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The relationship between Medicaid policy and realized access to home- and community-based services

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ABSTRACT

Medicaid funding for home- and community-based services (HCBS) has increased substantially in recent decades. Prior research has investigated the effects of this expansion on outcomes for individuals as well as costs to Medicaid, often using state policy as a proxy for access to HCBS or implicitly assuming that more generous policies affect outcomes through access, an assumption that may not hold. In this study, using survey data linked to Medicaid claims, we assess the extent to which common measures of state Medicaid HCBS generosity correspond to increased individual use of HCBS among older adults with potential needs. We find several measures to have strong predictive power, but only with relatively large changes in policy generosity. Our findings imply that increased funding of HCBS is not sufficient to ensure access to services and that researchers should be careful when using state policy generosity as a proxy for access.

Introduction

Demographic trends point to a growing need for long-term services and supports (LTSS) in the coming decades (CDC, 2003). LTSS includes assistance with functional and/or cognitive impairment provided in institutions such as nursing homes, in the community, or at home, through family care or paid services. Medicaid plays an outsized role in funding these paid services and enabling access to them for low-income individuals or middle-income individuals who have exhausted their savings. Individuals using LTSS account for only 6% of Medicaid recipients but 43% of Medicaid spending (Kaiser Family Foundation, 2013). Thus, state Medicaid programs have both a strong interest in efficient use of funds and substantial influence on access to care.

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In recent years, policymakers have been increasingly interested in expanding access to LTSS in home- and community-based settings as opposed to institutions, and much of this interest focuses on Medicaid policy, given Medicaid's dominant role. The momentum behind shifting LTSS away from institutions means that a growing number of Medicaid recipients receive LTSS in the form of home- and community-based services (HCBS). In 1990, 87% of Medicaid spending on long-term services and supports went to institutional care; today, more than half goes to HCBS (Eiken, Sredl, Burwell, & Saucier, 2016). This shift is consistent with growing acknowledgment that most beneficiaries prefer to age in place and receive services at home (Wolff, Kasper, & Shore, 2008).

Medicaid coverage of HCBS has increased through additions to state plan services and through waivers of parts of the Social Security Act that established Medicaid. State plan HCBS includes mandatory services (all states must offer them) and optional services (offered at states' discretion). States may offer multiple HCBS waiver plans. The majority of HCBS waivers are Section 1915(c) waivers, which allow states to provide long-term services and supports through HCBS as long as costs do not exceed those under nursing home care. Typical HCBS services might include personal care, targeted case management, adult day care, durable medical equipment, and transportation services. Services offered through waivers can be limited to individual counties, and the number of slots can be capped; thus, while HCBS has expanded dramatically over the past few decades on average, there is substantial variation in the extent of offerings between states and counties as well as over time.

A substantial research literature has attempted to determine the effects of this HCBS expansion on a variety of outcomes for individuals as well as costs to Medicaid. Many studies use state policy as a proxy for access to HCBS or implicitly assume that more generous state policies affect outcomes through access (Fabius, Okoye, Mulcahy, Burgdorf, & Wolff, 2022; Kitchener, Carrillo, & Harrington, 2003; Muramatsu et al., 2007; Segelman, Intrator, Li, Mukamel, & Temkin-Greener, 2019; Wang, Temkin-Greener, Simning, Konetzka, & Cai, 2021; Wang, Yan, Temkin-Greener, & Cai, 2021). Many of the metrics for state HCBS generosity are flawed or imperfect. For example, the commonly used "percent of state LTSS spending that goes to HCBS" does not take into account the underlying sickness or age of LTSS participants, a flaw that applies to most of the measures. It also depends on nursing home payment rates; states that pay nursing homes less (perhaps resulting in lower quality) would automatically perform better on this measure relative to states with equal spending on HCBS but higher nursing home rates. Several other measures may reflect limited aspects of access; for example, measures of the number of HCBS participants ignore whether those participants have adequate intensity of services, whereas measures of spending per participant reflect intensity of

services but ignore how many people are using any services (Gonçalves, Weaver, & Konetzka, 2018). Measures that capture the number of people on signal of lack of access, but because states differ widely in whether and how they use waitlists, comparisons across states may not be meaningful. Finally, substantial research and policy interest has focused on HCBS waivers as a proxy for access, but the number of HCBS waiver slots may not give a clear signal when states provide similar services through their state plans. For example, by 2005 nearly all states offered home health therapies and case management through their state plans and more than half of HCBS users used only state plan services (Agency for Healthcare Research and Quality, 2012). By 2020, 36 states offered personal care through their state plans (Congressional Research Service, 2022). At the individual level, in 2019, only 22% of all Medicaid HCBS users accessed these services through 1915(c) waivers (Kim, Weizenegger, & Wysocki, 2022). This suggests that relying solely on participation in HCBS waivers as an indicator of access to HCBS may be limited.

