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RESEARCH REPORT



# Variation in perceived providers of ambulatory physical therapy in the United States, 2009–2012: An analysis using data from the Medical Expenditure Panel Survey

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**ABSTRACT**

**Introduction**: Little is known about public perception of physical therapy (PT) delivery by type of provider in the United States (US). **Purpose**: This study aimed to describe differences in ambulatory PT visits and expenditures according to perceived provider type, and to determine if visits and expenditures varied by provider type. **Methods**: This study employed the Medical Expenditure Panel Survey (MEPS), which is a nationally representative survey of US households that used a complex, stratified, cluster sample design. Data from cross-sectional samples over 4 years of the MEPS Household Component were used to study adults with musculoskeletal conditions who reported receiving ambulatory PT. National-level, average annual estimates of numbers of visits, and reported total expenditures by perceived provider type were computed. Associations between perceived provider type and visits and expenditures were determined by linear regression, accounting for the sample design, and adjusting for demographic and clinical covariates. **Results**: Estimated annual perceived PT visits were 60.00 million with physical therapists, 39.66 million with non-physical therapist providers, and 20.66 million with multiple providers. Estimated annual expenditures for PT were $9.37 billion with physical therapists, $4.62 billion with non-physical therapist providers, and $3.09 billion with multiple providers. Compared with non-physical therapist providers, physical therapist provider status and multiple provider status were associated with higher numbers of visits and expenditures. **Conclusion**: Non-physical therapist providers are responsible for a substantial amount of PT delivery in the US. Numbers of visits and total expenditures varied by the type of provider delivering PT.

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## Introduction

The physical therapy (PT) profession in the United States (US) has grown in personnel over the decades from a relatively small number of reconstruction aides employed during World War I to the current estimate of over 200,000 practitioners employed throughout the US (United States Department of Labor, Bureau of Labor Statistics, 2015a). Continued growth of 34% is projected to occur between 2014 and 2024, compared to an average growth rate of 7% for other professions (United States Department of Labor, Bureau of Labor Statistics, 2015b). Nearly 9 million adults in the US received outpatient PT services in 2007, at a total cost of approximately 13.5 billion dollars (Machlin, Chevan, Yu, and Zodet, 2011). Outpatient rehabilitation is projected to grow by 7% per year between 2013 and 2018 (Harris Williams and Company, 2014). This growth denotes a dynamic evolving profession that has endeavored to establish a unique identity within the US healthcare system. Within this system, physical therapists assess and manage movement system disorders, often using interventions such as therapeutic exercise, manual therapy, functional training, and education. Despite the evolving professionalization of physical therapists in the US, the terms "physiotherapy" and "physical therapy" have historically been generic terms, used by other practitioners such as nurses, chiropractors, and physicians in addition to physical therapists (Huijbregts, 2007; Pincus et al., 2006).

Confusion regarding how PT is defined and who provides PT persists in the US and is reinforced by current realities in healthcare service delivery. Physicians are granted broad authority to practice medicine, which encompasses virtually all facets of care (National Council of State Boards of Nursing, 2009). Thus, physicians may legally provide interventions which are also commonly provided by physical therapists. There is also considerable overlap between interventions used by physical therapists and other healthcare professionals such as chiropractors

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and massage therapists. For example, in most states, chiropractors may legally provide interventions such as ultrasound, electrical stimulation, traction, massage, heat and cold application, and "rehabilitation" (Chang, 2014). Furthermore, the American Chiropractic Association advocates for insurance reimbursement of PT services provided by chiropractors (American Chiropractic Association, 2016). In addition, the Nursing profession considers complementary and alternative medicine interventions as being within the scope of nursing practice broadly throughout the states. Many of these interventions are shared with physical therapists including massage, biofeedback, relaxation, and exercise (Lindquist, Snyder, and Tracy, 2014; Snyder and Lindquist, 2001). In an informational fact sheet, the US Centers for Medicare and Medicaid services states that, "Doctors and other health care professionals (e.g. nurse practitioners, clinical nurse specialists, and physician assistants) may also offer PT… services" (Centers for Medicare and Medicaid Services, 2016).

This literature suggests that PT is viewed by the public as a set of interventions that may be delivered by any healthcare provider. This portrays PT as a commodity and discounts the training and expertise of the provider. If PT is considered as a commodity, the healthcare marketplace may favor providers who deliver PT in the fewest visits or at the least cost. This disregards quality and value of care and may ultimately harm the public if low quality, low-cost providers predominate in a competitive market. The extent to which the public perceives that PT is delivered by providers other than physical therapists has not been investigated, nor have the utilization and expenditures associated with PT delivery been described according to different types of providers.

We utilized a nationally representative survey to investigate public perceptions of PT providers in the US. The purpose of this study was to identify healthcare providers that were perceived to have delivered PT in the US and to describe demographic and health-related characteristics of those receiving PT by provider type. We further aimed to generate national-level estimates of perceived PT utilization and expenditures and to determine if these varied by provider type. Knowledge of PT delivery by providers other than physical therapists may enhance understanding of public perceptions of PT and may assist in efforts to develop and enhance professional identity among physical therapists.

## Methods

### Research ethics approval

This study was determined not to be human subject research by the Institutional Review Board for the Protection of Human Subjects of the State University of New York, Upstate Medical University.

### Overview of the Medical Expenditure Panel Survey

This study utilized a secondary analysis of data from the Medical Expenditure Panel Survey (MEPS), a nationally representative survey of US households, and healthcare providers which may be utilized to examine healthcare utilization and costs. The MEPS has been administered yearly since 1996 and is currently under the auspices of the Agency for Healthcare Research and Quality (AHRQ). A number of researchers have applied secondary data analyses using MEPS to investigate questions of interest to physical therapists (Chevan and Riddle, 2011; Luo et al., 2004; Machlin, Chevan, Yu, and Zodet, 2011; Machlin et al., 2009). The current investigation used the Household Component (HC) which surveys a cohort of families across the US about visits to healthcare providers, treatments received, and costs incurred during those visits. Data are also collected on demographic characteristics and healthcare access variables such as insurance status. The MEPS samples are assembled using multistage sampling methodology and assignment of survey weights that enable national-level estimates of health services utilization (Cohen, 2003, 2010).

