Psychosocial Influences and Mental Health Outcomes in Sport-Related Concussion

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## Presentations Goals

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<th>Illustrate Ways the Psychosocial Components of Athletics and the Culture of Sport Participation Influences the Response and Recovery from Concussion</th>
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<td>Highlight Potential Emotional and Mental Health Outcomes that Can Influence Athletes Compliance Practices and Their Rehabilitation Results</td>
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<td>Explain How a Health Psychology Paradigm and an Inter-Disciplinary Approach to the Clinical Management, of Concussion is Ideal for Healthcare Professionals</td>
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Physical / Mental Recovery From Injury

Physical / Psychological Readiness to Return to Sport Don’t Always Coincide!

Mental Factors Can Influence Response to Injury as Well as Physical Outcome!!

The Impact of Psychological Factors Post-Concussion is Not Well Understood!!!

Concussion in A Health Psychology Context

The Development of any **CHRONIC PAIN CONDITION** Involves Psychological Factors:

- Perception of Pain is the Result of Interpretation of the Injury and Its Sensations
- Believing a Stimulus is Harmful or Attributing Greater Meaning to Painful Sensations Cause People to Experience More Pain
- People Who are Worried, Anxious, Depressed, or Have a Negative Outlook Have a Higher Sensitivity to Pain
- Operant Conditioning, Social Reinforcement, and Secondary Gain Issues All Contribute to the Persistence of Pain Behaviors

Pain Intensity is One of the Most Powerful Predictors of Activity Tolerance, Particularly within Rehabilitation

However, **CATASTROPHIZING**, is Associated with Higher Levels of Subjective Pain Intensity, Disability, and Emotional Distress

**CATASTROPHIZING** is a Way of Thinking about an Injury Where People:

- **Ruminate about Painful Sensations:**
  “I Can’t Stop Thinking About How Much It Hurts”

- **Magnify Values of Pain Sensations:**
  “I Worry Something Serious May Be Wrong”

- **Feel Helpless To Cope Effectively:**
  “There’s Nothing I Can Do About It”

Factors Associated with Faster Recovery from Injury Include:

1. **Maintaining a Positive Attitude and Outlook**
2. **Being Self-Motivated / Having Desire to Heal**
3. **Having Social Support in Primary Social Network and Rehabilitation Facility**

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Factors Associated with Rehabilitation Outcomes

**Injury-Related Emotions**

Research has shown that the emotional reactions which follow the occurrence of injury can have an impact on the outcome of rehabilitation.

**Injury-Related Thoughts**

Injury-related cognitions can influence mood and emotions. Research has shown that personal and situational factors that influence thoughts also have an impact on recovery.

**Injury-Related Behaviors**

Coping strategies, social interactions, and exercise adherence are all examples of behavior patterns that can directly impact rehabilitation outcomes.
Injury-Related Emotions Associated with Rehab Outcomes

Injury is a Significant Stressor That Athletes Are Sometimes Ill-prepared (or Unwilling) To Face

Injured Athletes Are More Likely to Experience Depression, Anxiety, and Reduced Self-esteem When Compared to Non-Injured Peers

Athletes with Lower Self-esteem and Greater Emotional Reactions After Injury Were:
- Generally More Invested in Playing Professional Sports
- Had A Greater Identification with Being an Athlete
- Rarely Had Other Interests, Activities, or Motivations Outside of Sports

Athletes Say That Frustration, Confusion, Anger, and Fear Are Common Early Reactions to Injury. However, Negative Emotions Generally Decrease as Rehabilitation Progresses

Emotional Reactions Are Not As Fixed or Orderly As Has Been Suggested by “Grief” Models

A Reluctance to Discuss Emotions Related to Being Injured with Peers or Coaches Was Associated with:
- Persistent Feelings of Isolation and Alienation
- Reduced Long-term Psychological Rehabilitation

Persistent Post-injury Emotional Disturbance is Associated With:
- Poor Adherence To Rehabilitation Regimen
- Poor Rehabilitation Outcome

Emotional Distress after Injury Was also Associated with Decreased Confidence in:
- A Full Recovery
- Success In Sport
- Ability to Adhere to Rehab

Athletes Also Have Heightened Fears During The Transition Back to Sport. Commonly Reported Fears Include:
- Fear of Re-injury
- Fear of Falling Behind Others
- Fear of Underperforming
- Fear of Missing Out

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General Criteria Used for Return to Play Following Sport-Related Concussion Has Been Established for Almost Two Decades

- Symptom-Free At Rest
- Symptom-Free with Cognitive / Physical Exertion
- “Normal” Neuro-cognitive Data / Objective Evaluations

Being “Asymptomatic” is at the Core of Proper Concussion Management, But it is Not an Easily Defined State
Recovery From HS Football-Related Concussion: How Long Does it Take?