In addition to the limitations of the metrics themselves, another reason to question whether the generosity of state HCBS policies can be used as a proxy for access is that policy is only one of many factors determining access. The existence of generous state policies cannot guarantee that potential beneficiaries find out about services, have adequate supply of services where they live, are able to identify providers, and are able to navigate enrollment for Medicaid and for particular services (Borck, Peebles, Miller, & Schmitz, 2014; Kitchener, Ng, & Harrington, 2007; Shirk, 2006; Siconolfi et al., 2019). A key limitation of most studies of Medicaid HCBS generosity is that they cannot test the validity of the generosity measures as proxies for true access to care. In other words, it is not clear whether and to what extent more generous funding of HCBS translates into actual higher use of HCBS at an individual level.

Additional limitations of current studies of HCBS generosity involve the tradeoffs inherent in data sets used. Studies that use claims data can accurately identify Medicaid enrollment and HCBS use among Medicaid recipients but cannot provide population-based estimates and cannot account for key family structure variables such as whether or not the care recipient lives alone (Robinson, Menne, & Gaeta, 2021). Studies that use survey data can incorporate family structure and generate population-based estimates, but measures of HCBS use and even Medicaid enrollment tend to be much less precise and subject to reliability issues (Mellor, McInerney, & Sabik, 2021). Given current data sources, these limitations can be addressed only through the use of survey data linked to claims.

Our goal in this study is to assess the extent to which different measures of Medicaid HCBS generosity correspond to increased use of HCBS services among people with LTSS needs. From a beneficiary perspective, state policy generosity means little unless services are available and can be accessed to meet

LTSS needs at the time the services are needed at the individual level. We do not propose new measures, but rather test measures that have appeared in the literature and are available in commonly used data sources. Specifically, we examine the association between the generosity of state Medicaid policies for home- and community-based LTSS and the probability that an individual will use Medicaid-funded HCBS services. Using survey data linked to Medicaid claims, we furthermore test whether the associations are stronger for individuals living alone relative to those living with others.

Methods

Our overall approach is to use multivariable regression analysis to examine the association between common state-level measures of HCBS generosity and individual-level HCBS use.

Data and sample

We use restricted Health and Retirement Study (HRS) data with state identifiers, linked at the individual level with Medicare and Medicaid claims. The HRS is a nationally representative, longitudinal study of persons over age 50 (Health and Retirement Study, 2018). Once they enter the study, respondents are interviewed every 2 years. Linked Medicaid and Medicare data are available for the subset (more than 80%) of HRS respondents who consented to have their claims data released. We use the version of the HRS available in the RAND longitudinal files, which provide uniform variable names across years and imputations of income when missing in the original files (RAND HRS Longitudinal File, 2018). For variables not included in RAND longitudinal files (whether the respondent has a daughter and whether the respondent has a child living nearby), we merged variables from the biennial HRS core data with the RAND longitudinal data.

   We use data from waves 8 to 11 (2006–2012) of all cohorts. We chose these years because 1) many seminal studies of HCBS generosity were published during these years, and 2) identification of HCBS use in Medicaid claims was straightforward during these years. (Identification of HCBS use became less systematic in subsequent years when the Medicaid data were transformed from the MAX system to the TAF system.) We excluded states with statewide Medicaid managed care programs that include HCBS (AZ, DE, HI, RI, TN, VT), as encounter records for HCBS typically do not exist in the data. Individuals with Medicare Advantage were retained, as long as they were not enrolled in Medicaid managed care. We treat the sample as a pooled (not longitudinal) sample, with some individuals appearing in multiple waves.

   To focus on the main population of interest, we made several exclusions at the individual level. First, as our focus is on older adults, we limited the sample

to respondents age 65 and older. Second, because HCBS generosity is only relevant for individuals who might need such assistance, we study the subset of HRS respondents with a potential need for HCBS. Specifically, using data on functional status from the HRS as a proxy for need, we limit our sample to respondents reporting that they need assistance with at least two Activities of Daily Living (ADL) or Instrumental Activities of Daily Living (IADL).

