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RESEARCH ARTICLE

The Relationship between Formal and Informal Care among Adult Medicaid Personal Care Services Recipients

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Objectives. To test hypotheses concerning the relationship between formal and informal care and to estimate the impact of hours of formal care authorized for Medicaid Personal Care Services (PCS) on the utilization of informal care.

Data Sources/Study Setting. Data included home care use and adult Medicaid beneficiary characteristics from assessments of PCS need in four Medicaid administrative areas in Texas.

Study Design. Cross-sectional design using ordinary least-squares (OLS) and instrumental variable (IV) methods.

Data Collection/Extraction Methods. The study database consisted of assessment data on 471 adults receiving Medicaid PCS from 2004 to 2006.

Principal Findings. Both OLS and IV estimates of the impact of formal care on informal care indicated no statistically significant relationship. The impact of formal care authorized on informal care utilization was less important than the influence of beneficiary need and caregiver availability. Living with a potential informal caregiver dramatically increased the hours of informal care utilized by Medicaid PCS beneficiaries.

Conclusions. More formal home care hours were not associated with fewer informal home care hours. These results imply that policies that decrease the availability of formal home care for Medicaid PCS beneficiaries will not be offset by an increase in the provision of informal care and may result in unmet care needs.

Key Words. Informal caregiving, formal care, home-health care, Medicaid, personal care services

Mounting political pressure in the 1980s and 1990s pushed state Medicaid programs to refine the focus of public long-term supports and services (LTSS) by including formal home and community-based care in public programs (Kitchener and Harrington 2004; Capitman et al. 2005). Community-based care programs were offered through a collection of policies known as Medicaid home and community-based services (HCBS). Personal care services

(PCS) provided under these programs assisted poor older adults and individuals with disabilities in performing activities of daily living (ADLs) in their own homes (Capitman et al. 2005) and, in some cases, reduced overall Medicaid LTC spending (Kaye, LaPlante, and Harrington 2009).

However, the expansion of HCBS programs and the growth of the population needing services resulted in an explosion of public HCBS spending, eventually outpacing increases in spending for institutional LTSS (Kaye et al. 2006). Home-health care services now constitute approximately one-third of all Medicaid long-term care expenditures (Houser, Fox-Grage, and Gibson 2009). Medicare and Medicaid paid approximately 80 percent of all home-health costs in 2008—amounting to an estimated \$52 billion in costs to the public programs of \$65 billion total home-health expenditures (Hartman et al. 2010).

Faced with increased public spending for HCBS programs, policy makers feared that family members were declining to provide informal care because of the availability of publically funded formal care services, which could exacerbate the issue of increasing costs for these public programs (Caughlin et al. 1992). The availability of public PCS combined with demographic phenomena such as the growing elderly population (Goulding, Rogers, and Smith 2003), the decline in family size (Zedlewski and McBride 1992), and women entering the workforce (Matthews, Werkner, and Delaney 1989) led policy analysts to conclude that the availability of caregivers and their willingness to provide care was declining (Tennstedt, Crawford, and McKinlay 1993) as family members substituted public care for the informal care of their elderly and disabled kin. The fear that formal services might be reducing informal care was bolstered by research supporting a substitutive relationship between formal and informal care, which points to the exchangeability of the two forms of care (Greene 1983; Pezzin, Kemper, and Reschovsky 1996; Van Houtven and Norton 2004; Rogero-Garcia, Prieto-floreis, and Rosenberg 2008).

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According to the Hierarchical-Compensatory Model suggested by Cantor and others (Cantor 1979, 1991; Cantor, Brennan, and Sainz 1994), formal and informal care can substitute for one another along a hierarchy of ordered preferences with primary family members given priority and professionals viewed as the option of last resort. This is akin to the substitutive model posited by Greene (1983), which implies an inverse relationship between formal and informal care—that is, the increase in use of one form of care results in a decrease in use of the other form of care. Van Houtven and Norton (2004) conceptualized a substitutive model based on health care decisions made by the caregiver (in their model, the child) and care receiver (the parent). These decisions were presented as a balancing act between the child and parent, with the child providing informal care after taking into account the parent's formal care utilization and vice versa. Research supports the idea that informal care can substitute for Medicaid long-term care, home-health care, paid domestic help, and skilled nursing care (Kemper 1992; Van Houtven and Norton 2004, 2008; Bolin, Lindgren, and Lundborg 2008; Bonsang 2009).

