) indicate statistical significance based on a one-tail t-test exceeding the (90, 95, 97.5 and 99) percent levels of confidence. All test statistics and confidence intervals are adjusted for sample size.

validity is in doubt, is indeed exogenous, because the Anderson-Rubin overidentification test is robust to weak but valid instruments (Murray, 2006b). The test statistic of  $X^2(1) = 1.770$  ( $p$ -value = 0.183) supports the notion that the entry-level wage is not a relevant explanator in the turnover equation.<sup>15</sup>

#### INSTRUMENTING AVERAGE TOTAL COMPENSATION WITH THE LOCAL AVERAGE DSP WAGE

The alternative instrument for total compensation is the local average DSP wage. This variable is constructed for each CILA site by averaging the average DSP wage at the five closest CILA sites operated by the agency's competitors within a 30-mile radius.<sup>16</sup> The local average wage is exogenous with respect to an agency but should be correlated with that agency's total compensation due to overlapping labor markets. In particular, its exogeneity with respect to the agency solves the simultaneity problem and any problems due to unobserved agency attributes. Since it is also exogenous with respect to worker characteristics, it is also uncorrelated with worker tenure and heterogeneous worker characteristics at the agency in question.

In the first-stage regression the coefficient of the (natural logarithm of) local average wage in the specification for the (natural logarithm of) total compensation is positive, as expected (see column (4) of Table 2; as before, column (3), immediately to the left, contains the coefficient from a specification with no additional explanators). Local average wage largely overcomes the 'weak' instrument problem. The first-stage F-statistic is  $F(1,52) = 10.28$ , indicating that the true significance level of hypothesis tests based on 2SLS is below 15 percent when the nominal level is 5 percent (Stock and Yogo, 2002). Nevertheless, some might still reasonably argue that this instrument is potentially weak, and this possibility is accounted for in the calculation of preferred estimates below. The Anderson-Rubin test of whether the local average wage is valid conditional on the validity of the HHA and NA wages is  $X^2(1) = 0.717$  ( $p$ -value = 0.397), supporting the notion that the local average wage is not a relevant explanator in the turnover equation.<sup>17</sup>

<sup>15</sup> The Anderson-Rubin test of the validity of a subset of instruments is performed using 'ivreg2', a downloadable add-on command for *Stata*.

<sup>16</sup> For the vast majority of the CILA sites (192 sites), the local average wage is based on five non-relative, neighboring CILA sites located within 24.9 miles. For more isolated sites, fewer than 5 competitors' sites were selected. The 30 mile radius was chosen under the assumption that on average a worker would readily commute up to about 30 minutes from her current workplace.

<sup>17</sup> Two other instruments for total compensation were found to be quite weak. Local entry-level wage and local total compensation were constructed in the same manner as local average wage. The first-stage F-statistic is  $F(1,52) = 2.53$  for local entry-level wage and  $F(1,52) = 7.24$  for local total compensation. Local total compensation is not a strong instrument for total compensation because marginal variation in total compensation is largely driven by its wage component. While

Before proceeding, we note that the findings for the various instruments are as one might expect based on their variation in the data. The coefficient of variation (CV) for the logarithm of DSP total compensation is 0.078. The CVs for the wage instruments are uniformly lower because idiosyncratic agency components are averaged out, leaving only ‘systematic’ variation. The CVs are 0.058 and 0.044 for the logarithms of entry wage and local average wage, respectively, our two most promising instruments for total compensation. In contrast, the CVs for the logarithms of home health aide wage and nursing aide wage are substantially less at only 0.017 and 0.032, respectively. These two later wage measures are, not surprisingly given their relative lack of variation, found to be weak instruments for total compensation. They nevertheless are valid instruments and are useful for assessing the validity of the entry wage and local average wage, our two alternative wage instruments, both of which are strong instruments, but whose validity may be in doubt.

## FINDINGS

All specifications are estimated with OLS, two-stage least squares, or Fuller’s estimator, as appropriate, using a semi-log form, where controls that are not either binary or shares are logged. In fact, the findings differ little across linear, semilog, and log-log specifications.