Among these older adults in need of assistance, we create a subsample of respondents who are enrolled in Medicaid or show evidence of using Medicaid services, identified through the linked Medicaid claims data. This is the population to whom state-level measures of HCBS generosity should be most directly relevant. However, Medicaid enrollment itself is somewhat endogenous in that people may enroll in order to receive HCBS, and this incentive to enroll may be stronger in states with more generous policies. For example, if an individual of low income finds themselves in need of LTSS services and is interested in receiving HCBS, she may decide to enroll in Medicaid if she lives in a state with generous HCBS benefits. However, if that same individual lives in a state with less generous HCBS benefits, she may not bother to enroll in Medicaid. Thus, we create a second subsample of respondents who are in the bottom third of the income distribution, based on the wave-specific income distribution, as these individuals include both Medicaid enrollees and prospective Medicaid enrollees (Brown, Coe, & Finkelstein, 2007). This low-income category is a rough proxy for potential Medicaid eligibility should a beneficiary's spending eventually exceed their resources; actual eligibility varies by state and would also take wealth into account. The analysis of the Medicaid subsample essentially answers the question "Does state HCBS policy predict use of HCBS among Medicaid enrollees?" whereas analysis of the low-income sample answers "Does state HCBS policy predict use of HCBS among Medicaid enrollees or those who might become Medicaid enrollees?" We conduct all analyses separately for these two samples. Finally, because HCBS policies have been shown to be more relevant for individuals who live alone and therefore may have less access to family caregivers (Robinson, Menne, & Gaeta, 2021) we further stratify our results by whether or not an individual lives alone, based on HRS data.

Key measures

The main dependent variable in our analyses is HCBS use at an individual-wave level. To define HCBS use in the Medicaid claims, we use the Medicaid Community Long-Term Care (CLTC) codes, which were available in Medicaid claims during our study period (but no longer available in TAF data), and/or enrollment in a 1915(c) waiver. The CLTC codes capture whether a provided service qualifies as HCBS, including services provided under waivers and services provided under the state plan. Any respondent

with at least one HCBS claim in our data is coded as having used HCBS in that wave. If a respondent's sole use of HCBS was for transportation, we did not classify the respondent as an HCBS user, given conceptual ambiguity about whether transportation alone qualifies as HCBS.

Our key independent variable is Medicaid HCBS generosity, which we measure in multiple ways and test separately. These include measures of spending, utilization, wait lists, and waiver slots. We standardize each Medicaid HCBS generosity variable by converting it to z-scores for use in our regressions so that they are on the same scale for comparison to each other. Table 1 describes our measures, selected with regard to data availability and prior use in the literature.

Our control variables include demographics and factors that may influence the propensity to use Medicaid-funded HCBS either due to health status or due to potential family substitutes for paid formal care, all drawn from HRS: age, gender, race, ethnicity, marital status, number of ADLs and IADLs, whether the respondent has a daughter, and whether the respondent has a child living within 10 miles. For our sample selection based on income, we use RAND-calculated variables for income (RAND HRS Longitudinal File, 2018). We also control for the number of nursing homes and the number of nursing home beds per capita in each state, drawn from the National Center for Health Statistics (National Center for Health Statistics, 2017) and linked at the state level, as a proxy for relevant resources and alternatives.

Analysis

Because our HCBS utilization outcome is binary, we run logit regressions of individual-level HCBS use on state-level Medicaid generosity, including the control variables listed above and indicators for survey wave. In all analyses, we accounted for the complex survey design of the HRS, which includes using strata and primary sample unit adjustments to correct for the non-independent, non-identically-distributed standard errors. In some of the smallest subsamples, it was necessary to combine adjacent strata. Our preferred models also use HRS-given sampling weights (rwtresp) to account for unequal probability of appearing in the sample resulting from the HRS sampling strategy. For transparency, we present both the weighted and unweighted results for all regressions.

Results

Our sample consists of 2,059 person-wave observations (on 1,107 unique individuals) in the Medicaid sample and 4,438 observations (on 2,632 unique individuals) in the low-income sample, which includes Medicaid enrollees but also other low-income individuals. Table 2 describes the characteristics of the

Table 1. Definitions and sources of measures of HCBS generosity.

