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The Effect of the Program of All-Inclusive Care for the Elderly (PACE) on Quality

Final Report

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CONTENTS

Chapter **Page**

CONTENTS *(continued)*

Chapter **Page**

III *(continued)*

CONTENTS *(continued)*

Chapter **Page**

V *(continued)*

TABLES

TABLES *(continued)*

TABLES *(continued)*

FIGURES

EXHIBITS

I. INTRODUCTION

The Balanced Budget Act (BBA) of 1997 authorized Medicare coverage of the Program of All-Inclusive Care for the Elderly (PACE) and established PACE as a state plan option under Medicaid. It authorized a demonstration of for-profit PACE sites, and mandated that the U.S. Secretary of Health and Human Services (HHS) conduct a study of the quality and cost of providing PACE program services under the amendments of the BBA of 1997. This report assesses the quality of PACE care.

A. BACKGROUND

Increasing the independence and quality of life of people with disabilities is an explicit objective in the current strategic plan of HHS (HHS 2004). For elderly adults with declining physical or cognitive abilities, being independent and satisfied with life often means living at home or in a community setting for as long as possible, instead of living in a hospital or nursing home. In order to increase satisfaction and independence among the growing population of elderly Americans, the Centers for Medicare & Medicaid Services (CMS) along with state governments increasingly are becoming interested in community-based options as alternatives to institutional settings to serve the elderly and people with disabilities. At the national level, programs such as the PACE, Money Follows the Person, and Rebalancing Long-Term Care are all providing new mechanisms for keeping the elderly living in the community. PACE, however, is the only program that has been authorized as a permanent provider in the Medicare program. Currently, there are 39 PACE programs operating in 19 states. (See [http://www.npaonline.org].)

B. THE PACE PROGRAM

PACE is a Medicare managed care benefit intended to prolong the independence and enhance the quality of life of frail beneficiaries by providing solutions to the service delivery problems encountered by those who remain living in the community. To achieve that end, the PACE model attempts to (1) integrate participants' long-term care, medical care, and social services; (2) grant physicians and other providers more flexibility in the way they care for participants; and (3) continually monitor the health and well-being of participants. In PACE, interdisciplinary teams continually assess participants' needs for PACE-covered benefits, develop and coordinate customized care plans and provide all the benefits included therein, either directly or through contractors. (Table I.1 lists the minimum PACE benefits package.) Free from Medicare's usual coverage restrictions, PACE teams can deviate from Medicare regulations. For example, PACE can develop plans of care designed to improve or maintain functioning, whereas in traditional Medicare home health, providers can only plan services that are expected to improve functioning. PACE can also provide care that deviates from Medicare regulations about the frequency and duration of home care visits. Finally, except for care in inpatient hospitals, nursing facilities, medical specialties, or home care, most benefits are delivered in adult day health centers run by PACE organizations. Day center attendance provides a social opportunity for participants and is meant to allow staff to identify and address problems before complications develop. PACE staff may also care for participants in the home, hospital, or nursing home, and the program provides transportation both to the PACE center and to other providers.

To be eligible for PACE services, a beneficiary must be at least 55 years of age, a resident of a PACE organization's service area, and certified by the state Medicaid agency as eligible for nursing home level of care. Eligible beneficiaries, who voluntarily enroll in PACE, agree to

TABLE I.1

MINIMUM REQUIRED SERVICES FOR PACE PROGRAMS

Interdisciplinary Assessment and Treatment Planning
Primary Care Services, Including Physician and Nursing Services
Social Work
Restorative Therapies
Personal Care and Supportive Services
Nutritional Counseling
Recreational Therapy
Transportation
Meals
Medical Specialty Services
Laboratory Tests, X-Rays, and Other Diagnostic Procedures
Drugs and Biologicals
Prosthetic and Durable Medical Equipment, Corrective Vision Devices, Hearing Aids, and Dentures
Acute Inpatient Care
Nursing Facility Care

Source: 42 CFR Part 460.90, Medicare and Medicaid Programs; Programs of All-Inclusive Care for the Elderly (PACE); Final Rule.

forgo their usual sources of care and receive all their services through the PACE organization and its contractors.

PACE organizations accept capitated per-member per-month payments from Medicare and Medicaid for each eligible enrollee. Medicare participants who are not eligible for Medicaid pay monthly premiums equal to the Medicaid capitation amount.[1] In exchange for this pooled funding stream and freedom from coverage restrictions, PACE organizations assume full financial risk for all of the participants' care, without limits.

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[1] Beginning in 2006, these participants were also required to pay a Medicare Part D premium.

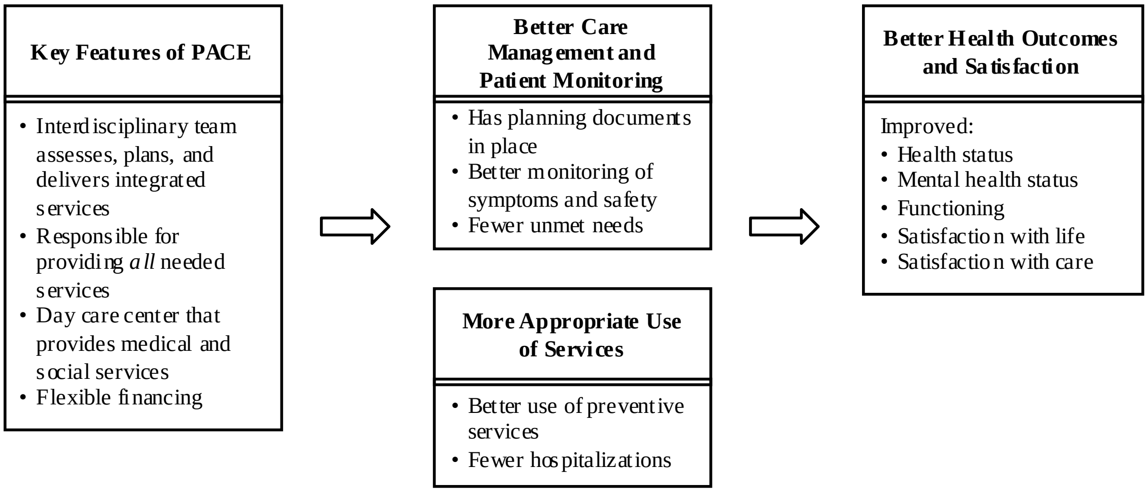
C. HOW IS PACE EXPECTED TO AFFECT QUALITY?

The PACE program has a number of key features that are thought to help improve quality for PACE enrollees. It has an interdisciplinary team that is responsible for assessing, planning, coordinating, and providing all needed services, along with a flexible financing structure. These features enable each PACE team to meet the needs of participants as it deems necessary and enable the program to pay for the care. The PACE program is also required to continually monitor the health status of the participants; team members can do this when they provide home care, and when the participants attend the PACE Center for health or social care.

This intensive coordination, management, and monitoring should, in turn, improve the delivery of services to patients, decreasing unmet needs and uncontrolled symptoms. (Figure I.1) It should also increase the use of preventive services. These improvements in care could, in turn, reduce hospitalizations, improve health status and functioning, and improve the participants' satisfaction with care and with life. The improvements can also help the PACE participants remain in the community rather than being placed long-term in a nursing home, further enhancing quality of life.

FIGURE I.1

EXPECTED EFFECTS OF THE PACE PROGRAM



Whether or not PACE can achieve these improvements over the long term is unknown. As participants age, their care needs are likely to increase. Because PACE is a capitated program, the limited resources to address these increasing needs could become a constraint, mitigating the ability to deliver the same quality of care as a fee-for-service system.

D. OVERVIEW OF THE STUDY

This study considers the effects of the PACE model on a variety of health care quality measures, including health management, health care use, health status, and participant satisfaction. To measure these effects, we compare survey responses from PACE enrollees with responses from a comparable group of elderly people who were enrolled in Medicaid home and community-based services (HCBS) Section 1915c waiver programs in the same states.[2] HCBS participants were chosen as a comparison group because both PACE and HCBS respondents (1) are eligible for nursing home entry based on the health and functioning guidelines set forth in their state, (2) demonstrated that they could remain in their home at the time of enrollment, and (3) are eligible for Medicaid. For these reasons, HCBS participation might be thought of as a viable alternative for those who can not or do not enroll in PACE, and therefore the outcomes among those in HCBS programs may be similar to the outcomes that PACE participants would have experienced had they not enrolled in PACE.

Though the similarities of the PACE and HCBS programs suggest that the programs might attract the same participants, there are reasons to believe that PACE may have different effects on quality than HCBS. First, the interdisciplinary team in PACE plans and coordinates care across all health have and community care providers. HCBS programs are focused on the

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[2] While many of these measures are collected by PACE and some HCBS programs, they are not always measured the same or collected in a comparable manner. Therefore a survey was administered to both groups to ensure comparability of outcomes.

planning and provision of home and community based services. Second, the interdisciplinary team continues to coordinate care for PACE participants who enter nursing homes, whereas HCBS participants leave the program upon admission to a nursing home. Third, the PACE program offers the PACE team the ability to deliver the care they feel to be most appropriate under a capitated payment system. The incentives of capitation may affect the quality of care, as it gives PACE programs the incentive to provide more of some types of services (such as preventive care) and less of other types of services.

The biggest challenge in estimating the effects of a program where participation is not randomized is knowing how a person would have fared without that particular intervention. PACE participation is not random, and in fact may be correlated with a number of unobservable individual preferences and characteristics that also determine a person's health status, functioning, or satisfaction with care. To further ensure the comparability of our two groups, we used propensity-score matching to identify a comparison group that "matched" on pre-enrollment characteristics.

To compare outcomes between people enrolled in PACE and the comparison group, we interviewed samples of both groups at two points in time. The first survey occurred as close to the time of enrollment as the data allowed, eighteen months to five years after program enrollment. Interviews were conducted after program enrollment because we wanted to capture the effects of PACE as a permanent program, and wanted to ensure that participants in this study benefited from the permanent model of service delivery. Because these interviews occurred after enrollment in the respective program, outcomes at the time of the first interview reflect the effects of program participation up until this point. The second round of interviews occurred approximately one year after the first, and capture longer-term effects and changes over the course of the year. These interviews are occurring well after participants enrolled in the program, and allow for the identification of whether PACE participation helps to stem the decline of participants' health status. Each survey asked respondents a wide range of questions about personal characteristics, living situation, health and functional status, use of formal and informal caregivers, health care utilization and quality of care, satisfaction with care, and quality of life. By asking the same questions at two points in time, we were able to identify the impacts of PACE enrollment on the outcome levels, as well as determine differences in the change of these outcomes, as compared to people enrolled in HCBS programs.

We conducted this comparison of PACE and HCBS participants in eight states that had at least one PACE program and also had data available in the Medicaid Statistical Information System (MSIS) to identify comparable HCBS participants in the same state. At that time, however, PACE operated in 14 states, and we wanted to gauge whether the states selected for our comparison were representative of the broader PACE program. To determine if the selected states were representative of the broader PACE program, we also conducted one interview with PACE participants from six states where no HCBS comparison was available, at the same time as the first interview for the PACE and HCBS study state samples. By comparing characteristics of PACE participants in the states where there was not an HCBS comparison sample selected to the characteristics in our study states, we were able to assess the generalizability of our findings to the PACE programs not surveyed.

II. DATA AND METHODS

A. DATA

1. Constructing the Universe of PACE and HCBS Participants

The eight states in our study are California, Colorado, Maryland, Massachusetts, Ohio, South Carolina, Texas and Wisconsin. These states were chosen because they (1) had at least one PACE program, (2) had a Medicaid 1915c home and community-based services (HCBS) waiver program for the elderly during the intake years, and (3) had submitted data to the Medicaid Statistical Information System (MSIS) that could be used to identify HCBS participants. We selected samples of PACE and HCBS participants to study within each of these states from which survey participants could be drawn.

To identify the universe of PACE participants, we selected all records on the Medicare Group Health Plan (GHP) file that included the appropriate plan identification numbers of PACE programs in the eight states. We included all PACE participants who enrolled during the intake period of 2001 to 2003 and who had not been enrolled in a Medicare managed care plan prior to entering PACE[3]. We then matched the sample to the beneficiary's state MSIS person-level file to ensure that the beneficiary was Medicaid eligible, and we matched the sample to the Medicare Enrollment Data Base (EDB) to identify those who had died, and hence were ineligible for the survey.

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[3] We excluded participants who had been in a health maintenance organization (HMO) prior to enrollment because we would not have their claims history, which was necessary for propensity-score matching.

To identify the universe of suitable HCBS participants, we used quarterly MSIS claims from 2000 to 2003 to construct person-level time lines.[4] Unlike PACE entry dates, start dates for HCBS participants are not easily observable in the data because the MSIS files do not have enrollment date information. Instead, we constructed a "pseudo-enrollment date." This date is the first date on which an individual received HCBS services during the 2001–2003 period. For individuals who started receiving services in the first quarter of 2001, we checked back one quarter to determine if HCBS services had been received previously. If they did not receive services in that preceding quarter, their first date of service was their pseudo-enrollment date. We then matched these participants to the GHP file to identify those who had been in an HMO prior to enrollment, and matched them to the EDB to identify those HCBS participants who were eligible for Medicare or who had died and were thus ineligible for the survey.

To ascertain that the PACE programs in the eight study states (henceforth referred to as the "PACE sample" for simplicity) are representative of other PACE programs, the first survey also included participants from PACE sites in six other states. The six PACE non-study states are Michigan, Missouri, New York, Oregon, Tennessee, and Washington. We identified PACE participants in these states in the same way as the PACE participants in the PACE sample.

2. Selecting an HCBS Comparison Group Using Propensity-Score Matching

a. Why Use Propensity-Score Matching?

The biggest challenge in estimating the effects of a program in which participation is not randomized is knowing how a person would have fared in the absence of the program. What outcomes would PACE participants have experienced if they had not enrolled in PACE? If

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[4] Data from the year 2000 were used to construct enrollment dates, but selected participants had enrollment dates similar to those in PACE in 2001–2003.

PACE applicants were assigned randomly into PACE programs, estimating this effect would be simple, because we could be assured that enrollment into PACE was not correlated with any characteristics of the individual who ultimately enrolled. However, PACE participation is not random, and in fact may be correlated with a number of unobservable individual preferences and characteristics that also determine a person's health status, functioning, or satisfaction with care.

Absent random assignment, we created a comparison group from HCBS participants because they are similar to PACE participants on a number of important dimensions: they qualify for nursing home admission in their state, are receiving Medicaid, have been deemed to be safe to receive care at home, and have consented to receive services at home.

We then used propensity-score matching, which enables us to further refine the comparison group so that it is similar to the PACE sample of participants on as many relevant dimensions as possible. A well-matched comparison group enables us to infer how PACE participants might have fared, had they not been subject to the intervention of PACE. The advantage of propensity scoring is that it allows matching on a single measure that takes into account a large number of other variables of interest (Rosenbaum and Rubin 1983). In this case, using the combined PACE and HCBS samples, a variety of observable demographic, health, and health care use characteristics available in Medicare enrollment and claims data were included in a logistic regression (propensity score) model to predict the probability that a person had enrolled in PACE.

HCBS comparison group members were matched to PACE participants whose propensity score (the predicted probability of PACE enrollment from the logistic regression) was in the same range. The single closest HCBS match for each PACE participant based on propensity scores was not the only one selected because the match process was done prior to interviewing sample members. Because we did not know a priori who would or would not participate in the survey, a one-to-one match of an HCBS participant to a PACE participant would mean that each time we had a non-respondent in the survey we would lose the information for that individual and the matching individual. Thus, we would have burdened respondents to collect information that would not be used in the analysis.

To address this problem, we matched the propensity scores within strata. That is, we calculated each treatment and comparison group member's predicted probability of PACE enrollment from the logistic model, and ordered the sample from lowest to highest propensity score. We then stratified our sample, defining the strata by ranges of propensity scores within each state. For example, a treatment group member (who is enrolled in PACE in a particular state) who had a predicted probability of PACE enrollment of 0.65 from the propensity-score matching would only be matched to comparison group members who had propensity scores within the stratum that contained 0.65 in the same state.

b. Variables Used to Predict the Probability of Enrollment in PACE

The following variables from Medicare enrollment and claims data were used to predict PACE enrollment in the propensity score model: (1) age at the date of enrollment (or pseudo-enrollment in the case of HCBS), (2) race, (3) quartile of Medicare Part A expenditures in the 12 months prior to enrollment, (4) quartile of Medicare Part B expenditures in the 12 months prior to enrollment, (5) diagnosis of a stroke in the 12 months prior to enrollment, (6) diagnosis of dementia in the 12 months prior to enrollment, (7) diagnosis of other chronic conditions in the 12 months prior to enrollment, (8) use of inpatient hospitalization in the 12 months prior to enrollment, (9) skilled nursing facility use in the 12 months prior to enrollment, (10) use of home health care in the 12 months prior to enrollment, and (11) distance (in miles) between ZIP code of residence and nearest PACE site.

Demographic characteristics capture attributes of the individual that may include willingness to seek medical care or willingness to give up one's usual source of care. The diagnoses of stroke, dementia, and chronic conditions (diabetes, arthritis, chronic obstructive pulmonary disease, and hip fracture) are based on International Statistical Classification of Diseases and Related Health Problems (ICD 9) codes in Medicare claims records, in a method developed by Newcomer et al. (1999).[5] Expenditure quartiles are state-specific and were determined using only the PACE and HCBS participants identified as being eligible for the match process. The expenditure and health condition variables were included in the match process because they are proxies for health status. The distance to the nearest PACE center (included for both those in PACE and HCBS) controls for the likelihood one would have considered PACE entry; those who live farther from a PACE center are presumed to be less interested in PACE. Using this information, we computed the probability of PACE enrollment for each person in the treatment (PACE) and comparison (HCBS) group. Matching was done at the state level for each of the eight states.

3. Conducting the Survey

The first survey of PACE and HCBS participants was conducted between March and November of 2005, which was between eighteen months and five years after participants had enrolled in their respective programs. In cases where respondents were too cognitively impaired to respond to the survey, proxy respondents were used. All three samples, PACE and HCBS in study states and PACE in non-study states, were interviewed in the first survey.

