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Detecting subtle brain injury in college students

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Pepperdine University

Graduate School of Education and Psychology

DETECTING SUBTLE BRAIN INJURY IN COLLEGE STUDENTS

A clinical dissertation submitted in partial satisfaction

of the requirements for the degree of

Doctor of Psychology in Clinical Psychology

by

Bryant Steury

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Louis Cozolino, Ph.D. – Dissertation Chairperson

This clinical dissertation, written by

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under the guidance of a Faculty Committee and approved by its members, has been submitted to and accepted by the Graduate Facility in partial fulfillment of the requirements for the degree of

DOCTOR OF PSYCHOLOGY

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DEDICATION

This dissertation is dedicated to my family, my friends but perhaps most importantly to my wife. You have supported me throughout not just this dissertation process but in all my endeavors. It is also dedicated to all the advisors, supervisors, professors, faculty and colleagues who have shaped me and helped me develop into the clinician I am today and push me to be an even better one tomorrow.

VITA
Bryant Steury

EDUCATION

Pre-Doctoral Clinical Psychology General Track Internship June 2018 to Present
APA Accredited Internship Program
VAMC Tennessee Valley Healthcare System – Nashville, TN

Doctoral Candidate in Clinical Psychology (Psy.D.) September 2015 to Present
APA Accredited Doctoral Program
Pepperdine University: Graduate School of Education and Psychology
Los Angeles, CA
Dissertation: Detecting Subtle Brain Injury in College Students
Dissertation chair: Louis Cozolino, Ph.D.

Master of Arts (M.A.) January 2013 to December 2014
Clinical Psychology with an Emphasis in Marriage and Family Therapy
Pepperdine University: Graduate School of Education and Psychology
Los Angeles, CA
Degree conferred May 2015

Bachelor of Arts (B.A.) September 2005 to May 2009
Business Administration & Music Performance
Illinois Wesleyan University
Bloomington, IL
Degree conferred May 2009

SUPERVISED CLINICAL EXPERIENCE

VAMC Tennessee Valley Healthcare System June 2018 to Present
General Track, APA Accredited Internship Program
Nashville, TN
Pre-Doctoral Clinical Psychology Intern

1st Rotation: Transplant Psychology & Behavioral Health Interdisciplinary Program (BHIP)
(Split Rotation: July 2, 2018 - October 25, 2018)
Training Supervisors: Saundra Saporiti, Psy.D. & Elizabeth Crowe, Ph.D.

Transplant Psychology Duties Included:

- Conducted diagnostic interviews with and administered, scored and interpreted cognitive and emotional testing measures to Veterans and their support/collateral persons to assess for candidacy for liver, kidney, heart and/or stem cell single- or dual-transplants
- Presented interview and assessment results weekly to an interdisciplinary team including transplant medical professionals, psychologists and social workers to assist in informing appropriateness of candidacy for both heart and liver transplant candidates

- Created comprehensive transplant candidacy reports incorporating all appropriate data and provided individualized feedback and treatment recommendations to Veterans and their support persons
- Co-led a weekly Heart Transplant Support Group and a weekly Liver Transplant Support Group, which provided psychoeducation and supportive therapy to assist in adjustment for Veterans in both the pre- and post-transplant phases
- Provided single-session supportive therapy to support persons of Veterans to assist with emotional distress, provide psychoeducation about the transplant process and to assist in adjustment difficulties
- Consulted with other disciplines within the Veterans Affairs Medical Center and Vanderbilt University Medical Center to discuss treatment planning, social support and/or additional identified factors informing transplant candidacy
- Received 3 hours of individual supervision per week
- Cognitive measures included the Montreal Cognitive Assessment (MoCA), Repeatable Battery for the Assessment of Neuropsychological Status (RBANS, all Updated forms) and Trail Making Test Parts A & B
- Emotional/personality measures included the Millon Behavioral Medicine Diagnostic (MBMD), Millon Clinical Multiaxial Inventory-III (MCMI-III), Minnesota Multiphasic Personality Inventory-2-Restructured Form (MMPI-2-RF) and Personality Assessment Inventory (PAI)

Behavioral Health Interdisciplinary Program (BHIP) Duties Included:

