Research Article
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Depression and patients attending outpatient physical therapy with musculoskeletal pain and disability

Abstract

Background: Depression is very prevalent and a comorbidity in musculoskeletal pain. Physical therapists treat high volumes of patients with musculoskeletal pain, thus warranting a need to screen patients for depression for safety and proper treatment. The aim of this study was to screen patients attending outpatient physical therapy for depression and determine what variables predict the presence of depression.

Patients and methods: A convenience sample of patients attending outpatient physical therapy for musculoskeletal pain was asked to complete a survey consisting of demographic information and the Patient Health Questionnairre-9 (PHQ-9), nine-item depression scale.

Results: The patient sample consisted of 320 patients with a mean age of 52.36 (±16.78) years with a mean duration of pain of 5.89 (±6.69) months. Mean PHQ-9 score at intake was 5.37±4.84) with 14.1% of the patients classified as moderate to severe depression. The variables most associated with a high PHQ-9 score were being disabled ($\beta = 4.26$, $p = 0.01$), having personal injury insurance ($\beta = 4.04$, $p = 0.12$) and a high body-mass index ($\beta = 3.75$, $p = 0.30$). Lower PHQ-9 scores were associated with getting more sleep ($\beta = -0.76$, $p = 0.02$) and higher minutes of exercise per week ($\beta = -0.004$, $p = 0.25$).

Conclusions: Approximately one in seven patients attending outpatient PT for musculoskeletal pain present with moderate to severe depression. Various patient characteristics were identified that may indicate a higher likelihood of clinical depression, which may aid in the identification of depression in patients with musculoskeletal pain. Additional research is needed to validate these preliminary findings from this study.

Keywords: depression, musculoskeletal pain, physical therapy, mental and behavioral health

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Introduction

According to the National Institute of Health it is estimated approximately one in five people in the United States (US) suffer from a mental, behavioral or emotional disorder and account for an annual spending in excess of $80 billion.[1] Within this data, it is estimated approximately six percent of Americans suffer from major depression,[1] with the life-time prevalence of depression estimated at 21.3% in women and 12.7% in males.[2] Unfortunately, depression has been shown to also be a leading cause of suicide, thus showcasing the importance for healthcare providers to screen for depression, treat the depression or does it change the course of the treatment plan and outcome?[2] Additionally, it is reported that depression rates have, and will continue to increase due to the corona virus disease of 2019 (COVID-19).[3,4]

Pain and depression have been shown to be interrelated, especially chronic pain.[5–7] Within this coexistence is a clinical dilemma for physical therapists (PT) - the need and ability to screen for depression and treat patients with varying levels of comorbid depression.[8] In 2020, amid the COVID-19 pandemic, the American Physical Therapy Association put forth a position statement supporting PT's ability to evaluate and treat behavioral and mental health disorders, including depression.[9] This mandate aligns with previous calls to PT to embrace a true biopsychosocial model, screen for depression and develop therapeutic interventions for depression.[10–12] It is well-established that depression influences outcomes related to pain and function.[10–13] It is proposed that PT's would use validated tools to screen for depression and refer to a mental health provider as needed.[6,14] For example the Patient Health Questionnairre-9 (PHQ-9) has been shown to be highly sensitive and could be used to rule out significant levels of depression.[14] The PHQ-9 validates the current belief that depression is seen as a continuum, anchored with lower levels of depression on the one side and anchored by major depression on the other side.[14,15] Based upon a cut-off score, the decision is made to refer patients on the higher end of the scale to a mental health provider.[15] Conversely, if a patient were to be on the lower end of the depression scale, non-behavioral health providers are ideally positioned to treat those patients.[10–12] In lieu of the coexistence of depression and chronic pain, it is not surprising that current best-evidence for depression and chronic pain shows significant overlap which includes primarily some type of cognitive intervention, aerobic exercise and skilled delivery of medication including selective-serotonin-reuptake-inhibitors and/or membrane stabilizers.[16–19] PT is thus ideally situated to help with the mental health crisis faced by society.

A gap in the literature is the prevalence of co-morbid depression in patients with musculoskeletal pain attending PT. A recent study of 156 consecutive patients presenting in PT with musculoskeletal disorders showed that 22.3% of the patients had co-morbid clinical depression.[20] Given the fact that depression is influenced by various factors and many clinicians do not readily screen for depression, studies are needed to identify the clinical prevalence of varying levels of depression in PT, and report on factors associated with the

likelihood of presenting with these various levels of depression. The aim of this study was to screen patients attending outpatient PT for depression and determine what variables predict the presence of varying levels of depression.

Patients and methods

The study design called for a convenience sample of patients attending outpatient PT to be recruited to complete a survey related to depression. Institutional review board (IRB) approval was obtained from St. Ambrose University for this study. Four private practice, PT clinics participated in the study. Patients with musculoskeletal pain and/or disability, attending PT were asked to participate in the study, by completing an anonymous survey. Participation was entirely voluntary and by agreeing to participate, patients consented to the study. In order to participate, patients must present with a primary complaint of musculoskeletal pain and/or disability, be over the age of 18 and proficient in reading and writing the English language. Surveys were collected at each clinic over a 4-month period.