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[5] Specifically, these diagnoses are based on inpatient, hospital, outpatient, skilled nursing facility (SNF), home health, physician, or hospice claims with the following ICD-9 codes: stroke (433xxd-436xx), dementia (290.0x, 290.2x, 290.3x, 290.9x, 331.0x), and chronic conditions (250xx, 714xx-715xx, 490xx-496xx, 820.01, 820.02, 820.03, 820.09, 820.20, 820.22, 820.8). These ICD-9 codes may not capture the true prevalence of each of these conditions, particularly for dementia, which is often not treated and therefore would not have an associated claim.

Second interviews of PACE and HCBS study state sample members were completed between June and December of 2006, approximately one year after the first interview, and three to six years after program enrollment. The content of this survey was the same as that in the first interview, which enables us to compare the outcomes of both groups at two different points in time, as well as the changes in these outcomes relative to their initial levels. Appendix A contains additional information about the survey collection process and quality assurance procedures.

4. Sample Size, Completion Rates, and Attrition

A total of 1,579 interviews were completed in the first survey (Table II.1). Of these, 1,215 respondents were from the eight study states (those with an HCBS comparison)—740 PACE participants and 475 HCBS participants—and 364 PACE participants from non-study states (the six states without an HCBS comparison sample). Of the 1,215 respondents from study states in the first survey, 873 were reinterviewed in the second interview (537 PACE participants and 336 HCBS participants). Appendix B provides details on the statistical precision of the sample and how we weighted it.

Differential response rates between PACE and HCBS participants in either the first interviews or the second interviews could bias our estimates if the reasons for non-response are correlated with our outcomes of interest. For example, our survey estimates could be biased if PACE sample members have a higher non-response rate than the HCBS sample members in either or both surveys because they have more severe health problems. Similarly, greater attrition among PACE sample members than among HCBS sample members in the second interview because of greater severity of illness, greater rates of institutionalization, or higher rates of mortality could also lead to bias in our results. Comparisons between PACE participants

TABLE II.1

INTERVIEW COMPLETION AND ATTRITION BY TREATMENT GROUP STATUS IN THE FIRST AND SECOND SURVEYS

	PACE (Non-Study States)	PACE (Study States)	HCBS[a]
First Interview			
Number of Completed Interviews			
State of Residence			
California[a]	--	230	99
Colorado[a]	--	114	57
Maryland[a]	--	34	31
Massachusetts[a]	--	65	58
Michigan	25	--	--
Missouri	35	--	--
New York	143	--	--
Ohio[a]	--	39	61
Oregon	80	--	--
South Carolina[a]	--	52	62
Tennessee	44	--	--
Texas[a]	--	186	87
Washington	37	--	--
Wisconsin[a]	--	20	20
Total	364	740	475
Number (%) completed by proxy[b]	231 (63.5%)	481 (65.0%)	286 (60.2%*)
Number of Non-Completed Interviews			
Reason for Attrition(% of total attrition)[c]			
Refusal	45 (26.5%*)	63 (19.3%)	37 (19.3%)
Inability to locate	58 (34.1%)	102 (31.3%)	76 (40.0%*)
Death	53 (31.2%)	109 (33.4%)	61 (31.8%)
Other	14 (8.2%)	52 (16.0%)	18 (9.4%)
Total	170	326	192
Second Interview			
Number of Completed Interviews			
State of Residence			
California[a]	--	164	70
Colorado[a]	--	78	37
Maryland[a]	--	30	26
Massachusetts[a]	--	44	37
Ohio[a]	--	26	43
South Carolina[a]	--	33	45
Texas[a]	--	145	62
Wisconsin[a]	--	17	16
Total	--	537	336
Number (%) completed by proxy[b]	--	368 (68.5%)	215 (64.0%)
Number of Non-Completed Interviews			
Reason for Attrition(% of total attrition)[c]			
Refusal	--	31 (15.3%)	23 (16.5%)
Inability to locate	--	7 (3.4%)	7 (5.0%)
Death	--	129 (63.6%)	82 (59.0%)
Other	--	36 (17.7%)	27 (19.4%)
Total	--	203	139

[a] States included in the PACE and HCBS comparisons.

[b] Used a proxy respondent at any point during the survey.

TABLE II.1 *(continued)*

[c] "Other" includes cases where the respondent was located, but the interview was not completed. This could be because contact was never made at the phone number or because contact was made with someone at the number who knew the sample member, but call backs failed to reach the sample member. The former represented about one-quarter of these cases and the latter represented three-quarters.

*Indicates that the proportion (in parentheses) is statistically significantly different from the PACE study state sample.

in the study states and those in non-study states could likewise be biased by differential non-response. To address this issue, our survey protocol required us to use identical approaches to finding sample members. Appendix A describes our location process.

We considered the possibility of non-response bias by comparing completion rates and reasons for non-response between the different groups at each interview. Of those who were not deceased, the overall response rate for the first survey was 77 percent (Table II.1). Rates of completion were essentially the same for the PACE and HCBS respondents in the study states (77 and 78 percent), and the PACE respondents in the non-study states (76 percent). Follow-up response rates were higher; 87 percent of those from the study states who completed the first survey and were not deceased at the time they were contacted for follow-up were reinterviewed. Again, rates of completion in the second interview were similar in both groups: 88 percent for those in PACE and 85 percent for those in HCBS.[6] Thus, it does not seem that differences in overall completion would bias our results.

Even though rates of completion were quite similar among the three groups, it could be that the reasons for not completing an interview varied by group. Death was the largest reason for non-response in the first interview; 223 of the 688 non-completed interviews (32 percent) were due to sampled respondents who were no longer living at the time of contact.[7] However, this fraction did not vary by group; 31 percent of the non-completed first interviews in PACE non-study states were because of death, compared to 33 percent in PACE study states and 32 percent in HCBS. Death was also the main cause of attrition in the second interviews, comprising 211 of

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[6] Recall that the PACE participants in the non-study states were not interviewed for the second survey.

[7] While the sample for interview was selected among participants still living when claims data were collected, the sample was refined as it came closer to selection for the survey to exclude those who had died in the subsequent period. Therefore, the mortality rates reflected in Table II.1 are lower than what would expect for PACE and HCBS participants over this length of time, since may were excluded prior to contact for survey participation.

the 342 cases of non-response (62 percent). The proportion of non-completed second interviews due to death was slightly lower among those in HCBS, 59 percent compared to 64 percent in PACE.

We also considered reasons other than death for non-response, such as respondent refusal and inability to locate sample members. Refusal to participate in the first interview was highest in PACE non-study states (38 percent of non-completed interviews for causes other than death, compared to 29 percent in PACE study states and 28 percent in HCBS). For the second interviews, the percentage of refusals to participate among non-completed interviews of living sample members was very similar between HCBS and PACE groups, approximately 40 percent. This suggests that if there is a bias due to refusal to participate, it may affect the comparison of PACE participants in study states to those in non-study states, but not the comparison between the PACE and HCBS participants in the study states.

Inability to locate the respondent for the first interview was highest among HCBS participants (58 percent of non-completed interviews among non-deceased sample members, compared to 47 percent in the PACE study and 50 percent in the non-study states sample). Because we used the same location techniques for all sample members, which specifically excluded contacting the PACE programs for information about participants, we do not believe this difference biases our sample.[8] However, if the inability to locate participants is related to outcomes that are affected by PACE, then the difference between HCBS and PACE in the first interview may be biased; but the direction of the potential bias is unknown. The inability to locate participants was markedly lower in the second interview, and only varied by three percentage points between those in PACE and those in HCBS.

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[8] The concern was that if we contacted programs to find sample members, program differences in staff-participant relationships might result a biased sample.

Finally, differential use of proxy respondents could also affect our results if the information given by proxies varies from the information that would be given by sample members themselves. Respondents who were too frail or cognitively impaired to complete the interview on their own were able to designate a proxy respondent to complete the survey on their behalf. A majority of interviews in both periods was completed by proxy respondents: 64 percent of first and 67 percent of second interviews. Rates of proxy response are slightly lower among those in HCBS in both interviews compared to the PACE study sample, but the proxy response rate is about equal in PACE study and non-study states. In the first interview, 60 percent of HCBS interviews were completed by a proxy, compared to 64 percent of PACE non-study state interviews and 65 percent of PACE study state interviews. At follow-up, 64 percent of HCBS interviews were proxies, compared to 69 percent of PACE interviews. To the extent that proxy responses are less reliable than responses from sample members, this difference would lead to "noisier" data for PACE participants, but should not bias our findings.

To summarize, attrition due to death and refusal to participate in the first and second surveys is about equal in the PACE and HCBS samples and therefore should not bias our results. Refusal to participate was higher in PACE non-study states and the inability to locate sample members was higher among the HCBS sample in the first interview than in the other samples. If these reasons for nonparticipation are correlated with outcomes affected by PACE, this might affect our results, but not in predictable ways. The use of proxies in both the first and second interviews was slightly lower in the HCBS sample than in the other samples. However, overall rates of attrition are similar enough among the samples that bias due to response rates should be small.

B. METHODS

1. Basic Analysis

Our main estimates are based on unadjusted comparisons of group means. In all cases, we identified statistical significance using the p-values of the relevant test statistic (either t-statistic or z-statistics) and used SUDAAN software to account for the effects of complex sample design.

We have three comparisons of interest. First, we consider the outcomes of PACE and HCBS at the time of the first interview. At this point, we expect to see some of the intermediate effects of PACE, such as increased rates of influenza vaccination or better detection of limitations in Activities of Daily Living (ADLs). In this time period, we are interested in the magnitude of the PACE mean as an indicator of how well the program is doing overall, and also in the difference between PACE and HCBS as an indicator of PACE's relative performance.

Second, we consider the same outcomes one year later, at the time of the second interview. . As for the first interview assessment, we are interested in both the magnitude of the PACE mean and the difference in means between PACE and HCBS.

Finally, we are interested in how the relative outcomes among individuals in PACE and HCBS change between the first and second interviews. Measuring the change in an individual's outcome is slightly different than comparing group means at the time of the two interviews. For example, suppose that the mean among PACE participants overall was higher in the first interview, but that the magnitude of the difference disappeared by the second survey. We would not know, looking only at group means, whether the smaller difference between the two groups was because relatively more people in PACE experienced a decline in the outcome or because relatively more people in HCBS improved. Thus, we need to study not only the overall changes among the groups, but also changes within individuals in the groups to understand the true cause of the difference over time.

We need to assess change in terms of both improvements and declines, because in many circumstances it may not be a reasonable goal to improve the health outcome of the individual. Rather, maintaining the individual's present level or not allowing it to decline may be the realistic outcome. Thus, even if the average health outcomes are the same for the two groups, keeping more of these participants from declining may be an important indicator of good care. To measure declines, we measured whether the participant's outcome became worse between periods. For example, if a person's self-reported health went from excellent at the first interview to good at follow-up, he or she would be categorized as having a health decline.

While stemming health declines may be the most likely outcome of the PACE program, it is also possible that PACE could be improving care that is not reflected in the average outcome. For example, the cumulative effect of careful monitoring may not be able to stop the first time an individual experiences pain, but it may be effective for a person who is prone to chronic pain. Hence, we measure improvements as whether the participant's outcome became better between periods.

2. Alternative Approach–Regression Adjustment

a. Regression Models

While our main results are presented as a comparison of unadjusted means of our propensity-score matched samples, we also investigated whether differences in other observed characteristics between the PACE and HCBS comparison groups could account for differences in the observed outcomes. Regression-adjusting the means will account for the variation due to these other factors and improve our ability to detect differences between our PACE and HCBS samples.

We used two types of regression models. When the variable of interest had multiple possible outcomes (for example, the five-level poor-to-excellent response scale for self-rated health status), we used the following ordinary least squares (OLS) models:

$Y_i = b_0 + b_1*PACE_i + b_2*X_i + e_i$ (for the comparisons between PACE and HCBS participants in the study states)

and

$Y_i = b_0 + b_1*STUDY_i + b_2*X_i + e_i$ (for the comparisons between study and non-study state PACE participants)

where Y_i is the outcome of interest. The coefficient b_0 is the constant for the reference group, which is either HCBS (in study states) or PACE in non-study states, depending on the context. The coefficient b_1 indicates the mean difference in the outcome, Y_i, between PACE study state participants and HCBS participants, or, again, PACE participants in study versus non-study states, controlling for all of the covariates in X_i. The control variables contained in X_i are discussed in detail below.

We used logistic regression models for outcome variables that are binary in nature; that is, they only take on a value of 0 or 1. For example, binary variables include whether a person has had a flu shot, whether a person has difficulty with a particular ADL, and whether a person has experienced either an improvement or a decline in an outcome variable. The logistic regression models are:

$log[Y_i/(1-Y_i)] = b_0 + b_1*PACE_i + b_2*X_i + e_i$ (for the comparisons between PACE and HCBS participants in the study states)

and

$log[Y_i/(1-Y_i)] = b_0 + b_1*STUDY_i + b_2*X_i + e_i$ (for the comparison between PACE study and non-study state participants)

The dependent variable in logistic models is the log-odds of outcome Y_i. As is the case in OLS models, the PACE variable here is a binary variable indicating whether the sample member is in a PACE study state. Because logistic models are nonlinear, obtaining interpretable estimates involves transforming raw coefficients in the model to a percentage point scale. To implement this transformation, we calculated individual-level predicted values in the case where PACE = 0 and again in the case where PACE = 1 for each sample member, using each person's individual X_i in both cases. The estimated effect of PACE compared to HCBS in the study states is then found by taking the difference between these two estimated means, and its statistical significance again is assessed by examining the p-value for the b_1 coefficient.

b. Covariates Included in the Regression Models

The purpose of using a regression framework is to control for any differences in outcomes that might be due to differences in observed characteristics between those in PACE and those not in PACE. However, to avoid endogeneity, we do not want to control for variables that may be influenced independently by participation in PACE, such as living arrangements. Our main results presented are unadjusted group means, but regression-adjusted models presented in the Appendix C contains a set of control variables that are thought to influence (but are not influenced by) our outcome variables. Appendix D includes controls for reported health conditions diagnosed at the time of the first interview, which might be influenced by PACE enrollment. Exhibit II.1 contains the demographic, health, and socioeconomic covariates included in the regression models.

When comparing PACE to HCBS, our regression models also include control variables that were originally used in the propensity-score framework. Had we selected a comparison group using one-to-one matching, rather than strata matching, these variables would be likely to have small effects on outcomes because treatment and control participants would be matched on a score constructed from them. However, our matching technique implies that even within strata, those in the treatment and control groups could have different mean levels of the matching

EXHIBIT II.1

COVARIATES INCLUDED IN REGRESSION-ADJUSTED MODELS

Characteristic	Covariates Included in Regression Models
Age	65–74 (omitted category), 75–84, 85 and older
Gender	Male (omitted category), female
Race	White (omitted category) black, Hispanic, other non-white
Education	Less than high school (omitted category), high school or more, other or don’t know
Annual income	Less than $10,000 (omitted category), $10,000 or more, don’t know or refused
Marital status	Married or partnered (omitted category), divorced or separated, widowed, never married, other[a]
Proxy status	Whether or not a proxy respondent was used to complete any portion of the interview
Enrollment length	Number of months between PACE enrollment or HCBS pseudo-enrollment and first interview
Time between interviews	Number of months between first and second interviews (only in improvement/decline models)
Propensity-score matching variables	The variables used in the matching procedure (see Table II.2) are included in regression models that compare the difference between PACE study states and HCBS.
Previously diagnosed health conditions at the time of first interview (only included in models where specified)	Arthritis, hip fractures, bed sores/leg ulcers, Alzheimer’s/dementia, other psychiatric conditions, diabetes, stroke, Parkinson’s disease, vision problems, hearing problems, angina/CHD, heart attack/MI, emphysema/ chronic bronchitis/COPD, cancer/malignancy, kidney disease/failure

[a] In the regression models we combined the refused category with divorced or separated due to the small number of responses.

variables. For this reason, we also include the following additional matching variables: any home health use, inpatient care use, or skilled nursing facility use in the previous year; quartile of Part A and Part B spending in the previous year; diagnoses of dementia, stroke, or chronic conditions in the past year; and distance to the nearest PACE center.

C. ASSESSMENT OF PROPENSITY-SCORE MATCHING

1. Comparisons Based on Characteristics Available in Administrative Claims Files (and Used in the Matching Process)

Though the PACE and HCBS programs enroll participants who (1) are eligible for nursing home entry based on the health and functioning guidelines set forth in their state, (2) demonstrate that they could remain in their home at the time of enrollment, and (3) are eligible for Medicaid, the characteristics of the universe of participants eligible for this study are quite different prior to propensity-score matching (Table II.2). The first two columns of Table II.2 compare the means of the variables used in the match process for the universe of participants in each program, prior to matching. These columns indicate that there are statistically significant differences across the groups that are often large in magnitude.[9]

The middle two columns show means for the same variables, this time after the propensity-score matching has been performed, for those who completed the first interview. There are no significant differences between the samples in the characteristics used to match the samples. The only statistically significant difference between the groups is in the predicted probability of enrollment in PACE. However, even this difference is much lower in magnitude than it was in

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[9] The predicted probability of PACE enrollment for each person was calculated using the logistic regression for the propensity-score matching technique. While only some of these cases are ultimately chosen as suitable matches, a propensity score is generated and retained for each case.