Each year, MEPS enrolls participants in a panel which runs for 2 years, overlapping with previous and subsequent panels, thus, each year's sample consists of respondents in 2 panels. Data from each year is intended to provide a cross-sectional sample of the US population for that year. In order to provide adequate sample sizes for subgroups with relatively small numbers of respondents in a given year (i.e., those who received PT) data from multiple years may be pooled to properly determine population-level estimates and variances (United States Department of Health and Human Services, Agency for Healthcare Research and Quality, 2014). For the current study, MEPS data from 2009 to 2012 were used to estimate average annual PT visits and expenditures within the US population during those years.

### Subject selection process

Following formulation of the research question, data from the 2009–2012 MEPS HC were used by the primary author to construct a cross-sectional, analysis dataset that included adults with musculoskeletal conditions who reported PT visits during those years, and the expenditures associated with those visits. Variables needed to complete this investigation were included in

publicly available data files for each of the 4 years examined in the investigation. These were acquired from the MEPS Website at http://meps.ahrq.gov/mepsweb/. The data files for each year were the Medical Conditions file, Condition-event Link file, Office-based Visits file, Outpatient Visits file, and the Full-year Consolidated Data file. The specific variables from each of these data files that were used in this investigation are listed in Appendix 1.

Figure 1 displays the data acquisition sequence for each of the 4 years. Participants with musculoskeletal conditions were identified in the Medical Conditions Files using 3-digit clinical classification codes developed by the AHRQ (United States Department of Health and Human Services, Agency for Healthcare Research and Quality, 2016a). The 3-digit clinical classification codes collapse International Classification of Diseases, 9th Revision, Clinical Modification codes into clinically important groups that may be used to identify musculoskeletal disorders (Machlin, Soni, and Fang, 2013). These codes have been shown to demonstrate acceptable accuracy in capturing broadly defined medical conditions of respondents in the MEPS HC, (Machlin et al., 2009) and have been used by previous investigators to select persons with musculoskeletal conditions in the MEPS (Carter and Rizzo, 2007). Codes corresponding to musculoskeletal conditions were linked with unique identifiers that match with specific healthcare visits using the Condition-Event Link files. This allowed individuals with musculoskeletal conditions to be linked with visits where the respondent indicated that he/she received PT in the office-based and outpatient visits files. Thus, each visit to a provider of interest (i.e., PTs, MDs, and Chiropractors) was reliably associated with a respondent who had a musculoskeletal condition as identified by the 3-digit clinical classification codes used to select the observations. Office-based visits include visits to private physical therapist or physician practices or clinics such as community health centers or walk-in urgent care centers. Outpatient visits include ambulatory visits to a hospital-based provider. All visits were associated with

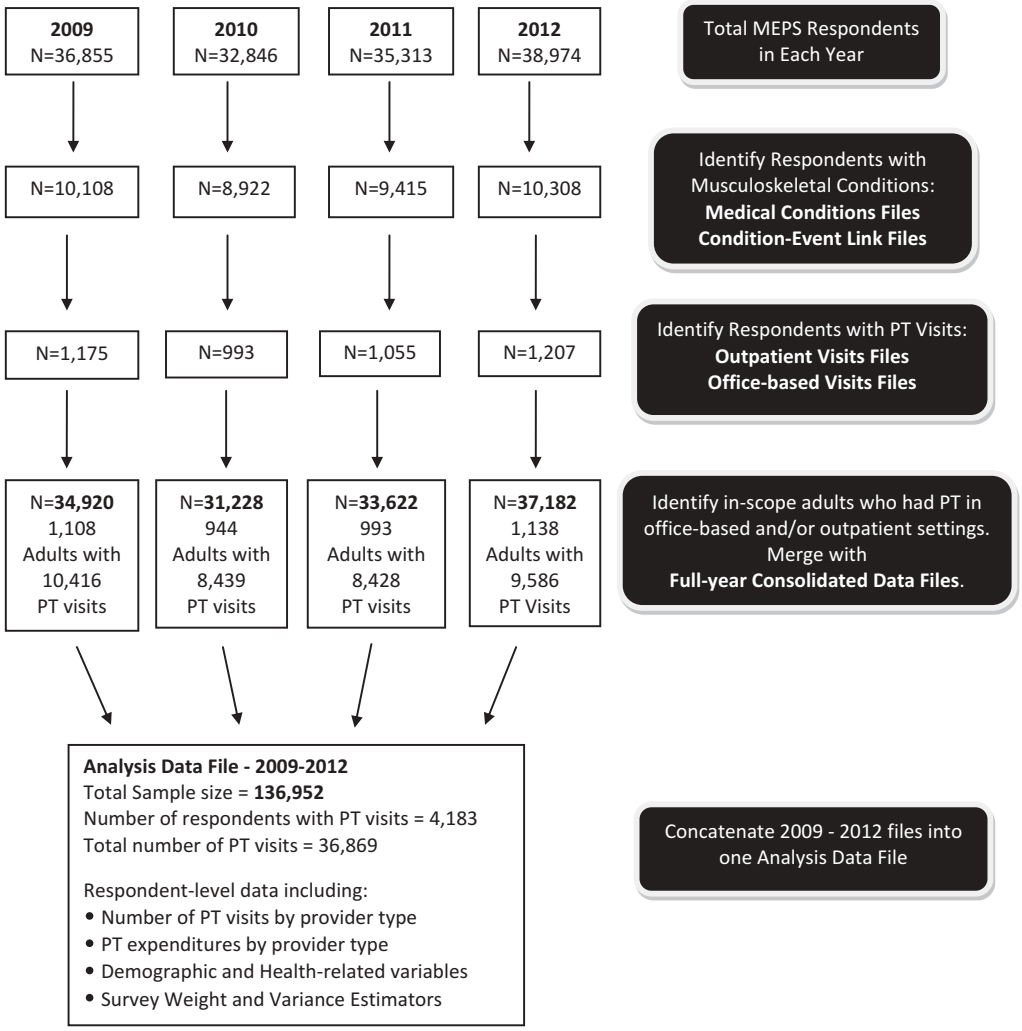


**Figure 1.** Schematic diagram of data acquisition.

individuals with at least one musculoskeletal condition in either an office-based or hospital-based outpatient setting. A small number of respondents in each year had PT visits in both office-based and hospital-based outpatient settings. These respondents' visits were summed across the two settings and they were coded as receiving PT in both settings. Important demographic and health-related characteristics, as well as survey weighting and variance estimator variables, for respondents in each year's sample were included by merging the visit data with the Full-year Consolidated Data files. Adults with PT visits who were in-scope (i.e., not institutionalized or in the military or out of the country for part of the year) were selected for analyses.