Variables	Numerator	Numerator source	Denominator	Denominator source
HCBS spending				
Percent of state LTSS spending that goes to HCBS Mean: 44 Std Dev: 13	This variable is directly reported in the data source	Improving the Balance: The Evolution of Medicaid Expenditures for Long-Term Services and Supports (LTSS), FY 1981–2014; Table [State Number] A-2 Long Term Services and Support Percentages for [State] Truven Health Analytics	NA	NA
HCBS spending per participant Mean: $16886 Std Dev: $6443	This variable is directly reported in the data source	KFF annual report on Medicaid Home and Community Based Services Waivers; Table 3A: *Total Medicaid HCBS Average Expenditures Per Person Served, by State*	NA	NA
HCBS Spending per capita among 65+ population Mean: $629.63 Std Dev: $499.10	Total HCBS spending for Aged/Disabled group	Improving the Balance: The Evolution of Medicaid Expenditures for Long-Term Services and Supports (LTSS), FY 1981–2014; Table [State] A-1. Long Term Services and Support Expenditures	65+ population	Census data
HCBS participation				
HCBS participants as a percent of Population Mean: 1.0 Std Dev: 0.4	Total Medicaid HCBS Participants, by State (includes Medicaid home health state plan services, Medicaid personal care state plan services, and Medicaid § 1915(c) HCBS waivers)	KFF annual report on Medicaid Home and Community Based Services Waivers; Table 1A: Total Medicaid HCBS Participants, by State	Total State Population	Census data
HCBS participants as a percent of Medicaid population Mean: 5 Std Dev: 2	Total Medicaid HCBS Participants, by State (includes Medicaid home health state plan services, Medicaid personal care state plan services, and Medicaid § 1915(c) HCBS waivers)	KFF annual report on Medicaid Home and Community Based Services Waivers; Table 1A: Total Medicaid HCBS Participants, by State	Number of Medicaid Enrollees	For 2006, 2008, 2010: CMS MSIS Tables; Table 01 - Fiscal Year 2006 Medicaid Eligibles, Beneficiaries, and Payments For 2012: MACStats: Medicaid and CHIP Data Book; Exhibit 14 Medicaid Enrollment by State, Eligibility Group, and Dually Eligible Status
Other HCBS policies				
Number of people on waitlist for HCBS Aged/Aged +Disabled per Population 65+ Mean: 0.003 Std Dev: 0.008	Waiting List Enrollment for Medicaid 1915 (c)	KFF annual report on Medicaid Home and Community Based Services Waivers From: Table 11: Waiting Lists for Medicaid § 1915(c) HCBS Waivers, by State and by Enrollment Group	65+ population	Census data
Waiver slots targeting A/AD as per Population 65+ Mean: 0.03 Std Dev: 0.02	Annual number of slots targeting Aged/ AD	1915(c) waiver applications (hand collected)	65+ population	Census data

Table 2. Summary of the analysis sample.

Total ADLs+IADLs	Medicaid Population (N = 2059)	Bottom 1/3 Income Distribution (N = 4438)
	Mean (Std. Dev.) or Percent	Mean (Std. Dev.) or Percent
2	19.18	23.59
3	14.23	15.93
4	12.24	12.78
5	9.62	9.98
6	9.13	8.68
7	7.92	7.28
8	8.01	6.56
9	9.23	6.67
10	1.44	8.54
Age	79.54 (8.81)	80.59 (8.69)
Gender		
Male	27.54	26.45
Female	72.46	73.55
Race/Ethnicity		
White non-Hispanic	5.90	57.66
Black non-Hispanic	26.23	24.16
Hispanic	2.40	16.02
Other non-Hispanic	2.48	2.16
Marital Status		
Not Married or Partnered	71.78	77.02
Married or Partnered	28.22	22.98
Has any daughters		
No	14.04	14.33
Yes	85.96	85.67
Resident child or child living within 10 miles		
No	24.04	23.64
Yes	75.96	76.36
Lives alone		
No	56.05	52.91
Yes	43.95	47.09
Nursing Home Beds Per Capita (65 plus)	.045 (.014)	.044 (.013)
Nursing Homes per Capita (65 plus)	0 (0)	0 (0)
HCBS Use (Outcome)		
No	52.45	79.22
Yes	47.55	20.78

Note: The Medicaid sample includes 1,107 unique individuals, some present in multiple waves. The Bottom 1/3 Income Distribution sample includes 2,632 unique individuals, some present in multiple waves.

samples. The Medicaid sample is somewhat more functionally impaired, with a higher concentration of people needing extensive functional assistance. The Medicaid sample also has higher proportions of Black and Hispanic people, a higher proportion of married individuals, and a lower proportion living alone. Both samples are almost three-quarters female and are equally likely to have a daughter and to have a co-resident child or a child living nearby. Not surprisingly, the Medicaid sample exhibits a substantially higher likelihood of HCBS use.