Other studies, however, suggest that care recipients need both forms of care simultaneously (Moscovice, Davidson, and McCaffrey 1988; Litwin and Attias-Donfut 2009), especially as levels of disability increase (Bonsang 2009). According to the Task-specific Theory championed by Litwak and others, formal and informal care has different structural characteristics and cannot function as substitutes (Litwak 1985; Litwak and Messeri 1989; Litwak, Messeri, and Silverstein 1990). These characteristics include proximity to caregivers, plus the caregivers' technical skill, commitment, and motivation. Individuals choose care providers based on a match between potential caregiver and the characteristics of the specific task with which assistance is needed. Accordingly, factors not related to the amount of formal care provided (such as proximity to an informal caregiver) are the best predictors of informal care utilization (Tennstedt, Crawford, and McKinlay 1993; Zhu et al. 2008). Within these models, formal and informal home care are complements. Each may enhance the other, but they cannot be treated as substitutes.

Understanding whether formal and informal care act as substitutes or complements is important. Currently, PCS are believed necessary for 10.9 million residents across the United States (Kaye, Harrington, and LaPlante 2010), with the expectation that this population needing services will continue to grow. As the payment structure for PCS moves away from a fee-for-service structure toward a prospective case mix model, payment may be based on estimations of beneficiary need rather than care use (Phillips et al. 2008). State

equations for allocation of formal care may then include the amount of informal care utilized to “adjust” the amount of formal care provided by public programs. If beneficiaries rely on formal and informal care simultaneously (and the two forms of care are complements), then adjusting formal care allocations based on the belief that informal services will increase to meet any shortfall may result in unmet needs. The lack of consistent findings concerning the nature of the relationship between informal and formal care necessitates further inquiries to assist policy makers in making informed decisions regarding formal care allocation.

The following cross-sectional analysis addressed this issue by examining data on informal care utilization in light of formal care hours authorized through a publicly funded (Medicaid) PCS program in Texas. This research juxtaposes the two competing hypotheses and provides an empirical investigation that should add weight to the potential validity of the hypothesis which finds support in these data. This research addressed three specific questions:

1. Is there any evidence of substitution of formal care for informal care?
2. Is there any evidence of a complementary relationship between formal and informal care?
3. What factors predict informal care utilization?

METHODS

Study Design

According to the basic economic theory of demand, the answer to the question of whether formal care and informal care are substitutes or complements is determined by the sign of the cross-price elasticity for formal and informal care. If a decrease in the unit price of formal care results in a decrease in informal care units used, the cross-price elasticity is positive, and formal and informal care are by definition substitutes. Conversely, if a decrease in the unit price of formal care results in an increase in informal care units used, the cross-price elasticity is negative, and formal and informal care are by definition complements.

Thus, at least conceptually, the question could be addressed by estimating a demand equation for informal care:

$$H_I = f(P_I, P_F, Y, D, X, u), \quad (1)$$

where H_I is the number of hours of informal care used, P_I is the unit price of informal care, P_F is the unit price of formal care, Y is “income” (measures of ability to pay), D is “disability” (measures of need for care), X is other factors affecting demand, and u is an error term. The sign of the estimated coefficient of P_F would indicate if informal and formal care are substitutes or complements.

Unfortunately, equation (1) cannot be estimated directly in the context of Medicaid PCS and informal care. The main reason is that the unit price variables are not easily measured (P_I) or are zero ($P_F = 0$ for Medicaid-authorized formal hours). Medicaid PCS beneficiaries could conceivably purchase additional formal care hours (at a unit price of P_F), but virtually never do so, given their low income.

Given these limitations, an alternative approach is to estimate the relationship between formal care hours used and informal care hours used:

$$H_I = f^*(H_F, Y, D, X, \epsilon_I), \quad (2)$$

where H_F is hours of formal care used, and ϵ_I is the error term for the informal care hours equation. Note that Medicaid PCS beneficiaries have no control over the Medicaid-authorized hours of formal care. Furthermore, Medicaid PCS beneficiaries always use all hours authorized, and never purchase additional formal care hours. Thus, H_F is always equal to Medicaid-authorized formal care hours and may be considered conceptually exogenous for the individual Medicaid PCS beneficiary.