TABLE II.2

MEANS OF VARIABLES AVAILABLE IN MEDICARE ADMINISTRATIVE DATA AND INCLUDED IN THE PROPENSITY-SCORE MATCHING, FOR PACE AND HCBS SAMPLES

(Percentages, Unless Otherwise Noted)

	PACE Sample Eligible for Survey Participation (Before Propensity-Score Matching	HCBS Sample Eligible for Survey Participation (Before Propensity-Score Matching	PACE Selected Survey Sample, Interviewed in First Interview (After Propensity-Score Matching)	HCBS Selected Survey Sample, Interviewed in First Interview (After Propensity-Score Matching)	PACE Selected Survey Sample, Interviewed in First and Second Interview (After Propensity-Score Matching)[a]	HCBS Selected Survey Sample, Interviewed in First and Second Interview (After Propensity-Score Matching)[a]
Diagnoses in the 12 months prior to enrollment						
Stroke	0.24	0.27*	0.24	0.23	0.23	0.24
Dementia	0.20	0.14***	0.19	0.15*	0.17	0.14
Chronic condition	0.74	0.80***	0.73	0.74	0.73	0.74
Quartile of Medicare Part A spending in the 12 months prior to enrollment						
Lowest	0.30	0.23***	0.29	0.27	0.32	0.25**
Second	0.26	0.24	0.28	0.30	0.28	0.31
Third	0.22	0.26**	0.22	0.21	0.20	0.21
Highest	0.22	0.27***	0.21	0.22	0.20	0.23
Quartile of Medicare Part B spending in the 12 months prior to enrollment						
Lowest	0.32	0.22***	0.32	0.30	0.32	0.29
Second	0.25	0.23	0.25	0.26	0.26	0.26
Third	0.23	0.26**	0.23	0.23	0.22	0.22
Highest	0.20	0.29***	0.20	0.21	0.20	0.23
Distance between zip code and PACE site (miles)	3.03	4.78***	3.00	3.36	2.92	3.52**
Age						
65–74	0.24	0.31***	0.24	0.24	0.26	0.25

Table II.2 *(continued)*

	PACE Sample Eligible for Survey Participation (Before Propensity-Score Matching	HCBS Sample Eligible for Survey Participation (Before Propensity-Score Matching	PACE Selected Survey Sample, Interviewed in First Interview (After Propensity-Score Matching)	HCBS Selected Survey Sample, Interviewed in First Interview (After Propensity-Score Matching)	PACE Selected Survey Sample, Interviewed in First and Second Interview (After Propensity-Score Matching)[a]	HCBS Selected Survey Sample, Interviewed in First and Second Interview (After Propensity-Score Matching)[a]
75–84	0.47	0.46	0.47	0.50	0.50	0.53
85 and older	0.29	0.23***	0.29	0.26	0.24	0.22
Health Care Utilization in the 12 months prior to enrollment						
Any home health care	0.32	0.45***	0.31	0.36	0.28	0.36**
Any inpatient care	0.44	0.54***	0.43	0.44	0.41	0.46
Any skilled nursing facility	0.16	0.21***	0.15	0.15	0.13	0.16
Race						
Black	0.18	0.29***	0.19	0.17	0.19	0.16
Hispanic	0.20	0.10***	0.22	0.22	0.21	0.22
White	0.46	0.53***	0.46	0.49	0.46	0.49
Other	0.15	0.08***	0.14	0.12	0.14	0.13
Sample Size	1,218	2,819	740	475	537	336
Predicted probability of PACE enrollment	0.49	0.22***	0.48	0.44***	0.49	0.43***

Source: Medicare Enrollment Data Base (EDB), Medicare claims records, and Medicaid Statistical Information System (MSIS) from California, Colorado, Maryland, Massachusetts, Ohio, South Carolina, Texas, and Wisconsin.

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Mean differences between groups are tested for statistical significance using t-tests. Differences in means between PACE and HCBS survey samples use initial weights (for first survey comparison) and follow-up weight (for second survey comparison).

[a] Does not include 203 PACE participants and 133 HCBS participants who completed the first survey but were lost to follow-up due to death, inability to locate, refusal, etc.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

the universe of participants, indicating how much more comparable the strata-matched groups are.

Finally, even though propensity-score matching created treatment and comparison groups that are very similar on the range of variables included in the model, in a two-period survey attrition or non-response in the second survey could affect the comparability between the comparison and treatment group on the observable characteristics used in the matching process. The final two columns of Table II.2 indicate the means of the same claims-based matching variables used to match the groups initially, but this time only for those people who were surveyed in both the first and second interviews. Despite attrition, the groups still look quite similar on the variables used to select the initial propensity-score matched sample, with a few exceptions. Like the sample in the first interview, there is a significant difference in the probability of PACE enrollment. Also, 6 percent more PACE group members are in the lowest quartile of Part A spending than HCBS group members. There also is a statistically significant difference between the two groups in terms of the distance to the nearest PACE site. However, because this variable is measured in miles, the difference of about one-half mile is not practically significant for most people. In other words, even after attrition from the survey sample, our treatment and comparison groups remain quite similar.

2. Comparisons of Characteristics Available in the Survey

The results presented above demonstrate that the propensity-score matching yielded two samples that were the same based on the information from administrative claims files that was available at the time we completed the match. However, upon completing the initial survey, we had additional data about the survey participants, including some of their demographic, socioeconomic, and health characteristics. Comparing the two groups on these dimensions provides us with additional information on the quality of the match.

a. Duration of Program Enrollment

Sample members were selected from claims data in the years 2000-2003, which means that there is the potential for a range of approximately three years in enrollment dates. If there are differences in the length of enrollment between PACE and HCBS, and if our outcomes are changing over time, this could affect the extent to which there are observed differences between PACE and the HCBS group.

On average, those in the PACE sample had been enrolled for 37 months and those in HCBS had been enrolled for 40 months at the time of first interview. While the average length of enrollment is fairly close between those in the PACE and HCBS samples, we do find that the biggest differences are in the tails of the distribution (see Table II.3). More than one-quarter of HCBS survey participants had been "enrolled" in HCBS for more than four years at the time of the first interview, compared to only 16 percent of those in PACE study states. Thus, to the extent that outcomes change over time, the concern is that our results may be biased. To address this, we included months between enrollment and the first interview as a control variable in our regressions.

TABLE II.3

LENGTH OF PROGRAM ENROLLMENT AT THE TIME OF THE FIRST INTERVIEW
(Percent)

Length of Enrollment at the Time of First Interview (Months)	PACE (Study States)	HCBS
18 to 24	13.1	4.4
25 to 30	20.7	16.8
31 to 36	18.5	19.8
37 to 42	17.6	15.8
43 to 48	14.2	15.6
49 to 61	15.9	27.6

b. Completion of Interviews Using a Proxy Respondent

Earlier, it was shown that PACE sample members were approximately 5 percentage points more likely to complete both the first and second interviews using a proxy respondent. While the proxy respondents were identified the same way for PACE and HCBS, one concern may be that PACE caregivers, given their strong relationship with PACE participants, may be identified more often as proxy respondents. This is not expected to bias the results in anyway, but is a concern as to whether there may be more measurement error in one group versus the other. To investigate this issue, Table II.4 shows the relationship of these proxy respondents to the sample member.

TABLE II.4

RELATIONSHIP OF PROXY RESPONDENTS TO SAMPLE MEMBERS
(Percent)

	First Interview PACE Sample	First Interview HCBS Sample	Second Interview PACE Sample	Second Interview HCBS Sample
Percent of Interviews Completed by Proxy	65.0	60.2	68.5	64.0
Relationship of Proxy to Sample Member (Percent of All Proxy Respondents, Total Sums to 100 Percent)				
Spouse/Partner	7.3	4.5	8.2	5.1
Child	46.4	58.0***	47.3	60.9***
Parent	0.8	0.7	0.3	0.5
Other Relative	15.6	15.0	17.4	14.4
Friend	0.8	1.7	1.4	1.9
Paid Caregiver	7.3	8.7	10.9	10.7
Other	20.8	9.8***	14.7	6.5***
Don’t Know/Refused	1.0	1.4	0.0	0.0

Note: An interview was classified as being completed by a proxy respondent if a proxy was used at any point during the interview. For the majority of cases, the proxy completed the entire interview, but for a small number of cases, a proxy respondent was designated after the sample member began the interview. Statistical significance at the 1 percent level is denoted by ***, other differences were not statistically significant at any conventional level.

We found that PACE sample members are just as likely as HCBS sample members to have a paid caregiver as a proxy respondent. In the first interview, PACE sample members were slightly less likely to have paid givers as the respondent (7.3 versus 8.7 percent), but were slightly more likely in the second interview (10.9 versus 10.7 percent), and these differences were not statistically significant. PACE sample members were less likely to have one of their children as a proxy respondent, but more likely to have someone classified as having another relationship as there proxy respondent. This difference is due in part to the inclusion of a PACE site that enrolled Catholic nuns during our intake year.

c. Demographic, Socioeconomic, and Health Characteristics

At the time of the first interview, those in the PACE sample appeared quite similar to those in the HCBS sample on a variety of demographic, socioeconomic, and health dimensions, as shown in Table II.5. There were no significant differences between the two groups in terms of age, gender, race, education, or income. Both groups were mostly female, minority, and had low educational attainment and income. Some of these variables were included in the propensity-score matching, so it is not surprising that the two groups were similar on these dimensions. Of the nearly 50 measures we used to compare the two groups that were not included in the match regression, more than 70 percent did not differ between the two groups. For example, about 15 percent of both groups resided in a nursing home at the time of the survey.

The two groups did differ in their marital status. Members of the PACE sample were 18 percent less likely to be married and 25 percent less likely to be divorced or separated than members of the HCBS sample, but almost 50 percent more likely to have never been married. This difference can be attributed to a PACE site that enrolled a number of Catholic nuns during our intake year: about half of the never-married respondents were nuns.

TABLE II. 5

DEMOGRAPHIC, ECONOMIC, AND HEALTH CHARACTERISTICS OF PACE STUDY STATE AND HCBS PARTICIPANTS

	PACE (Study States)	HCBS	Difference
Age			
65–74	0.24	0.24	0.01
75–84	0.47	0.50	-0.03
85 and older	0.29	0.26	0.02
Female	0.72	0.73	-0.01
Race			
Hispanic	0.36	0.39	-0.03
Black	0.17	0.15	0.02
Other non-white	0.15	0.12	0.03
Don't know/refused	0.01	0.02	-0.01
Education			
Less than high school	0.48	0.48	0.00
High school or GED	0.17	0.17	0.00
Some college	0.07	0.06	0.01
College graduate	0.11	0.12	-0.01
Trade/business school	0.02	0.03	-0.01
Other	0.05	0.04	0.01
Don't know/refused	0.09	0.09	-0.00
Annual Income			
Less than $10,000	0.56	0.61	-0.05*
$10,000–$19,999	0.23	0.20	0.04
$20,000–$29,999	0.02	0.01	0.01
$30,000–$39,999	0.01	0.00	0.01
$40,000–$49,999	0.00	0.00	-0.00
$50,000 or more	0.00	0.00	-0.00
Don't know/refused	0.18	0.17	0.00
Marital Status			
Married/partnered	0.19	0.23	-0.04
Divorced/separated	0.12	0.16	-0.04*
Widowed	0.52	0.51	0.01
Never married	0.14	0.09	0.06***
Don't know/refused	0.02	0.01	0.01
Living Situation			
Alone	0.28	0.34	-0.06**
With spouse/partner	0.15	0.19	-0.04
With children, relatives, friends (and not spouse)	0.26	0.27	-0.00
Paid caregivers	0.11	0.07	0.03*
Nursing home or other long-term care facility	0.15	0.13	0.02
Other/nonrelated people	0.06	0.00	0.06***
Don't know/refused	0.00	0.00	-0.00

TABLE II.5 *(continued)*

	PACE (Study States)	HCBS	Difference
Living Location			
Own house or apartment	0.39	0.51	-0.13***
Relative or friend's house or apartment	0.15	0.20	-0.05**
Group home (including convent)	0.11	0.03	0.09***
Assisted living	0.20	0.13	0.07***
Nursing home or other long-term care facility	0.15	0.13	0.02
Other	0.01	0.00	0.00
Previously Diagnosed Health Conditions			
Arthritis	0.60	0.72	-0.12***
Hip fracture	0.13	0.13	-0.00
Bed sores/leg ulcers	0.14	0.16	-0.02
Alzheimer's/dementia	0.42	0.29	0.13***
Other psychiatric condition	0.12	0.12	0.01
Diabetes	0.33	0.34	-0.01
Stroke	0.26	0.22	0.04
Parkinson's disease	0.05	0.09	-0.04**
Vision problems	0.58	0.63	-0.05
Hearing problems	0.40	0.43	-0.03
Angina/CHD	0.25	0.25	-0.00
Heart attack/MI	0.14	0.14	0.01
Emphysema/chronic bronchitis/COPD	0.14	0.17	-0.03
Cancer/malignancy	0.08	0.15	-0.07***
Kidney disease/failure	0.09	0.14	-0.05**

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between PACE study and non-study states use initial sampling weights. Mean differences between groups are tested for statistical significance using t-tests.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

The PACE and HCBS samples also differed in who they lived with and the location where they lived at the time of the first interview. Those in HCBS were about 20 percent more likely to live alone than PACE participants (34 percent compared with 28 percent). However, PACE participants were more likely to live with paid caregivers (11 percent compared with 7 percent) and also more likely to live with other non-related people (6 percent in PACE). This latter finding is again due to the sample of nuns that were enrolled in a PACE site during our survey intake period. Furthermore, PACE participants were more likely to report living in a group home or convent (11 percent in PACE compared with 3 percent in HCBS), again a product of having a large fraction of nuns in the sample. Those in the PACE sample were also more likely to report being in an assisted living facility than those in the HCBS sample (20 percent and 13 percent, respectively). However, HCBS sample members were more likely to report living in their own home (48 percent compared to 37 percent in PACE) and living in the home of a relative or family member (19 percent compared with 15 percent in PACE).

Because the first survey occurred after program enrollment, it is not possible to determine whether living arrangements were a key determinant in program participation, or whether program enrollment affected living arrangements. Indeed, it is quite plausible that program participation would affect one’s living situation. For example, the flexibility of PACE financing might make it easier for enrollees to live in an assisted living facility than would be the case for those receiving HCBS.

While the PACE and HCBS samples had similar rates of diagnoses for the majority of the conditions that we asked about, PACE participants were less likely to have been told that they had a diagnosis of arthritis (12 percentage points lower in PACE), Parkinson’s disease (4 percentage points lower in PACE), cancer and malignancies (7 percentage points lower in

PACE), or kidney disease or failure (5 percentage points lower in PACE). This suggests that the PACE participants had slightly fewer health conditions than the HCBS participants. The exception to this trend is that PACE participants were more likely to report that they had been diagnosed with Alzheimer's disease or another form of dementia. Forty-two percent of the PACE participants had been told they had such a condition, compared with 29 percent of the HCBS participants, a difference of 13 percentage points. We caution, however, that due to the timing of the first interview relative to enrollment, some of these diagnoses could have occurred as a result of program participation. That is, if conditions were diagnosed at a different rate by PACE physicians than by physicians who treated HCBS participants, then diagnosis rates might be different as a result of participation, rather than due to selection on health status into the program.

In conclusion, we find that the PACE and HCBS study samples are fairly similar, although the high proportion of nuns who enrolled in PACE during our sample period does result in differences in marital status and living situations. Furthermore, while participants report similar rates of most diagnoses, the PACE participants were more likely to report a dementia diagnosis, and less likely to report the existence of other health problems.

III. THE EFFECT OF PACE ON QUALITY: HYPOTHESES, PREVIOUS EVIDENCE, AND SURVEY MEASURES

The PACE program has many features that can facilitate the provision of high quality care. PACE programs have interdisciplinary teams that regularly assess participants' needs, develop care plans, and deliver all services that the team deems necessary. PACE centers provide both social and medical services, and visits to the PACE center allow staff to monitor the health and well-being of the participants. The previous evaluation of PACE demonstrated that there were some improvements in health status over the short- and medium-run by enrolling in PACE (Chatterji et al. 1998). However, the capitated financing of the program, which allows providers to deliver services participants need rather than limiting services to those reimbursable under Medicare and Medicaid, also limits the amount of resources available. If participants require more and more services over time and PACE teams find it difficult to meet those needs, quality could diminish. This chapter discusses the ways in which PACE is expected to influence participant outcomes, previous evidence on the effect of PACE, and in light of those expectations, the way we measured quality outcomes in our survey.

A. THE EFFECT OF PACE ON QUALITY: PREDICTIONS AND HYPOTHESES

As described in Figure I.1, the PACE program has a number of key features that are expected to improve the management and delivery of care. We discuss below how these could affect the care delivery process, and in turn, influence participants' health outcomes and satisfaction.

The primary feature that distinguishes PACE from many other models of care is the interdisciplinary team. The PACE interdisciplinary team consists of the primary care physician, registered nurse, social worker, physical therapist, occupational therapist, recreational therapist or coordinator, dietitian, PACE center manager, home care coordinator, personal care attendants (or their representatives), and the drivers (or their representatives). The team is required to conduct an initial assessment of each enrolled beneficiary, and to conduct reassessments as needed, (at least every six months). The assessment must cover a range of health and social issues, and be used as a basis to develop an integrated plan of care that will meet the participants' medical, physical, emotional, and social needs. The team then is required to deliver the care to meet those needs, drawing on the PACE service network.

This approach to delivering care, if it is implemented effectively, could improve care coordination, management, and the utilization of services. First, the assessment and planning process enables the team to clearly identify the participant's needs, so preventive services such as health care screenings, vaccinations, and other recommended services, can be identified. Making the interdisciplinary team responsible for implementing the plan should improve the likelihood that needed health and social services, which the team has identified, are provided. The team is responsible for providing all of the services that the participant needs, and the financing is flexible so that payments can be made without regard to coverage requirements; these factors reduce the likelihood that regulatory requirements will hinder the delivery of needed services. The continuous monitoring process makes it likely that changes in a participant's health or social concerns can be identified early, enabling the team to address those concerns as they arise.

If PACE does improve health care management and the utilization of services, then, in turn, we expect this to improve the health, mental health, and functional status of the participant. That is, better care should lead to improved outcomes. Alternatively, it may be that these outcomes are not improved, but rather they are better maintained among the frail elderly population whose health may otherwise be expected to decline.

Finally, if PACE does improve health care management, it may lead to improved participant satisfaction. If the team takes responsibility for providing all of the care that the participant needs, and for monitoring the provision of that care, then this should relieve the burden on the participant or his or her caregivers of arranging such services, and improve the overall level of satisfaction. Furthermore, because participants receive many services through the PACE center, which is focused on providing health care to the frail, elderly population, one would expect that the providers will be experienced in addressing the needs of this population and be able to provide more satisfactory care.