### Data reduction and analysis

During the MEPS interviews, respondents were asked about specific visits with healthcare providers including which interventions were provided and the type of provider seen. Thus, treatment received and provider seen were based on self-report. Visits were retained for analyses if the respondent indicated that he or she received PT (MEPS variable: PHYSTH) during the visit. The primary variable of interest was the type of provider of PT (i.e., MEPS variable: MEDPTYPE), classified for analyses as physical therapist, other provider (e.g., chiropractor, physician, and other non-physical therapist) and multiple providers (i.e., respondents received PT from more than one type of provider). The setting in which the visit occurred, either office-based or hospital-based outpatient or both, and expenditures for each visit were also retained. Numbers of visits and total expenditures for all visits were tallied for each respondent and analyzed by provider type. Regarding expenditures, when pooling data from multiple years, it is recommended that expenditures should be adjusted for inflation by dividing physician and other provider expenditures by the Personal Health Care indices for each respective year. For the current investigation, expenditures incurred in 2010–2012 were accordingly adjusted and are expressed in 2009 dollars, 2009 being the reference year for these price indices (United States Department of Health and Human Services, Agency for Healthcare Research and Quality, 2016b). Demographic and health-related variables were retained for descriptive analyses and for use in determination of national-level estimates. These are listed in Appendix 2, including coding categories used in analyses. Selection of variables used in analyses occurred after the research question was formulated.

Descriptive statistics were used at the sample level to enumerate adults who reported receiving PT, as well as all other respondents in the MEPS sample, and to describe demographic and health-related variables. Sample demographic and health-related variables were also analyzed by provider status (PT, non-PT, and multiple provider types). Chi-square analysis was used to determine differences in proportions according to whether or not sample respondents received PT, and according to provider status. Because age did not have a Gaussian distribution, the Wilcoxon rank-sum test was used to determine if sample respondents' age varied by PT status. SAS© (SAS Institute, SAS Campus Drive, Cary, North Carolina 27513) survey procedures were used to generate national-level estimates according to provider category. These procedures applied survey weighting and variance estimation variables to account for the multistage sample design characteristics of the MEPS survey, and produced average annual estimates across the 4 years of the MEPS sample, with 95% confidence intervals (CIs), for the period 2009–2012. The Surveymeans procedure was used to estimate numbers of patients who received PT, total PT visits and expenditures, and per-patient visits and expenditures by type of provider. The Surveyreg procedure was used to test the hypotheses that the number of PT visits and PT expenditures varied according to provider type, adjusting for demographic and health-related variables, also accounting for the survey design characteristics. For all hypothesis tests, alpha was set at 0.05.

## Results

### Descriptive sample findings

The 2009–2012 MEPS HC sampled 143,988 persons in the US, of whom 136,952 were in-scope respondents. Figure 1 displays the numbers of sample respondents in each of the 4 years of the study period. A total of 4,183 were adults with musculoskeletal conditions who reported 36,869 PT visits in office-based and hospital-based ambulatory care settings. Mean (standard deviation [SD]) age of adults who received PT was 52.8 (16.5) years and mean (SD) age of all other respondents was 33.9 (26.4) years. This difference was statistically significant ($p < 0.0001$). Table 1 displays the sample distributions of other demographic and health-related variables stratified according to PT treatment status (i.e., respondents who received PT treatments versus all other respondents). Except for Metropolitan Statistical Area status, proportions of these characteristics varied according to PT status ($p < 0.0001$). Compared to all other respondents, higher proportions of females, non-Hispanic whites, those with 12 or more years of education, middle and high income earners, married individuals, those with any private insurance

