

Direct Access Physical Therapy Policy and Low Back or Neck Pain Disability: An Ecological Study

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Abstract

Background: Low-back and neck pain are major causes of disability in the United States. Policies that increase access to physical therapy may contribute to reducing back and neck pain-related disability.

Aim: This study's purpose was to assess the association between Direct Access Physical Therapy (DAPT) policies and disability attributable to back/neck pain.

Materials and Methods: Outcomes included 2017 state-level Disability-Adjusted Life Years (DALYs) attributable to back/neck pain, measured per 100,000 population and as a percent of state DALYs. DAPT policy was categorized as unrestricted, provisional, and restricted. Multiple linear regression analysis was used to estimate the association between level of DAPT policy and disability outcomes holding sociodemographic variables constant.

Results: 40% of states had unrestricted DAPT, 54% provisional, and 3 states restricted DAPT. In multivariate analysis, state-level policy allowing unrestricted DAPT compared to provisional was associated with lower percent of total state DALYs attributable to neck pain ($p=.014$). The level of DAPT policy was not associated with DALYs attributable to low back pain. Sociodemographic variables associated with disability outcomes included age, race, education, and income.

Conclusion: Results suggest that state policies with unrestricted DAPT were associated with lower neck pain disability. Data also highlight socioeconomic factors associated with neck and low-back pain. Future research is required at the individual level to ensure unrestricted DAPT is warranted. These findings provide a foundation for further investigation of direct access physical therapy policy. Exploration of direct access physical therapy policy may inform health care policy makers and support efficient health care resource distribution.

Keywords: DAPT; DALYs; Neck pain; Back pain

Introduction

Pain represents a substantial public health burden in the United States (U.S). For example, low back pain is one of the leading causes of disability globally, with more than 60 million years lived with disability in 2015. This places it in the top five contributors to years lived with disability for each state and country analyzed in the 2010 Global Burden of Disease study^[1]. Data collected from the 2010 National Health Interview Survey showed that 25.7% of workers in the United States experienced low back pain in the last three months. This number shows no sign of going down in the near future, with disability-adjusted life-years (DALYs) for low back pain showing small yearly increases over the last decade^[2]. Neck pain is less often studied, but it is the fourth leading cause of disability in the United States^[1,3,4].

Neck and back pain also have high economic costs to society. Specifically, low back and neck pain combined are the third leading cause of health spending behind heart disease and diabetes. One review of low back pain costs estimated that, on average, one case of low back pain costs about \$22,000, although this number varies based on whether the individual had surgery^[5,6].

The current best evidence for clinical management of low back and neck pain emphasizes physical therapy and education over surgery or pharmaceuticals. Several studies have provided

evidence that physical therapy helps reduce health care costs, prescription drug use, and imaging^[7,8]. Thus, increasing access to physical therapy is an evidence-based pathway towards more cost-effective management of disability related to low back and neck pain^[9,10].

Given this value, it is important to consider consumer policy-related access pathways to physical therapy. Direct access physical therapy, or the removal of physician referral requirements, is a policy option for increasing access. However, the specifics of direct access practice differ by state. This has been an emerging area of study and policy development in the United Kingdom, Canada, and the United States as the need for primary care practitioners remains unmet^[11]. A 2020 claims-based study found that ~5% of patients with new-onset low back pain from 2008-2013 first saw a physical therapist *via* direct access^[12,13].

Direct access policy is implemented at the state level with variation in the degree of access allowed by each state, and these various levels can have a differential impact on

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specific medical conditions. The American Physical Therapy Association categorizes direct access policy into three groups: restricted, provisional, or unrestricted. Restricted direct access policies allow physical therapists to provide care in well-defined or specific cases; for example, providing care for children with diagnosed developmental disabilities or those in skilled nursing facilities [11]. Provisional policies allow for more traditional physical therapy practice to a broader range of patients. The provisions specified in most cases include contacting a physician after a specified number of days or visits if the patient does not show improvement and are often limited to certain medical conditions. Although provisional policies allow for greater access over restricted policies, a state with a provisional policy that only expands direct access to care for 15 calendar days before physician referral is needed may not be much different than a state with restricted direct access in the case of chronic low back and neck pain. Finally, unrestricted direct access policies allow physical therapists to provide care with no restrictions outside of what is already mandated by the state's physical therapy practice act.