3-Year Prospective Study of 17 HS American Football Teams: N=2,141; Total Concussions: N=134
Factor Analysis Post-Concussion Symptom Scale

High School and College Athletes w/in 7 Days of Concussion, N = 1,438

AFFECTIVE
Sadness
Feeling More Emotional
Nervous

COGNITIVE - MIGRAINE
Headache – Dizziness - Fatigue
Drowsiness - Photophobia
Phonophobia - Feeling Slowed Down
Mentally Foggy
Difficulty Concentrating
Difficulty Remembering

SOMATIC
Vomiting
Numbness

SLEEP
Trouble Falling Asleep
Sleeping Less Than Usual

Four-Factor Solution Accounted for 58.3% of Variance and 17 of 22 Items

Five Items Failed to Clearly Load on Any Factor, But Were Strongly Associated:
- Nausea
- Balance Problems
- Sleeping More Than Usual
- Irritability
- Vision Problems

Strong C-M-F Factor (40.0% of Variance) Suggests a “Global” Symptom Pattern w/in First Week of Injury

Concentration Problems and Mental Sluggishness Contributed to C-M-F Factor More Than Headache!!

Females Athletes Tended to Score Higher on the Affective Cluster

Using Trajectories to Inform Treatment

FACTORS THAT INFLUENCE RECOVERY

• Previous Concussions
• Migraine History (Family / Personal)
• Age
• LD / ADHD History
• Sex
• Ocular History
• Motion Sensitivity
• Litigation
• Prior Functioning: Physical
• Prior Functioning: Psychological

Anxiety and Mood Clinical Profile Following SRC

MENTAL HEALTH HISTORY:
Several Studies Found That A Diagnosed Mental Health History or Previous Mental Health Tx Predicts Greater Symptom Endorsement and A Protracted Recovery from A Concussion

BRAIN ALTERATIONS:
The Overlap of SRC-Symptoms and Mental Health Disorders are Partially Due To Physiological Changes That Occur in The Emotional Centers of The Brain after Concussion

SOCIAL SUPPORT:
Perceived Stress Post-Concussion Has Been Positively Associated with Levels of Anxiety and Depressive Symptoms

High Levels of Parental Pre-injury Anxiety and Child Reported Stress after Concussion Was Predictive of Greater Symptoms at 18 months

Covassin et al. (2014) Reported That Concussed Athletes Who Endorsed High Levels of Social Support Reported Low Levels Post-Injury Anxiety

BIOLOGICAL SEX:
Females Tend To Report More Emotional Symptoms than Males Before and After Injury (Iverson et al., 2015; Kontos, Elbin, et al., 2012)

Sex Differences Have Been Attributed to Biological Factors and Cultural Phenomena, but No Consensus Explanation for Differences in SRC-Symptom Reporting Exists at This Time (Covassin et al, 2007, 2012)

General Indicators of Emotional Disturbance after Injury Include:
- Inconsistencies in Subjective Sx Reporting vs. Objective Deficits
- Worsening of Symptoms and Deficits Over Time, as These Patterns Are Not Consistent With Typical SRC Recovery

Anxiety / Mood Clinical Profile is Characterized By Emotional Disturbance (e.g., Anxiety, Dysphoria), Hypervigilance of Somatic Complaints, and Sleep Dysregulation

The Culture of Youth Athletics

Sports No Longer A Prize Unto Itself

• Educational Component Diminished
• Greater Focus on “Destinations” Such as College and Professional Sports, Particularly for Parents w/o H.S. Degrees
• Prevailing Mindset for Success in College Admissions has Become Sport Specialization
  ▪ Other Pursuits (e.g., Music, Art) Have Also Adopted Specialization Approach
• Dedication, Time, and Money Required To Play Year-round is Far Beyond What Previous American Youth Experienced

Kids Are Not Just Picking One Sport at The Expense of Other Sports ...
They’re Picking One Sport at The Expense of Any Other Extracurricular Interests!