We report unadjusted regression results in appendix Table A1, and correlations among all our HCBS generosity measures and among control variables in appendix Tables A2–A4. In general, the HCBS generosity measures are not highly correlated with each other. The exception is that Total HCBS Spending

Table 3. Main results of regressions of HCBS use on HCBS generosity measures.

Main Independent Variable	Medicaid Sample				Bottom 1/3 Income Distribution Sample			
	Weighted		Unweighted		Weighted		Unweighted	
	Coefficient	N	Coefficient	N	Coefficient	N	Coefficient	N
Percent of LTSS Spending that goes to HCBS	0.065** (0.025)	2,059	0.049*** (0.013)	2,059	0.009 (0.016)	4,438	0.024*** −0.008	4,438
HCBS Spending per Participant	−0.000 (0.021)	2,059	−0.023** (0.011)	2,059	−0.015 (0.012)	4,438	−0.018*** −0.006	4,438
HCBS Spending Per Capita among 65+ Population	0.086*** (0.019)	2,059	0.060*** (0.011)	2,059	0.024** (0.012)	4,438	0.029*** −0.006	4,438
HCBS Participants as a Percent of Total State Population	0.078*** (0.016)	2,059	0.061*** (0.010)	2,059	0.027** (0.011)	4,438	0.033*** −0.006	4,438
HCBS Participants as a Percent of Total Medicaid Population	0.055*** (0.020)	2,059	0.042*** (0.012)	2,059	0.011 (0.012)	4,438	0.020*** −0.007	4,438
Number of people on waitlist for HCBS Aged/Aged+Disabled per Population 65+	−0.031 (0.024)	1,920	−0.034*** (0.010)	1,920	−0.005 (0.012)	4,157	−0.011* −0.006	4,157
Waiver Slots Targeting A/AD per Population 65+	−0.013 (0.024)	641	0.029 (0.023)	645	0.018 (0.016)	1,498	0.032** −0.013	1,498

Notes: Standard errors in parentheses.
***$p < .01$, **$p < .05$, *$p < .1$.
HCBS=Medicaid Home- and Community-Based Services.

per Capita has a .71 correlation with Total HCBS Participants as a Percent of the Total State Population.

Multivariable regressions reveal statistically significant but small associations between some measures of state HCBS generosity and the individual probability of HCBS use, as shown in Table 3. In the Medicaid (weighted) sample, a one standard deviation increase in many of the HCBS spending and participation measures of state policy generosity is associated with approximately a 5–9%-point higher individual probability of HCBS use. These include *Percent of LTSS Spending that goes to HCBS*, *Total HCBS Spending Per Capita among the 65+ Population*, *HCBS Participants as a Percent of Total State Population*, and *HCBS Participants as a Percent of Total Medicaid Population*. The exception is HCBS spending per participant, which does not have a significant association. Similarly, the waiver-related generosity measures (wait lists and waiver slots) exhibit very small and nonsignificant associations with HCBS use. The unweighted results are not dramatically different, providing reassurance that the probability weights are not causing instability in our sample.

The right-hand section of Table 3 shows results for the sample of respondents in the bottom third of the income distribution, whether or not they report being enrolled in Medicaid or have Medicaid claims. In general, these results are attenuated relative to the Medicaid sample and most lose statistical significance. The strongest generosity measure in this sample is *HCBS Participants as a Percent of Total State Population*, where

Table 4. Results of regressions of HCBS use on HCBS generosity measures among older adults living alone.

Main Independent Variable	Medicaid Sample				Bottom 1/3 Income Distribution Sample			
	Lives Alone Weighted		Lives Alone Unweighted		Lives Alone Weighted		Lives Alone Unweighted	
	Coefficient	N	Coefficient	N	Coefficient	N	Coefficient	N
Percent of LTSS Spending that goes to HCBS	0.060* (0.034)	895	0.062*** (0.019)	905	−0.001 (0.020)	2,090	0.027** (0.011)	2,090
HCBS Spending per Participant	−0.019 (0.031)	895	−0.039** (0.016)	905	−0.028 (0.017)	2,090	−0.031*** (0.009)	2,090
HCBS Spending Per Capita among 65 + Population	0.094*** (0.029)	895	0.064*** (0.016)	905	0.022 (0.016)	2,090	0.028*** (0.008)	2,090
HCBS Participants as a Percent of Total State Population	0.104*** (0.023)	895	0.079*** (0.014)	905	0.031** (0.015)	2,090	0.040*** (0.008)	2,090
HCBS Participants as a Percent of Total Medicaid Population	0.086*** (0.028)	895	0.066*** (0.017)	905	0.019 (0.017)	2,090	0.032*** (0.009)	2,090
Number of people on waitlist for HCBS Aged/Aged+Disabled per Population 65+	−0.023 (0.028)	836	−0.030** (0.014)	848	−0.006 (0.015)	1,958	−0.008 (0.008)	1,958
Waiver Slots Targeting A/AD per Population 65+	−0.046 (0.035)	265	0.020 (0.036)	278	0 (0.024)	713	0.012 (0.019)	716