However, the number of Medicaid-authorized hours is determined by a needs assessment, which relies on the extent of disability:

$$H_F = g(D, \epsilon_D), \quad (3)$$

where D refers to measured disability and ϵ_D refers to potential aspects of disability affecting authorized hours that are not measurable in the data. Note that the availability of informal care is not a criterion used to determine Medicaid-authorized formal care hours. Thus, the conventional concern that formal and informal care utilization is jointly determined (Van Houtven and Norton 2004) does not apply in this case. If the impact of any unobserved disability factors in ϵ_D on H_F is “small” enough to be ignorable, then H_F in equation (2) is exogenous, and its coefficient may be estimated using ordinary least-squares (OLS) regression. However, if ϵ_D is not ignorable, then H_F is correlated with the error term in the informal care hours model. The OLS-estimated coefficient of H_F would be biased in this case. An instrumental variable (IV) approach is used to address this possibility (see Instrumental Variables below).

Data

This study used data on a sample of adult, community-dwelling Medicaid PCS beneficiaries from four administrative regions in Texas who participated in a field test for the Community Care Assessment Tool (CCAT). The CCAT was developed to assess the personal care needs of Medicaid-eligible community-dwelling older adults and individuals with disability for the Texas Department of Disability and Aging Services (TDADS). Texas contains a total of 10 administrative regions, four of which were selected for data collection based on a purposive sampling methodology, whereby regions were selected for sampling if investigations indicated that the regions largely contained “typical” Medicaid PCS beneficiaries (Phillips et al. 2008).

The 2006 CCAT was used by the TDADS to obtain information on beneficiary characteristics, potential informal caregivers, and hours of informal care utilized (Phillips et al. 2008). State caseworkers completed the CCAT assessment for Medicaid PCS beneficiaries as part of their review of individuals receiving Texas Medicaid PCS in 2006 for TDADS.

The number of formal care hours authorized was obtained from the 2004–2005 Form 2060. The Form 2060 was the standard protocol prior to implementation of the CCAT in 2006. Data collected in 2004–2005 from in-person interviews by case managers using the Form 2060 were merged with the data from 2006.

There were 1,120 adult Medicaid PCS beneficiaries who participated in the CCAT field test. A total of 779 beneficiaries with a record of PCS hours received were retained for this analysis. Of those 779 PCS recipients, 308 were excluded for missing a record of care assessment using the Form 2060 in 2004–2005. The final sample contained 471 adults with complete CCAT and Form 2060 records. The restricted subject pool did not substantially differ from the original sample (Phillips et al. 2008).

Measurement

Dependent Variable. Hours of informal care utilized was the outcome of interest, and it represented the total number of hours of help with instrumental and basic activities of daily living (IADLs and ADLs) the beneficiary recalled receiving from unpaid helpers in the 3 days prior to the 2006 CCAT assessment. The total number of hours was rounded at the discretion of the caseworker and transformed to account for skewness using the square root of the original variable. Although time diaries are perhaps the most foolproof

means for ascertaining hours of informal care received, the recall method also provides valid information on informal care utilization (Bernard van den Berg 2006). Time diaries are expensive and time consuming and therefore impractical for large cross-sectional surveys. Recall methods are valid as long as recipients do not “double count” (Robinson 1985). We assumed that beneficiaries adjusted for this possibility of informal caregivers performing more than one care task at the same time because the CCAT instrument did not ask about assistance with specific ADLs or IADLs.

Independent Variables. The primary independent variable is the number of hours of formal care assigned to a beneficiary by his or her caseworker in the 2004–2005 Form 2060 assessment. This variable indicates the number of personal care hours authorized through TDADS for late 2004–2005.

Covariates. Beneficiary health status provided a proxy for care need and was measured through an ADL impairment scale, cognitive status, and bladder continence. A scale was created to reflect level of ADL impairment using 11 unstandardized items from the CCAT concerning beneficiary performance of ADL (bathing, transfer from bathtub or shower, personal hygiene, dressing upper body, dressing lower body, walking, wheeling, and locomotion outside of home, toilet transfer, toilet use, and eating). Each ADL category was coded from 0 to 6, with 0 indicating independence (needing no help or help less than three times in the past week) and 6 indicating total dependence, making the minimum score 0 and the maximum 66. The scale exhibited satisfactory internal consistency with a Cronbach's alpha of 0.87.

