

Are Statistical Groupings of Biopsychosocial Factors Associated with Level of Capability and Pain Intensity in Patients with Hip Pain?

Zoe Trutner¹, Niels Brinkman², Eugenia Lin, David C Ring, Kevin John Bozic³, Prakash Jayakumar

¹Surgery, Dell Medical School, University of Texas, Austin, ²Department of Surgery and Perioperative Care, Dell, ³Dell Med Sch, Univ of Texas At Austin

INTRODUCTION:

Musculoskeletal health involves a dynamic interaction between objective pathophysiology, mental health (mindset), and social health (circumstances). Evidence demonstrates that mindset explains a substantial proportion of the variation in comfort (pain intensity) and capability experienced by patients across common musculoskeletal conditions. Additionally, early studies suggest that social circumstances are intrinsically linked to health outcomes, while objective pathophysiology plays a less dominant role. We sought to better understand the impact of different combinations of pathophysiology, mental, and social health on comfort and capability within patient populations with degenerative hip conditions including osteoarthritis (OA) and avascular necrosis (AVN). Our primary objective was to generate statistical groupings based on pathophysiological, psychological, and social factors among patients presenting with hip pain. Secondly, we assessed the association of these statistical groupings with levels of capability and comfort at baseline and after three months of conservative care in a comprehensive integrated practice unit.

METHODS:

A total of 138 English- and Spanish-speaking adults seeking care for chronic hip pain (mean age 61 ±12 years, 62% female, 67% white) were enrolled and 117 (85%) completed surveys for mental health (symptoms of anxiety, GAD-2, and symptoms of depression, PHQ-2), social health (Accountable Health Communities Health Related Social Needs survey on housing, utilities, transport, food, and personal safety, AHC HRSN), level of hip capability (Hip dysfunction and Osteoarthritis Outcomes Score for Joint Replacement, HOOS JR), and pain intensity (numeric pain rating scale, NPRS) at baseline. Board certified orthopaedic surgeons graded hip degeneration severity using the Kellgren-Lawrence (KL) classification system at baseline. At 3 months we also measured HOOS JR with 66 (56%) respondents and NPRS with 69 (59%). We performed cluster analysis to identify statistical groupings of GAD-2, PHQ-2, HRSNs, and KL before conducting bivariate analysis to seek factors associated with HOOS JR and NPRS at baseline and 3 months ($p < 0.10$ moved to multivariable analysis). We then conducted multivariable regression to better understand the level of variation in capability and comfort that could be explained by these variables over time.

RESULTS:

We identified three statistical groupings in our cohort at baseline: A (minimal OA severity and psychosocial distress, 75%), B (moderate OA severity and overall psychosocial distress but severe symptoms of depression; 11%), and C (severe OA severity and psychosocial distress; 14%). In multivariable regression at baseline, statistical groupings B (Regression Coefficient, RC=-13, $p=0.02$) and C (RC=-10, $p=0.04$), and being disabled or unable to work compared to being employed (RC=-20, $p < 0.001$) were significantly associated ($p < 0.05$) with lower levels of hip capability. Factors associated with increased pain intensity in multivariable regression included statistical grouping C (RC=2.1, $p < 0.001$) and any annual household income lower than \$150,000 (RC=1.5-1.7, $p < 0.042$). After three months, statistical grouping B/C (pooled together due to the low number of observations, RC=-28, $p < 0.01$) compared to A, being disabled or unable to work (RC=-20, $p=0.045$) compared to employed, and income between \$15,000 and \$49,999 (RC=-25, $p=0.016$) were associated with lower levels of hip capability. The combined statistical grouping B/C (RC=2.9, $p < 0.01$) and being disabled or unable to work (RC=2.9, $p=0.021$) were associated with increased pain intensity at 3 months.

DISCUSSION AND CONCLUSION:

Statistical groupings involving higher levels of distress are associated with lower levels of capability and pain intensity at baseline and over time despite conservative treatment. Our findings support the need to redesign models of musculoskeletal care to offer a more personalized whole-person approach via comprehensive care pathways and the opportunity to optimize outcomes in the management of hip OA.