While the overall expectation is that PACE participation will improve quality, impediments to the process may keep PACE programs from achieving these improvements. If the interdisciplinary team does not function effectively, or if the services are unavailable in a community, then it is less likely that the PACE program can improve care, and in turn, health outcomes and satisfaction. Furthermore, if the capitated payment does not allow for adequate resources to provide all needed services, then it becomes less likely that PACE can improve care for its participants.

B. THE EFFECT OF PACE ON QUALITY: EVIDENCE FROM THE PREVIOUS EVALUATION

The effects of PACE on health care use, health and functioning, and satisfaction have been considered previously in a 1998 evaluation study (Chatterji et al. 1998). That study considered the implications of the PACE model for these outcomes closer to the time of program enrollment, focusing on outcomes at 6, 12, 18, and 24 months after enrollment in PACE. The current study instead considers the longer-term effects of PACE by focusing on outcomes between eighteen months and five years after enrollment. The two studies also vary in the groups selected to be suitable comparisons to PACE participants. This study compares PACE to

HCBS participants, whereas the earlier analysis compared PACE enrollees to people who expressed interest in enrolling in a PACE program but ultimately did not enroll. Because of these differences, our work and the earlier study are not directly comparable, but together provide a broad look at the effects of PACE over a lengthy period of time, and compared to different groups of people.

Despite these differences, the Chatterji et al. study identified a number of effects of PACE in the short term that also are expected to be present in our evaluation of longer-term outcomes. Some highlights of these findings relevant to our study include the following:

- ***Health Care Utilization.*** PACE enrollment led to sustained lower levels of hospitalization and long-term nursing home admission but sustained increases in ambulatory visits.
- ***Health and Functioning.*** PACE enrollees had higher levels of self-reported health and physical functioning in the short term, but these increases generally decreased over the follow-up period. Enrollees also had a higher number of days living in the community in a year and decreased mortality.
- ***Satisfaction and Quality of Life.*** PACE enrollees were more likely over the duration of the evaluation to report regular attendance at social functions (at least once per week), and also were more likely to report satisfaction with care and a better quality of life. However, these satisfaction and quality-of-life effects declined as the length of time enrolled in the program increased.

C. MEASUREMENT OF OUTCOMES IN OUR SURVEY

To estimate the impact of PACE on the quality of care, we designed a survey that asked respondents about four major topic areas that may be affected by participation in PACE: (1) outcomes associated with care management, (2) health care utilization, (3) health status and symptoms, and (4) satisfaction with care. We describe below the rationale behind the questions asked and how they were measured. Exhibits III.1 to III.4 provide details on how we measured each variable.

EXHIBIT III.1

DESCRIPTION OF CARE MANAGEMENT MEASURES

Advanced Directive/Living Will	Whether sample member has an advanced directive or living will. We consider having both, either, or each one separately as possible outcomes. 1 indicates the sample member has it (or both) in place, 0 indicates he or she does not.
Pain Management	Sample members were asked about the frequency and intensity of their pain during the past week. Variable coded as 1 if the person reports pain that interferes with normal routine (mild, moderate, or severe pain either some, most, or all of the time) and 0 otherwise.
Falls	Whether the sample member had a fall in the past six months. 1 indicates the person had a fall, 0 indicates he or she did not.
Unintentional Weight Loss	Whether the sample member has unintentionally lost 10 or more pounds in the past six months. 1 means the person has lost weight, 0 means the person has not.
Unmet ADL Need	For each ADL (getting around, dressing, bathing, toileting, and getting out of bed), sample members were asked whether all of their needs for help had been met. Those who reported that they did not receive help with a particular ADL were asked whether they needed any help they did not receive. Those who reported that they received help with an ADL were asked whether they needed more help than they received. For each ADL, these two variables were collapsed into a single measure, where 0 indicates no unmet ADL needs, and 1 denotes unmet need.

1. Care Management

As noted above, one area in which PACE may be relatively effective is in monitoring and managing participants' personal care, which may range from adequate preparation for end-of-life issues to proper pain management to assistance with performing routine tasks. The survey gauged personal care management on many of these measures.

Advanced Directives and Living Wills. Having advanced directives or living wills can be an important part of planning for the end of life that can improve the quality of life for both the participant and his or her family. Survey respondents were asked whether or not they have executed either of these documents.

Pain Management. One important aspect of improving quality of life for chronically ill elderly people is proper pain management. The survey thus asked respondents about the frequency and severity of pain. We considered a person's pain to be properly managed if it occurred never or only occasionally and was of mild severity at worst; we considered pain of any greater severity or frequency to be improperly managed.

Unexpected Weight Loss and Falls. Among the frail elderly, weight loss and falls may signal undiagnosed or improperly treated health problems. We consider the person's care unsuccessfully managed if he or she had an unintended weight loss of 10 pounds or more in the previous six months, or had a fall in the previous six months. Survey respondents were asked these questions directly.

Unmet Need for ADLs. Among nursing-home-eligible seniors, receiving timely, adequate help with routine activities can be key to improving overall quality of life. Unmet needs for help with ADLs could include receiving insufficient help or no help at all. Survey respondents reporting no help with an ADL were asked whether they needed, but could not find, any help for that activity. Sample members who reported that they did have some help in completing an ADL were asked whether they needed more help than they received. Respondents who indicated yes in either case were classified as having an unmet need.[10]

2. Health Care Utilization

Institutional Care. The goal of the PACE and HCBS programs is to maintain participants' health, functioning, and residence in the community, thereby decreasing the likelihood and necessity of hospital stays and nursing home admissions. The reduction in the use of expensive services such as hospitalizations and other institutional services is one of the mechanisms that is expected to fund the provision of the enhanced community care services that PACE provides,

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[10] Due to an error in the administration of the survey measure for the variable unmet need for eating, these results are not reported.

EXHIBIT III.2

DESCRIPTION OF HEALTH UTILIZATION MEASURES

Hospitalizations	Whether the sample member has spent at least one night in a hospital in the previous year. 0 indicates the sample member did not, 1 indicates he or she did.
Nursing Home Stays	Whether the sample member has spent at least one night in a nursing home in the previous year. 1 indicates the sample member did not, 0 indicates he or she did.
Hearing Screening	Whether the sample member has had his or her hearing checked regularly (at least once a year). 1 indicates the person had the screening, 0 indicates he or she did not. Those who are non-hearing are categorized as having the screening.
Vision Screening	Whether the sample member has had his or her vision checked regularly (at least once a year). 1 indicates the person had the screening, 0 means he or she did not. Those who are non-sighted are categorized as having the screening.
Influenza Vaccine	Utilization: Whether the sample member had received a flu shot since the previous September. 1 indicates the sample member received the shot, 0 indicates he or she did not. Access: Whether the sample member either received or was offered the flu shot. 1 indicates the sample member had access to the shot, 0 indicates he or she did not.
Pneumococcal Vaccine	Whether the sample member has ever had a pneumococcal vaccine. 1 indicates the sample member had the shot, 0 indicates he or she did not.

and it has been shown that PACE programs have very low rates of hospitalization (Eng et al. 1997; Nadash 2004; Weiland et al. 2000). The survey therefore asked respondents whether the sample member ever spent any time during the previous year in either of these settings.[11]

Influenza Vaccinations. Vaccinations are a proven way to avoid later complications from infections. The Centers for Disease Control and Prevention (CDC) recommend annual influenza vaccines for all individuals over the age of 50 (CDC 1996). The survey asked respondents whether they had received a flu shot since the previous September (thus covering the previous year's flu season). We also asked respondents if they had been offered a flu shot during the

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[11] We did not use Medicare or Medicaid claims data to measure health care utilization because the PACE programs are paid on a capitated basis, and hence do not file claims.

same time period, because rates of flu shot receipt may not convey a complete picture of quality of care if providers offer the shots but patients refuse them.

Pneumococcal Vaccine. Whether a person has ever received pneumococcal vaccine is also an important preventive measure among the elderly. This vaccine protects against pneumonia, bacteremia, and meningitis, and the CDC recommends the pneumococcal vaccine for anyone over the age of 65 (CDC 1997). However, unlike the influenza vaccine, which must be given once a year to be effective, the pneumococcal vaccine need be administered only once (or possibly twice) over the course of a lifetime (CDC 1997). The survey thus asked if the sample member had ever had the pneumococcal vaccine in his or her life.[12]

Vision and Hearing Screenings. Vision and hearing loss are frequent problems among the elderly, and can impact their functioning and quality of life. The U. S. Preventive Services Task Force recommends routine vision screening for adults over age 65 (Maciosek et al. 2006). We asked survey respondents whether they have their hearing and vision checked regularly, which is noted to be at least once a year.

3. Health Status and Symptoms

Health Status. The purpose of any health care system is to effect improvements in the health of the served population. To measure health status, the survey asked respondents to rate and report their health status relative to other people their age and to a particular point in time. Individuals were asked to rate their health on a five-point scale ranging from poor to excellent,

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[12] Though the pneumonia vaccine is necessary only once in a lifetime, some respondents reported having had the vaccine during the baseline interview, but not having had it at the second interview. This could be due to recall error or error from the use of proxy respondents. Because we could not verify the validity of either answer, we report the data as given.

EXHIBIT III.3

DESCRIPTION OF HEALTH STATUS MEASURES

Self-rated Health Status	Self-rated health status: Sample member's report of health compared to other people the same age. The variable is on a five-point scale, where 1 equals poor health and 5 equals excellent health. Self-rated health comparison: Sample member's own comparison of his or her health now to one year ago. On this five-point scale, 1 denotes much worse health and 5 denotes much better health.
Activities of Daily Living	Whether the sample member had difficulty with completing each of five activities during the past week; (1) getting around, (2) dressing, (3) bathing, (4) toileting, and (5) getting out of bed. Difficulty is defined as the sample member getting help from another person, or reporting that he or she needed help from a person that they did not receive. Each of these questions was converted to a binary scale, where 0 indicates no difficulty independence (either performing activity on own or with use of assistive device) and 1 means done with difficulty (including not doing the activity at all, receiving help from another person, or needing but not receiving help).
Depression	Sample members were asked if they have had any of four symptoms of depression in the past month: (1) felt down, depressed, or hopeless, (2) experienced little interest or pleasure in doing things, (3) worried a lot, or (4) felt keyed up or on edge. Each variable coded as 1 if the person has the symptom, 0 if he or she does not.
Behavioral Problems	Proxy respondents were asked to gauge behavioral problems of sample member on four behaviors: (1) wandering, (2) delirium, (3) physical aggression, and (4) verbal aggression. Proxies were asked whether the behavior happens more then once a week, less than once a week, or never. Each of these questions was converted to a binary variable, where 0 indicates the behavior never happens and 1 indicates the behavior happens sometimes (less or more than once a week).

and then were asked whether their health was worse or better than in the previous year (also on a five-point scale, ranging from much worse to much better).

Activities of Daily Living. The ability to perform ADLs is of crucial importance to elderly individuals who are already eligible for nursing home care. ADLs are tasks that are important to everyday functioning and living independently, and include getting around indoors, dressing, bathing, toileting, and getting out of bed. We constructed measures of respondents' ability to perform each ADL using the following categories: (1) able to do on his or her own; (2) able to do with the help of an assistive device, such as a cane or a walker; (3) able to do with the assistance of another person; or (4) unable to do at all. We defined difficulty in completing an ADL as the latter two categories, that is, requiring help from another person to complete the activity, or not being able to complete it at all.[13]

Mental Health. Depression is quite common among the elderly, especially the oldest old, but it can be managed well if identified and treated (National Institute of Mental Health 2007). The survey asked respondents how often in the past month they (1) felt down, depressed, or hopeless; (2) experienced little interest or pleasure in doing things; (3) worried a lot; or (4) felt keyed up or on edge. We constructed a measure for each variable that indicates whether a person ever experienced these symptoms in the past month.

Because of the high prevalence of cognitive impairment among the nursing home population, and the association of cognitive impairment with behavioral problems, we asked proxy respondents questions about how frequently the sample member wandered, was delirious, exhibited physical aggression, or was verbally aggressive. For each question, the response choices were "never occurred," "occurred less than once a week," or "occurred more than once a week." For each problem, we created a measure to capture whether the behavior ever occurred.

4. Satisfaction with Quality of Life and with Health and Personal Care Services

One difficulty that arises in measuring the quality of care of PACE programs is that there are no widely used measures to summarize the quality of the multidisciplinary team as a whole (Eleazer 2000; Mukamel et al. 2006). However, an alternative method to gauge the quality of

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[13] We also considered an alternative definition where the use of an assistive device was categorized in the 'not independent' category. For other variables, this alternative specification (by definition) led to higher levels of functional limitations in both groups. However, it did not substantively change our findings regarding the difference in functional limitations between those in PACE and those in HCBS. Due to an error in the administration of the survey measures of functioning for eating are not reported.

EXHIBIT III.4

DESCRIPTION OF SATISFACTION MEASURES

Satisfaction with Quality of Care	Sample members were asked (1) how satisfied they are with how they are living their life, and (2) how much control they have over what they do and when they do it. The first of these is coded so that 1 indicates somewhat or completely satisfied, and 0 indicates not satisfied. The second is coded so that 1 indicates some or a great deal of choice, and 0 indicates not very much choice.
Satisfaction with Medical Care	Sample members were asked about their satisfaction with (1) the overall quality of medical care, (2) information given to them about treatment for health conditions, (3) the concern of doctors about overall health, not just a particular symptom, and (4) how much concern doctors had for what a patient said. They were also asked (5) whether it takes energy to get needed care. Each of these five questions was placed on a 0/1 scale, where 0 indicates not satisfied and 1 indicates satisfied.
Satisfaction with Personal Assistance	Sample members who had help with any ADL from a paid caregiver were asked (1) their satisfaction with caregivers treating them as a person, (2) the emotional support given by caregivers, (3) how often caregivers pay attention to what a person says, (4) whether caregivers addressed needs as often as they should have, (5) how often caregivers completed all of the work they should have, and (6) how often caregivers rushed through their work. Each of these six questions was placed on a 0/1 scale, where 0 indicates not satisfied and 1 indicates satisfied.

these individual components is to ask participants about their levels of satisfaction with the quality of life, health care services, and personal care services.

As older people become more dependent on others for care and coordination of daily activities, the loss of freedom may reduce their satisfaction with the way they are living. Survey respondents were asked whether or not they were satisfied with their overall quality of life, and whether or not they had the freedom to do what they want in life.

A series of five questions was asked of all survey respondents about their satisfaction with their health care providers. These questions ascertained whether participants were satisfied overall with the care they received, and specific questions probed whether providers responded to the participants' needs and listened to their concerns.

Finally, a person who reported receiving help from a paid caregiver to complete any ADL and was not himself or herself a paid caregiver acting as a proxy respondent, was asked a series of six questions to gauge satisfaction with personal assistance services. (Paid caregivers were not asked the questions because their responses may have been biased.) The sample sizes for these questions were small because few respondents met the eligibility restrictions for these questions, and even fewer were present for both interviews.

IV. ASSESSING THE IMPACT OF PACE RELATIVE TO HCBS: RESULTS

A. HOW DOES PACE AFFECT CARE MANAGEMENT?

1. How Did PACE and HCBS Care Management Outcomes Compare at the First and Second Interviews?

PACE participants had better overall outcomes than HCBS participants in areas that reflect superior health care management. PACE participants were much more likely to have advanced directives and living wills in place at both the first and second interviews, and they were less likely to report pain that interfered with their normal routine (Table IV.1). For example, in the first interview only 35 percent of the PACE participants reported having such pain, compared to 46 percent of the HCBS respondents. This suggests that the comprehensive care and consistent monitoring offered by PACE may address these issues more readily.

PACE participants also were less likely to report fewer unmet needs in performing two activities of daily living in both interviews. In the first interview, approximately 30 percent fewer PACE participants reported that they did not have enough help in getting around, and 38 percent fewer indicated that they had unmet needs in getting dressed. These differences persisted into the second interview; furthermore, PACE respondents in the second interview were less likely to report an unmet need for bathing. However, participation in PACE did not have an effect on unmet needs for toileting or getting out of bed.

The percentage of PACE and HCBS participants who experienced a fall or had an unintentional weight loss was about the same in both interviews (Table IV.1). Thus, PACE programs do not appear to prevent falls or weight loss to any greater degree than HCBS participants experience.