- Provided weekly individual therapy to a diverse population of Veterans presenting with a variety of mood and trauma-based concerns, including depression, anxiety, PTSD, adjustment difficulties, substance abuse and sexual trauma
- Developed, implemented and amended individualized treatment plans which encompassed the Veteran's endorsed presenting concerns, short- and long-term goals, baseline emotional screening outcome measures and interventions utilized
- Consulted with other Veterans Affairs providers to collaborate on treatment planning, medication referrals and physiological conditions
- Utilized several Evidence-Based Practices including Cognitive Behavioral Therapy and Acceptance and Commitment Therapy in a time-limited setting to provide appropriate, individualized, evidence-based therapy
- Administered outcome measures such as the Patient Health Questionnaire-9 (PHQ-9), Beck Depression Inventory-II (BDI-II) and Beck Anxiety Inventory (BAI) to assess functioning, track treatment progress and appropriateness of treatment planning and interventions
- Presented clients in both individual and group supervision to receive feedback surrounding clinical skills, treatment planning and interventions
- Received 1 hour of individual supervision each week

2nd Rotation: Pain Psychology & Behavioral Health Interdisciplinary Program (BHIP)
(Split Rotation: October 25, 2018 - February 22, 2019)
Training Supervisors: Whitney Pierce, Psy.D., RN, BCB & F. Nicholas Denton, Ph.D.

Pain Psychology Duties Included:

- Utilized a biopsychosocial approach to provide time-limited behavioral health interventions and assessment for Veterans presenting with chronic pain
- Received training in and implemented Biofeedback Training to assist with Veteran treatment and provide physiologically-based feedback to Veterans about treatment goals and progress
- Co-led a five-week long, structured coping skills group which provided behavioral techniques, psychoeducation and addressed maladaptive thought patterns surrounding pain, the course of treatment and pain management outcomes
- Conducted spinal cord stimulator pre-procedural evaluations utilizing cognitive, personality, and substance-abuse based measures (MMPI-2-RD, MoCA BAI, BDI, PCS, POQ, AUDIT & COMM) to assess for procedural candidacy
- Co-led a weekly pain education group focusing on psychoeducation about pain, medications and procedures that may impact pain and the available services Veterans may utilize within a VA setting
- Conducted pain psychology diagnostic intake interviews and psychological evaluations of Veterans and utilized data and information gathered to inform treatment planning, interventions and treatment progress
- Implemented computerized suicide prevention screening measures via in-person training to Nurse Practitioners, Physicians, Clinical Pharmacists and Pharmacy Residents
- Collaborated in an interdisciplinary setting to provide formal and informal consultation and to establish treatment planning with a variety of Veterans Affairs providers including Anesthesiologists, Nurse Practitioners, Physicians, Clinical Pharmacists and Pharmacy Residents
- Received 3 hours of individual supervision per week

Behavioral Health Interdisciplinary Program (BHIP) Duties Included:

- Provided weekly individual therapy to a diverse population of Veterans who presented with a variety of mood, trauma-based, sexuality and gender identity concerns
- Conducted psychological evaluations for Veterans considering cross-sex hormone therapy, gender transition surgery or gender transition counseling to assess for appropriateness of physiological and psychological interventions
- Conducted intake evaluations for Veterans to assess for appropriateness of therapy and to assist with formulating diagnostic impressions, treatment planning and intervention and protocol use
- Routinely administered outcome measures such as the PHQ-9, BDI and BAI along with personality protocols such as the Personality Assessment Inventory (PAI) or Minnesota Multiphasic Personality Inventory-2 (MMPI-2)
- Received training in Cognitive Behavioral Therapy for Depression (CBT-D) and implemented when appropriate for Veterans presenting with depressive concerns
- Received 1 hour of individual supervision per week

3rd Rotation: Neuropsychological Assessment (February 25, 2019 - June 21, 2019)
Training Supervisor: Maria Cottingham, Ph.D., ABPP-CN & Elizabeth Fenimore, Ph.D.