Cognitive status was measured through an item on the CCAT measuring cognitive independence for daily decision making. Beneficiaries were observed by caseworkers for performance level in making daily decisions concerning tasks of everyday living, and given a number designation based on level of decision making independence (independent, modified independent, mild impairment, moderate impairment, and severe impairment). This designation was transformed to a binary variable indicating cognitive independence or cognitive dependence due to irregular cell counts in the original variable. Bladder continence described control of urinary bladder function, with recipients described as either continent (complete control of bladder) or incontinent (problems with bladder control).

Recipient characteristics were included in the model to control for variance in informal care utilization based on age, gender, and ethnicity. Age is a potentially important predictor of care utilization, as limitations in

physical functioning in ADLs increase with age and ADL impairment is associated with increased risk for long-term services and supports utilization (Berg et al. 1997; Miller and Weisert 2000). Age was categorized into four categories (21–64, 65–74, 75–84, 85 and up) for age group comparisons. Informal caregiver arrangements can also differ based on ethnicity (Burton et al. 1995). As such, ethnicity (black, Hispanic, and white) was also included in the analysis.

Variables indicating the presence of potential informal caregivers were used to adjust for variance in the availability of informal care: recipient lives with spouse, or recipient lives with someone other than a spouse. No measures of access to potential caregivers not living with the recipient are available in the data. A number of variables relating to actual caregivers are available in data but were not used in the informal hours model due to a concern that they might be endogenous for informal care hours.

The data do not allow comprehensive measures of “ability to pay” for home-health services (e.g., from Social Security or pension income, savings, or monetary contributions from family or friends). Given that all Medicaid PCS customers have very low income and limited assets, adjustment for variation in “income” across individuals is probably unnecessary.

Beneficiaries were equally sampled within each region based on three need categories (strata)—light, moderate, and heavy need. Light-need individuals utilized minimal PCS, such as meals on wheels. Heavy-need individuals were potentially nursing home eligible, but community dwelling and using PCS. All other subjects were moderate need.

Instrumental Variables. Two IVs defined hours of formal care authorized by TDADS. Both IVs are measures of care need from the 2004–2005 Form 2060, and thus suspected to be correlated with the hours of formal care authorized for use. Although each IV is time-lagged (and thus “predetermined”), it is possible that they may correlated with the hours of informal care reported on the 2006 CCAT through unobservable variables related to disability affecting both formal and informal hours.

The first IV is the Form 2060 scale measuring level of impairment in ADLs; the second IV is also from the Form 2060 and is the scale measuring the level of impairment with IADLs. Several instruments were considered to affect hours of formal care authorized; lagged scores on the TDADS ADL scale and IADL scale were chosen as they passed the overidentification tests and were strongly correlated with formal care. The TDADS Form 2060 ADL

and IADL scales generated a summary score based on caseworker assessment of a beneficiary's capacity for self-care in nine areas associated with ADL and IADL: bathing, dressing, feeding, grooming, toileting, toilet hygiene, transferring, walking, and housework.

ANALYSIS

The regression approach used is based on equation (2), with informal care hours utilization as the dependent variable, with the independent variables being time-lagged hours of authorized formal care and additional covariates adjusting for measures of care need, access to potential informal caregivers, and beneficiary characteristics. Separate models were generated for both the OLS and IV regressions containing just informal and formal care use; care plus need; care use plus access to potential informal caregivers; use, access, and need for care; and finally the full model with use, access, need, and beneficiary characteristics.

To test the underlying assumptions of the IV analysis—that the instruments were both relevant (correlated with the endogenous variable) and valid (orthogonal to the disturbance)—the following analyses were performed (Baum, Schaffer, and Stillman 2003; Baum 2006). First, the instruments were regressed on the suspected endogenous variable to test the predictive value of the instruments and confirm their relevancy. Second, a test of over-identifying restrictions was conducted to determine if the instruments were uncorrelated with the disturbance (error term). If the instruments correlate with the error term, the IV regression produces inconsistent and inefficient estimates, and the model must be re-specified. Third, as more than one instrument was used, the instruments were (a) individually regressed and (b) regressed in groupings in the IV model to test for fluctuations. All analyses were performed using *STATA* 11.0 (College Station, TX). A parameter was considered statistically significant when $p \leq .05$.