TABLE IV.1

DIFFERENCES IN CARE MANAGEMENT OUTCOMES BETWEEN PACE AND HCBS ENROLLEES AT THE FIRST AND SECOND INTERVIEWS

	First Interview	First Interview	First Interview	Second Interview	Second Interview	Second Interview
	PACE	HCBS	Difference	PACE	HCBS	Difference
Advanced Directive/Living Will						
Has an advanced directive	0.47	0.35	0.11***	0.47	0.40	0.08**
Has a living will	0.33	0.26	0.07**	0.37	0.35	0.02
Has both	0.26	0.20	0.06**	0.28	0.27	0.01
Has either	0.53	0.42	0.12***	0.56	0.47	0.09**
Pain Management: Experiences Pain That Interferes with Normal Routine	0.35	0.46	-0.11***	0.40	0.48	-0.08**
Experienced a Fall in the Last Six Months	0.33	0.30	0.03	0.31	0.31	-0.00
Unintentionally Lost 10 or More Pounds in the Past Month	0.19	0.21	-0.02	0.18	0.23	-0.05
Unmet ADL Needs						
Getting around	0.16	0.23	-0.07**	0.17	0.25	-0.08**
Toileting	0.17	0.16	0.01	0.17	0.19	-0.02
Bathing	0.12	0.12	0.00	0.14	0.21	-0.08***
Dressing	0.10	0.16	-0.06***	0.13	0.19	-0.06**
Getting out of bed	0.11	0.13	-0.02	0.13	0.17	-0.04

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between PACE (study states) and HCBS at the first interview use initial sampling weights, and differences in means at follow-up use follow-up weights. Mean differences in each period are tested for statistical significance using t-tests.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

2. How Did PACE Affect Improvement and Decline in Care Management Outcomes?

There was little overall difference between PACE and HCBS participants in the measures reflecting the improvements or declines in health care management outcomes. PACE participants were no more likely than HCBS participants to put end-of-life preparatory documents in place over the year. (Table IV.2). Nor were the rates of improvement or decline in pain management, falls, unintentional weight loss, or unmet ADL needs different between the two groups in most cases. We found two statistically significant differences in changes in unmet need; one difference was favorable to PACE participants (suggesting that they were less likely to experience a decline in bathing), and one was unfavorable to PACE participants (suggesting that PACE participants were less likely to experience an improvement in getting around). These results suggest that even though PACE improved health management outcomes, over a year, PACE participants were no more likely to improve or decline in these measures relative to HCBS participants

B. HOW DOES PACE AFFECT HEALTH CARE UTILIZATION?

1. How Did PACE and HCBS Health Care Utilization Compare at the First and Second Interviews?

PACE participants were much more likely than their HCBS counterparts to receive higher levels of preventive care, such as vaccines and screenings (Table IV.3). For example, at the first interview, about 30 percent more PACE participants reported receiving a flu shot since the previous September than those in HCBS (83 percent compared to 63 percent). PACE participants were much more likely to be offered flu shots, although the difference between the

TABLE IV.2

DIFFERENCES IN IMPROVEMENT AND DECLINE IN HEALTH CARE MANAGEMENT FOR PACE AND HCBS ENROLLEES

	PACE Improvement	HCBS Improvement	Difference Improvement	PACE Decline	HCBS Decline	Difference Decline
Advanced Directive/Living Will[a]						
Has an advanced directive	0.13	0.13	-0.00	--	--	--
Has a living will	0.15	0.17	-0.02	--	--	--
Has both	0.13	0.14	-0.01	--	--	--
Has either	0.14	0.14	-0.00	--	--	--
Experiences Pain That Interferes with Normal Routine	0.14	0.14	-0.00	0.15	0.14	0.01
Experienced a Fall in the Last Six Months	0.15	0.15	-0.00	0.13	0.17	-0.04
Unintentionally Lost 10 or More Pounds in the Past Month	0.10	0.08	0.01	0.12	0.14	-0.02
Unmet ADL Needs						
Getting around	0.08	0.13	-0.05*	0.11	0.13	-0.02
Toileting	0.10	0.11	-0.01	0.10	0.13	-0.03
Bathing	0.07	0.08	-0.01	0.10	0.17	-0.07**
Dressing	0.07	0.10	-0.03	0.10	0.13	-0.03
Getting out of bed	0.07	0.07	-0.00	0.10	0.11	-0.01

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between HCBS and PACE (study states) use follow-up sampling weights and are tested for statistical significance using t-tests.

[a] Declines for these variables are not reported since interpretation of the findings is not clear.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE IV.3

DIFFERENCES IN HEALTH CARE UTILIZATION BETWEEN PACE AND HCBS ENROLLEES AT THE FIRST AND SECOND INTERVIEWS

	PACE First Interview	HCBS First Interview	Difference First Interview	PACE Second Interview	HCBS Second Interview	Difference Second Interview
Hospitalization in the previous year	0.27	0.37	-0.11***	0.27	0.36	-0.09**
Nursing home stay in the previous year	0.24	0.16	0.08***	0.27	0.17	0.10***
Hearing screening in the previous year	0.73	0.44	0.29***	0.75	0.50	0.25***
Vision screening in the previous year	0.85	0.72	0.14***	0.87	0.74	0.12***
Had a flu shot since last September	0.83	0.63	0.21***	0.86	0.72	0.14***
Had or was offered a flu shot since last September	0.91	0.76	0.15***	0.92	0.85	0.07**
Had a pneumococcal vaccine ever	0.60	0.47	0.13***	0.67	0.59	0.08*

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between PACE (study states) and HCBS at the first interview use initial sampling weights, and differences in means at follow-up use follow-up weights. Mean differences in each period are tested for statistical significance using t-tests.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

two groups was slightly lower; 91 percent of PACE participants and 76 percent of HCBS participants had been offered access to a flu shot.[14] Furthermore, PACE participants were also more likely in both survey periods to have had a pneumococcal vaccine, a vision screening, and a hearing screening.

Perhaps as a result of the improved use of preventive services, PACE participants reported significantly fewer hospitalizations in the year prior to both the first and second interviews (Table IV.3). PACE participants were nearly 30 percent less likely to be hospitalized than the HCBS population.

Nursing home stays in the year prior to both interviews were actually more likely among those in PACE than those in HCBS (Table IV.3). Because the question we asked referred to any nursing home stay, this measure reflects both long- and short-term nursing home stays. That is, this nursing home measure reflects appropriate short-stay admissions (for respite services or in lieu of a hospital admission) as well as permanent long-term nursing home placement.[15] As a result, this measure can not be interpreted as a measure of better quality of care.

2. How Did PACE Affect Improvement and Decline in Health Care Utilization?

PACE participants did not improve in their use of health care services as much as HCBS participants, but this is due to the fact PACE participants started at a higher level at the first interview, leaving less room for improvement. Over the course of the year, HCBS participants who had not received hearing screenings or a flu shot by the first interview were much more

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[14] Note that PACE organizations are required to report flu shot rates via the Health Plan Management System (HPMS), and we are aware that the HPMS reports these rates to be higher, suggesting that there is some reporting error. However, we could not use the HPMS data for this purpose, as it is not available for HCBS participants.

[15] Because they are not bound by the usual Medicare and Medicaid regulations, PACE programs can provide facility-based respite services or can admit a patient to a skilled nursing facility without a prior hospitalization, thus using nursing homes for short-term stays that may reflect more appropriate care. This is not allowable under fee-for-service Medicare.

likely to receive them by the second, while those who had previously been hospitalized were less likely to be rehospitalized. (Table IV.4).

PACE participants did improve in these measures over time, but the HCBS participants improved at a higher rate. When we account for differences in the initial levels, we find that PACE participants were just as likely to improve, if not be more likely to improve. (See Section F). With these higher rates of improvement, PACE participants maintained higher overall levels of preventive service use, as there was no difference between the groups in the likelihood of decline among those who had the preventive service in the first interview.

C. HOW DOES PACE AFFECT HEALTH STATUS AND HEALTH SYMPTOMS?

1. How Did the Health Status Measures Among PACE and HCBS Compare at the First and Second Interviews?

Given our findings that PACE participants have better management outcomes and receive more preventive services, we expect that these improvements will be reflected in better health outcomes. Consistent with this expectation and previous studies, PACE participants reported better self-rated health status and improvement in self-rated health status at the first interview (Table IV.5). This broad measure which reflects the participants view of their overall health, indicates higher level of health status among PACE participants. However, by the second interview, self-reported health status was the same for PACE and HCBS participants.

Despite reporting better health status at the first interview, PACE participants generally reported the same levels of functioning as the HCBS participants in both periods. As expected of a population eligible for nursing home care, both groups were impaired. For example, over 60 percent of both the PACE group and the HCBS comparison group could not bathe on their own at the time of the first interview, and about half of each group could not dress on their own. While most levels of functioning were similar across the samples, PACE participants reported

TABLE IV.4

DIFFERENCES IN IMPROVEMENTS AND DECLINES IN HEALTH CARE UTILIZATION FOR PACE AND HCBS ENROLLEES

	PACE Improvement	HCBS Improvement	Difference Improvement	PACE Decline	HCBS Decline	Difference Decline
Hospitalization in the previous year	0.11	0.16	-0.05*	0.14	0.15	-0.01
Nursing home stay in the previous year[a]	--	--	--	--	--	--
Hearing screening in the previous year	0.13	0.21	-0.08***	0.14	0.14	-0.00
Vision screening in the previous year	0.08	0.09	-0.01	0.09	0.09	0.00
Had a flu shot since last September	0.09	0.16	-0.08***	0.07	0.07	-0.00
Had or was offered a flu shot since last September	0.07	0.18	-0.11***	0.06	0.07	-0.01
Had a pneumococcal vaccine ever[a]	0.13	0.15	-0.02	--	--	--

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between HCBS and PACE (study states) use follow-up sampling weights and are tested for statistical significance using t-tests.

[a] Improvements and declines for these variables are not reported because interpretation of the findings is not clear.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE IV.5

DIFFERENCES IN HEALTH STATUS BETWEEN PACE AND HCBS ENROLLEES AT THE FIRST AND SECOND INTERVIEWS

	PACE First Interview	HCBS First Interview	Difference First Interview	PACE Second Interview	HCBS Second Interview	Difference Second Interview
Self-Rated Health Status (1 = Poor, 5 = Excellent)	2.66	2.45	0.21***	2.53	2.49	0.03
Self-Rated Health Compared to a Year Ago (1 = Much Worse, 5 = Much Better)	3.02	2.74	0.28***	2.86	2.79	0.07
Activities of Daily Living						
Difficulty getting around	0.40	0.44	-0.04	0.43	0.47	-0.04
Difficulty toileting	0.43	0.38	0.05*	0.45	0.43	0.03
Difficulty bathing	0.63	0.64	-0.01	0.66	0.72	-0.06*
Difficulty dressing	0.51	0.56	-0.05	0.54	0.57	-0.03
Difficulty getting out of bed	0.39	0.39	-0.00	0.43	0.45	-0.02
Behavioral Problems[a]						
Sample member has ever been delirious, confused, or hallucinated	0.47	0.38	0.09**	0.45	0.42	0.03
Sample member has ever wandered or become lost in the community	0.18	0.17	0.01	0.19	0.18	0.00
Sample member has ever been physically aggressive or combative towards self or others	0.14	0.10	0.04	0.18	0.08	0.10***
Sample member has ever been verbally aggressive	0.25	0.22	0.03	0.24	0.20	0.04
Depression						
Has felt down or depressed in the past month	0.38	0.48	-0.10***	0.39	0.45	-0.06
Has had little interest or pleasure in activities that the sample member usually enjoys in the past month	0.38	0.41	-0.03	0.42	0.48	-0.06
Has worried a lot in the past month	0.36	0.47	-0.11***	0.38	0.48	-0.10***
Has often felt keyed up or on edge in the past month	0.30	0.32	-0.02	0.31	0.31	-0.00

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between PACE (study states) and HCBS at the first interview use initial sampling weights, and differences in means at follow-up use follow-up weights. Mean differences in each period are tested for statistical significance using t-tests.

[a] Asked only of proxy respondents.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

more difficulty toileting at the first interview and less difficulty bathing at the second interview. Otherwise, we found no differences in our functioning measures in these two groups, indicating that participants were functioning at the same level.

We found some evidence that proxy respondents for PACE participants were more likely to report behavioral problems than those for HCBS participants.. (Table IV.5). Among those who had health and cognitive limitations that warranted use of a proxy respondent in the survey, the same proportion of PACE and HCBS participants displayed problems with wandering and verbal aggression at both the first and second interviews. But PACE participants were more likely to display periods of hallucination or delirium at the first interview, but this difference did not persist in the second interview. PACE and HCBS participants displayed the same levels of physically aggressive behavior initially, but in the second year physical aggression towards oneself or others was 10 percentage points higher among those in PACE. We could not find anything in the PACE model that would account for such differences between the two groups, nor could we find reasons why these effects might have been present in one survey period but not the other.

PACE participants appear to have fewer mental health problems than HCBS participants (Table IV.5). PACE participants were less likely than HCBS enrollees to report feeling depressed at the first interview, and they also reported feeling less worried in both interviews. The close monitoring of the PACE model may result in depression being addressed more readily. The PACE model also requires the team to meet all of the participants' needs, meaning that participants may have fewer reasons to worry. However, both groups were just as likely to report that they had times when they felt keyed up or on edge, and about the same percentage of both groups had said they experienced times when they found themselves having little interest in activities that they usually found enjoyable.

2. How Did PACE Affect Improvement and Decline in Health Status Outcomes?

PACE participants had the same general rates of improvement and decline in their health status, functioning, and mental health outcomes as HCBS participants. PACE participants were no more likely than those in HCBS to experience an improvement or a decline in their self-reported health status (Table IV.6). Indeed, both groups were more likely to experience declines than improvements in their health, and the rates of improvement and decline were the same in both groups.

There were few differences between PACE and HCBS participants in improvement or decline in physical functioning between the interviews (Table IV.6). We had hypothesized that better management and use of preventive services in PACE could slow the decline in functioning. And we did find that PACE participants were likely to improve in bathing (report less difficulty) over the course of the year. However, we found that the functioning of both PACE and HCBS participants is much more likely to decline than to improve, and we found no difference in the rates of decline between the two groups for measures other than improved toileting.

The effect of PACE on the change in behavioral problems, as reported by proxy survey respondents, was mixed (Table IV.6). For most measures, PACE and HCBS participants were just as likely to improve in behavioral problems, although PACE respondents were twice as likely to show an improvement in the likelihood of delirium. In contrast, PACE respondents who did not report physical or verbal aggression in the first interview were more likely to do so in the second interview. These mixed results suggest that behavioral problems change over time, and that participation in PACE does not affect these changes. Furthermore, we found no differences in the rates of improvement or declines for mental health measures.

TABLE IV.6

DIFFERENCES IN IMPROVEMENT AND DECLINE IN HEALTH STATUS FOR PACE AND HCBS ENROLLEES

	PACE Improvement	HCBS Improvement	Difference Improvement	PACE Decline	HCBS Decline	Difference Decline
Self-Rated Health Status (1 = Poor, 5 = Excellent)	0.23	0.28	-0.05	0.34	0.33	0.01
Self-Rated Health Compared to a Year Ago (1 = Much Worse, 5 = Much Better)[a]	--	--	--	--	--	--
Activities of Daily Living						
Difficulty getting around	0.08	0.11	-0.02	0.16	0.16	-0.00
Difficulty toileting	0.08	0.07	0.01	0.14	0.14	0.01
Difficulty bathing	0.06	0.03	0.03*	0.12	0.14	-0.01
Difficulty dressing	0.05	0.08	-0.03	0.12	0.11	0.01
Difficulty getting out of bed	0.06	0.07	-0.01	0.14	0.15	-0.00
Behavioral Problems[b]						
Sample member has ever been delirious, confused, or hallucinated	0.14	0.07	0.07**	0.16	0.21	-0.06
Sample member has ever wandered or become lost in the community	0.10	0.13	-0.03	0.09	0.09	0.00
Sample member has ever been physically aggressive or combative towards self or others	0.07	0.07	-0.00	0.14	0.04	0.10***
Sample member has ever been verbally aggressive	0.12	0.09	0.03	0.12	0.04	0.08***
Depression						
Has felt down or depressed in the past month	0.13	0.17	-0.03	0.16	0.14	0.02
Has had little interest or pleasure in activities that the sample member usually enjoys in the past month	0.15	0.18	-0.03	0.22	0.23	-0.02
Has worried a lot in the past month	0.15	0.14	0.00	0.18	0.15	0.03
Has often felt keyed up or on edge in the past month	0.13	0.12	0.01	0.15	0.13	0.02

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between HCBS and PACE (study states) use follow-up sampling weights and are tested for statistical significance using t-tests.

[a] Improvements and declines for this variable are not reported because interpretation of the findings is not clear.

[b] Asked only of people who used ADL help from a person.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

D. HOW DOES PACE AFFECT SATISFACTION WITH CARE?

1. How Did PACE and HCBS Satisfaction Measures Compare at the First and Second Interviews?

Both PACE and HCBS participants had very high levels of satisfaction with their medical and personal care. (Table IV.7) We found mixed results in our two quality-of-life measures. At the first interview, PACE and HCBS participants were equally satisfied with their overall quality of life; but at the second interview, we found PACE participants were more satisfied with their overall quality of life. When asked about their satisfaction with their choice of activities, both groups were equally satisfied at the first interview, but PACE participants were less satisfied at the second (Table IV.7). Both of these could be PACE effects, as the benefits of the PACE program could improve overall quality of life, while attendance at the PACE center could make participants feel less satisfied with their choice of activities.

We also found mixed results in participants' satisfaction with medical care. Satisfaction with medical care was high for both PACE and HCBS participants. Four of the five measures of satisfaction with medical care were virtually identical in both PACE and HCBS at the time of the first interview, with levels of satisfaction ranging between 93 and 96 percent (Table IV.7). However, in our second survey, PACE participants reported they were less satisfied with the information they received from providers about their treatment (4 percentage points) and they were less satisfied with the amount of concern the doctor expressed for what they said (3 percentage points). In contrast, PACE participants consistently reported that it did not take energy to obtain needed care (11 percentage points at the first interview and 18 percentage points at the second). Again, these results could be consistent with PACE effects: having the interdisciplinary team managing care and making recommendations could result in some patients being less satisfied with the communication with their physician, while having that team take care of all of the individual's needs and having a comprehensive array of services available at the

TABLE IV.7

DIFFERENCES IN SATISFACTION WITH CARE BETWEEN PACE AND HCBS ENROLLEES AT THE FIRST AND SECOND INTERVIEWS

	PACE First Interview	HCBS First Interview	Difference First Interview	PACE Second Interview	HCBS Second Interview	Difference Second Interview
Quality of Life						
Satisfied with overall quality of life	0.74	0.71	0.03	0.73	0.65	0.07**
Satisfied with own choice of activities	0.74	0.70	0.04	0.71	0.79	-0.08**
Satisfaction with Medical Care						
Satisfied with overall quality of medical care	0.95	0.96	-0.01	0.94	0.97	-0.02
Satisfied with information given about treatment of a health condition	0.94	0.94	0.00	0.93	0.96	-0.04**
Satisfied with concern of doctors about patient’s overall health	0.93	0.94	-0.01	0.93	0.96	-0.03
Satisfied with concern of doctors for what patient had to say	0.95	0.95	-0.00	0.93	0.96	-0.03*
Feel that it does not take energy to get needed care	0.50	0.39	0.11***	0.52	0.34	0.18***
Satisfaction with Personal Assistance[a]						
Satisfied that paid caregivers treat sample member as a person	0.95	0.96	-0.02	0.95	0.99	-0.04
Satisfied with emotional support given by paid caregivers	0.85	0.90	-0.05	0.91	0.88	0.03
Satisfied with how often paid caregivers paid attention to what the sample member said	0.85	0.91	-0.06	0.90	0.89	0.01
Satisfied that paid caregiver addressed needs of sample member	0.94	0.91	0.03	0.91	0.91	-0.01
Satisfied with how often paid caregivers completed their work	0.90	0.94	-0.04	0.94	0.92	0.02
Satisfied with how often paid caregivers did not rush through work	0.68	0.70	-0.02	0.72	0.59	0.13*

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between PACE (study states) and HCBS at the first interview use initial sampling weights, and differences in means at follow-up use follow-up weights. Mean differences in each period are tested for statistical significance using t-tests.