Notes: Standard errors in parentheses.
*** $p < .01$, ** $p < .05$, * $p < .1$.
HCBS=Medicaid Home- and Community-Based Services.

a one standard deviation increase is significantly associated with a 2.7%-point increase in the probability of individual HCBS use (weighted regressions). A slightly smaller but similar association is found for HCBS spending per capita among the 65+ population.

Table 4 shows the results for the same analyses, but among the subset of respondents who live alone. As expected, the associations with HCBS use are somewhat larger, as this population is less likely to have family caregivers as an alternative to Medicaid-funded care. For example, a one standard deviation increase in *HCBS Participants as a Percent of Total State Population* is associated with a 10%-point increase in the probability of HCBS use among people living alone. Consistent with the broader sample, the waiver-related state generosity measures do not exhibit associations with HCBS use even in this sample. Also, consistent with the broader sample, the associations are attenuated and mostly nonsignificant in the low-income sample.

Discussion

Our findings indicate that not all measures of state HCBS generosity have a significant association with the probability of HCBS use on an individual level. When there is a significant association, it is generally modest in magnitude from the perspective of an individual beneficiary, given that our estimates are for people already enrolled in Medicaid or plausibly eligible for Medicaid. The associations between Medicaid HCBS generosity and HCBS use are

naturally stronger in the population enrolled in Medicaid, relative to a sample of low-income individuals where income serves as a proxy for potential Medicaid enrollment. Though the associations are larger for older adults enrolled in Medicaid who live alone and are therefore less likely to have unpaid alternatives to HCBS, they are still modest in magnitude at the individual level. Of course, small effects at an individual level can still represent a meaningful change when applied to the entire population of individuals in need of LTSS.

Overall, the strongest state-level predictor of individual HCBS use among these commonly used measures is *HCBS Participants as a Percent of Total State Population*, where a one-standard-deviation increase in this measure predicts a 10% point increase in the probability of receiving HCBS among Medicaid-enrolled older adults living alone. However, given that the mean of this measure is just 1% and the standard deviation 0.4, a one-standard-deviation increase amounts to a 40% increase in HCBS participants statewide. This is 40% increase in HCBS use as a proportion of the entire state population constitutes a sizable policy change that would be needed to result in the predicted 10%-point increase in HCBS use. Among Medicaid enrollees not living alone, there is almost an 8%-point increased probability of HCBS use corresponding to this sizable policy change.

The next set of generosity measures with significant coefficients in the Medicaid sample are *HCBS Spending Per Capita among 65+ Population* and *HCBS Participants as a Percent of Total Medicaid Population*. A one-standard-deviation increase in the spending measure corresponds to an 80% increase in spending per capita that would be required to produce a 9%-point increased probability of receiving HCBS for a Medicaid-enrolled individual living alone. A one-standard-deviation increase in the participants measure corresponds to a 40% increase in participants per Medicaid enrollee that would be required to produce a 9%-point increased probability of receiving HCBS for a Medicaid-enrolled individual living alone. The magnitudes are attenuated somewhat for Medicaid enrollees not living alone.

The final state generosity measure that is significantly associated with individual probability of HCBS use is *Percent of LTSS Spending that goes to HCBS*, perhaps the most commonly used measure. For this measure, one-standard-deviation increase corresponds to a 30% increase in percent of LTSS spending going to HCBS that would be required to produce a 7%-point increased probability of receiving HCBS for a Medicaid-enrolled individual living alone (6% points for Medicaid enrollees not living alone). A 30% increase in percent of LTSS spending going to HCBS is within the realm of what some states have achieved over the past decade or two.