To date, the relationship between policies type and outcome in neck and back pain has been underexplored. Thus, the purpose of this secondary analysis was to explore the association between state-level low back and neck pain at the population level and the level of direct access policy. Given implications on pain, analyses controlled for several state-level Sociodemographics. It was perceived that such findings might assist in understanding the implications of policy implementation while also inform health education efforts regarding direct access physical therapy, a growing interest in the field, and a top priority for the American Physical Therapy Association.

Materials and Methods

This study involved a secondary, ecological analysis of state-level Direct Access Physical Therapy (DAPT) policies and state (population-level) disability attributable to low back or neck pain.

Measurement

Low back and neck pain: The dependent variables used to quantify low back and neck pain burden in each state were total DALYs per 100,000 population for low back and neck pain. DALYs are the sum of years of life lost to a disability and years lived with a disability. We also explored the percentage of total DALYs attributable to low back and neck pain in each state as outcome measures. In the final dataset, these are separated into four different variables: Low back pain DALYs/100,000 population, percentage of total DALYs attributable to low back pain, neck pain DALYs/100,000 population, and percentage of total DALYs attributable to neck pain. This data was collected from the Institute for Health Metrics and Evaluation's Global Burden of Disease 2017 data [14]. This dataset is aggregated using insurance claims data and epidemiological surveillance data in each state. All dependent variables were directly retrieved from the Global Burden of Disease 2017 data query tool.

Direct access policy level

Each state's policy for direct access physical therapy was

grouped into one of the three categories provided by the APTA: restricted, provisional, and unrestricted [11]. This categorical group variable serves as the independent variable for analysis pertaining to the primary research objective. States grouped in the unrestricted category have no restrictions on physical therapy practice for patients without referrals. States grouped in the provisional category allow for direct access but with restrictions such as visit or time limits that may interrupt a physical therapy plan of care. Finally, restricted states limit direct access to very specific conditions, such as children with diagnosed developmental disorders.

Sociodemographic variables

State-level sociodemographic variables included age (percentage of state population 65 years or older), sex ratio (males per 100 females), educational attainment (percentage of state population with a bachelor's degree or higher), and race (percentage of the population that identifies as Group A, Group B, or Group C). Socioeconomic variables include median household income, health insurance coverage (percentage of state population covered by any form of health insurance), and participation in manual labor (percentage of state population working in agriculture, construction, and warehousing). These sociodemographic variables were collected from the results of the 2013-2017 American Community Survey 5-year estimates data profile conducted by the United States Census Bureau. This survey is distributed to 3.54 million households every year, with a response rate ranging from 89.9% to 96.7% over the five years included in the estimation. Addresses are chosen and assigned to 16 strata with variable weights for randomization. All addresses to be evaluated for the year are then generated and surveys are distributed.

Statistical analyses

All variables listed above were collected individually from the data sources referenced and entered into and managed using Excel then transferred to SPSS 27 for analysis. After transfer, descriptive analyses were conducted, and the dependent variables checked for normal distribution using the Shapiro-Wilk test. A log transformation of median household income was used to reduce skewness of the distribution. Bivariate analyses were then conducted and relations between dependent and independent variables were assessed with Analysis of Variance (ANOVA) was used to compare means among groups defined by the level of direct access policy. Pearson correlation coefficients using a type I error rate cutoff of 0.05. Tukey-Kramer post-hoc analyses were also conducted to determine which groups differed. Multiple linear regression analysis was used to estimate the association between level of DAPT policy and disability outcomes. The full regression model for each dependent variable included direct access policy (restricted, provisional, unrestricted) and all demographic and socioeconomic variables.

Results

State-level descriptive characteristics

A total of 20 states (39.2%) had unrestricted direct access policy, 28 (54.9%) provisional policy, and only three states

(Alabama, Mississippi, and Missouri) had restricted direct access policy. Table 1 shows the mean and standard deviation for each dependent and independent variable by the level of direct access policy. Means differed by level of direct access policy for neck pain DALYs/100,000 population, percentage of state DALYs attributable to neck pain, sex ratio, and manual labor ($p < .05$, ANOVA). Figure 1 provides a visualization of the geographic distribution of direct access policy across the United States. Unrestricted direct access policy states can be found across the country but show a higher concentration in the West. The three restricted direct access policy states can all be found in the Southeast.