[a] Asked only of people who used ADL help from a paid caregiver. If a paid caregiver is the sample member’s proxy respondent, these questions are skipped.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

PACE center could make it easier for the participant to access needed services. As a result, PACE participants might report that obtaining needed care requires less energy.

Finally, we found few differences between the groups in terms of satisfaction with personal assistance among those who reported using help from a paid caregiver. Of our 12 satisfaction measures (6 at each interview), we found only one significant difference: in the second interview PACE participants were more likely to report that they were satisfied that their caregivers did not rush through work. All the other measures suggest that PACE and HCBS participants were equally satisfied with the personal assistance given by paid caregivers.

2. How Did PACE Affect Improvement and Decline in Satisfaction Outcomes?

We found little evidence of a difference between PACE and HCBS participants in improvement or decline for most measures of satisfaction (Table IV.8). As noted, for earlier, in general both PACE and HCBS participants were very satisfied with the care they received, hence it would be unlikely to identify differences in improvements in satisfaction, although one might expect to find differences in declines. However, we generally did not find differences between the two groups. One measure that did show a statistical difference was the participant's satisfaction with his or her choice of activities (Table IV.8). PACE participants' satisfaction with their choice of activities was less likely to improve, and more likely to decline. As noted earlier, one possible explanation is that some PACE enrollees may not like attending the PACE center; previous research showed that this was a key reason for potential PACE participants not to enroll in PACE (Irvin et al. 1997). However, note that we did not find this difference at the first interview, which suggests this dissatisfaction only develops in the longer term. Also, PACE participants were no more likely to report and improvement or decline in overall quality of life.

TABLE IV.8

DIFFERENCES IN IMPROVEMENT AND DECLINE IN SATISFACTION WITH CARE FOR PACE AND HCBS ENROLLEES

	PACE Improvement	HCBS Improvement	Difference Improvement	PACE Decline	HCBS Decline	Difference Decline
Satisfied with Overall Quality of Life	0.10	0.12	-0.03	0.13	0.17	-0.04
Satisfied with Own Choice of Activities	0.09	0.16	-0.07**	0.15	0.08	0.07***
Satisfaction with Medical Care						
Satisfied with overall quality of medical care	0.04	0.05	-0.00	0.04	0.03	0.01
Satisfied with information given about treatment of a health condition	0.05	0.04	0.01	0.06	0.02	0.03**
Satisfied with concern of doctors about patient’s overall health	0.05	0.03	0.02	0.04	0.04	0.00
Satisfied with concern of doctors for what patient had to say	0.04	0.03	0.01	0.05	0.02	0.03**
Feel that it does not take energy to get needed care	0.19	0.15	0.04	0.18	0.19	-0.01
Satisfaction With Personal Assistance[a]						
Satisfied that paid caregivers treat sample member as a person	0.07	0.06	0.01	0.06	0.02	0.03
Satisfied with emotional support given by paid caregivers	0.09	0.09	-0.00	0.06	0.12	-0.06
Satisfied with how often paid caregivers paid attention to what the sample member said	0.09	0.05	0.04	0.07	0.04	0.03
Satisfied that paid caregiver addressed needs of sample member	0.05	0.07	-0.01	0.09	0.04	0.05
Satisfied with how often paid caregivers completed their work	0.03	0.03	0.01	0.04	0.11	-0.07
Satisfied with how often paid caregivers did not rush through work	0.15	0.13	0.01	0.10	0.10	0.00

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between HCBS and PACE (study states) use follow-up sampling weights and are tested for statistical significance using t-tests.

[a] Asked only of people who used ADL help from a paid caregiver. If a paid caregiver is the sample member’s proxy respondent, these questions are skipped.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

The rates of improvement and decline in satisfaction with medical care were generally the same for PACE and HCBS participants. PACE participants' satisfaction was more likely to decline than that of HCBS participants on two measures; they reported a bigger decline in satisfaction with the information given about the treatment of a health condition and with the concern shown by a doctor for what the patient had to say (Table IV.8). However, satisfaction with their overall quality of medical care, concern of their doctor about their overall health, and the amount of energy it took to get needed care declined at the same rates. This suggests that over time PACE participants became relatively less satisfied with communication, although this didn't affect their overall satisfaction with care. We found no differences in improvements or declines with satisfaction with personal care.

E. SENSITIVITY TESTS USING REGRESSION ADJUSTMENT

In order to ensure that the previously reported results were not due simply to differences in observed variables between the PACE and HCBS groups, we performed two different sets of regression-adjusted analyses. In the first set of analyses, which we call "regression adjusted without health controls," we controlled for all of the variables that were used in propensity-score matching, as well as survey variables that should not have been affected by enrollment in PACE or HCBS. These include age, race, gender, education, income, marital status, and months since enrollment. Models that considered either differences at the second interview or improvement or decline between interviews included an additional control for the amount of time elapsed between the first and second interviews. Exhibit II.1 contains the more detailed definitions of the variables and how they were included in the regression models. (Complete results for these models can be found in Appendix C).

In the second set of analyses, which we call "regression adjusted with health controls," we controlled for all of the variables that were included in the first analyses, and in addition we included the diagnosed health conditions at the time of the first interview. We separated health conditions in this alternate specification because the diagnosis of these health conditions could have been endogenous to PACE status. That is, participants might be more (or less) likely to have been told of their diagnoses due to their enrollment in PACE. If PACE was the reason for these diagnoses, we do not want to include these variables in our regression models predicting the effect of PACE relative to HCBS on our other measures. However, if these conditions were unaffected by PACE, then controlling for them will allow for better precision. (Complete results for these models can be found in Appendix D).

Despite the exhaustive list of covariates included in the regression models, the results for comparisons of both the mean levels of the measures for each interview and of improvements or declines between interviews among PACE and HCBS participants were virtually unchanged. As Tables IV.9 through IV.16 show, none of our estimates changed sign; that is, none of the results that were favorable to PACE became unfavorable, or vice versa. In most cases, estimates of the differences that were not statistically significant in the unadjusted comparisons stayed insignificant in the regression-adjusted models, both with and without health controls. Similarly, most differences that were statistically significant in the unadjusted comparisons remained so after regression adjustment. A few of our results did change their statistical significance and these are highlighted in Tables IV.9 to IV.16. For the most part, these changes affected isolated measures and did not display a consistent pattern that affected our interpretation.

From these tests, we identified one area where the results are not robust to the inclusion of covariates, including the controls for health conditions in the first interview. We found that in the regression-adjusted models with health controls included, some of our estimated impacts on ADLs changed (Table IV.13). Compared to no difference in functioning in the unadjusted models or regression models without health controls, PACE participants were significantly less

TABLE IV.9

DIFFERENCES IN CARE MANAGEMENT OUTCOMES BETWEEN PACE AND HCBS ENROLLEES AT THE FIRST AND SECOND INTERVIEWS

	Unadjusted Difference at First Interview	Regression Adjusted Difference at First Interview with Health Controls	Regression Adjusted Difference at First Interview Without Health Controls	Unadjusted Difference at Second Interview	Regression Adjusted Difference at Second Interview with Health Controls	Regression Adjusted Difference at Second Interview Without Health Controls
Advanced Directive/Living Will						
Has an advanced directive	0.11***	0.09***	0.09***	0.08**[a]	0.10**[a]	0.06[a]
Has a living will	0.07**	0.06*	0.06**	0.02	0.05	0.02
Has both	0.06**[a]	0.04[a]	0.05**[a]	0.01	0.04	0.01
Has either	0.12***	0.11***	0.10***	0.09**	0.11***	0.07**
Pain Management						
Experiences Pain That Interferes with Normal Routine	-0.11***[a]	-0.04[a]	-0.09***[a]	-0.08**[a]	-0.03[a]	-0.07*[a]
Experienced a Fall in the Last Six Months	0.03	0.02	0.02	-0.00	-0.01	-0.01
Unintentionally Lost 10 or More Pounds in the Past Month	-0.02	-0.04	-0.03	-0.05	-0.07**	-0.05
Unmet ADL Needs						
Getting around	-0.07**	-0.09***	-0.09***	-0.08**	-0.09***	-0.10***
Toileting	0.01	0.00	0.00	-0.02	-0.01	-0.03
Bathing	0.00	-0.01	0.01	-0.08***	-0.10***	-0.09***
Dressing	-0.06***	-0.08***	-0.06***	-0.06**	-0.08**	-0.07**
Getting out of bed	-0.02	-0.02	-0.02	-0.04[a]	-0.07**[a]	-0.05*[a]

[a] The shading indicates a change in magnitude across specifications.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE IV.10

DIFFERENCES IN IMPROVEMENT AND DECLINE IN HEALTH CARE MANAGEMENT FOR PACE AND HCBS ENROLLEES

	Unadjusted Difference in Improvement Between PACE and HCBS	Regression Adjusted Difference in Improvement Between PACE and HCBS with Health Controls	Regression Adjusted Difference in Improvement Between PACE and HCBS Without Health Controls	Unadjusted Difference in Decline Between PACE and HCBS	Regression Adjusted Difference in Decline Between PACE and HCBS with Health Controls	Regression Adjusted Difference in Decline Between PACE and HCBS Without Health Controls
Advanced Directive/Living Will[a]						
Has an advanced directive	-0.00	0.03	-0.01	--	--	--
Has a living will	-0.02	0.03	-0.00	--	--	--
Has both	-0.01	0.02	-0.02	--	--	--
Has either	-0.00	0.04	0.00	--	--	--
Experiences Pain That Interferes with Normal Routine	-0.00	0.03	0.00	0.01	0.03	0.01
Experienced a Fall in the Last Six Months	-0.00	0.00	0.00	-0.04	-0.05	-0.04
Unintentionally Lost 10 or More Pounds in the Past Month	0.01	0.00	0.01	-0.02	-0.02	-0.01
Unmet ADL Needs						
Getting around	-0.05*	-0.06**	-0.07**	-0.02	-0.03	-0.03
Toileting	-0.01	-0.03	-0.02	-0.03	0.01	-0.02
Bathing	-0.01	-0.01	0.00	-0.07**	-0.09***	-0.07**
Dressing	-0.03 [b]	-0.06** [b]	-0.03[b]	-0.03[b]	-0.06*[b]	-0.04*[b]
Getting out of bed	-0.00	-0.01	0.00	-0.01	-0.02	-0.01

[a] Declines in these variables are not reported because this outcome is unfeasible.

[b] The shading indicates a change in magnitude across specifications.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE IV.11

DIFFERENCES IN HEALTH CARE UTILIZATION BETWEEN PACE AND HCBS ENROLLEES AT THE FIRST AND SECOND INTERVIEWS

	Unadjusted Difference at First Interview	Regression Adjusted Difference at First Interview with Health Controls	Regression Adjusted Difference at First Interview Without Health Controls	Unadjusted Difference at Second Interview	Regression Adjusted Difference at Second Interview with Health Controls	Regression Adjusted Difference at Second Interview Without Health Controls
Hospitalization in the previous year	-0.11***	-0.11***	-0.12***	-0.09**	-0.08**	-0.07**
Nursing home stay in the previous year	0.08***	0.07***	0.07***	0.10***	0.10***	0.10***
Hearing screening in the previous year	0.29***	0.28***	0.26***	0.25***	0.24***	0.22***
Vision screening in the previous year	0.14***	0.12***	0.10***	0.12***	0.13***	0.12***
Had a flu shot since last September	0.21***	0.21***	0.19***	0.14***	0.16***	0.14***
Had or was offered a flu shot since last September	0.15***	0.14***	0.14***	0.07**	0.08**	0.07***
Had a pneumococcal vaccine ever	0.13***	0.15***	0.13***	0.08* [a]	0.06 [a]	0.06* [a]

[a] The shading indicates a change in magnitude across specifications.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE IV.12

DIFFERENCES IN IMPROVEMENT AND DECLINE IN HEALTH CARE UTILIZATION FOR PACE AND HCBS ENROLLEES

	Unadjusted Difference in Improvement Between PACE and HCBS	Regression Adjusted Difference in Improvement Between PACE and HCBS with Health Controls	Regression Adjusted Difference in Improvement Between PACE and HCBS Without Health Controls	Unadjusted Difference in Decline Between PACE and HCBS	Regression Adjusted Difference in Decline Between PACE and HCBS with Health Controls	Regression Adjusted Difference in Decline Between PACE and HCBS Without Health Controls
Hospitalization in the previous year	-0.05* [a]	-0.03 [a]	-0.05* [a]	-0.01	0.01	0.00
Nursing home stay in the previous year[b]	--	--	--	--	--	--
Hearing screening in the previous year	-0.08***	-0.10***	-0.08***	-0.00	-0.03	-0.01
Vision screening in the previous year	-0.01	0.00	0.01	0.00	-0.03	-0.01
Had a flu shot since last September	-0.08***	-0.06**	-0.08***	-0.00	-0.01	-0.01
Had or was offered a flu shot since last September	-0.11***	-0.11***	-0.10***	-0.01	-0.03	-0.02
Had a pneumococcal vaccine ever[a]	-0.02	-0.04	-0.02	--	--	--

[a] The shading indicates a change in magnitude across specifications.

[a] Improvements and declines in this variable are not reported because the interpretation of the findings is ambiguous.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE IV.13

DIFFERENCES IN HEALTH STATUS BETWEEN PACE AND HCBS ENROLLEES AT THE FIRST AND SECOND INTERVIEWS

	Unadjusted Difference at First Interview	Regression Adjusted Difference at First Interview with Health Controls	Regression Adjusted Difference at First Interview Without Health Controls	Unadjusted Difference at Second Interview	Regression Adjusted Difference at Second Interview with Health Controls	Regression Adjusted Difference at Second Interview Without Health Controls
Self-Rated Health Status (1 = Poor, 5 = Excellent)	0.21***	0.21***	0.20**	0.03	0.02	0.02
Self-Rated Health Compared to a Year Ago (1 = Much Worse, 5 = Much Better)	0.28***	0.27***	0.30***	0.07	0.11	0.09
Activities of Daily Living						
Difficulty getting around	-0.04[a]	-0.06*[a]	-0.06*[a]	-0.04[a]	-0.08**[a]	-0.06*[a]
Difficulty toileting	0.05*[a]	0.00[a]	0.02[a]	0.03	-0.02	-0.01
Difficulty bathing	-0.01	-0.08**	-0.03	-0.06*	-0.13***	-0.09***
Difficulty dressing	-0.05[a]	-0.10***[a]	-0.07[a]	-0.03[a]	-0.11***[a]	-0.07[a]
Difficulty getting out of bed	-0.00	-0.03	-0.02	-0.02	-0.05	-0.04
Behavioral Problems[b]						
Sample member has ever been delirious, confused, or hallucinated	0.09**	0.07*	0.08**	0.03	-0.03	0.04
Sample member has ever wandered or become lost in the community	0.01	-0.01	-0.00	0.00	-0.02	-0.03
Sample member has ever been physically aggressive or combative towards self or others	0.04	0.04	0.04	0.10***	0.07**	0.09***
Sample member has ever been verbally aggressive	0.03	0.01	0.03	0.04	0.05	0.03
Depression						
Has felt down or depressed in the past month	-0.10***	-0.09***	-0.09***	-0.06[a]	-0.09**[a]	-0.06[a]
Has had little interest or pleasure in activities that the sample member usually enjoys in the past month	-0.03	-0.01	-0.02	-0.06	-0.06	-0.05
Has worried a lot in the past month	-0.11***	-0.08**	-0.10***	-0.10***[a]	-0.06[a]	-0.09**[a]
Has often felt keyed up or on edge in the past month	-0.02	0.03	-0.01	-0.00	0.03	-0.01

TABLE IV.13 *(continued)*

[a] The shading indicates a change in magnitude across specifications.

[b] Asked only of proxy respondents.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE IV.14

DIFFERENCES IN IMPROVEMENT AND DECLINE IN HEALTH STATUS FOR PACE AND HCBS ENROLLEES

	Unadjusted Difference in Improvement Between PACE and HCBS	Regression Adjusted Difference in Improvement Between PACE and HCBS with Health Controls	Regression Adjusted Difference in Improvement Between PACE and HCBS Without Health Controls	Unadjusted Difference in Decline Between PACE and HCBS	Regression Adjusted Difference in Decline Between PACE and HCBS with Health Controls	Regression Adjusted Difference in Decline Between PACE and HCBS Without Health Controls
Self-Rated Health Status (1 = Poor, 5 = Excellent)	-0.05 [a]	-0.06* [a]	-0.05 [a]	0.01	0.02	0.00
Self-Rated Health Compared to a Year Ago[b] (1 = Much Worse, 5 = Much Better)	--	--	--	--	--	--
Activities of Daily Living						
Difficulty getting around	0.02	-0.03	-0.03	0.01	-0.01	-0.00
Difficulty toileting	0.01	0.01	-0.02	-0.02	0.03	0.01
Difficulty bathing	0.03*	0.04**	0.04**	-0.03	-0.02	-0.02
Difficulty dressing	-0.03 [a]	-0.04* [a]	-0.03 [a]	0.01	0.00	0.00
Difficulty getting out of bed	-0.01	-0.01	-0.02	-0.01	0.00	0.02
Behavioral Problems[b]						
Sample member has ever been delirious, confused, or hallucinated	0.07** [a]	0.06** [a]	0.05 [a]	-0.06	-0.08	-0.07
Sample member has ever wandered or become lost in the community	-0.03	-0.04	-0.03	0.00	0.01	-0.01
Sample member has ever been physically aggressive or combative towards self or others	-0.00	-0.01	0.00	0.10***	0.08***	0.09***
Sample member has ever been verbally aggressive	0.03	0.03	0.04	0.08***	0.10***	0.08***
Depression						
Has felt down or depressed in the past month	-0.03	-0.03	-0.04	0.02	-0.01	0.00
Has had little interest or pleasure in activities that the sample member usually enjoys in the past month	-0.03	-0.01	-0.02	-0.02	-0.01	-0.01
Has worried a lot in the past month	0.00	0.01	0.00	0.03	0.03	0.02

TABLE IV.14 *(continued)*

	Unadjusted Difference in Improvement Between PACE and HCBS	Regression Adjusted Difference in Improvement Between PACE and HCBS with Health Controls	Regression Adjusted Difference in Improvement Between PACE and HCBS Without Health Controls	Unadjusted Difference in Decline Between PACE and HCBS	Regression Adjusted Difference in Decline Between PACE and HCBS with Health Controls	Regression Adjusted Difference in Decline Between PACE and HCBS Without Health Controls
Has often felt keyed up or on edge in the past month	0.01	0.01	0.01	0.02	0.03	0.03

[a] The shading indicates a change in magnitude across specifications.