RESULTS

Table 1 displays descriptive data for the study sample. The mean hours of informal care utilized was 10, with 13 percent of formal care users reporting no informal care hours. The mean hours of formal care utilized was 20. The plurality of beneficiaries in this sample were white (44 percent), and most

Table 1: Descriptive Statistics ($N = 471$)*

	Mean or Percent	Standard Deviation	Minimum	Maximum
Beneficiary characteristics (2006 CCAT and 2004–2005 Form 2060)				
Hours of informal care	10	14	0	91
No reported hours of informal care	13%			
Hours of formal care (2004–2005 Form 2060)	20	11	0	55
No authorized hours of formal care	2.5%			
Strata				
High need	36%	–		
Moderate need	58%	–		
Low need	6%	–		
Ethnicity				
White	44%	–		
Black	27%	–		
Hispanic	28%	–		
Age	70.6	–	23	101
21–64	32%	–		
65–74	19%	–		
75–84	29%	–		
85 and up	19%	–		
Female	70%	–		
Potential informal helpers				
Spouse (married)	16%	–		
Lives alone	48%	–		
Lives with spouse only	12%	–		
Lives with another individual (not spouse)	41%	–		
Cognitively impaired	48%	–		
Incontinent	54%	–		
ADL scale	25	15	0	66
Beneficiary characteristics (2004–2005 Form 2060)				
ADL scale	16	5	0	30
IADL scale	19	4	0	30

*All descriptive statistics are derived from the 2006 Community Care Assessment Tool (CCAT) intake or the 2004–2005 Form 2060.

were elderly (age 65+, 68 percent), female (70 percent), and exhibited a moderately high level of need for care (56 percent). The mean age was 70.6, with a range from 23 to 101. Most of the beneficiaries (53 percent) reported living with a spouse or someone other than a spouse. Slightly less than half of the study population was cognitively impaired (48 percent), and slightly more than half (54 percent) indicated some level of incontinence.

Table 2: IV Equation Dependent Variable = Hours of Formal Care Authorized

<i>Independent Variables</i>	<i>Coefficient</i>	<i>p</i>
IV: ADL score on Form 2060 (2004–2005)	7.61	.000
IV: IADL score on Form 2060 (2004–2005)	5.11	.000
Ethnicity		
Black	1.55	.062
Hispanic	2.08	.013
Strata		
High need	4.53	.003
Moderate need	0.14	.921
Age		
65–74	0.73	.468
75–84	1.66	.062
85 and up	2.15	.038
Female	0.34	.661
Married	–1.53	.328
Lives with spouse only	–2.44	.183
Lives with another (not spouse)	–3.32	.000
Cognitively impaired	–0.28	.711
Incontinent	0.81	.626
ADL scale on CCAT 2006	0.95	.003
Constant	–6.74	.003

Note. Omitted: ethnicity (white), strata (low need), age (23–64), and lives alone.

$N = 467$; $R^2 = 0.52$.

The F test for the IVs $F(2,450) = 77.56$.

Table 2 illustrates the first stage IV equation. In this equation, the dependent variable is the number of hours of formal care authorized by TDADS for the year 2006. The independent variables are all the exogenous variables included in the OLS model plus the two lagged IVs (2004–2005 Form 2060 ADL scale score and IADL scale score). The highly significant p values associated with the IVs (both $p < .001$) suggest a high correlation between the lagged ADL and IADL scores and formal care hours. The incremental F (2,454) was 75.5—well above the marker ($F > 10$) for strong IVs using a two-stage least-squares model—leading to a rejection of the null hypothesis of weak instrumentation (Baum 2006).

The overidentification restriction test statistics are not significantly different from zero, which suggests that the IVs are not strongly correlated with the error term in the model. The Sargan test statistic ($\chi^2 = 0.019$, $p = .890$) and the Bassman test ($\chi^2 = 0.018$, $p = .892$) were used as tests of overidentifying restrictions (Baum 2006). While this result may seem reassuring, it should be emphasized that the failure to reject the null hypothesis does not necessarily imply that the null hypothesis is “true” in this case.