### DETERMINANTS OF TURNOVER

Table 3 presents estimates of the agency turnover rate as a function of resident, job, and agency characteristics. Column (1) presents findings from the complete specification discussed above. The second column presents findings for the parsimonious specification, dropping variables whose estimated effects differ insignificantly from zero at a 20 percent or higher confidence level in a one-sided t-test. The coefficients of selected resident characteristics (sex and ICAP), some job characteristics (wage schedule, work load, union), and agency characteristics (public non-profit and MH service provider binaries) are insignificant. A comparison of columns (1) and (2) shows that the estimated coefficients for the parsimonious specification are reasonably insensitive with respect to dropping the other variables from the specification.<sup>18</sup>

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there is little cross-site variation in fringe benefit compensation within an agency, there is cross-site variation in wages in response to local labor market conditions. The second-stage findings using these two ‘weak’ instruments are qualitatively similar to those reported below.

<sup>18</sup> In particular, the ‘union’ effect is still insignificant when the union variable is maintained while other insignificant variables are dropped. Because only 13 of the 61 agencies had any unionized DSPs, it is quite possible that the incidence of unions in our sample is too low to identify a potential independent union effect.

Powers and Powers: Causes of Caregiver Turnover

Table 3: OLS and 2SLS estimates of Turnover equation (Instrumenting Log of total compensation)

Variables	OLS estimates (1)	OLS estimates (2)	2SLS estimates (Instrument is Log of entry- level wage) (3)	2SLS estimates (Instrument is Log of local average wage) (4)
<i>Resident characteristics</i>				
Share male residents	-0.048 (0.087)			
Share elder residents	-0.108 (0.120)	-0.137*** (0.066)	-0.110* (0.075)	-0.126** (0.074)
Share elder male residents	-0.044 (0.189)			
Share nonambulatory residents	0.467**** (0.114)	0.506**** (0.102)	0.498**** (0.106)	0.503**** (0.103)
Share dually-diagnosed residents	0.083** (0.049)	0.088** (0.044)	0.074* (0.049)	0.083** (0.048)
Share blind/deaf residents	-0.434*** (0.193)	-0.372*** (0.165)	-0.416*** (0.177)	-0.390*** (0.174)
Log of ICAP score	-0.013 (0.083)			
<i>Job characteristics</i>				
Log of total compensation	-0.247**** (0.094)	-0.237*** (0.082)	-0.391*** (0.194)	-0.302* (0.203)
Log of wage schedule	-0.040 (0.109)			
Log of work load	-0.016 (0.047)			
Union	-0.015 (0.047)			
Log of county unemployment rate	-0.186** (0.110)	-0.173** (0.097)	-0.196** (0.103)	-0.183** (0.101)
<i>Agency characteristics</i>				
Private nonprofit	-0.099** (0.054)	-0.068** (0.035)	-0.060* (0.037)	-0.065** (0.036)

Table 3 (continued): OLS and 2SLS estimates of Turnover equation (Instrumenting Log of total compensation)

<i>Agency characteristics (continued)</i>				
Public nonprofit	-0.056 (0.063)			
Log of size	0.040** (0.020)	0.029** (0.015)	0.038** (0.019)	0.033** (0.019)
Any MH services	-0.026 (0.032)			
Number of observations	61	61	61	61
R <sup>2</sup>	0.525	0.487	0.452	0.481
Adjusted R <sup>2</sup>	0.352	0.408	0.368	0.401
F-test	F(16,44) = 3.04 p-value = 0.001	F(8,52) = 6.17 p-value = 0.000	F(8,52) = 5.31 p-value = 0.000	F(8,52) = 5.35 p-value = 0.000

Notes: Entries are estimated coefficients with standard errors in parentheses beneath. (\*, \*\*, \*\*\*, \*\*\*\*) indicates statistical significance based on a one-tail t-test exceeding the (90, 95, 97.5 and 99) percent levels of confidence. All test statistics and confidence intervals are adjusted for sample size.

