Symptom Cluster Profiles Following Traumatic Orthopaedic Injuries

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INTRODUCTION

Each year, millions of Americans suffer traumatic orthopaedic injuries (TOI) [1,2]. TOI survivors often experience co-occurring symptoms of anxiety, depression, pain, sleep disturbance, and stressor-related disorders [3,4]. The regulation of brain-derived neurotrophic factor (BDNF) may contribute to co-occurring symptoms in TOI survivors [5]. Mathematically sorting TOI survivors into groups called symptom cluster profiles and testing the associations of demographic and clinical factors and markers of BDNF regulation may reveal subpopulations of TOI survivors at highest risk for post-injury symptoms and negative long-term outcomes early in the post-injury period [6].

SPECIFIC AIMS

1. Describe TOI survivors' group membership in symptom cluster profiles, indicated by pain, sleep disturbance, and symptoms of anxiety, depression, and stressor related disorders, immediately following a traumatic orthopaedic injury

2. Examine associations between demographic and clinical factors and symptom cluster profile membership among TOI survivors

3. Test hypothesis that low serum concentrations of BDNF are associated with membership among symptom cluster profiles following TOI

4. Test hypothesis that the val66met single nucleotide polymorphism (rs6265) on one or both alleles of the BDNF gene is associated with membership among symptom cluster profiles following TOI

STUDY DESIGN AND METHODS

Design: Cross-sectional
Sample Size: 150
Setting: Yale New Haven Hospital
Measures: - PROMIS Short Forms
      (Anxiety, Depression, Pain, Sleep)
      - Acute Stress Disorder Scale
Biomarkers: - Serum BDNF Concentration
      - BDNF Genotype (val/val, val/met, met/met)
Inclusion Criteria:

1. Aged 18+ years
2. Within 72 hours of injury
3. Fracture to appendicular skeleton or pelvic ring
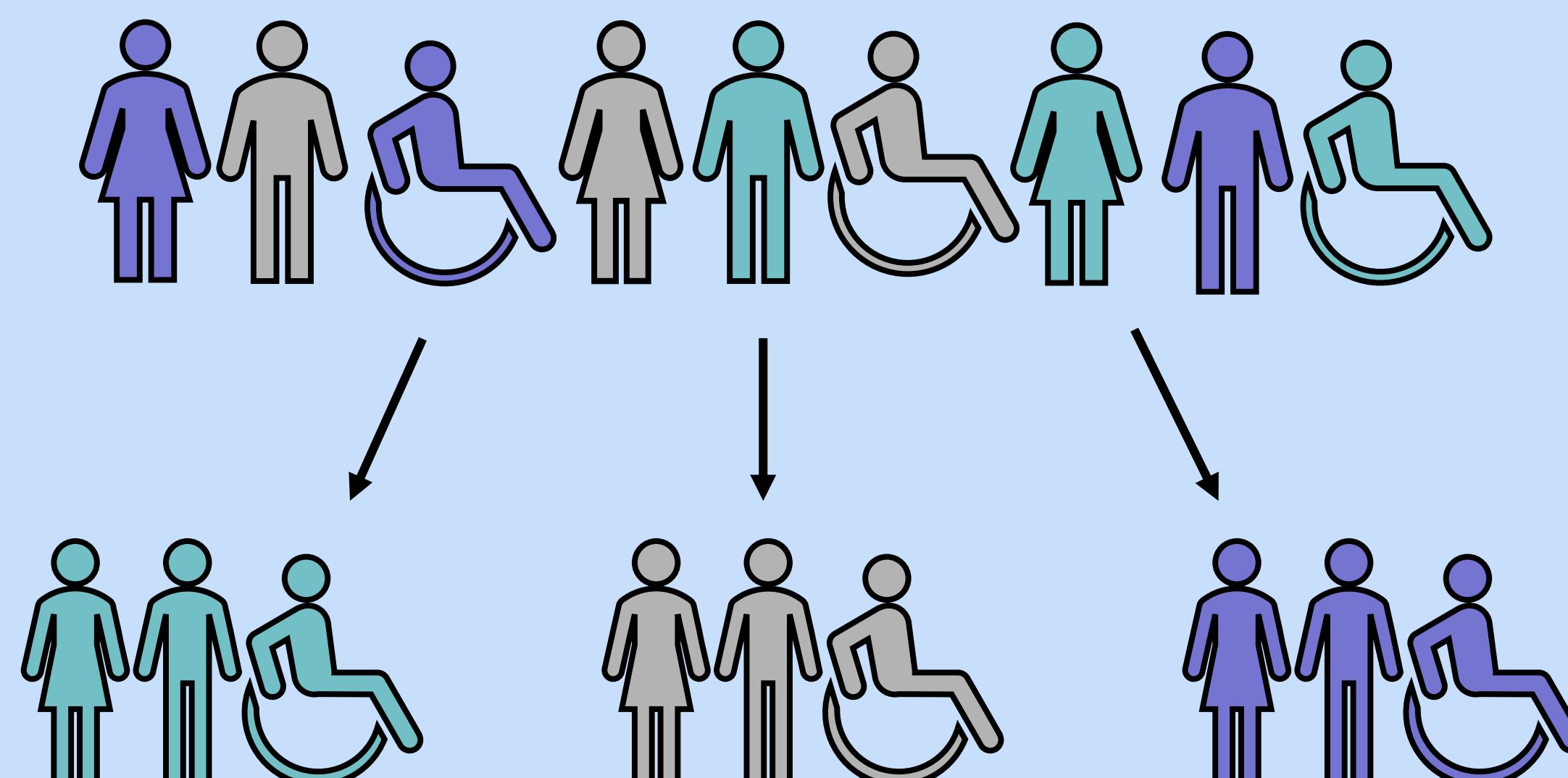4. Speak and understand English
5. Cognitively intact