Table 3: Comparison of Ordinary Least-Squares (OLS) and IV Estimation of Squared Total Informal Care Hours (*p* in parentheses)

<i>Independent Variables</i>	<i>OLS</i>	<i>IV</i>
Hours of formal care authorized (2004–2005)	0.006 (.565)	–
Predicted hours of formal care authorized (2004–2005)	–	0.027 (.145)
Ethnicity		
Black	–0.202 (.311)	–0.220 (.263)
Hispanic	0.274 (.172)	0.226 (.260)
Strata		
High need	0.558 (.124)	0.408 (.275)
Low need	0.588 (.085)	0.593 (.078)
Age		
65–74	0.204 (.390)	0.186 (.398)
75–84	0.299 (.163)	0.267 (.209)
85 and up	0.222 (.374)	0.231 (.330)
Female	0.128 (.186)	0.161 (.519)
Married	–0.230 (.538)	–0.224 (.545)
Lives with spouse only	1.399 (.002)	1.467 (.001)
Lives with another (not spouse)	1.185 (.000)	1.230 (.000)
Cognitively impaired	0.547 (.003)	0.563 (.002)
Incontinent	–0.035 (.366)	–0.047 (.351)
ADL scale (CCAT 2006)	0.205 (.003)	0.145 (.076)
Constant	0.189 (.634)	–0.004 (.992)
	$N = 467; R^2 = 0.20$	$N = 467; R^2 = 0.21$

Table 3 presents the estimates of hours of informal care using both the OLS (column 1) and IV models (column 2). The estimated coefficient of the hours of formal care authorized variable in both the OLS model and the IV model is quite small (0.006 and 0.022, respectively) and not statistically significant (although the IV point estimate of the coefficient is larger than the OLS point estimate). Together, the results suggest that the hours of formal care authorized does not significantly affect hours of informal care utilized in the study sample.

Results for other model covariates are generally similar for the OLS and IV models. Among the most important factors affecting informal hours were measures of need, namely cognitive impairment and ADL scale. Likewise, the availability of a live-in potential caregiver (spouse or nonspouse) was associated with greater use of informal hours. After adjusting for ADL scale and other measures of need, beneficiary age per se was not strongly associated with hours of informal care. Likewise, there were no statistically significant differences in informal care hours related to beneficiary race or ethnicity.

Table 4: Effect of Covariates on the Relationship between Informal and Formal Care. Outcome: Informal Care; Treatment: Formal Care

	<i>Formal Care Coefficients (OLS)</i>		<i>Formal Care Coefficients (IV)</i>	
	<i>Beta</i>	<i>St. Beta</i>	<i>Beta</i>	<i>St. Beta</i>
Formal care	0.029**	0.16	0.072**	0.39
Formal care + need	0.002	0.009	0.041*	0.22
Formal care + access	0.025**	0.14	0.045**	0.24
Formal care + access + need	0.007	0.041	0.025	0.13
Formal care + access + need + demographics	0.006	0.030	0.027	0.15

* $p < .05$.

** $p < .01$.

Table 4 illustrates changes in the estimated relationship between formal and informal care as the set of variables used for covariate adjustment in the model changes. When authorized formal care hours is included in the informal care hours model with no adjustment for covariates, its estimated coefficient is positive and statistically significant in both the OLS and IV models (0.029 and 0.072, respectively). However, this positive association could be spurious, given that the omitted beneficiary need variables affect both formal and informal care hours. Indeed, when the informal care model adjusts for measures of need, in the OLS model, the point estimate of formal care hours is small (0.002) and not statistically significant. In the IV model, the magnitude of the point estimate for the coefficient for formal hours is reduced when the need covariates are added to the model (from 0.72 to 0.41), but the association remains statistically significant.

Adding measures of potential informal caregivers alone to formal care hours in the informal care hours model barely affects the point estimate of formal hours in the OLS model, but it reduces the point estimate from 0.072 to 0.045 in the IV model. Adding measures of need and measures of access to potential caregivers reduces the magnitude of the point estimate of the formal hours coefficient in both the OLS and IV models (0.007 and 0.025, respectively) and renders both statistically insignificant. Finally, adding the beneficiary demographic covariates to the measures of need and measures of access to potential informal caregivers has no impact on the estimated effect of authorized formal hours on informal care hours used. In addition, the overall influence of hours of formal care authorized on hours of informal care utilized (as measured using standardized beta coefficients) is halved (from 0.16 to 0.09 in the OLS model and 0.39 to 0.15 in the IV model) once need, access to potential

caregivers, and demographics are taken into account, with the largest reductions associated with the need, access, and the combination of need and access.