These results have several implications for HCBS policy and related research. In terms of policy, these findings underscore the fact that simply funding services may not ensure access to those services. Access also requires that older adults in need of LTSS find out about services, have adequate supply

of services where they live, to identify providers, and navigate enrollment for Medicaid and for particular services (Borck, Peebles, Miller, & Schmitz, 2014; Kitchener, Ng, & Harrington, 2007; Shirk, 2006; Siconolfi et al., 2019). Simply allowing Medicaid payment for such services is not enough, and other policy efforts to ensure access may be needed. These additional efforts might include adequate funding and staffing and advertising of helplines, assistance with enrollment, case management, and multifaceted policies to improve provider supply. At the same time, our results imply that policy efforts to expand access to HCBS have made a difference at the individual level. This is best reflected in the measure of *Percent of LTSS Spending that goes to HCBS*, where realistic increases of 30% over time are associated with a 6–7% point increase in an individual using HCBS. This increment represents a meaningful change to beneficiaries as well as to the LTSS population as a whole.

In terms of research, our findings underscore the fact that state HCBS generosity, as typically measured, may be a blunt and fairly weak signal for access to HCBS at an individual level unless one is studying very large policy changes. Depending on data availability to each researcher, the generosity measures associated with the strongest predictive power, and therefore recommended, are *HCBS Participants as a Percent of Total State Population*, *HCBS Spending Per Capita among 65+ Population*; *HCBS Participants as a Percent of Total Medicaid Population; and Percent of LTSS Spending that goes to HCBS*. Still, these measures should be used with caution and acknowledgment that null results may be a product of this weak signal, especially if studying small increments in these measures. The challenge is exacerbated if researchers study low-income populations as potential Medicaid enrollees because of lack of data, to avoid the endogeneity of actual Medicaid enrollment, or to avoid measurement error in reported Medicaid enrollment (Mellor, McInerney, & Sabik, 2021). The fact that the associations are stronger for individuals who live alone indicates that the inclusion of survey data to account for family structure in studies of HCBS can be important and helpful, though the general similarity of estimates does not raise red flags for research that uses claims data alone.

Finally, it is of note that several potential measures of Medicaid HCBS generosity – the state-level number of people on waiting lists for waiver services or the per capita number of approved waiver slots for AD – show no association at all with actual HCBS use. This is likely due to substantial variation in state strategies for funding HCBS. States that have more waiver slots may prefer the use of waivers (which can be capped) to including services in the state plan (which then become entitlements), but other states may use both in tandem to expand services. Thus, it is not clear whether more waiver slots consistently reflect generosity. Similarly, state policies vary significantly in whether

waiting lists are used and whether eligibility for services is assessed before individuals are added to the waiting list. Thus, there is likely very little meaning across states in the number of people on waiting lists. These two measures are therefore not recommended as proxies for HCBS generosity across states.

Interest in HCBS continues to grow among both policymakers and researchers, consistent with strong consumer interest in care models that allow aging to be in place and avoidance of institutionalization. To accurately assess the costs and benefits of HCBS expansions, accurately capturing HCBS generosity is critical. Our research shows that some measures of state HCBS generosity are better than others as proxies for access, but that overall it is better to use individual-level data on access to care when possible. Depending on data availability, future research may be able to refine and improve measures that capture key aspects of state policy in funding and ensuring access to HCBS.

Disclosure statement

Funding

Data availability statement

The data used in this study are subject to strict data use agreements with the Health and Retirement Study and the Centers for Medicare and Medicaid Services and cannot be shared publicly. However, we will share our programming code upon request.

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APPENDIX

Table A1. Results of unadjusted regressions of HCBS use on HCBS generosity measures.

Main Independent Variable	Medicaid Sample				Bottom 1/3 Income Distribution Sample			
	Weighted		Unweighted		Weighted		Unweighted	
	Coefficient	N	Coefficient	N	Coefficient	N	Coefficient	N
Percent of LTSS Spending that goes to HCBS	0.091*** (0.023)	2,243	0.072*** (0.011)	2,243	0.016 (0.015)	4,868	0.021*** (0.006)	4,868
HCBS Spending per Participant (among all Medicaid enrollees)	0.001 (0.024)	2,243	−0.024** (0.009)	2,243	−0.018 (0.017)	4,868	−0.026*** (0.005)	4,868
Total HCBS Spending Per Capita	0.101*** (0.019)	2,243	0.069*** (0.010)	2,243	0.037*** (0.011)	4,868	0.034*** (0.005)	4,868
Total HCBS Participants as a Percent of Total State Population	0.090*** (0.016)	2,243	0.075*** (0.009)	2,243	0.044*** (0.014)	4,868	0.045*** (0.005)	4,868
Total HCBS Participants as a Percent of Total Medicaid Population	0.054** (0.024)	2,243	0.050*** (0.011)	2,243	0.019 (0.018)	4,868	0.030*** (0.006)	4,868
Number of people on waitlist for HCBS Aged/AgedDisabled as percent of Population 65+	−0.015 (0.020)	2,098	−0.012 (0.010)	2,098	0.008 (0.011)	4,567	0.006 (0.005)	4,567
Waiver Slots Targeting A/AD as percent of Population 65+	−0.021 (0.019)	690	0.008 (0.018)	694	−0.021 (0.026)	1,634	0.000 (0.011)	1,634

Notes: Standard errors in parentheses.
***$p < .01$, **$p < .05$, *$p < .1$.
  HCBS = Medicaid Home- and Community-Based Services

Table A2. Table of correlations between control variables (Medicaid Sample).