A survey was developed in line with the objectives of the study. The survey consisted of two sections:

i. **Demographics:** In line with previous studies, demographic data collection included age, gender, employment status, education background, primary insurance type, social status, prior pain experience, pain rating (numeric pain rating scale), family history of chronic pain, location of pain, amount of sleep per night, amount of exercise per week, if they smoke, weight, height, family history of depression and prior imaging related to their pain.

ii. **Depression Scale (PHQ-9):** The PHQ-9 is the nine-item depression scale and one of the most validated tools in mental health assisting clinicians with diagnosing depression and monitoring treatment response.[21–23] The nine items of the PHQ-9 are based directly on the nine diagnostic criteria for major depressive disorder in the DSM-IV. Each items is scored from 0 - 3 for a total of 27 possible points. Total PHQ-9 scores are classified as 0-4 (none to minimal depression); 5-9 (mild depression); 10-14 (moderate depression); 15-19 (moderately severe depression and 20-27 (severe depression).[24]

Upon development of the questionnaire, a first-version was circulated to experts in the management of musculoskeletal pain; management of depression and questionnaire design. Experts were asked to comment, in line with the objectives of the study on the various demographic items potentially associated with depression, clarity and ease of the questionnaire and any grammatical or spelling edits. A convenience sample (n = 5) of patients attending PT with musculoskeletal pain similarly reviewed the questionnaire and provided feedback. Completion of the questionnaire averaged ~8 minutes. Responses were gathered over 60 days. According to Powel, if 70% agreement was obtained by reviewers, the questionnaire would be deemed ready for use.[25]

The completed paper survey data was entered into Microsoft Excel™ spreadsheets by the clinicians for data analysis by an independent research assistant. The statistical program RStudio Cloud version 1.4 of RStudio IDE was used in all analyses. Of the original 344 observations, only 320 were used in analysis due to outliers in pain ratings and hours of sleep. Height and weight were originally recorded in inches and pounds, so observations were converted to meters and kilograms. Body mass index (BMI) was then calculated for each participant based on their height and weight. Demographic data was calculated for the cohort and represented as means, standard deviations and percentages. PHQ-9 scores were analyzed in relationship to patient variables using multiple linear regression to determine what factors most significantly impacted PHQ9 score. Bayesian Information Criterion (BIC) was used to determine the most accurate model of all demographics.

Results

Three-hundred-and-twenty patients presenting to PT with musculoskeletal pain completed surveys (Table 1). The overall, mean PHQ-9 score was 5.37 (± 4.84; range 0-27). The majority of the patients scored in the lower range on the PHQ-9 survey (Figure 1). Approximately one in seven patients (n = 45; 14.1%) presented with moderate through severe depression when attending outpatient PT with musculoskeletal pain.

Table 1 Demographics

Characteristics	**Patients (n = 320)**
Mean age (years) (SD)	52.36 (16.78)
Female (%)	185 (57.81)
Race:	
White/Caucasian (%)	140 (43.75)
Native Hawaiian or Other Pacific Islander (%)	73 (22.81)
African American/Black (%)	46 (14.38)
Other	61 (19.06)
Employment	
Full-time (%)	149 (46.56)
Retired (%)	80 (25.00)
Part-time (%)	31 (9.69)
Other	60 (18.75)
Educational background	
Four-year university degree (%)	117 (36.56)
High school diploma (%)	105 (32.81)
Post-graduate degree (%)	63 (19.69)
Other	35 (10.94)
Social Status	
Married (%)	178 (55.63)
Single (%)	82 (25.63)
Divorced (%)	30 (9.37)
Not answered	30 (9.37)
Currently experiencing pain (%)	261 (81.56)
Mean duration of pain for those currently experiencing pain in months (SD)	5.89 (6.69)
Mean pain score (NPRS) for those currently experiencing pain (SD)	3.91 (2.22)
Experienced pain for more than 6 months (%)	63 (19.69)

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Table Continued...

Characteristics	Patients (n = 320)
Most common area of pain (%)	
Low back	110 (34.38)
Shoulder	106 (33.13)
Knee	80 (25)
Other	24 (7.49)
Mean hours of sleep per night (SD)	6.79 (1.21)
Mean time exercising per week (minutes) (SD)	116.44 (126.2)
Smokers (%)	30 (9.42)
Mean BMI (SD)	30.71 (7.09)
Immediate family struggle with depression (%)	136 (42.50)

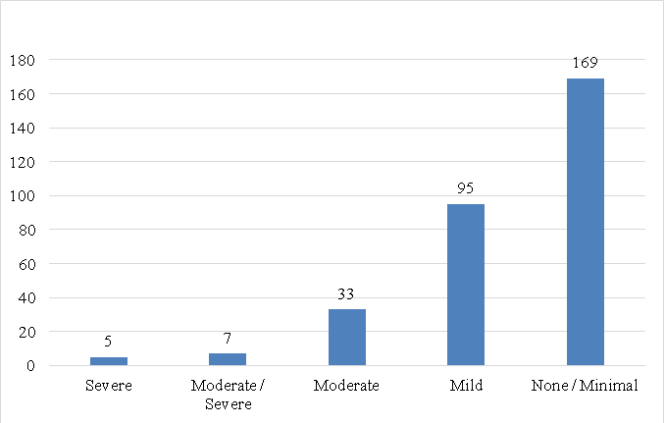

Figure 1 Numbers of PHQ-9 scores, by level, in patients attending outpatient PT with musculoskeletal pain and dysfunction.