Early Specialization Actually Narrows Development and Increases Risk of Injury

Specialized Athletes More Susceptible To Injury Because They Are “Exposed” To Their Sport More Often and Put More Stress on The Concentrated Group of Muscles, Ligaments and Bones Related To Their Sport (i.e., “Overtrained”)
Familial Expectations for NCAA Football Players

Since I was young, my family expected I would be a...
(% of NCAA football players responding ‘Agree’ or ‘Strongly Agree’)

- FBS: College Athlete 60%, Pro/Olympian 39%
- FCS: College Athlete 66%, Pro/Olympian 30%
- DII: College Athlete 66%, Pro/Olympian 32%
- DIII: College Athlete 51%, Pro/Olympian 14%

Note: Endorsement of top two scale points on 6-point scale. NCAA 2015 GOALS study (4,724 NCAA football student-athletes surveyed).
Injury Rates in High School Athletes Have A Direct Relationship to Exposure by Hours Per Week and Higher Training Intensity / Volumes Have Consistently Been Shown To Increase The Risk of Overuse Injuries

**Weekly Volume**
Training More than 16 Hours A Week Was Associated with A Significantly Increased Risk of Overuse Injury

**Yearly Volume**
Kids (9-14) Who Pitched More Than 100 Innings A Year Were 3.5 Times More Likely To Suffer An Overuse Injury

**Yearly Volume**
There Was 42% Increase in Overuse Injuries in High School Athletes Who Participated All Year Versus 3 Seasons or Less Per Year

**Yearly Volume**
There Is an Increased Risk for Shoulder and Elbow Injuries in Youth Pitchers Who Pitch More than 8 Months A Year

**Scheduling**
Multiple Events on Same Day or Several Events over Consecutive Days is Considered A Risk Factor for an Overuse Injury
The Current Culture of Adolescence

Susanna Schrobsdorff – Time Magazine; Oct., 2016 “Teen Depression and Anxiety: Why the Kids Are Not Alright”

Today’s Adolescents: Post-9/11 Generation, Raised in Era of Insecurity

- Never Known a Time when Terrorism and School Shootings Weren’t the Norm
- Grew Up Watching Their Parents Weather a Severe Recession
- Hit Puberty when Technology and Social Media Were Transforming Society
- Significantly More Standardized Testing Protocols Implemented in the Past Decade

For Today’s Adolescents, "No Firm Line" between Real and Online Worlds

- Technology and Online Bullying Are Affecting Kids as Early as Fifth Grade
- Every Fight / Slight is Documented Online for Hours or Days after the Incident
- Managing a Social-Media Identity Plus Fretting about Unique Cultural and Societal Pressures

Anxiety and Depression in High School Has Been on the Rise Since 2012

- Statistic Cuts Across All Demographics - Suburban, Urban and Rural
- Mental Illness Impacts Those Who Are College Bound And Those Who Aren’t
- Family Financial Stress Can Exacerbate These Issues
- Studies Show That Girls Are More At Risk Than Boys
The Current Culture of Adolescence

In 2015, HHS reported that about 3 million teens (Ages 12-17) experienced at least one major depressive episode in the preceding year.

- More than 2 million report experiencing depression that impairs daily function.

According to the NIMH, about 30% of girls and 20% of boys (almost 6.3 million teens) have had an anxiety disorder.

- Child Mind Institute (2015) found only 20% of youth with a diagnosable anxiety disorder get treatment.

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College Student-Athletes Experience More Psychological Pressure and Stress than their Non-Athletic peers, But are Significantly Less Likely to Seek Mental Health Services

When Student-Athletes Seek Counseling, They Have More Stress-Related Physical Illnesses and Higher Rates of Depression and Anxiety

Examination of Student-Athlete Sleep Patterns Show they Experience, on Average, Four Nights of Insufficient Sleep per Week

48% of male athletes felt rested more than half the mornings in a week. Only 45% of the male general student body felt the same.

43% of female athletes felt rested more than half the mornings in a week. Only 39% of the female general student body felt the same.
Concussion in A Health Psychology Context

Questions To Ask Patient

Concussion Has No Observable Signs or Physical Limitations, Athletes May Struggle with Perception of “Appearing” Healthy while Injured

Concussion Is Also Brain Injury, Which May Directly Affect The Injured Athletes Cognitive Ability To Cope with Being Injured

(Covassin, Crutcher, Elbin, Burkhart & Kontos, 2013)

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<th>MUSCULOSKELETAL (MSK)</th>
<th>CONCUSSION</th>
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<td>A Defined and Causal Causal Mechanism That Precedes Diagnosis</td>
<td>Can Lack A Clear, Causal Mechanism or Blow To The Head</td>
</tr>
<tr>
<td>Observable Consequence or Visible Evidence of Injury</td>
<td>No Observable Signs or Physical Limitations</td>
</tr>
<tr>
<td>More Certain Prognosis, with An Often Well-defined Treatment and Rehabilitation Schedule Injury</td>
<td>Presents Uniquely in Each Athlete, with More Global Impairments</td>
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“Anyone in Family Have A History of Anxiety or Stress-Related Health Conditions?”

