

## Identifying Clusters of Orthopaedic Trauma Patients at Risk for Poor Outcomes: Results from a Prospective, Multicenter Study

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**Purpose:** Numerous studies have demonstrated that long-term outcomes following orthopaedic trauma are related to psychosocial and behavioral health factors evident early in the patient's recovery. Less is known about how these factors relate to each other, and whether distinct clusters of individuals at varying risk of poor outcomes can be identified. The objectives of the study were to: (1) examine the distribution of known risk and protective factors in an orthopaedic trauma population, and (2) test whether these risk and protective factors could be used to classify individuals into risk profiles.

**Methods:** Participants (N = 681) with Abbreviated Injury Scale (AIS) 3 orthopaedic injuries were enrolled into a prospective, multicenter study. At 6 weeks post discharge, patients completed standardized measures for five risk factors: numeric rating pain intensity scale, depression (Patient Health Questionnaire [PHQ]-9), posttraumatic stress disorder (PTSD) (PTSD Check List), alcohol and tobacco use. Five protective factors were also measured: resilience (Connor-Davidson Resilience Scale), social support (Behavioral Risk Factor Surveillance System single-item scale), and 10-point self-efficacy scales for return to usual activity and managing the financial demands of recovery. Latent class analyses were used to classify participants into clusters. The sample was 64% male, 76% white, and had mean age 38.59 years and mean ISS score 16.6.

**Results:** A latent class analysis of the risk and protective factors supported a three-cluster solution (see table). Cluster 1 (n = 309) reflected low risk and high protection, cluster 2 (n = 256) reflected moderate risk and low protection, and cluster 3 (n = 116) reflected high risk and low protection.

**Conclusion:** The study shows trauma patients can be classified into meaningful risk/protective clusters. These clusters have important implications for the use and efficacy of psychosocial interventions and referral programs. The 45% of participants who fall into the low risk/high protection category are likely to achieve full recovery barring clinical complications and are unlikely to need additional services. The 38% of participants who fall into the subclinical risk/low protection category are at risk for pain, depression, and PTSD complications and have limited psychosocial resources, which could be improved with appropriate support services. The remaining 17% of participants fall into the severe risk/low protection category, and exceed widely used screening criteria for pain, depression, and PTSD. Aggressive referral and treatment will be critical for this subpopulation.

	<b>Factors<sup>1</sup></b>	<b>Overall</b>	<b>Cluster 1</b>	<b>Cluster 2</b>	<b>Cluster 3</b>
Risk <sup>2</sup>	Pain	4.6 (2.7)	3.3 (2.2)	5.1 (2.4)	7.1 (2.1)
	Depression	7.7 (5.9)	3.8 (3.5)	8.4 (4.0)	16.3 (4.6)
	PTSD	16.7 (14.6)	7.6 (7.3)	16.8 (9.0)	41.3 (10.7)
	Alcohol Abuse, n (%)	80 (12)	25 (8)	42 (17)	13 (12)
	Tobacco Use, n (%)	198 (29)	41 (13)	97 (38)	60 (52)
Protective <sup>3</sup>	Resilience	6.5 (1.6)	7.1 (1.3)	6.2 (1.6)	5.5 (1.7)
	Social Support	2.1 (1.0)	3.6 (0.7)	2.9 (1.0)	2.5 (1.3)
	Return to Work	7.2 (2.9)	9.1 (1.3)	5.9 (2.8)	5.0 (2.9)
	Manage Finance	5.9 (3.3)	8.2 (2.1)	4.0 (2.7)	3.6 (3.0)

<sup>1</sup> Results expressed as mean (SD), except where otherwise indicated.

<sup>2</sup> Ranges (clinical cut-point): Pain: 0-10 ( $\geq 5$ ); Depression: 0-30 ( $\geq 10$ ); PTSD: 0-68 ( $\geq 30$ ).

<sup>3</sup> Ranges: Resilience: 0-8; Social support: 0-4; Return to work: 1-10; Manage finance: 1-10.