Column (3) presents the findings when the entry-level wage instruments total compensation, and column (4) presents the findings when the local DSP average wage is the instrument. Higher total compensation always reduces turnover, as hypothesized, and the magnitudes of these estimated effects are substantial. A 10 percent increase in total compensation (a \$1.11 increase at the mean) reduces turnover from 3.02 to 3.91 percentage points, depending on the instrument, representing a 27 to 65 percent larger effect than the OLS estimate reported in column (2). The fact that both IV coefficient estimates exceed their OLS counterparts suggests that simultaneity of total compensation with turnover is the major source of bias.

When instruments are weak, confidence intervals are understated, and 2SLS point estimates can be severely biased as well (Murray, 2006a, 2006b). While the first-stage findings for both IVs presented in the previous section indicate that they are reasonably strong, we nevertheless explore the robustness of the findings to any potential weakness. Moreira's (2003) two-sided conditional likelihood ratio (CLR) approach corrects for biased confidence intervals. Following Murray's (2006a, 2006b) recommendation for choosing a point

estimate for the coefficient of an endogenous explanator when instruments are potentially weak, we compute point estimates using two of Fuller's estimators (with parameter values  $a = 1$  and  $a = 4$ ).<sup>19</sup>

Using entry-level wage as the instrument for total compensation, the CLR test yields a 95-percent confidence interval of [-0.9571, -0.0046] with a  $p$ -value for the null hypothesis of no effect of total compensation on turnover of 0.0304. The Fuller estimates are -0.376 when  $a = 1$  and -0.344 when  $a = 4$  (the most conservative endogeneity-corrected estimate). Both are reasonably close to the 2SLS point estimate of -0.391. These findings strongly suggest that the effect of total compensation on turnover is negative and considerably larger—45 to 65 percent larger in absolute magnitude—taking account of endogeneity.

When local average wage is the instrument for total compensation, the CLR test yields a 95-percent confidence interval of [-0.8645, 0.1632] and a  $p$ -value for the null hypothesis of no effect of total compensation on turnover of 0.1252. The 2SLS estimate of the effect of total compensation on turnover is -0.302; Fuller estimates are -0.295 ( $a = 1$ ) and -0.280 ( $a = 4$ ). While the local average wage-instrumented findings are weaker, they again suggest a conservative estimate of the effect of total compensation on turnover (-0.280) that is quite large in absolute magnitude, or 18 percent larger in absolute size, taking endogeneity into account.

The evidence collectively indicates that the simultaneity of total compensation and turnover is a source of bias in the OLS estimates. The estimated magnitude of this bias depends on the instrument set and the estimator. In particular, the Fuller ( $a = 1$ ) estimates are from 24 to 59 percent larger than their OLS counterparts; the Fuller ( $a = 4$ ) estimates are from 18 to 45 percent larger than their OLS counterparts; and the 2SLS estimates are from 27 to 65 percent larger than their OLS counterparts.

The unemployment rate has the expected effect. A 10 percentage-point increase in the unemployment rate reduces turnover by 1.73 to 1.96 percentage points (columns (1) – (4)). Resident characteristics have the hypothesized effects, and these effects are of substantial magnitude. A 10 percentage-point increase in the share of nonambulatory residents increases turnover by 4.67 to 5.06 percentage points; a 10 percentage-point increase in the share of blind/deaf residents reduces turnover by 3.72 to 4.34 percentage points; a 10 percentage-point increase in the share of older residents reduces turnover by 1.08 to 1.37 percentage points; and a 10 percentage-point increase in the share of dually-diagnosed residents increases turnover by 0.74 to 0.88 percentage points.

Agency characteristics affect turnover as expected. Private non-profit agencies experience 6.0 to 9.9 percentage points less (or about one third less)

<sup>19</sup> In the context of weak instruments, when  $a = 1$  Fuller's estimator is approximately unbiased. When  $a = 4$ , Fuller's estimator is biased, but its mean square error is less than when  $a = 1$ .

turnover than for-profits. Turnover is higher at larger agencies; a 10 percent increase in agency size (a 20 worker increase at the mean) is associated with a 0.29 to 0.40 percentage-point increase in turnover.