DISCUSSION

The study findings indicated that factors associated with the need for care and the availability of potential informal caregivers carry the heaviest impact on informal care utilization (adjusted for formal care hours and beneficiary characteristics). The overwhelming importance of access to informal caregivers and care need suggested a limited role of publically funded formal care in informal care decisions in this population.

Perhaps the most important finding was the absence of any evidence that beneficiaries and caregivers would reduce the amount of informal care provided based on an increase in the amount of “free” Medicaid formal care available to them. Study results suggested that, if any relationship exists between these two types of care, the hours of informal care utilized increased as the number of formal care hours increased. Such results tend to provide support for a task-specific conceptual perspective in which the amounts of informal and formal care are provided with little or no consideration for each other. For policy makers or program administrators involved in the Medicaid program, promoting long-term care cost containment through decreasing formal care allocations, based on the assumption that informal care will “take up any slack,” may serve neither recipients nor programs well. We find no evidence that informal caregivers calibrate their hours of effort based on what the Medicaid program is, or is not, doing to help the one for whom they care.

These results differ from those produced in some earlier works (Kemper 1992; Van Houtven and Norton 2004, 2008; Bolin, Lindgren, and Lundborg 2008; Bonsang 2009). These differences derive from a variety of factors. Earlier studies asked different questions about different populations. None of these studies investigated the relationship between the amount of informal and formal care in a sample where all sample members were low income, mostly older adults, and receiving formal home care through a government program for the poor. Often, these earlier studies simply evaluated the effect of informal care on using any paid care, and not the relationship among the amounts of care received.

Bolin, Lindgren, and Lundborg (2008) looked at a general community-dwelling population of older adults, of whom only 14 percent used home care. In addition, their analysis investigated only whether informal care had any

effect on the use of any paid home care services. They did not investigate, as this research did, the relationship between the amount of formal and informal care.

In Bonsang's work (2009), only 9 percent of the sample used home care. Like Bolin and colleagues, the results indicated that the amount of informal care was negatively related to the use of any paid domestic services. Bonsang did evaluate the relationship between the amount of informal care and paid care. The relationship between informal and formal care was positive in a two-stage least-squares model treating informal care as endogenous, but the association was not statistically significant.

Van Houtven and Norton's (2004) work investigated both the effect of informal care on any home care use and the amount of home care use. In both instances, after adjusting for endogeneity, they found that more informal care meant less formal care. In their sample, 8 percent used home care, and 16 percent received Medicaid services. Their work in 2008 (Van Houtven and Norton) focused solely on Medicare expenditures for home care, which is not a long-term care program among beneficiaries who averaged just over 4 hours of home care per week, a rather limited number of hours of care.

In contrast to these works, this effort directly addressed the policy issue of whether the amount of Medicaid PCS provided to adults affected the amount of informal care received. Our results do not support the notion that when Medicaid agencies provide home care services, informal caregivers respond by reducing their care commitments. As one type of care increases, so does the other, mainly because the need for care may drive both forms of care. Formal caregivers may take over tasks from informal caregivers, but there are always more tasks that need to be done and different tasks that need attention as the beneficiary's needs change. Thus, the results indicate that Medicaid policy makers need not be overly concerned about a potential adverse effect of expanded coverage for formal care on the level of informal care available to adults and older persons.

A number of empirical limitations affected the applicability of the study findings. The inherent nature of the study design, as a largely cross-sectional analysis, precludes any strong conclusions on causality. In particular, as noted, both formal care and informal care are related to the underlying need for care. Although the multivariate model we employed included adjustments for several measures of need, it is possible that variation in unmeasured aspects of need could result in a spurious positive correlation between informal care hours and formal care hours, and that the IV approach used was not sufficient to ameliorate the potential spurious correlation.

Generalizing to the U.S. population is also problematic because the sample is limited to Medicaid PCS beneficiaries in one state (Texas). Furthermore, this analysis did not take into account certain beneficiary characteristics that may influence informal care utilization, such as education or any variations in socioeconomic status.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

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