**Table 1.** Demographic and Health-related Variables in the 2009–2012 MEPS Sample.

| | Adults Reporting PT Treatments* | | All Other Respondents* | |
|---|---|---|---|---|
| | Frequency | Percent | Frequency | Percent |
| **Sex** | | | | |
| Female | 2,598 | 62.1 | 68,949 | 51.9 |
| Male | 1,585 | 37.9 | 63,820 | 48.1 |
| **Race/Ethnicity** | | | | |
| Asian | 231 | 5.5 | 9,224 | 6.9 |
| Black, Non-Hispanic | 538 | 12.9 | 26,919 | 20.3 |
| Hispanic | 662 | 15.8 | 39,528 | 29.8 |
| All Other, Non-Hispanic | 2,752 | 65.8 | 57,098 | 43.0 |
| **Education** | | | | |
| <12 yrs | 1,050 | 25.1 | 71,494 | 53.8 |
| 12 yrs | 2,147 | 51.3 | 36,189 | 27.3 |
| >12 yrs | 986 | 23.6 | 25,086 | 18.9 |
| **Income** | | | | |
| Poor/Low | 1,151 | 27.5 | 62,250 | 46.9 |
| Middle | 1,271 | 30.4 | 38,146 | 28.7 |
| High | 1,761 | 42.1 | 32,373 | 24.4 |
| **Marital Status** | | | | |
| Not Married | 1,800 | 43.0 | 86,115 | 64.9 |
| Married | 2,383 | 57.0 | 46,654 | 35.1 |
| **Health Insurance Coverage** | | | | |
| Uninsured | 301 | 7.2 | 22,946 | 17.3 |
| Any Private | 3,007 | 71.9 | 69,865 | 52.6 |
| Public Only | 875 | 20.9 | 39,958 | 30.1 |
| **Census Region** | | | | |
| West | 1,216 | 29.1 | 35,719 | 26.9 |
| South | 1,167 | 27.9 | 50,119 | 37.7 |
| Northeast | 790 | 18.9 | 20,358 | 15.3 |
| Midwest | 1,010 | 24.1 | 25,596 | 19.3 |
| Inapplicable | 0 | 0 | 977 | 0.7 |
| **Metropolitan Statistical Area**[a] | | | | |
| MSA | 3,630 | 86.8 | 114,460 | 86.2 |
| Non-MSA | 553 | 13.2 | 18,309 | 13.8 |
| **Diabetes** | | | | |
| Absent/Unknown | 3,676 | 87.9 | 123,520 | 93.0 |
| Present | 507 | 12.1 | 9,249 | 7.0 |
| **Arthritis** | | | | |
| Absent/Unknown | 2,129 | 50.9 | 111,865 | 84.3 |
| Present | 2,054 | 49.1 | 20,904 | 15.7 |
| **High Blood Pressure** | | | | |
| Absent/Unknown | 2,359 | 56.4 | 102,707 | 77.4 |
| Present | 1,824 | 43.6 | 30,062 | 22.6 |
| **Stroke** | | | | |
| Absent/Unknown | 3,986 | 95.3 | 129,405 | 97.5 |
| Present | 197 | 4.7 | 3,364 | 2.5 |
| **Heart Disease** | | | | |
| Absent/Unknown | 3,383 | 80.9 | 121,140 | 91.2 |
| Present | 800 | 19.1 | 11,629 | 8.8 |
| **Perceived Health Status** | | | | |
| Good-Excellent | 3,201 | 76.5 | 116,901 | 88.0 |
| Fair-Poor | 981 | 23.5 | 14,475 | 10.9 |
| Missing/Not Applicable | 1 | 0.0 | 1,393 | 1.0 |
| **Perceived Mental Health Status** | | | | |
| Good-Excellent | 3,705 | 88.6 | 122,843 | 92.5 |
| Fair-Poor | 478 | 11.4 | 8,503 | 6.4 |
| Missing/Not Applicable | 0 | 0 | 1,423 | 1.1 |

*Proportions of all variables except MSA status varied by PT status ($p < .0001$).
PT: physical therapy; MSA: Metropolitan Statistical Area.

and respondents living in the Midwest, Northeast, and West received PT treatments. Additionally, compared with all other respondents, higher proportions of respondents with diabetes, arthritis, high blood pressure, stroke, and heart disease received PT treatments. Finally, lower proportions of adults who received PT treatments reported good-excellent perceived health and perceived mental health compared to all other respondents.

Healthcare providers who were identified by respondents as delivering PT were physical therapists, chiropractors, physicians, and others such as nurses and massage therapists. Table 2 displays the proportions of sample respondents who reported perceived PT visits from physical therapist providers, non-physical therapist providers and multiple providers (e.g., a physical therapist and a chiropractor) according to demographic and health-related variables. Of the 4,183 sample

**Table 2.** Sample demographic and health-related characteristics by perceived provider status in 4,183 adults reporting PT visits.

| | PT provider | | Non-PT provider | | Multiple providers | |
|---|---|---|---|---|---|---|
| | Frequency | Percent | Frequency | Percent | Frequency | Percent |
| **Total** | 1913 | 45.7 | 1875 | 44.8 | 395 | 9.4 |
| **Sex**[a] | | | | | | |
| Male | 697 | 36.4 | 760 | 40.5 | 128 | 32.4 |
| Female | 1216 | 63.6 | 1115 | 59.5 | 267 | 67.6 |
| **Race/Ethnicity**[a] | | | | | | |
| White/Other, Non-Hispanic | 1319 | 68.9 | 1161 | 61.9 | 272 | 68.9 |
| Black, Non-Hispanic | 262 | 13.7 | 233 | 12.4 | 43 | 10.9 |
| Hispanic | 240 | 12.6 | 362 | 19.3 | 60 | 15.2 |
| Asian | 92 | 4.8 | 119 | 6.3 | 20 | 5.1 |
| **Education** | | | | | | |
| <12 yrs | 451 | 23.6 | 508 | 27.1 | 91 | 23.0 |
| 12 yrs | 1012 | 52.9 | 923 | 49.2 | 212 | 53.7 |
| >12 yrs | 450 | 23.5 | 444 | 23.7 | 92 | 23.3 |
| **Income**[a] | | | | | | |
| Poor/Low | 526 | 27.5 | 526 | 28.1 | 99 | 25.1 |
| Middle | 528 | 27.6 | 630 | 33.6 | 113 | 28.6 |
| High | 859 | 44.9 | 719 | 38.3 | 183 | 46.3 |
| **Marital Status** | | | | | | |
| Not Married | 829 | 43.3 | 793 | 42.3 | 178 | 45.1 |
| Married | 1084 | 56.7 | 1082 | 57.7 | 217 | 54.9 |
| **Health Insurance Coverage**[a] | | | | | | |
| Uninsured | 81 | 4.2 | 191 | 10.2 | 29 | 7.3 |
| Any Private | 1392 | 72.8 | 1328 | 70.8 | 287 | 72.7 |
| Public Only | 440 | 23.0 | 356 | 19.0 | 79 | 20.0 |
| **Census Region**[a] | | | | | | |
| West | 528 | 27.6 | 554 | 29.5 | 134 | 33.9 |
| South | 481 | 25.1 | 588 | 31.4 | 98 | 24.8 |
| Northeast | 403 | 21.1 | 314 | 16.7 | 73 | 18.5 |
| Midwest | 501 | 26.2 | 419 | 22.3 | 90 | 22.8 |
| **Metropolitan Statistical Area** | | | | | | |
| MSA | 1657 | 86.6 | 1624 | 86.6 | 349 | 88.4 |
| Non-MSA | 256 | 13.4 | 251 | 13.4 | 46 | 11.6 |
| **Diabetes**[a] | | | | | | |
| Absent/Unknown | 1655 | 86.5 | 1676 | 89.4 | 345 | 87.3 |
| Present | 258 | 13.5 | 199 | 10.6 | 50 | 12.7 |
| **Arthritis**[a] | | | | | | |
| Absent/Unknown | 839 | 43.9 | 1101 | 58.7 | 189 | 47.8 |
| Present | 1074 | 56.1 | 774 | 41.3 | 206 | 52.2 |
| **High Blood Pressure**[a] | | | | | | |
| Absent/Unknown | 980 | 51.2 | 1142 | 60.9 | 237 | 60.0 |
| Present | 933 | 48.8 | 733 | 39.1 | 158 | 40.0 |
| **Stroke**[a] | | | | | | |
| Absent/Unknown | 1800 | 94.1 | 1807 | 96.4 | 379 | 95.9 |
| Present | 113 | 5.9 | 68 | 3.6 | 16 | 4.1 |
| **Heart Disease**[a] | | | | | | |
| Absent/Unknown | 1474 | 77.1 | 1574 | 83.9 | 335 | 84.8 |
| Present | 439 | 22.9 | 301 | 16.1 | 60 | 15.2 |
| **Perceived Health Status**[a] | | | | | | |
| Good-Excellent | 1430 | 74.8 | 1481 | 79.0 | 290 | 73.4 |
| Fair-Poor | 482 | 25.2 | 394 | 21.0 | 105 | 26.6 |
| **Perceived Mental Health Status** | | | | | | |
| Good-Excellent | 1688 | 88.2 | 1666 | 88.9 | 351 | 88.9 |
| Fair-Poor | 225 | 11.8 | 209 | 11.1 | 44 | 11.1 |