#### ROBUSTNESS OF THE TURNOVER ESTIMATES

While the turnover measure is agency-wide, the right-hand-side variables, except for agency characteristics, are specific to CILA operations. Since there is variation in the extent to which agencies' activities are dominated by CILAs, we explore whether the turnover estimates, particularly with regard to the CILA-DSP-specific variables, strengthen as we increasingly focus on agencies most dedicated to CILAs. We re-estimate the basic OLS turnover equation, dropping the 16, 25, and 33 percent of the agencies in our sample with the smallest CILA-reimbursement revenue shares. Findings are consistent with CILA operations dominating agency turnover. All estimated coefficients are robust with respect to these sample alterations and the effects of many—notably resident characteristics and total compensation—increase in absolute magnitude. The overall fit also strengthens (the adjusted R-squared rises from 0.39 to 0.44).<sup>20</sup>

Several other pieces of evidence support our assumption that agency-wide turnover is governed by CILA-DSP turnover. CILA-operating agencies experience turnover that is 50 percent higher than that of agencies without CILA operations. Further, when we estimate turnover equations—in each case replacing CILA-specific variables with other program-area-specific variables (MH and DD nonresidential programs)—there are no significant predictors of turnover. Similarly, when we pool information across all program areas (MH, DD nonresidential, and CILA) to create program-area-weighted-average explanatory variables, no statistically significant relationships are found. Thus assorted evidence collectively and strongly supports the notion that DD-agency turnover is chiefly a CILA-DSP staffing problem.

#### DISCUSSION AND CONCLUSIONS

We have identified multiple factors influencing turnover of frontline caregivers. Resident characteristics indicating a higher caregiving burden are associated with increased turnover. Thus, the incidence of turnover is unevenly distributed, and residents with the greatest caregiving needs (those who are younger, nonambulatory, and dually diagnosed with a mental illness) face systematically higher turnover and potentially lower-quality care. Turnover is higher at larger agencies, consistent with personnel cost efficiencies or exit theory, or both. Agencies paying higher total compensation to frontline caregivers experience less

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<sup>20</sup> Findings available upon request.

turnover. Depending on the chosen IV estimate, an increase of from 23.9 to 30.5 percent in total compensation (or an increase of \$2.65 to \$3.38 per hour at the sample mean of \$11.065 per hour) cuts turnover by one-third.<sup>21</sup> Other findings of interest are the effects of DSP unionization and agencies' nonprofit status. Unionization does not appear to reduce turnover directly. Nonprofit agencies have lower turnover, consistent with the notion that they are more concerned with both quality care and worker welfare.

The finding of an important influence of compensation on turnover in this research stands in stark contrast to much prior work. Research on the childcare and teaching sectors has produced surprisingly little evidence in favor of a significant effect of compensation, while research on the nursing field has tended to find only small wage effects. Industry differences, problems of accurately measuring compensation, and the lack of endogeneity correction (which we find increases the estimated effect of compensation) likely explain this difference. While the childcare literature has been largely unsuccessful in identifying many significant influences on turnover at all, our work is similar to prior research on teaching in finding that 'client' characteristics (students, in the case of teaching, and group home residents, as studied here) do have an important influence on worker turnover. Given the intense and potentially long-term nature of the relationships between workers and 'clients' in both settings, it strikes us as quite plausible that 'client' characteristics have a great influence on the psychic costs and benefits in the work environment in these industries.

Our work informs the debate over the adequacy of pay in the caregiving sector by quantifying the relationship of turnover to compensation in addition to other factors. Our estimates are comparable in magnitude to those found by Howes (2005). At a nominal wage of \$8.85 in 2001, her estimates imply that a \$1 (or 12.4 percent) increase in the wage cuts turnover of new workers by 17.6 percent.

Agencies can manipulate job characteristics to affect voluntary worker turnover. The prudent agency balances the associated costs against the benefits of reducing turnover (higher productivity, reduced recruiting costs, reduced training costs, and other costs). Since agencies in the sample tolerate fairly high turnover rates, these benefits are presumably insufficient to cause them to lower turnover.<sup>22</sup> Nevertheless, it may be socially, but not privately, efficient to do so. In other

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<sup>21</sup> These estimated effects are from the coefficient estimates of -0.376 and -0.295 obtained applying Fuller's ( $a = 1$ ) estimates to models in which total compensation is instrumented with entry wage and local average wage, respectively.