“Do You Spend A Lot of Time Thinking about Your Symptoms?”

“How Often Do Your Parents Ask about Your Symptoms?”

“Have Your Social Activities Been Restricted?”

“Have You Avoided Participating in Activities, Even When Cleared To Do So?”

“Does Worry or Stress Cause Your Concussion Symptoms To Get Worse?”

(Collins et al, KSST, 2014; Reynolds et al, Neurosurgery, 2014; Covassin et al. (2017). Sport, exercise, and performance psychology, 6 (3), 220–229.)
**Concussion Symptoms**
Typically Worst In First 7-10 Days, But Usually Resolve Within A Month Following The Injury


Conclude That Psychological Factors Play A Larger Role Than Physiological Response To Concussion

- Time Loss From Practice / Games
- Social Isolation
- Withdrawal From ADLs

**Restoration Of Athletic Ability**
and **Return To Play** Are Primary Objectives Following Any Injury!!

Severity of Original Injury Does Not Directly Correlate with Risk Of PCS! Often, PCS Symptoms Are Worse Than The Initial Concussion

Athletes w/ High Athletic Identity, Amotivation, and Performance Anxiety Had Continued Symptoms Up To 28 Days Post-Concussion

Larger Social Network Size Predicted Greater Improvements In Symptoms

High Mastery / Low Ego Coach Environment And Low Mastery / High Ego Parent Environments Predicted Symptoms Reductions

**Psychosocial Variables**
Accounted for 23 - 31% of Symptom Change Over Time
Depressive Symptoms Associated with Concussion

Several Studies Have Documented Increased Depression Symptoms In Athletes w/ SRC

- Hutchinson et al., 2009, Manwaring et al., 2004, Kontos et al., 2012.

Yang et al. (2015) Found:

- 20% of Concussed College Athletes Had Increased Depression Sxs after SRC
- College Athletes w/ Baseline Depression Sxs Were 4.59 Times More Likely To Suffer Dysphoria After SRC

Depression Also Shown To Be A Long-Term Consequence of SRC

- Guskiewicz et al. (2007): Dose-Response Relationship Between Self-Reported SRCs and Clinical Depression Later in Life
- Retired NFL Players w/ 1-2 SRCs Had 1.5X Greater Depression Risk for Depression
- Retired NFL Players w/ 3+ SRCs Had 3X Greater Depression Risk

In One of The Few Studies To Examine Suicide Following SRC, Only 10% of Athletes with A Post-Injury Psychiatric Outcome Had Suicidal Ideation

(Ellis et al., 2015)

Numerous Researchers And Experts Have Called For Clinicians To Incorporate Depression and Mood Screening Assessment Into Their Pre- and Post SRC Management

Depression Is Common Feature of PCS and Chronic Pain, But It’s Difficult To Determine A Causal Direction Between Emotional Disturbance And Pain Fixation

SRC’s Shared Symptoms of Depression Include (Iverson, 2006):

- Sadness
- Mental Sluggishness
- Fatigue
- Concentration Difficulties

Armstrong & Oomen-early (2009) Reported 33.5% of Collegiate Athletes Exhibit Depression Symptoms ... Found No Difference Between College Athletes and Non-College Students

Yang et al. (2015) Found 21.4% of Collegiate Athletes Report Depression Symptoms at Baseline

Appears Depression Symptoms In HS and College Athletes w/ SRC Follow A Similar Trajectory as Cognitive Sequela of SRC ... Typically Resolving w/in One Month of Injury

(McCrory et al., 2013, Roiger et al., 2015)
Anxiety Symptoms Associated with Concussion

Anxiety Symptoms Often Difficult To Disentangle from SRC Symptomatology (Bloom et al, 2004)

SRC’s Shared Anxiety Symptoms:
- Anxiousness
- Fatigue
- Nervousness
- Sleep Difficulties

Fear / Anxiety in Athletic Injuries Can Be Directed At:
- Uncertainty about Clearance Process
- Uncertainty about Long-term Career
- Thoughts of Current / Future Health
- Concerns of Death, Disability, and Reduced Quality-of-Life
- Concerns about Maintaining Elite Level of Performance or Intensity
- Loss of Control, Pride, or Identity By A Forced Alteration of Playing Style

Yang et al. (2015) Reported Over One-Third of Concussed College Athletes Experienced State Anxiety Following Their SRCs

Turner et al.’s (2017) Comparison of CONC and MSK Groups:
- 73.3% of Participants Exceeded Threshold for State Anxiety during Acute Phase of Post-Injury … REGARDLESS OF TYPE OF INJURY
- Both Groups Demonstrated Gradual Improvement in Mood State Throughout The Recovery Process
- Over Half of Participants in Each Group Scored Above Cutoff During ACUTE and RETURN TO PLAY Phase!!