	ADL + IADL	Gender	Race/Ethnicity	Age	Age Squared	Marital Status	Has 1+ daughters	Has child within 10 miles	Lives alone	Nursing Home Beds Per Capita (65+)	Nursing Homes Per Capita (65+)
ADL + IADL	1										
Gender	−0.0197	1									
Race/Ethnicity	−0.0735	−0.0591	1								
Age	0.2577	0.0879	−0.1397	1							
Age Squared	0.2588	0.0949	−0.1396	0.9983	1						
Marital Status	−0.0259	−0.3885	0.0664	−0.2401	−0.2438	1					
Has 1+ daughters	−0.0316	0.0052	0.0148	−0.0199	−0.0209	0.0157	1				
Has child within 10 miles	−0.0224	0.1026	0.0904	−0.016	−0.0165	−0.0084	0.1668	1			
Lives alone	0.0624	0.1748	−0.2061	0.2212	0.224	−0.5434	−0.0405	−0.2234	1		
Nursing Home Beds Per Capita (65+)	−0.0069	0.0294	−0.1747	0.0513	0.0516	−0.0669	0.024	0.0419	0.055	1	
Nursing Homes Per Capita (65+)	−0.0017	0.0169	−0.2108	0.0525	0.053	−0.0415	0.0108	0.0312	0.0732	.8519	1

Table A3. Table of correlations between control variables (bottom 1/3 income distribution sample).

	ADL + IADL	Gender	Race/Ethnicity	Age	Age Squared	Marital Status	Has 1+ daughters	Has child within 10 miles	Lives alone	Nursing Home Beds Per Capita (65+)	Nursing Homes Per Capita (65+)
ADL + IADL	1										
Gender	0.0228	1									
Race/Ethnicity	0.0056	−0.034	1								
Age	0.2109	0.1206	−0.171	1							
Age Squared	0.2126	0.1241	−0.1712	0.9984	1						
Marital Status	−0.0535	−0.3753	0.1149	−0.2564	−0.2578	1					
Has 1+ daughters	−0.0177	0.0027	0.052	−0.0345	−0.0366	0.032	1				
Has child within 10 miles	−0.0039	0.0614	0.0788	0.0029	0.0006	−0.0369	0.1136	1			
Lives alone	0.0457	0.1527	−0.2334	0.1872	0.1886	−0.5007	−0.0606	−0.2117	1		
Nursing Home Beds Per Capita (65+)	−0.0038	−0.0339	−0.1556	−0.0043	−0.003	−0.0357	−0.0088	0.0073	0.0446	1	
Nursing Homes Per Capita (65+)	−0.014	−0.04	−0.178	−0.0128	−0.0113	−0.0091	−0.025	0.0004	0.0562	.8457	1

Table A4. Table of correlations between HCBS generosity variables.

	Percent of LTSS Spending that goes to HCBS	HCBS Spending per Participant (among all Medicaid enrollees)	Total HCBS Spending Per Capita	Total HCBS Participants as a Percent of Total State Population	Total HCBS Participants as a Percent of Total Medicaid Population	Number of people on waitlist for HCBS Aged/AgedDisabled as percent of Population 65+	Waiver Slots Targeting A/AD as percent of Population 65+
Percent of LTSS Spending that goes to HCBS	1						
HCBS Spending per Participant (among all Medicaid enrollees)	.2008	1					
Total HCBS Spending Per Capita	.462	.2927	1				
Total HCBS Participants as a Percent of Total State Population	.466	-.0271	.7108	1			
Total HCBS Participants as a Percent of Total Medicaid Population	.4209	-.0976	.1209	.5487	1		
Number of people on waitlist for HCBS Aged/AgedDisabled as percent of Population 65+	-.2307	-.1091	-.076	-.1538	-.3435	1	
Waiver Slots Targeting A/AD as percent of Population 65+	.312	-.3441	.16	.2739	.2836	-.1321	1