Direct access policy and sociodemographic variables

In bivariate analyses, median household income was negatively

associated with neck pain DALYs ($B = -371.9$, $p = .017$; Table 2). All other state-level sociodemographic variables were significantly correlated with low back and neck pain DALYs with the exception of percent insured.

Low back and neck pain and direct access policy

In multiple linear regression adjusting for sociodemographic variables, provisional direct access (compared to unrestricted direct access) was significantly associated with greater percent DALYs attributable to neck pain ($B = 0.239$, $p = .014$; Tables 3 and 4); restricted direct access ($n = 3$) was not ($B = -.205$, $p = .297$). Direct access was not significantly associated with neck pain DALYs/100,000 population. Furthermore, direct access was not found to be a significant correlate for low back pain DALYs/100,000 population or percent DALYs attributable to low back pain.

Table 1: Descriptive statistics by level of direct access policy.

	Restricted DA (n=3)		Provisional DA (n=28)		Unrestricted DA (n=20)	
	Mean	SD	Mean	SD	Mean	SD
Low Back Pain						
DALYs/100,000	1771.4	198.14	1736.7	130.3	1762.1	150.5
% Total DALYs	4.4	0.5	4.7	0.6	4.9	0.6
Neck Pain						
DALYs/100,000*	513.3a,b	74.8	478.7a	62.4	412.2b	92.5
% Total DALYs*	1.7a,b	0.2	1.8a	0.3	1.6b	0.3
Age	15.3	0.6	15.3	1.7	15	2.1
Sex Ratio*	93.9a	2.6	96.3a	2.1	99.8b	4
Group A%	69.9	11.9	74.5	11.1	79.6	16.5
Education	24.7	3.5	31.5	6.6	29.6	5.3
Log Median Household Income	46674	4769	58570	9501	59503	10083
% Insured	88.4	1.8	90.3	3.3	90.3	4.3
% Manual Labor*	13.9a,b	1.4	12.9a	2.5	16.0b	4.1

Note: DA=Direct Access, Group A=White; * $p < .05$, analysis of variance (ANOVA); Means with same superscript (a,b) do not differ; Tukey-Kramer pairwise comparison test.

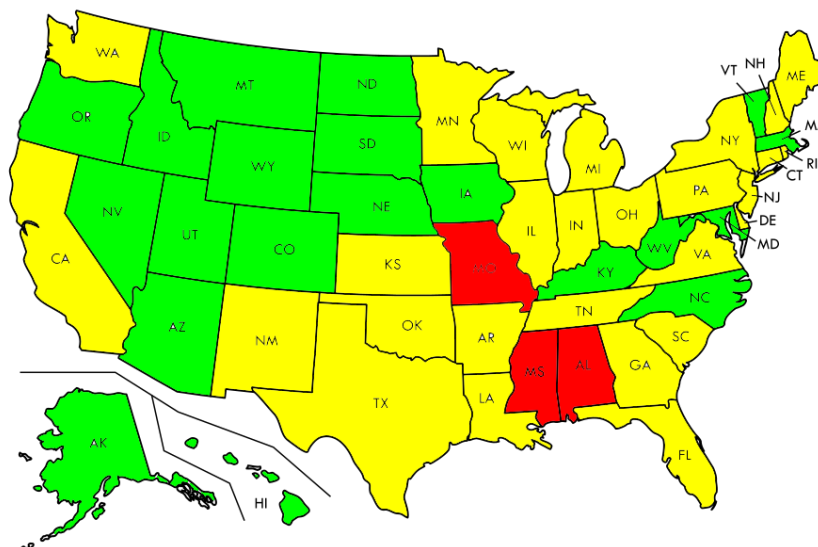


Figure 1. Geographic distribution of direct access policy. **Note:** Red=Restricted, Yellow=Provisional, Green=Unrestricted

Table 2: Association between independent variables and measures of disability.