Children w/ Post-Concussion SXS for Longer Than One Month Reported More Anxiety Than Children Whose Symptoms Resolved Within One Week (Grubenhoff et al., 2016)

Covassin et al. (2014) Posit That High Prevalence of Anxiety in SRCs Due To:
- Heightened Perception of Severity
- Lack of Prognostic Timeline for RTP
- Loss of Athletic Identity

In A Pediatric Population, Concussed Patients w/ No Premorbid HX of Anxiety Took ~ 76 Days To Recover

Patients Diagnosed w/ Premorbid Anxiety Took ~ 6 Months To Recover (Corwin et al., 2014)

Youth And Collegiate Athletes Who Exhibited Early Signs Of Anxiety Should Be Targeted For Interventions To Decrease Their Chances Of Prolonged Recovery From SRC (Collins, Kontos, Reynolds, Murawski & Fu, 2014)

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Prescription of Prolonged, Strict Rest Has Been Associated w/ Development of Emotional Difficulties That, For Some, Require Formal Psychological Intervention

Behavioral Reregulation is Practice of Maintaining Healthy Lifestyle Factors To Prevent PCS Symptoms From Becoming Chronic Impairment:

- Sleep Schedule
- Adequate Nutrition and Hydration
- Daily Movements / Physical Activity
- Management of Stress

**SLEEP:**
Sleep Disturbance Common After Concussion, But is Also Associated w/ Reduced Cognitive Functioning, Anxiety, and Depression in General Population

**PHYSICAL ACTIVITY AND DESENSITIZATION:**
Positive Influence of Physical Activity on Mood / Anxiety SXS is Multifactorial while Avoidance Behaviors Can Become “Conditioned” Quickly

Avoidance Results in Loss of Outlets for Coping w/ Stress as well as Limited Engagement In Meaningful, Social Interactions and Loss of Daily Routine

**COPING STYLE:**
Active, Problem-Focused Coping Style Shown To Be Beneficial In Reducing PCS Symptom Burden

Individuals w/ Higher Levels of Resiliency Demonstrated Less Emotionality as well as Better Quality-of-Life after Concussion

**PSYCHOEDUCATION:**
Reassurance; Provision of Support; and Appropriate Education Shown To Reduce PCS Symptoms in Several, Replicated RCT Studies

Discussion of SXS In Positive Context; Cognitive Reattribution of Symptoms; and Gradual Activation Associated w/ Better Psychological Outcomes

Education Has Included Informing Patients about Concussion SXS To Medication Management Issues and Expected Recovery Times

Cognitive Behavioral Psychotherapy

Treatment Typically Includes Graded Exposure, Activity Scheduling, Relaxation Exercises, Social Skills Training, and Cognitive Restructuring

Cognitive Training Focuses On:
- Altering Problematic Beliefs
- Helping Clients Improving Problem-Solving Skills
- Self-Monitoring Their Thoughts, Emotions, and Behaviors

Improving Coping Strategies Involve Teaching Patients:
- Mental Disengagement
- Positive Reinterpretation
- Emotional Venting And Re-processing
- Relaxation Training, Mindfulness, And Guided Imagery

Medications
- SSRI’s (e.g., Zoloft)
- Benzodiazepines (e.g., Klonopin)
- SNRI’s (e.g., Cymbalta)
- Tricyclic Antidepressants (e.g., Amitriptyline)
- Other Antidepressants (e.g., Trazodone for Sleep)
Psychosocial Components of Athletics and the Culture of Today’s Sports Environments Have a Direct Influence on Emotional and Psychological Reactions to Concussive and MSK Injuries

- The Influence of Psychological Factors on Concussion Recovery is Not Currently Understood, but Evidence Suggests a Similarity with Chronic Pain Literature

- Symptoms of Anxiety and Depression Appear to be Common Responses to Concussion as well as Risk Factors for Protracted Recovery

- Clinicians Must Balance Tenants of Concussion Management w/ the Risk of Fostering Emotional Difficulties That May Require Formal Treatment in the Future
Thank you

FOR YOUR BRAIN
THE BEST MINDS

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REFERENCES / FURTHER EXPLORATION

Take a deeper dive into the world of sport psychology and injury by reviewing the following:


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