[a]Significant difference by provider status, $p < .05$.
PT: physical therapy; MSA: Metropolitan Statistical Area.

respondents who reported receiving PT, 1,913 (45.7%) received PT from physical therapists, 1,875 (44.8%) from non-PT providers, and 395 (9.4%) from multiple providers. There were statistically significant differences in sample demographic and health-related variables according to provider type. Compared with non-physical therapist providers, there were higher proportions of females, whites, high-income respondents, respondents with any private or public insurance, and respondents in the Northeast and Midwest who reported perceived PT visits with physical therapist providers. In addition, compared with non-physical therapist providers there were higher proportions of individuals with diabetes, arthritis, high blood pressure, stroke, heart disease, and fair-poor perceived health status among respondents who reported perceived PT visits with physical therapist providers.

### *National-level estimates*

Table 3 displays national-level, average annual estimates with 95% CIs across the 4-year MEPS sample for PT visits and expenditures according to provider type. Estimates for total number of patients receiving

**Table 3.** National-level average annual estimates of patients, visits, and expenditures by perceived provider type in adult MEPS respondents reporting physical therapy visits, 2009–2012.

| | All providers | | PT providers | | Non-PT providers | | Multiple providers | |
|---|---|---|---|---|---|---|---|---|
| | Est. | 95% CI | Est. | 95% CI | Est. | 95% CI | Est. | 95% CI |
| Patients (Millions) | 13.25 | 12.42, 14.09 | 6.30 | 5.84, 6.77 | 5.69 | 5.20, 6.18 | 1.26 | 1.09, 1.43 |
| Physical Therapy Visits | | | | | | | | |
| Total (Millions) | 120.31 | 110.94, 129.71 | 60.00 | 53.75, 66.26 | 39.66 | 34.90, 44.42 | 20.66 | 17.04, 24.27 |
| Mean Per-patient Visits | 9.08 | 8.69, 9.47 | 9.52 | 8.97, 10.07 | 6.97 | 6.42, 7.52 | 16.38 | 14.65, 18.11 |
| Physical Therapy Expenditures | | | | | | | | |
| Total ($ Billions) | 17.08 | 15.33, 18.82 | 9.37 | 8.10, 10.63 | 4.62 | 3.98, 5.26 | 3.09 | 2.27, 3.91 |
| Mean Per-patient Expenditures ($) | 1,288 | 1,196, 1,380 | 1,486 | 1,354, 1,617 | 812 | 722, 902 | 2,452 | 1,970, 2,933 |
| Mean Per-visit Expenditures ($) | 149 | 141, 158 | 157 | 148, 166 | 138 | 123, 153 | 161 | 133, 188 |

MEPS: Medical Expenditure Panel Survey; PT: physical therapist; Est.: estimate; CI: confidence Interval.

PT was 13.25 million, of whom 6.30 million received PT from physical therapists, 5.69 million from non-physical therapists, and 1.26 million from multiple providers. Estimates for total number of PT visits equaled 120.31 million, of which 60.00 million were delivered by physical therapists, 39.66 million by non-physical therapist providers and 20.66 million by multiple providers. Mean number of per-patient PT visits from 2009 to 2012 was 9.08 for all providers, including 9.52 visits with physical therapists, 6.97 visits with non-physical therapist providers, and 16.38 visits with multiple providers. Total expenditures for PT equaled $17.08 billion, of which $9.37 billion may be attributed to physical therapists, $4.62 billion to non-physical therapist providers and $3.09 billion to multiple providers. Nationally, mean per-patient expenditures were $1,288 overall, including $1,486 with physical therapists, $812 with non-physical therapist providers, and $2,452 with multiple providers. Per-visit expenditures were $149 overall, including $157 with physical therapists, $138 with non-physical therapists, and $161 with multiple providers.

Table 4 displays the results of multivariate analyses for associations between provider type and number of PT visits and PT expenditures. In these analyses, provider category was significantly associated with both total number of visits and total expenditures. After adjusting for demographic and health-related variables, respondents who received PT from physical therapist providers reported having, on average, 2.1 more visits compared to non-physical therapist providers, and respondents who received PT from multiple providers reported having 9.2 more visits compared to non-physical therapist providers. Expenditures reported for treatment by physical therapist providers were, on average, $485 more than expenditures reported for treatment by non-physical therapist providers, while expenditures reported for treatment by multiple providers were, on average, $1,621 more than expenditures reported for treatment by non-physical therapist providers. These differences were statistically significant ($p < 0.0001$).