Independent Variable	Low Back Pain		Neck Pain	
	DALYs/100,000 Population	% Total DALYs	DALYs/100,000 Population	% Total DALYs
Age	.496**	-0.079	.334*	0.001
Sex Ratio	0.125	.489**	-.390**	-0.164
Group A%	.583**	.476**	0.155	-0.102
Group B%	-.350*	-.560**	0.095	0.019
Group C%	-.425**	-0.11	-0.199	0.225
Education	-.588**	-0.05	-.330*	0.13
% Insured	-0.133	-0.066	-0.049	0.063
% Manual Labor	.354*	.372**	-0.259	-.296*
Log Median Household Income	-.528**	0.159	-.364**	0.223

Note: r is Pearson product-moment correlation coefficient; Group A=White, Group B=Black, Group C=Asian; *Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level (2-tailed).

Table 3: Multiple linear regression models predicting low back pain.

Predictors	DALYs/100,000 Population ^a			% Total DALYs ^b		
	Unstandardized Coefficient	Std. Error	Part R	Unstandardized Coefficient	Std. Error	Part R
Direct Access						
Unrestricted DA	REF			REF		
Provisional DA	3.2	32.4	0.009	0.007	0.171	0.005
Restricted DA	-13.2	67.3	-0.018	0.062	0.356	0.021
Log Median Household Income	364.8	415.7	0.081	3.318	2.196	0.178
Age	30.9**	9.4	0.303	0.002	0.05	0.004
Sex Ratio	-7.6	8.5	-0.083	0.016	0.045	0.041
Group A%	4.3***	1.2	0.332	0.022**	0.006	0.403
Education	-9.5*	4.4	-0.201	-0.004	0.023	-0.023
% Insured	-7.3	5.3	-0.126	-0.014	0.028	-0.06
% Manual Labor	7.1	7	0.093	0.033	0.037	0.105

Note: *p<.05, **p<.01, ***p<.001; Group A=White;

^aAdjusted R2=0.575; F(9,41)=8.53; p<0.001,

^b Adjusted R2=0.305; F(9,41)=3.44; p=0.003

Table 4: Multiple linear regression models predicting neck pain.

Predictors	DALYs/100,000 Population ^a			% Total DALYs ^b		
	Unstandardized Coefficient	Std. Error	Part R	Unstandardized Coefficient	Std. Error	Part R
Direct Access						
Unrestricted D A	REF			REF		
Provisional DA	37.5	22.2	0.18	0.239*	0.093	0.33
Restricted DA	33	46.2	0.076	0.205	0.194	0.137
Log Median Household Income	534.8	284.9	0.201	2.771*	1.198	0.299

Age	7.5	6.4	0.124	0.01	0.027	0.047
Sex Ratio	-10.7	5.8	-0.197	-0.009	0.024	-0.049
Group A%	1.8 ^{**}	0.8	0.235	0.002	0.003	0.087
Education	-10.0 ^{**}	3	-0.359	-0.023	0.013	-0.238
% Insured	-5.6	3.6	-0.163	-0.007	0.015	-0.056
% Manual Labor	-6.7	4.8	-0.149	-0.015	0.02	-0.099

Note: *p<.05, **p<.01, ***p<.001; Group A=White; aAdjusted R²=0.429; F(9,41)=5.18; p<0.001, b Adjusted R²=0.164; F(9,41)=2.09; p=0.053

Low back and neck pain and sociodemographic variables

Significant state-level variables in multivariable models included age, race, education, and income (all p s<.05). Higher state-level percent Group A was associated with low back pain (DALYs/100,000 and percent total DALYs) and neck pain DALYs/100,000. Higher percentage of the population older than 65 years was associated with greater low back pain DALY's/100,000. Lower percentage of population with bachelor's degree was associated with higher low back and neck pain DALYs/100,000. Lastly, higher median household income was associated with greater percentage of total DALYs attributable to neck pain.

Discussion

The results of this secondary analysis suggest that unrestricted direct access physical therapy policies are associated with less neck pain disability (measured by DALYs) at the state level. This observation was supported statistically with lowest mean neck pain DALYs/100,000 and %DALYs attributable to neck pain in states with unrestricted direct access and a significant effect size in multiple linear regression between unrestricted and provisional direct access policies. On the other hand, direct access did not significantly influence low back pain disability.