[a] Improvements and declines in this variable are not reported because the interpretation of the findings is not clear.

[b] Asked only of proxy respondents.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE IV.15

DIFFERENCES IN SATISFACTION WITH CARE BETWEEN PACE AND HCBS ENROLLEES AT THE FIRST AND SECOND INTERVIEWS

	Unadjusted Difference at First Interview	Regression Adjusted Difference at First Interview with Health Controls	Regression Adjusted Difference at First Interview Without Health Controls	Unadjusted Difference at Second Interview	Regression Adjusted Difference at Second Interview with Health Controls	Regression Adjusted Difference at Second Interview Without Health Controls
Quality of Life						
Satisfied with overall quality of life	0.03	0.02	0.02	0.07**	0.07*	0.07*
Satisfied with own choice of activities	0.04	0.02	0.04	-0.08**	-0.08**	-0.09***
Satisfaction with Medical Care						
Satisfied with overall quality of medical care	-0.01	-0.02	-0.01	-0.02	-0.02	-0.02
Satisfied with information given about treatment of a health condition	0.00	-0.01	-0.00	-0.04**	-0.06***	-0.04**
Satisfied with concern of doctors about patient's overall health	-0.01	-0.03*	-0.02	-0.03	-0.03	-0.03
Satisfied with concern of doctors for what patient had to say	-0.00	0.00	0.00	-0.03*	-0.04**	-0.03*
Feel that it does not take energy to get needed care	0.11***[a]	0.05[a]	0.08***[a]	0.18***	0.14***	0.15***
Satisfaction with Personal Assistance[b]						
Satisfied that paid caregivers treat sample member as a person	-0.02	--	--	-0.04	--	--
Satisfied with emotional support given by paid caregivers	-0.05	--	--	0.03	--	--
Satisfied with how often paid caregivers paid attention to what the sample member said	-0.06	--	--	0.01	--	--
Satisfied that paid caregiver addressed needs of sample member	0.03	--	--	-0.01	--	--
Satisfied with how often paid caregivers completed their work	-0.04	--	--	0.02	--	--
Satisfied with how often paid caregivers did not rush through work	-0.02	--	--	0.13*	--	--

[a] The. shading indicates a change in magnitude across specifications.

[b] Asked only of people who used ADL help from a paid caregiver. If a paid caregiver is the sample member's proxy respondent, these questions are skipped. Due to the small sample size for these outcomes, regression-adjusted results are not reported.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE IV.16

DIFFERENCES IN IMPROVEMENT AND DECLINE IN SATISFACTION WITH CARE FOR PACE AND HCBS ENROLLEES

	Unadjusted Difference in Improvement Between PACE and HCBS	Regression Adjusted Difference in Improvement Between PACE and HCBS with Health Controls	Regression Difference in Improvement Between PACE and HCBS Adjusted Without Health Controls	Unadjusted Difference in Decline Between PACE and HCBS	Regression Adjusted Difference in Decline Between PACE and HCBS with Health Controls	Regression Adjusted Difference in Decline Between PACE and HCBS Without Health Controls
Satisfied with Overall Quality of Life	-0.03	-0.03	-0.04	-0.04	-0.04	-0.05*
Satisfied with Own Choice of Activities	-0.07**	-0.06**	-0.06**	0.07***	0.09***	0.09***
Satisfaction with Medical Care						
Satisfied with overall quality of medical care	-0.00	-0.00	-0.00	0.01	0.02	0.01
Satisfied with information given about treatment of a health condition	0.01	0.02	0.01	0.03**	0.05***	0.04***
Satisfied with concern of doctors about patient's overall health	0.02	0.02	0.02	0.00	0.01	0.00
Satisfied with concern of doctors for what patient had to say	0.01	0.01	0.01	0.03**	0.04**	0.03*
Feel that it does not take energy to get needed care	0.04[a]	0.07*[a]	0.04*[a]	-0.01	-0.03	-0.01
Satisfaction With Personal Assistance[b]						
Satisfied that paid caregivers treat sample member as a person	0.01	--	--	0.03	--	--
Satisfied with emotional support given by paid caregivers	-0.00	--	--	-0.06	--	--
Satisfied with how often paid caregivers paid attention to what the sample member said	0.04	--	--	0.03	--	--
Satisfied that paid caregiver addressed needs of sample member	-0.01	--	--	0.05	--	--
Satisfied with how often paid caregivers completed their work	0.01	--	--	-0.07	--	--
Satisfied with how often paid caregivers did not rush through work	0.01	--	--	0.00	--	--

[a] The. shading indicates a change in magnitude across specifications.

[b] Asked only of people who used ADL help from a paid caregiver. If a paid caregiver is the sample member's proxy respondent, these questions are skipped. Due to the small sample size for these outcomes, regression-adjusted results are not reported.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

likely to report difficulties with getting around and dressing in both interviews, with differences ranging from 6 to 12 percentage points. Also, in the unadjusted models, the PACE sample appeared to have significantly more difficulty toileting in the first interview, but this effect disappeared in the regression-adjusted models.

The regression-adjusted analysis of improvements and declines in functioning were also affected by the inclusion of health conditions in the regressions; a few variables changed their significance, with some changes favoring PACE and others becoming less favorable (Tables IV.13 to IV.16). These results are consistent with multiple interpretations: one is that after controlling for health status, PACE participants have fewer ADL difficulties. A second interpretation is that our health status measures are endogenous and correlated with PACE participation, and hence when we control for health status, it appears that PACE participants have fewer ADL difficulties. Given these alternative explanations, and that our other strong impacts were generally robust with respect to the specifications, we are less inclined to attribute these ADL statistically-adjusted differences to the PACE program.

In summary, regression adjustment did not affect many of the results, and most of the changes arose when we used the specification using health conditions as a control variable (which may be endogenous and therefore be biased measures of the true effect of PACE). The results which were the least robust with respect to the specifications came when assessing the impacts on ADLs: both the results for the mean levels of the measures and for the improvement and decline measures were affected by the inclusion of health conditions. No other set of variables displayed a similar pattern, although a few individual results did. Overall, these findings did not change our interpretation of the results.

F. SENSITIVITY TESTS OF IMPROVEMENT AND DECLINE, CONDITIONING ON OUTCOMES IN THE FIRST INTERVIEW

One concern when measuring improvements and declines between the PACE and HCBS groups is that the likelihood of improvement and decline is affected by whether the initial level is higher or lower. For example, because PACE had higher levels of preventive care use at the first interview, the PACE sample may be less likely to show improvements than those in the HCBS sample, since there were fewer people who could improve. To address this issue, we also estimated the likelihood of improvement and decline conditional on the initial levels at first interviews. In other words, the probability of improvement is only calculated among those who could have gotten better based on their outcome in the first interview, and the probability of declining is limited only to those who could have gotten worse than they already were at the first interview. Tables IV.17 to IV.20 show the summary results of these alternative specifications.

We find that the majority of the results are not affected by this alternative specification. In Tables IV.17 to IV.20, we have highlighted the results for which we found results that were statistically different than the main results when we conditioned on levels at the first interview. In only a few cases are the unadjusted conditional results qualitatively different than the unconditional ones. However, because the PACE participants had much higher levels of preventative care at the baseline, the conditional models for these preventative services demonstrate consistently different results (Table IV.18). While the unconditional models suggested that PACE was less likely to improve in areas areas such as screenings and flu shots, the conditional models show that once their initial levels were controlled for, PACE participants were just as likely, or even more likely, to improve in these areas than those in the HCBS sample. We also found that while the unconditional models suggested no difference between the two groups in the probability of declining in hearing screening, those in PACE were less likely to experience a decline, conditional on levels at the first interview.

TABLE IV.17

DIFFERENCES IN UNADJUSTED CONDITIONAL AND UNCONDITIONAL IMPROVEMENTS AND DECLINES IN HEALTH CARE MANAGEMENT OUTCOMES

	PACE Levels at First Interview	HCBS Levels at First Interview	Unconditional Difference in the Percent with Improvement	Conditional Difference in the Percent with Improvement	Unconditional Difference in the Percent with Decline	Conditional Difference in the Percent with Decline
Advanced Directive/Living Will[a]						
Has an advanced directive	0.47	0.35	-0.00	0.04	--	--
Has a living will	0.33	0.26	-0.02	0.00	--	--
Has both	0.26	0.20	-0.01	-0.00	--	--
Has either	0.53	0.42	-0.00	0.06	--	--
Pain Management Experiences Pain That Interferes with Normal Routine	0.35	0.46	-0.00	0.07	0.01	-0.03
Experienced a Fall in the Last Six Months	0.33	0.30	-0.00	-0.06	-0.04	-0.06
Unintentionally Lost 10 or More Pounds in the Past Month	0.19	0.21	0.01	0.12	-0.02	-0.03
Unmet ADL Needs						
Getting around	0.16	0.23	-0.05*[b]	0.11[b]	-0.02	-0.04
Toileting	0.17	0.16	-0.01	-0.04	-0.03	-0.04
Bathing	0.12	0.12	-0.01	0.09	-0.07**	-0.08**
Dressing	0.10	0.16	-0.03	0.07	-0.03	-0.04
Getting out of bed	0.11	0.13	-0.00	0.14	-0.01	-0.02

[a] Declines for these variables not reported because the interpretation is not clear.

[b] The shading indicates a change in magnitude across specifications.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE IV.18

DIFFERENCES IN UNADJUSTED CONDITIONAL AND UNCONDITIONAL IMPROVEMENTS AND DECLINES IN HEALTH CARE UTILIZATION OUTCOMES

	PACE Levels at First Interview	HCBS Levels at First Interview	Unconditional Difference in the Percent with Improvement	Conditional Difference in the Percent with Improvement	Unconditional Difference in the Percent with Decline	Conditional Difference in the Percent with Decline
Hospitalization in the previous year	0.27	0.37	-0.05*	0.02	-0.01	-0.05
Nursing home stay in the previous year[a]	0.24	0.16	--	--	--	--
Hearing screening in the previous year	0.73	0.44	-0.08***[b]	0.16***[b]	-0.00[b]	-0.14***[b]
Vision screening in the previous year	0.85	0.72	-0.01[b]	0.30***[b]	0.00	-0.02
Had a flu shot since last September	0.83	0.63	-0.08***[b]	0.09[b]	-0.00	-0.03
Had or was offered a flu shot since last September	0.91	0.76	-0.11***[b]	0.10[b]	-0.01	-0.03
Had a pneumococcal vaccine ever[a]	0.60	0.47	-0.02	0.06	--	--

[a] Improvements and declines for these variables not reported because their interpretation is not clear.

[b] The. shading indicates a change in magnitude across specifications.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE IV.19

DIFFERENCES IN UNADJUSTED CONDITIONAL AND UNCONDITIONAL IMPROVEMENTS AND DECLINES IN HEALTH STATUS OUTCOMES

	PACE Levels at First Interview	HCBS Levels at First Interview	Unconditional Difference in the Percent with Improvement	Conditional Difference in the Percent with Improvement	Difference in the Percent with Decline Unconditional	Difference in the Percent with Decline Conditional
Self-Rated Health Status (1 = Poor, 5 = Excellent)	2.66	2.45	-0.05	-0.05	0.01	-0.01
Self-Rated Health Compared to a Year Ago (1 = Much Worse, 5 = Much Better) [a]	3.02	2.74	--	--	--	--
Activities of Daily Living						
Difficulty getting around	0.40	0.44	-0.02	-0.02	-0.00	-0.03
Difficulty toileting	0.43	0.38	0.01	0.02	0.01	0.02
Difficulty bathing	0.63	0.64	0.03*	0.05**	-0.01	-0.05
Difficulty dressing	0.51	0.56	-0.03	-0.04	0.01	-0.01
Difficulty getting out of bed	0.39	0.39	-0.01	-0.01	-0.00	-0.01
Behavioral Problems						
Sample member has ever been delirious, confused, or hallucinated	0.47	0.38	0.07** [b]	0.06 [b]	-0.06	-0.00
Sample member has ever wandered or become lost in the community	0.18	0.17	-0.03	-0.13	0.00	0.00
Sample member has ever been physically aggressive or combative towards self or others	0.14	0.10	-0.00	-0.26	0.10***	0.11***
Sample member has ever been verbally aggressive	0.25	0.22	0.03	0.07	0.08***	0.11***
Depression						
Has felt down or depressed in the past month	0.38	0.48	-0.03	0.02	0.02	-0.03
Has had little interest or pleasure in activities that the sample member usually enjoys in the past month	0.38	0.41	-0.03	-0.00	-0.02	-0.07
Has worried a lot in the past month	0.36	0.47	0.00	0.12	0.03	-0.01
Has often felt keyed up or on edge in the past month	0.30	0.32	0.01	0.05	0.02	0.03

[a] Improvements and declines for this variable not reported because their interpretation is not clear.

[b] The. shading indicates a change in magnitude across specifications.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE IV.20

DIFFERENCES IN UNADJUSTED CONDITIONAL AND UNCONDITIONAL IMPROVEMENTS AND DECLINES IN SATISFACTION WITH CARE OUTCOMES

	PACE Levels at First Interview	HCBS Levels at First Interview	Unconditional Difference in the Percent with Improvement	Conditional Difference in the Percent with Improvement	Unconditional Difference in the Percent with Decline	Conditional Difference in the Percent with Decline
Quality of Life						
Satisfied with overall quality of life	0.74	0.71	-0.03	-0.02	-0.04	-0.06
Satisfied with own choice over activities	0.74	0.70	-0.07**	-0.15**	0.07***	0.08***
Satisfaction with Medical Care						
Satisfied with overall quality of medical care	0.95	0.96	-0.00	-0.14	0.01	0.02
Satisfied with information given about treatment of a health condition	0.94	0.94	0.01	-0.01	0.03**	0.04**
Satisfied with concern of doctors about patient’s overall health	0.93	0.94	0.02	-0.17	0.00	0.01
Satisfied with concern of doctors for what patient had to say	0.95	0.95	0.01	0.07	0.03**	0.03**
Feel that it does not take energy to get needed care	0.50	0.39	0.04	0.15	-0.01	-0.16***
Satisfaction with Personal Assistance[a]						
Satisfied that paid caregivers treat sample member as a person	0.95	0.96	0.01	--	0.03	--
Satisfied with emotional support given by paid caregivers	0.85	0.90	-0.00	--	-0.06	--
Satisfied with how often paid caregivers paid attention to what the sample member said	0.85	0.91	0.04	--	0.03	--
Satisfied that paid caregiver addressed needs of sample member	0.94	0.91	-0.01	--	0.05	--
Satisfied with how often paid caregivers completed their work	0.90	0.94	0.01	--	-0.07	--
Satisfied with how often paid caregivers did not rush through work	0.68	0.70	0.01	--	0.00	--

[a] Improvements and declines for these variables are not reported due to small sample sizes.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

V. HOW SIMILAR WERE THOSE IN PACE STUDY STATES TO OTHER PACE PARTICIPANTS?

The comparison of PACE to HCBS was carried out in only eight study states, but PACE programs exist in many more states, and each PACE site is unique along many dimensions. To assess the generalizability of our PACE comparisons to HCBS, we conducted the first survey in six states that had PACE sites but no available data from which to draw the HCBS comparison group at the time of our study.[16] This section compares our PACE study state sample to PACE sites in our non-study states. Results will enable us to make inferences about how representative our PACE study state sample was for PACE programs more generally.

A. DEMOGRAPHIC, SOCIOECONOMIC, AND HEALTH DIFFERENCES IN THE FIRST INTERVIEW

Examining the demographic characteristics between the two samples, we found that there were significant differences (Table V.1). First, the PACE study state sample was significantly older than the non-study state sample. More than three-fourths of those in study states were older than age 75, compared to 68 percent of the non-study state sample. Furthermore, the proportion older than age 85 was 10 percentage points higher in study states (29 percent compared to 19 percent). The study state sample was also significantly less likely to be female, less likely to be black, and twenty percentage points more likely to be Hispanic. The high proportion of Hispanics is due to the large number of PACE participants in Texas and California. Those participants in PACE study states were twice as likely to be college graduates (11 percent compared to 6 percent in non-study states), but significantly less likely to be only high school graduates. Given that the study sample was older and more likely to be a minority group, it was

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[16] The eight study states were California, Colorado, Maryland, Massachusetts, Ohio, South Carolina, Texas, and Wisconsin. The six states without an HCBS comparison group were Michigan, Missouri, New York, Oregon, Tennessee, and Washington.