Statistical Analyses:
    Aim 1: Latent Profile Analysis
    Aim 2: Multinomial Logistic Regression
    Aim 3: ANOVA / Kruskal-Wallis
    Aim 4: Genotypic association testing via χ^2

PRELIMINARY RESULTS

Sample Demographics (N=74)

Variable	Mean (SD) / N (%)
Age (years)	48.55 (12.28)
Sex	
Male	49 (66.22)
Female	25 (35.78)
Race	
American Indian / Alaskan Native	1 (1.35)
Asian	1 (1.35)
Black / African American	14 (18.92)
Native Hawaiian / Pacific Islander	1 (1.35)
White	51 (68.92)
Prefer not to answer	6 (8.11)
Ethnicity	
Hispanic / Latino	15 (20.27)
Not Hispanic / Latino	59 (79.73)
Insurance Type	
Medicare	9 (12.16)
Medicaid	19 (25.68)
Private	37 (50)
Tricare / VA	7 (9.46)
Uninsured	2 (2.7)
Employment Status	
Unemployed	16 (21.62)
Employed Part-Time	7 (9.46)
Employed Full-Time	34 (45.95)
Self-Employed	4 (5.41)
Retired	13 (17.57)
Education Level	
Less than Highschool	4 (5.41)
Graduated Highschool / GED	24 (32.43)
Some College	22 (29.73)
Bachelor's Degree	15 (20.27)
Master's Degree or Higher	9 (12.16)

Sample Clinical Characteristics (N=74)

Variable	Mean (SD) / N (%)
Mechanism of injury	
Motor vehicle collision	21 (28.38)
Motorcycle collision	11 (14.86)
Pedestrian struck	7 (9.46)
Fall	27 (36.49)
Assault	4 (5.41)
Cut / Piercing	1 (1.35)
Industrial accident	3 (4.05)
# of fractures	
1	39 (52.7)
2	21 (28.38)
3	8 (10.81)
4	3 (4.05)
5	3 (4.05)
Open Fracture	12 (16.22)
Operative Management	58 (78.38)
Admission hemoglobin	13.3 (1.86)
Admission hematocrit	39.83 (5.09)
Lactic acid drawn	
No	63 (85.14)
Yes	11 (14.86)
Fracture Site	
Right Upper Extremity	14 (18.92)
Left Upper Extremity	7 (9.46)
Right Lower Extremity	35 (47.3)
Left Lower Extremity	22 (29.73)
Pelvis	7 (9.46)
Right Acetabulum	5 (6.76)
Left Acetabulum	6 (8.11)
Combination Injuries	
Isolated Upper Extremity	9 (12.16)
Isolated Lower Extremity	37 (50)
Bilateral Upper Extremities	2 (2.7)
Bilateral Lower Extremities	7 (9.46)
Upper and Low Extremities	8 (10.81)

Symptom Measures (N=74)

Symptom	Mean (SD)	N (%) above clinical threshold	N (%) PROMIS above 60
ASDS†	39.86 (15.11)	13 (17.57)	NA
Anxiety	58.06 (10.2)	61 (82.43)	32 (43.24)
Depression	50.85 (8.19)	45 (60.81)	11 (14.86)
Pain	59.24 (6.65)	67 (90.54)	40 (54.05)
Sleep Disturbance	56.88 (10.83)	53 (71.62)	29 (39.19)