The significant decrease in population neck pain disability attributable to unrestricted direct access compared to provisional access warrants additional research on direct access physical therapy policy. While many have been interested in examining direct access policy generally, these findings indicate value in differentiating the specific details of these policies and level of access provided with or without limitations. While not statistically significant, there does appear to be a trend for even greater neck and low back pain disability in the three states with restricted policy. It should also be noted that two of the three states with restricted direct access have not adopted Medicaid expansion. This may indicate a more broadly restrictive health policy environment. Thus, finding the best approach to direct access and general health policy development could have wide-reaching effects on population health.

State healthcare cultures may also vary widely within the United States. Future studies examining direct access policy may account for state-level surgical or pharmaceutical management rates as available. As noted in the introduction, there are several options for management of back and neck pain, with physical therapy remaining underutilized among them. Surgery and medication continue to be the front-line option and rates of utilization will most likely have an impact on future findings.

Another purpose of this study was to examine state-level demographic and socioeconomic characteristics associated with low back and neck pain DALYs. The bivariate and multiple linear regression findings for these factors agree with previous literature on low back and neck pain disparities. Future studies on direct access physical therapy care could benefit from including demographic and socioeconomic variables. Exploring these factors may aid in health care resource distribution and the determination of those that are not accessing currently available resources.

In summary, this study provides a foundation for several future research questions regarding direct access physical therapy policy. Future individual-level studies should examine the health care and disability outcomes for those with low back or neck pain who receive physical therapy through direct access. Determining if direct access physical therapy is successful at the individual level and what factors play into the choice to seek out care could be critical to future conversations around policy and implementation.

Conclusion

The study was also limited in that only three states had restricted direct access policies making it difficult to draw conclusions regarding the association between level of restrictions on direct access policy as in a dose-response relationship. Furthermore, the fact that these three states were all in the Southeast may introduce some regional bias not accounted for in this study. Variance Inflation Factors were also noted to be greater than 2.0 for many sociodemographic variables in the multivariate analyses. This collinearity may increase the risk of Type II errors and false negative conclusions as it pertains to statistical significance.

Health insurance coverage is also broadly covered by percent of population covered by any insurance in this study. Even among private health insurance plans there is wide variety on coverage of physical therapy services. Future studies examining type of insurance coverage as it relates to physical therapy and direct access policy may provide more clarity on the effective access a state's population has to direct access physical therapy.

Limitations

One possible explanation for the differential effect of direct access policy on low back and neck pain may be explained by differences in care-seeking behaviors for the different musculoskeletal conditions. In fact, previous studies have suggested that there are differences in care-seeking between neck and low back pain patients regarding the type of health care

provider patients ultimately choose for care. Patients with low back pain tend to report higher pain levels than those with neck pain [15,16]. Given this trend in the literature, it is possible that those with low back pain or disability may seek out physicians for more intensive care than provided by physical therapy, including prescription pain medication or even surgery [17]. A systematic review of the literature on chiropractic care showed that more patients seek chiropractic services for low back pain (49.7%) than neck pain (22.5%). Another study demonstrated that chiropractors are seen more often than physical therapists for chronic back pain [18,15].

Taken together, it is possible that patients with low back pain are less likely than patients with neck pain to seek physical therapists for treatment when given direct access. This study design is insufficient to investigate this hypothesis. However, it does provide a basis for further investigation when examining direct access and other physical therapy policy effects on care-seeking behaviors and health outcomes among individual patients. Determining if there are differences could have many practical uses. First, it would allow governments and professional organizations to develop appropriate messaging. It would also be helpful for physical therapists and other health care providers when deciding if direct access physical therapy is the best option for different patient presentations.

It is important to note that ecological type studies determine whether an association exists by studying group characteristics rather than individuals. In this study, individuals in each state were characterized by the average figures for that state. What is known as the ecologic fallacy occurs when characteristics are ascribed to members of a group that they, in fact, do not possess as individuals. The problem introduced with this design means that claims for causation or associations at the individual level are limited. Although the current study showed that states with unrestricted direct access policies have less percent DALYs attributable to neck pain, we cannot conclude that unrestricted direct access policies cause less neck pain disability or that an individual seeking physical therapy through direct access will experience less neck pain disability. However, this data is promising. Future research that examines the health outcomes of patients with musculoskeletal conditions who can directly access physical therapists for treatment, without referral or limitations, is warranted.

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