The results of the multiple linear regression to determine which demographic factors most associated with PHQ-9 scores are listed in Table 2. The variables of being disabled, having personal injury insurance, and a high BMI had the largest partial effects on PHQ-9 as individual variables, holding all other variables constant. Not only were these partial effects on PHQ-9 the largest in magnitude, but they were also all positively correlated with PHQ-9 score (Table 2).

Table 2 Results of Multiple linear regression of variables associated with higher PHQ-9 scores (moderate to severe).

Variable	Coefficient
Disabled*	(β = 4.26, p = 0.01)
Personal Injury Insurance*	(β = 4.04, p = 0.12)
High BMI*	(β = 3.75, p = 0.30)
Currently experiencing pain	(β = 1.52, p = 0.03)
Family history of depression	(β = 1.28, p = 0.08)
Female gender	(β = 1.06, p = 0.15)
If the participant has had imaging	(β = 0.82, p = 0.30)
Smoker	(β = 0.56, p = 0.65)

* = higher correlation to depression.

Conversely, two lifestyle choices, easily influenced PT in clinical practice was found to be associated with lower likelihood of presenting with a high PHQ-9 score: Getting more sleep (β = -0.76, p = 0.02) and higher minutes of exercise per week (β = -0.004, p = 0.25). The linear model between these variables and PHQ9 score was found to be statistically significant with F (11, 129) = 4.82. Post-hoc power analysis showed a high level of power at 0.99 (df = 129). This would indicate that the model is highly likely to find an effect on PHQ9 score from the independent variables in the model.

Discussion

This study concurs with previous studies showing the high prevalence of depression in patients attending PT, but to the best of our knowledge is the first to add additional insight into the levels of depression as well as variables that may alert clinicians to the potential of a patient presenting with moderate to severe depression.

Matheson, et, al, showed that approximately one in five patients in rehabilitation presented with depression.[20] In this study, the number is closer to one in seven. The Matheson study, however was specific to a pain rehabilitation program, whereas these results specifically showcase the numbers related to general outpatient PT practice and thus are more representative of what a typical outpatient PT can expect. Additionally, the depression scale used in this study, the PHQ-9, concurs with current PT guidelines for screening depression, compared to the instruments used in the previous study.[11] It is argued that depression should not be classified as either being present or not, but rather on the linear scale of depression anchored between none/minimal and severe as a means to allow clinicians to triage care accordingly.[26] The results from this study are unique in whereby it specifically showcases the prevalence of the more troubling moderate to severe depression which is more indicative of the potential need for additional care, multidisciplinary care and caution.[11] This study allows outpatient PTs to recognize that depression is relatively common, especially the higher-end scale of depression.[26] These results validate the current mandate that PT's, especially in a first-contact provider role, should screen for depression.

The exact number of PT's that screen for depression is unknown. It is known, however, that depression screening has become more common place with the advent of more direct-access, OPPT, increased prevalence of chronic pain, the explosion of mental and behavioral health issues amid COVID-19 and more.[4,27,28] This study, using the validated PHQ-9 screening instrument, additionally highlights various patient characteristics that may be indicative of a patient presenting with a higher likelihood of depression, such as being disabled, personal injury or a high BMI. These results concur with studies showcasing the higher incidence of depression in people that are disabled and patients with a higher BMI.[29–31] Clinicians should recognize that depression is more prevalent in sub-groups of patients and be on the lookout for these clinical presentations by adding another layer of screening for depression. Interestingly, the two factors associated with lower PHQ-9 (increased sleep and exercise) is in line with current best-evidence treatment for depression as well as chronic pain and are part of common clinical practice in PT.[16–19,32] This adds to the current belief that PT should not only screen for depression, but may be ideally suited to help patients with lower-level depression.

The study contains various limitations. First, it's important to recognize that the data collection occurred amid a global pandemic (COVID-19) implicated in increased mental and behavioral health issues including depression.[3,4] The prevalence of depression may thus be inflated, however if people attending outpatient PT represent a sample of the general population at-large, the numbers are in line with what is known to be the prevalence of depression. Second, the sample may not be a true representative sample of patients attending outpatient PT given its age restrictions (18 and above) as well as language (English-only).

Conclusion

Approximately one in seven patients attending outpatient PT for musculoskeletal pain present with moderate to severe depression. Patients who are disabled, have had a personal injury and high BMI are more likely to report a higher depression score, while patients who sleep and exercise more present with lower depression scores. Additional research is needed to further explore and elaborate on these findings.

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Conflicts of interest

The authors have no conflict of interest, financial interest or benefit to declare in relation to this manuscript. No funding was received for this manuscript or research.

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