## Discussion

Based on estimates from a nationally representative survey of healthcare utilization and expenditures in the US between 2009 and 2012, we found that a substantial portion of PT delivered annually was perceived by MEPS respondents to be delivered by providers other than physical therapists. On average from 2009 through 2012, among MEPS respondents who received PT, 42.9% indicated that they received PT from non-physical therapist providers. This included 32.9% of visits and 27.0% of expenditures that were associated with non-physical therapist providers.

**Table 4.** Multivariate models[a] for self-reported physical therapy visits and expenditures by perceived provider status, 2009–2012.

| | | | 95% Confidence limits for estimate | | | |
|---|---|---|---|---|---|---|
| | Parameter estimate | Standard error | Lower | Upper | t-Value | *p*-Value for *t*-test of β = 0 |
| **Visits** | | | | | | |
| PT Provider | 2.1277 | 0.4656 | 1.2098 | 3.0456 | 4.5697 | <0.0001 |
| Multiple Providers | 9.1776 | 1.0823 | 7.0439 | 11.3113 | 8.4799 | <0.0001 |
| Non-PT Provider (Reference) | 0.0 | 0.0 | 0.0 | 0.0 | | |
| **Expenditures** | | | | | | |
| PT Provider | 485.0735 | 94.8211 | 298.1346 | 672.0125 | 5.1157 | <0.0001 |
| Multiple Providers | 1621.002 | 284.1291 | 1060.844 | 2181.160 | 5.7052 | <0.0001 |
| Non-PT Provider (Reference) | 0.0 | 0.0 | 0.0 | 0.0 | | |

[a]Models adjusted for setting, age, sex, race/ethnicity, education level, income level, marital status, insurance coverage, region, metropolitan statistical area status, diabetes, arthritis, high blood pressure, heart disease, stroke, perceived health, and perceived mental health. Models also accounted for survey sampling weights.

Furthermore, during the 4-year period, compared to respondents who indicated receiving PT from non-physical therapist providers, respondents who indicated receiving PT from physical therapist providers had higher annual mean per-patient visits and expenditures, and respondents who indicated receiving PT from multiple providers had annual mean per-patient visits and expenditures that were higher still. The differences in visits and expenditures by provider status remained after controlling for demographic and clinical variables in multivariate analyses.

The variation in visits and expenditures observed by provider type in the current analyses is noteworthy in that it identifies how much PT is perceived to be delivered by providers other than physical therapists. While it is known that interventions commonly delivered by physical therapists are also delivered by other practitioners, no prior study has attempted to determine whether patients perceived treatment provided by non-physical therapists, as PT. Chiropractors' scope of practice, for example, includes several interventions which overlap with interventions commonly provided by physical therapists. These include exercise plans and physical modalities such as heat and cold application, massage, traction, and ultrasound (Chang, 2014; Nyiendo, Haas, Goldberg, and Lloyd, 2001).

The current findings should be interpreted in light of the definition of PT used by the MEPS, and the implications of that definition on the identity of a physical therapist. Within the MEPS for 2009–2012, PT was listed as a treatment that a respondent may receive during a visit to a healthcare provider. Other treatments that were listed during MEPS interviews include: occupational therapy; speech therapy; chemotherapy; radiation therapy; kidney dialysis; IV therapy; drug or alcohol treatment; allergy (and other) shot (s); and psychotherapy/counseling. Respondents were given definitions of treatments only on request. The definition of PT that was provided on request during MEPS interviews is:

> *The use of means such as exercise, massage, light, cold, heat, electricity, and mechanical devices in the prevention, diagnosis, and treatment of diseases, injuries, and other physical disorders. PT does not include the use of X-rays or other types of radiation. Physiotherapy is the same as physical therapy.* (United States Department of Health and Human Services, Agency for Healthcare Research and Quality, 2010).

It is possible that the definition could have influenced some respondents to classify certain treatments as PT even though they initially did not consider them as such. This may have resulted in overreporting of PT delivered by non-physical therapist providers if respondents initially believed that only physical therapists may deliver PT. It is also possible that PT was underreported by respondents after hearing this definition if they or members of their households received a treatment (i.e., manipulation) that they felt was inconsistent with the definition.

Conceptualization of PT as a "treatment" does not consider the clinical reasoning and decision making inherent in the management of patients by physical therapists. The American Physical Therapy Association (APTA) defines PT as "…limited to the care and services provided by or under the direction and supervision of a physical therapist…" (American Physical Therapy Association, 2014) and emphasizes physical therapist evaluation and management of the movement system as the core of PT practice (American Physical Therapy Association, 2015). Other commentators recognize the decision-making that characterizes professional practice and suggest that PT does not fit well into the biomedical model of health in which treatments are rendered according to an unambiguous medical diagnosis. They argue that a "process of care" that emphasizes clinical reasoning and patient classification according to clinical findings will result in more effective clinical practice (Silvernail, 2012; Wainner, Whitman, Cleland, and Flynn, 2007). Furthermore, the current findings that respondents with higher rates of comorbidities are more likely to indicate receiving PT from physical therapist providers rather than non-physical therapist providers emphasizes the importance of clinical reasoning and decision making among those providers. These perspectives support the concept that PT is more than a particular intervention or group of interventions, and that physical therapists' identities are conceived within a professional practice rather than being a commodity or a collection of modalities.

The biopsychosocial model of healthcare emphasizes a team-based approach to care, which challenges the hegemony of physician-directed care with a corresponding ascendance of non-physician health professions. Accordingly, physical therapists have sought to establish a distinct professional identity as autonomous practitioners who work interdependently, rather than dependently, with physicians (Johnson and Abrams, 2005). These efforts have included successful legislative campaigns to permit direct access to physical therapists in all 50 states within the US (American Physical Therapy Association, 2016a), and a branding campaign advocating that physical therapists be considered as experts in human motion. As part of its branding initiative, the APTA lists "7 Myths About Physical

Therapy", one of which is that "Any health care professional can perform physical therapy", and notes that 37% of healthcare consumers (still) believe that this is so (American Physical Therapy Association, 2016b). Our findings suggest that the public may not yet perceive of PT as interventions that are integrated within a professional practice delivered by uniquely qualified physical therapist providers. Rather, PT may be viewed as a commodity that includes treatments that may be provided by healthcare providers other than physical therapists.