TABLE V.1

DEMOGRAPHIC, ECONOMIC, AND HEALTH CHARACTERISTICS OF PACE ENROLLEES IN NON-STUDY AND STUDY STATES

	PACE (Study States)	PACE (Non-study States)	Difference
Age			
65–74	0.24	0.31	-0.07**
75–84	0.47	0.49	-0.02
85 and older	0.29	0.19	0.09***
Female	0.72	0.77	-0.05*
Race			
Hispanic	0.36	0.16	0.19***
Black	0.17	0.26	-0.09***
Other non-white	0.15	0.16	-0.02
Don’t know/refused	0.01	0.01	0.01
Education			
Less than high school	0.48	0.44	0.05
High school or GED	0.17	0.27	-0.10***
Some college	0.07	0.08	-0.02
College graduate	0.11	0.06	0.05***
Trade/business school	0.02	0.01	0.01
Other	0.05	0.06	-0.00
Don’t know/refused	0.09	0.08	0.01
Annual Income			
Less than $10,000	0.56	0.59	-0.02
$10,000–$19,999	0.23	0.19	0.04
$20,000–$29,999	0.02	0.02	-0.00
$30,000–$39,999	0.01	0.00	0.01
$40,000–$49,999	0.00	0.00	0.00
$50,000 or more	0.00	0.00	0.00
Don’t know/refused	0.18	0.20	-0.02
Marital Status			
Married/Partnered	0.19	0.15	0.04*
Divorced/Separated	0.12	0.21	-0.09***
Widowed	0.52	0.51	0.01
Never married	0.14	0.11	0.04*
Don’t know/refused	0.02	0.02	-0.00
Living Situation			
Alone	0.28	0.34	-0.06*
With spouse/partner	0.15	0.08	0.07***
With children, relatives, friends	0.26	0.27	-0.00
Paid caregivers	0.11	0.18	-0.07***
Nursing home or other long-term care facility	0.15	0.12	0.03
Other/non-related people	0.06	0.02	0.04***
Don’t know/refused	0.00	0.00	0.00

TABLE V.1 *(continued)*

	PACE (Study States)	PACE (Non-study States)	Difference
Living Location			
Own house or apartment	0.39	0.32	0.07**
Friend or relative's house or apartment	0.15	0.12	0.03
Group home (includes convent)	0.11	0.14	-0.03
Assisted living	0.20	0.31	-0.10***
Nursing home or other long-term care facility	0.15	0.12	0.03
Other	0.01	0.00	0.00
Previously Diagnosed Health Conditions			
Arthritis	0.60	0.69	-0.09***
Hip fracture	0.13	0.18	-0.05**
Bed sores/leg ulcers	0.14	0.15	-0.01
Alzheimer's/dementia	0.42	0.43	-0.02
Other psychiatric	0.12	0.18	-0.05**
Diabetes	0.33	0.32	0.01
Stroke	0.26	0.31	-0.04
Parkinson's disease	0.05	0.05	0.00
Vision problems	0.58	0.67	-0.09***
Hearing problems	0.40	0.34	0.06*
Angina/CHD	0.25	0.28	-0.02
Heart attack/MI	0.14	0.17	-0.03
Emphysema/chronic bronchitis/COPD	0.14	0.14	-0.00
Cancer/malignancy	0.08	0.10	-0.02
Kidney disease/failure	0.09	0.09	-0.00

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between PACE (study states) and PACE (non-study states) use initial sampling weights and are tested for statistical significance using t-tests.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

somewhat surprising that this group was more educated. The only demographic trait that was the same across the two samples was the income level: there were no significant income differences between groups.

Participants in the PACE study states had different living arrangements and marital status than PACE enrollees in the non-study states. Study state participants were more likely to never have been married, while those in non-study states were almost twice as likely to have been divorced. Furthermore, study state participants were 6 percentage points less likely to be living alone, 7 percentage points more likely to be living with a spouse or partner, 7 percentage points less likely to be living with a paid caregiver, and 4 percentage points more likely to be living with other non-related people. (This latter finding is again due to the cohort of Catholic nuns that were part of one study states). Study state members were also more likely to live in their own home, but less likely to live in a group home or assisted living facility. As noted earlier, since these living arrangements were not measured at baseline, it is unclear whether these reflect differences in the study states themselves, or differences in how PACE programs may affect these living arrangements.

Finally, although the two samples had similar rates of most diagnosed health conditions, there were a few significant health differences that suggest that those in PACE study states were slightly healthier than their counterparts in non-study states. Among these ever-diagnosed conditions, those in study states were 9 percentage points less likely to have arthritis, 5 percentage points less likely to have been diagnosed with either a hip fracture or a psychiatric condition and 9 percentage points less likely to have a vision problem. The only condition that was significantly higher among those in PACE study states was hearing difficulty, which was 6 percentage points, or 18 percent, higher than in non-study states.

B. PERSONAL CARE MANAGEMENT, HEALTH CARE UTILIZATION, HEALTH STATUS, AND QUALITY IN THE FIRST INTERVIEW

Though there were differences between PACE study and non-study state participants in terms of demographics, living arrangements, and health conditions, there were very few differences between PACE study and non-study state participants in terms of outcomes at the time of the first interview (Tables V.2 to V.5). This similarity suggests that while each PACE program operates distinctly, the overall model of care provided by PACE results in similar outcomes despite differences in the population enrolled at each site.

One of the only differences between PACE study and non-study state groups was found for the fraction of those who reported problems with wandering (Table V.4). Among those who had a proxy respondent complete the survey on their behalf, the presence of any wandering was higher among those in non-study states (24 percent compared to 18 percent). There was also a difference of a similar magnitude, but not statistically significant, for the presence of delirium (53 percent in study states compared to 47 percent in non-study states). However, the fact that only one difference for behavioral issues was significant among study and non-study states suggests that this result may be spurious.

The fraction of participants who had an advanced directive or living will was higher in non-study states, with significant differences among those with only a living will, or both a living will and an advanced directive (Table V.2). Those in non-study states were 8 percentage points more likely than those in study states to have a living will, 7 percentage points more likely to have both a living will and an advanced directive, but only 3 percentage points more likely to have an advanced directive alone. These differences imply that the higher levels of end-of-life planning exhibited by PACE study state participants relative to the HCBS sample may slightly underestimate the true difference between the two programs.

There were a few other instances where PACE study state sample members had different outcome levels than PACE sample members from the non-study states. PACE study state members were more likely to have had a hearing screening in the past year and less likely to report difficulty getting around.

Other than these differences, PACE study and non-study states did not appear significantly different in terms of self-reported health, functional status, use of hospitals, nursing homes, preventive care, pain management, depressive symptoms, satisfaction with care, or unmet needs. In some cases, PACE study states appear to be doing slightly better, but in other cases, they may be doing slightly worse; none of these other differences are statistically significant. These similarities imply that the study states are a reasonable representation of the outcomes expected by a broader sample of PACE programs.

TABLE V.2

DIFFERENCES IN CARE MANAGEMENT OUTCOMES AT THE FIRST INTERVIEW BETWEEN PACE ENROLLEES IN STUDY AND NON-STUDY STATES

	PACE (Study States)	PACE (Non-Study States)	Difference
Advanced Directive/Living Will			
Has an advanced directive	0.47	0.49	-0.03
Has a living will	0.33	0.41	-0.08***
Has both	0.26	0.33	-0.07**
Has either	0.53	0.57	-0.04
Experiences Pain That Interferes with Normal Routine	0.35	0.39	-0.04
Experienced a Fall in the Last Six Months	0.33	0.35	-0.02
Unintentionally Lost 10 or More Pounds in the Past Month	0.19	0.19	0.00
Unmet ADL Needs			
Getting around	0.16	0.19	-0.03
Toileting	0.17	0.13	0.04
Bathing	0.12	0.11	0.01
Dressing	0.10	0.09	0.01
Getting out of bed	0.11	0.10	0.01

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between PACE (non-study states) and PACE (study states) use initial sampling weights and are tested for statistical significance using t-tests.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE V.3

DIFFERENCES IN HEALTH CARE UTILIZATION AT THE FIRST INTERVIEW BETWEEN PACE ENROLLEES IN STUDY AND NON-STUDY STATES

	PACE (Study States)	PACE (Non-Study States)	Difference
Hospitalization in the previous year	0.27	0.29	-0.02
Nursing home stay in the previous year	0.24	0.20	0.04
Hearing screening in the previous year	0.73	0.68	0.06*
Vision screening in the previous year	0.85	0.85	0.00
Had a flu shot since last September	0.83	0.82	0.02
Had or was offered a flu shot since last September	0.91	0.89	0.02
Had a pneumococcal vaccine ever	0.60	0.60	0.00

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between PACE (non-study states) and PACE (study states) use initial sampling weights and are tested for statistical significance using t-tests.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE V.4

DIFFERENCES IN HEALTH STATUS AT THE FIRST INTERVIEW BETWEEN PACE ENROLLEES IN STUDY AND NON-STUDY STATES

	PACE (Study States)	PACE (Non-Study States)	Difference
Self-Rated Health Status (1 = Poor, 5 = Excellent)	2.66	2.58	0.08
Self-Rated Health Compared to a Year Ago (1 = Much Worse, 5 = Much Better)	3.02	2.98	0.04
Activities of Daily Living			
Difficulty getting around	0.40	0.46	-0.06*
Difficulty toileting	0.43	0.45	-0.02
Difficulty bathing	0.63	0.64	-0.01
Difficulty dressing	0.51	0.55	-0.04
Difficulty getting out of bed	0.39	0.39	-0.00
Behavioral Problems[a]			
Sample member has ever been delirious, confused, or hallucinated	0.47	0.53	-0.07
Sample member has ever wandered or become lost in the community	0.18	0.24	-0.06*
Sample member has ever been physically aggressive or combative towards self or others	0.14	0.12	0.02
Sample member has ever been verbally aggressive	0.25	0.26	-0.02
Depression			
Has felt down or depressed in the past month	0.38	0.41	-0.03
Has had little interest or pleasure in activities that the sample member usually enjoys in the past month	0.38	0.37	0.01
Has worried a lot in the past month	0.36	0.38	-0.02
Has often felt keyed up or on edge in the past month	0.30	0.32	-0.02

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between PACE (non-study states) and PACE (study states) use initial sampling weights and are tested for statistical significance using t-tests.

[a] Asked only of proxy respondents.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

TABLE V.5

DIFFERENCES IN SATISFACTION WITH CARE AT THE FIRST INTERVIEW BETWEEN PACE ENROLLEES IN STUDY AND NON-STUDY STATES

	PACE (Study States)	PACE (Non-Study States)	Difference
Quality of Life			
Satisfied with overall quality of life	0.74	0.73	0.00
Satisfied with own choice over activities	0.74	0.75	-0.01
Satisfaction with Medical Care			
Satisfied with overall quality of medical care	0.95	0.95	-0.00
Satisfied with information given about treatment of a health condition	0.94	0.92	0.02
Satisfied with concern of doctors about patient's overall health	0.93	0.93	0.00
Satisfied with concern of doctors for what patient had to say	0.95	0.95	0.00
Feel that it does not take energy to get needed care	0.50	0.47	0.03
Satisfaction with Personal Assistance[a]			
Satisfied that paid caregivers treat sample member as a person	0.95	0.97	-0.03
Satisfied with emotional support given by paid caregivers	0.85	0.79	0.05
Satisfied with how often paid caregivers paid attention to what the sample member said	0.85	0.89	-0.04
Satisfied that paid caregiver addressed needs of sample member	0.94	0.91	0.03
Satisfied with how often paid caregivers completed their work	0.90	0.90	-0.01
Satisfied with how often paid caregivers did not rush through work	0.68	0.71	-0.03

Note: Due to rounding, a few of the calculated differences may be greater or less than the reported mean differences. Differences in means between PACE (non-study states) and PACE (study states) use initial sampling weights and are tested for statistical significance using t-tests.

[a] Asked only of people who used ADL help from a paid caregiver. If a paid caregiver is the sample member's proxy respondent, these questions are skipped.

*Significantly different from zero at the .10 level, two-tailed test.
**Significantly different from zero at the .05 level, two-tailed test.
***Significantly different from zero at the .01 level, two-tailed test.

VI. SUMMARY AND DISCUSSION

A. SUMMARY OF FINDINGS

This report estimated the effect of PACE on indicators of quality of care such as health management, health care utilization, health status, and participant satisfaction by comparing PACE participants with a propensity-score matched group of HCBS participants who entered their respective programs at the same time. The analysis assessed whether the PACE participants had different outcomes using surveys at two points in time: the first was conducted approximately one-and-a-half to five years after program enrollment, and the second occurred one year after the first. The first interview captured the initial improvements that were sustained over the course of at least eighteen months that can be attributed to PACE. The second interview captured the longer-term effects of the program, as well as whether participation in PACE helped stem the decline of participants' health status.

Overall, the results indicate that PACE improved health management outcomes, increased preventive care, and reduced hospital use. PACE participants also increased nursing home use but we caution that this increased use should not be interpreted as a negative outcome—as short-term nursing home stays may indicate more appropriate use of services. We also found limited evidence that PACE participants had better self-reported health status; the same levels of functioning, and fewer depressive symptoms than HCBS participants. But PACE participants also had more behavioral incidents. Finally, both PACE and HCBS participants were highly satisfied with their medical and personal care, and PACE participants were just as satisfied as HCBS participants with their quality of life, medical care, and personal care.

Specifically, the findings indicate that PACE participants had better outcomes associated with good health management. PACE participants were more likely than HCBS participants to have end-of-life documents in place and to have less pain, and were less likely to have unmet needs in two activities of daily living; however, there was no evidence of a difference between the two groups in having a fall or unintentionally losing weight. There was also little evidence that PACE participants were improving or declining at different rates for any of these measures.

There was strong evidence that PACE improved preventive health care utilization. PACE participants were much more likely than HCBS participants to have had hearing and vision screenings, flu shots, and pneumococcal vaccines. They also were less likely to have had a hospital admission. However, PACE participants had a higher rate of nursing home use than HCBS participants, which was attributable, in part, to the use of nursing homes for short-stay purposes, and hence is not an indicator of poor care. PACE participants did improve in these measures over time, but HCBS participants improved more, which was related to the fact that PACE participants had higher overall levels at the first time they were interviewed.

Despite the significant improvements in health management and preventive health care, and the reduction in hospital admissions, the evidence is much weaker as to whether participation in PACE improved physical or mental health status. Self-reported health status was higher for PACE participants, but only at the initial interview. And while PACE participants had indications that they experience fewer depressive symptoms, they were also more likely to have behavioral issues, and overall, PACE participants had the same functioning levels as the HCBS participants. While there was some evidence that PACE participants were less likely to improve in some measures of functioning than those in HCBS, those results were sensitive to alternative specifications.

Finally, participants in both PACE and HCBS had high levels of satisfaction with quality of life, medical care, and personal assistance. There were few significant differences in these measures overall; and some of these differences favored PACE participants, while others favored HCBS participants.

Because our study was conducted in states where data on HCBS participants was available, we also compared the characteristics of PACE study participants with PACE enrollees in the non-study states that had PACE sites at that time. The results show that the two groups differed on demographic characteristics, but their levels of outcomes were the same. This means that the comparison of PACE and HCBS in the study states is reflective of a comparison to PACE more broadly.

B. LIMITATIONS OF THE STUDY

This analysis has several potential limitations including (1) the comparability of the samples of PACE and HCBS participants, (2) the limited number of outcomes measured, and (3) the timing of the survey.

1. Comparability of the PACE and HCBS Samples

The comparability of treatment and comparison groups is always of paramount concern when a quasi-experimental design is used for evaluation of social and health programs. To the extent that beneficiaries who enter PACE instead of HCBS differ in motivation or in other characteristics that are not measured but are correlated with our quality measures, there is the possibility of bias in the estimation of PACE impacts. To address this issue, we conducted sensitivity analyses by controlling for various covariates in different sets of regression models, and our overall conclusions remained the same. Nevertheless, unmeasured differences between the PACE and comparison samples that could affect the measured differences may remain.

2. Unmeasured Outcomes

We measured a wide range of outcomes, but the list is not exhaustive. Our measures were limited to data that could be collected in a participant survey, and it is possible that we failed to measure outcomes that might be more sensitive to the strengths and weaknesses of the PACE model. The survey instrument was reviewed by the National PACE Association prior to implementation to mitigate the possibility of missing important issues, and we are unaware of any key outcomes that could have been measured using a survey but were not. Other measures, such as clinical quality of care and caregiver outcomes, were not assessed.

3. Timing of the Interview Relative to Enrollment

Due to the limitations of the data and the need to gauge the effects of a mature, permanent program, the survey took place when participants had been enrolled in their programs for about three years on average. One effect of this design is that the sample of participants in PACE and HCBS may not represent the experience of all participants in these programs. Participants had been enrolled for more than a year to start at the first interview and were interviewed again one year later, thus, those that died before being interviewed are not included. Thus, this analysis is not representative of all PACE participants, but of those who have a longer survival period.

Also, because the first interview did not occur prior to enrollment, it did not measure true baseline differences between groups prior to their enrollment in these programs, thus, it is possible that there were baseline differences between the two groups. The use of Medicare claims from the year prior to enrollment to select our sample mitigates this possibility of differences between PACE and HCBS, and the observed differences between the groups respondents at the first survey are therefore most likely due to PACE.

C. CONCLUSIONS

This analysis found that frail, elderly, dually eligible beneficiaries who are enrolled in the PACE program benefit from participating in PACE. Previous research suggested that PACE had short-term impacts on participant outcomes; this study suggests that these impacts persist over longer time periods. However, while the evidence strongly demonstrates PACE improves health management and preventive care, the evidence is weaker as to whether it improves health status or mental health. Furthermore, weak evidence demonstrates that the program did not consistently improve participants functioning. Finally, we found that PACE generally did not improve upon very high levels of satisfaction with care.

Any assessment of PACE must consider the costs of the program to the government as well. A companion report to this analysis, used Medicare and Medicaid claims data to assess Medicare and Medicare expenditures on PACE Foster et al. (2007). Though the period of observation in that report is earlier than in this one, the Foster report found that the Medicare expenditures per person per month were essentially the same for PACE participants and those in the HCBS comparison group, but Medicaid expenditures were higher for the PACE enrollees over the two years after enrollment for which data were available Policy makers will wish to consider both sets of findings.

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