<sup>22</sup> In an early article, Leonard (1987) concludes that the 200 high-technology plants he studies have an economically justifiable level of turnover. However, this conclusion stems from a finding of a very small compensation effect on turnover which necessitates enormous (and expensive) wage increases to induce noticeable turnover declines.

work (Powers and Powers, 2009), we present estimates of potential cost savings from cutting turnover by one-third for the sample of agencies analyzed here.<sup>23</sup> Four parties potentially benefit from this wage increase—DSP workers, residents (through quality improvements), agencies (through cost reductions), and the state (through cost reductions on subsidized items).<sup>24</sup> Findings from the same data (see Powers and Powers, 2009, for a detailed presentation) suggest that, conservatively, an increase in total compensation sufficient to cut turnover by one-third would be socially justified *without appeal to worker welfare* if residents' valuation of increased service quality (emanating from reduced worker turnover) is from 9 to 12 percent of the annual payment made to agencies by the state for their care (i.e., the state's declared cost of providing food, shelter, and supervision, after assumed allowances for client payments, or \$39,678 per person; Powers et al., 2006).<sup>25</sup> Our perception is that the upper bound of 12 percent on resident valuation is reasonably small.<sup>26</sup>

Findings with regard to the other model variables indicate that policies to encourage non-profit entry and smaller agencies could also reduce turnover. Some of the characteristics associated with increased turnover are arguably encouraged by peculiar features of Illinois' DD policy (see Powers et al., 2006, for a detailed discussion). The state's reimbursement system shifts financial risk onto providers, increasing incentives to pool risk over large resident bases with diverse characteristics. The state's reimbursement schedule also creates incentives for agencies to offer a variety of compliment services in order to exploit opportunities for cross-subsidization. Both factors encourage large agencies, which we have found to be associated with greater turnover. State policies to reimburse entry-level worker training underwrite one of the potential major costs of turnover to agencies (see Powers and Powers, 2009, for a detailed analysis of this issue). The findings presented here also suggest that reimbursement differentials for extra-special-needs (dually-diagnosed and non-ambulatory) residents are inadequate to compensate DSP workers for their additional effort in caring for these individuals. An additional implication of our

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<sup>23</sup> The choice of a specific level of turnover reduction for these calculations is somewhat arbitrary. We choose one-third because that is the level of reduction in turnover determined by U.S. Department of Health and Human Services (2006) to support an adequate caregiving workforce to the DD sector, which might be perceived as a reasonable policy goal.

<sup>24</sup> Efforts to raise direct care workers' compensation is in the spirit of the 'Living Wage' movement (e.g., Adams and Neumark, 2005), which targets government contractors employing low-wage workers.

<sup>25</sup> It is important to point out that the typical client has little income aside from Supplemental Security Income payments that are already dedicated to living expenses.

<sup>26</sup> Alternative estimates for a range of assumptions yield similar magnitudes (see Powers and Powers, 2009, for details).

findings is that the secular aging of the population may serve to reduce turnover at group homes for individuals with DD.

Several specific public policies are promising for reducing turnover. A federal Medicaid wage pass-through policy applied to the DD sector is one. This option permits states to increase Medicaid reimbursements to agencies above current *per diems* if the increase is dedicated to DSP compensation (see U.S. Department of Health and Human Services and Institute for the Future of Aging Services, 2002, for discussion). Enhancing resident choice in the long-term care system likely would spur agencies to compete on quality, creating incentives for agencies to reduce their turnover. While Illinois' current policy of subsidizing entry-level training implicitly encourages turnover, we do not advocate for its elimination. Agencies would tend to under-train DSP workers in its absence because they cannot internalize the benefits of their training to other employers.

Future work to understand low-wage worker turnover, its role in the long-term care 'crisis,' and its implications generally is well served by the availability of position-specific data at the establishment level for other types of establishments in the long-term care sector. The present study, while limited to long-term community-based care for persons with developmental disabilities, sheds new light on this important topic.

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