Some insight into public perception of who provides PT may be gained from related research findings. While there are no prior studies that directly addressed the question of who may provide PT, several investigations examined public perception of practitioners ideally suited to manage conditions typically managed by physical therapists. Kearns, Ponichtera, Rucker, and Ford (2014) noted that physicians were rated as the top choice over physical therapists to treat three of four conditions, including sprains/strains, walking difficulties, and weak muscles, by a sample of Western New York residents. Also notable was the finding that chiropractors were rated as top choice over physical therapists for treatment of spinal conditions. A study of direct access to physical therapists in South Florida revealed that minorities of respondents indicated that back/neck problems (21.6%), movement/walking problems (19.1%), pain (14.8%), and muscle strengthening (11.7%) were reasons to see a physical therapist (Snow, Shamus, and Hill, 2001). An earlier Australian study found that both physicians and chiropractors were ranked higher than physical therapists for back injuries, while physical therapists were ranked highest for sports injuries (Sheppard, 1994). In an investigation of college students in Central Arkansas, over 70% of respondents ranked physicians as the most competent medical professionals compared with physical therapists who were ranked as most competent by 17% of respondents (Prati and Liu, 2006). These findings suggest the public may not fully appreciate the benefits of PT and that the profession is right to increase its efforts to improve its "brand" (Childs et al., 2005).

We are aware of no investigations of patient perceptions regarding the identity of various healthcare providers; however, perceptions of healthcare providers have been explored in the context of quality of care provided. Quality of care may be understood within the framework of professionalism regarding patients (Wilde, Starrin, Larsson, and Larsson, 1993), including being treated respectfully, communicated with openly and being involved in decision-making. Patients also expect healthcare providers to be technically competent to conduct a thorough examination, offer a definitive diagnosis, and provide a plan of care. Organizational characteristics that result in timely care processes are also important (Reeve and May, 2009; Samsson, Bernhardsson, and Larsson, 2016).

Among the few studies of patient perceptions of quality of care that compare PTs with other providers, several have compared physical therapist-led primary care provision for musculoskeletal conditions with usual (physician-led) care. In all of these, physical therapist-led care compared favorably with physician-led care in patient perceived quality of care (Hurtubise, Shanks, and Benard, 2017; Reeve and May, 2009; Samsson, Bernhardsson, and Larsson, 2016). Interestingly, these investigations were conducted in countries that are members of the European Union, so the findings may have limited application within the US health system. It is possible that the perception of who is delivering PT could have an impact on the perceived quality of, and satisfaction with the provided services. The MEPS database does not include detailed quality and satisfaction measures for specific providers beyond those who are the "usual source of care" for respondents. Nor is quality or satisfaction measured for each visit to a provider. For these reasons, the interplay between quality, satisfaction, and the perceived provider of PT cannot be ascertained using the MEPS.

### Limitations

Several limitations of the current study should be acknowledged. Most importantly, the study is based on patient perceptions of the treatment that they received and the provider(s) that they received it from. While patient perceptions regarding the specific treatment they received and the profession of the provider who delivered treatment may not be fully accurate, it is still important to ascertain patients' perspectives. According to the biopsychosocial model of care, patient perceptions and beliefs matter (i.e., they are integral to recovery and healing from musculoskeletal disorders) (Waddell, 2006). What patients perceive to be true will impact action that they take and their recovery process. For example, patient perceptions and beliefs influence prognosis in LBP (Campbell, Foster, Thomas, and Dunn, 2013; George and Beneciuk, 2015). It follows then, that determining patient perceptions regarding the type of treatment they receive, and the provider who delivers it, informs us about their beliefs and helps to frame the issue for further study of PT

providers. Future investigations may verify the current findings using claims data or other data sources that validate treatments and provider status. The current study's focus on patient perceptions may also contribute toward a conversation about how to influence public perceptions regarding the professionalism and competence of physical therapists as uniquely qualified healthcare providers.

Observational studies of healthcare delivery and expenditures (i.e., costs) typically adjust for other factors associated with expenditures so as not to attribute expenditure outcomes solely to the service provided (Davis, Onega, Weeks, and Lurie, 2012; Machlin, Chevan, Yu, and Zodet, 2011). Among the factors associated with expenditures are demographic characteristics, comorbidities, and health system attributes such as insurance coverage, which were accounted for in the current study. Another factor that was found to be associated with expenditures was functional limitation (Davis, Onega, Weeks, and Lurie, 2012; Williams, Walker, Faith, and Egede, 2017). The current study did not adjust for functional limitation in its estimates of expenditures, which we acknowledge as a limitation.

An additional limitation is that the current analysis was cross-sectional. Thus, the visits reported did not represent completed episodes of care, which enable the timing and sequencing of healthcare visits and expenditures to be established. The yearly MEPS cross-sectional sample sizes for conditions commonly managed with PT are relatively small; however, by pooling 4 years of data, we achieved a sufficient sample size to meet AHRQ requirements for reporting (Machlin, 2007). Nevertheless, due to sample size limitations, we only investigated perceived PT in a broad category of MEPS respondents with musculoskeletal conditions and did not analyze more specific subgroups such as those with back, knee, or shoulder pain. Nor did we analyze perceptions by type of provider (e.g., chiropractor and physician). By grouping these providers as non-physical therapist providers, differences within this category may be obscured. Our aim, however, was not to elaborate on the practice patterns of these other providers, rather it was to describe perceived PT delivery by physical therapist and non-physical therapist providers. Future investigations of PT care delivery by different types of providers should examine the content, quality and outcomes of care as well as downstream costs associated with PT care as delivered by different providers.

Finally, bias may have been introduced in the selection of respondents who perceived that they received PT. Indeed, there are many differences in demographic and health-related variables between adults with PT treatments and all other respondents (Table 1). It is important to note, however, that national-level estimates and multivariate models used for testing whether visits and expenditures varied by provider type adjusted for these variables in the analytic procedures, thus minimizing their influence as potential confounding factors.

Findings should also be interpreted with caution due to potential recall error and other inaccuracies in reporting. It may be that inaccurate recall on the part of MEPS respondents explains some of the differences in utilization and expenditures between PT perceived to be delivered by physical therapists versus other providers. During the MEPS interview, one individual in the household acts as a proxy for other household members and reports on health-related information, including visits to medical providers. Zuvekas and Olin (2009) found that households tended to underreport office visits for MEPS participants who are Medicare beneficiaries. If this was the case, the current findings may represent underestimation of PT utilization. A further caveat is that visits and expenditures were not verified with another data source such as claims data.

## Conclusion

Based on household responses to a nationally representative survey in the US, less than half of PT visits are perceived to be delivered solely by physical therapists. In addition, numbers of visits and total expenditures vary according to the type of provider delivering PT. These findings are informative regarding patients' perceptions of PT delivery by physical therapist and non-physical therapist providers in the US. Patients' beliefs often have a large impact on their actions and may influence the type of treatment and type of provider they visit.

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## Declaration of interest

The authors report no conflict of interest.

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## Appendix 1. Variables obtained from the 2009–2012 MEPS data files

| MEPS data files 2009–2012 | Variable name | Variable description |
|---|---|---|
| HC-154, 146, 137, 128: | DUPERSID | Person-level identifier variable |
| Medical Conditions Files | ICD9CODX | 3-digit clinical classification code |
| HC-152if1, 144if1, 135if1, 126if1: Condition-event Link Files | DUPERSID | Person-level identifier variable |
| | CLNKIDX | Condition-link identifier |
| HC-152f, 144f, 135f, 126f: Outpatient Visits Files | DUPERSID | Person-level identifier variable |
| | MEDPTYPE | Type of medical provider seen during the visit |
| | OPXPyyX | Total expenditures for the visit |
| | PHYSTH | Received physical therapy treatment during the visit |
| HC-152g, 144g, 135g, 126g: Office-based Medical Provider Visits Files | DUPERSID | Person-level identifier variable |
| | MEDPTYPE | Type of medical provider seen during the visit |
| | OBXPyyX | Total expenditures for the visit |
| | PHYSTH | Received physical therapy treatment during the visit |
| HC-155, 147, 138, 129: | AGEyyX | Age in years on December 31 of the survey year |
| Full Year Consolidated Data Files | ANGIDX | Angina diagnosis |
| | ARTHDX | Arthritis diagnosis |
| | CHDDX | Coronary heart disease diagnosis |
| | DIABDX | Diabetes diagnosis |
| | DUPERSID | Person-level identifier variable |
| | EDUCYR | Years of education at study enrollment |
| | HIBPDX | High blood pressure diagnosis |
| | INSCOVyy | Type of insurance coverage |
| | MARRYyyX | Marital status on December 31 of the survey year |
| | MIDX | Myocardial infarction diagnosis |
| | MNHLTH42 | Perceived mental health status |
| | MSAyy | Metropolitan Statistical Area |
| | OHRTDX | Any other heart disease diagnosis |
| | POVCATyy | Poverty status |
| | PERWTyyF | Person-level weight |
| | RACETHNX | Race/Ethnicity (2009–2011) |
| | RACETHX | Race/Ethnicity (2012) |
| | REGIONyy | Census region |
| | RTHLTH42 | Perceived health status |
| | SEX | Male, Female |
| | STRKDX | Stroke diagnosis |
| | VARPSU | Primary sampling unit variance estimator |
| | VARSTR | Stratum variance estimator |

Where notation indicates yy, substitute the survey year.

## Appendix 2. Demographic and health-related variables used in analyses

| MEPS variable | Definition | Coding for analyses |
|---|---|---|
| AGEyyX | Age in years | • Top coded at 85 |
| RACETHNX (2009–2011)<br>RACETHX (2012) | Race/Ethnicity | • Hispanic<br>• Black, non-Hispanic<br>• Asian<br>• All other non-Hispanic |
| EDUCYR | Years of Education on entry to MEPS | • Less than 12 years<br>• 12 years<br>• More than 12 years |
| POVCATyy | Family income as percent of poverty line | • Poor/low (<100% - 199% of FPL)<br>• Middle (200% to 399% of FPL)<br>• High (400% of FPL or higher) |
| MARRYyyX | Marital status on Dec. 31 of the survey year | • Married<br>• Not married |
| INSCOVyy | Health insurance coverage indicator for the survey year | • Any private insurance<br>• Public insurance only<br>• No insurance |
| REGIONyy | Census region on Dec. 31 of the survey year | • Northeast<br>• South<br>• Midwest<br>• West |
| MSAyy | MSA status on Dec. 31 of the survey year | • MSA (urban, suburban)<br>• Non-MSA (rural) |
| ARTHDX | Arthritis diagnosis | • Present<br>• Absent/unknown |
| DIABDX | Diabetes diagnosis | • Present<br>• Absent/unknown |
| HIBPDX | High blood pressure diagnosis | • Present<br>• Absent/unknown |
| STRKDX | Stroke diagnosis | • Present<br>• Absent/unknown |
| ANGIDX<br>CHDDX<br>MIDX<br>OHRTDX | • Angina diagnosis<br>• Coronary heart disease diagnosis<br>• Myocardial infarction diagnosis<br>• Other heart disease diagnosis | • Coded as heart disease if any one or more present |
| MNHLTH42 | Perceived mental health status, rounds 4/2 (survey year) | • Good to excellent<br>• Poor to fair |
| RTHLTH42 | Perceived health status, rounds 4/2 (survey year) | • Good to excellent<br>• Poor to fair |

MEPS: Medical Expenditure Panel Survey; FPL: Federal poverty level; MSA: Metropolitan Statistical Area.