Neuropsychological Assessment Duties Included:

- Conducted individualized neuropsychological assessments utilizing semi-structured clinical interviews of Veterans and their collateral persons (if available), as well as a flexible-fixed battery of validity, cognitive and personality measures
- Received referrals to assist with differential diagnoses and recommendations from multiple Veterans Affairs providers including neurology, neurosurgery, psychiatry, primary care and transplant to assess for a variety of cortical and subcortical dysfunctions
- Administered, scored and interpreted testing results into comprehensive, integrated neuropsychological reports to be disseminated to appropriate referring providers
- Provided feedback and recommendations to Veterans and their collateral persons as well as to referring providers and other medical staff
- Received 3 hours of individual supervision per week

Additional Year-Long TVHS Internship Opportunities

- Attended weekly didactics focusing on a variety of topics including diversity, ethical dilemmas, mental health treatment for various populations, psychopharmacology, and multiple treatment modalities
- Developed and implemented a project focusing on Veteran suicide protocols within the VA, efficacy of those protocols and provider awareness and education of those protocols
- Presented multiple de-identified clients at didactic trainings for feedback and experience presenting in an interdisciplinary setting
- Attended a weekly Neuropsychology didactic and seminar training focusing on various cognitive, emotional and projective measures along with neurophysiology, neuroanatomy, neurocognitive disorders and their presentation, and ethical dilemmas in the role of a neuropsychologist
- Attended monthly neuropsychology journal club meetings throughout the internship year to discuss neuropsychology literature, neuroanatomy and the role of statistics in neuropsychological studies
- Attended weekly group supervision (1 hour per week)
- Attended monthly Psychology Department Grand Rounds

VA Long Beach Healthcare System August 2017 to May 2018
Long Beach, CA
Neuropsychology Assessment Clerk (18 hours per week)
Training Supervisor: Vanessa Zizak, Ph.D.

Setting: Veterans Affairs (VA) Medical Center Assessment and Therapy

- Conducted comprehensive interviews and neuropsychological assessments within the Neuropsychology clinic with Veterans with trauma-related and anxiety disorders, mood disorders, neurocognitive disorders and substance abuse disorders
- Assembled individualized batteries for each Veteran utilizing past medical and psychological records in order to select the most appropriate measures with secondary review and approval from training supervisor

- Administered, scored, interpreted and compiled comprehensive neuropsychological assessment reports to asses for a variety of potential cognitive deficits and develop diagnostic conceptualizations for referral clients
- Provided individualized feedback of assessment results and treatment recommendations to Veterans dependent on composite assessment data, interview information and presenting problem(s)
- Provided recommendations to and participated in inter-disciplinary treatment teams which looked to address psychiatric and comorbid health and social issues for referred Veterans
- Co-facilitated a monthly TBI therapy group focusing on psychoeducation about Traumatic Brain Injury, individual and interpersonal relationships post-injury and coping methods
- Attended weekly didactic seminars which included fact-finding practice, neuroanatomy training and journal review
- Attended weekly 1-hour group supervision to improve clinical skills, ensure implementation of effective, competent treatment and assessment and present de-identified client cases for feedback
- Received 2 hours of weekly individual supervision
- Cognitive and emotional assessment measures utilized include BDI-II, BVMT-R, Boston Naming Test, CVLT-II, Dot Counting, DKEFS Verbal Fluency Measures, Finger Tapping Test, GAD-7 GDS, Grooved Pegboard, Grip Strength, MoCA, RBANS, Rey-Osterrieth Complex Figure Immediate & 3-minute delayed recall, TOMM, TOPF, Trails A & B, WMS-IV, WAIS-IV, Wisconsin Card Sorting Test, WTAR

Southern California Neuropsychology Group May 2016 to April 2018
Woodland Hills, CA
Doctoral Psychology Intern (20 hours per week)
Training Supervisor: Michelle Conover, Ph.D., Q.M.E.
Setting: Assessment and Therapy Practice

- Administered, scored and interpreted multiple clinical and forensic neuropsychological batteries with measures including the ASDS, B-test, Booklet Category Test, BYI-II, Dot Counting Test, D-KEFS, GARS-3, MOCA, NEPSY-II, P3, PAI, RBANS A-D, Rivermead-II, TOMM, Vanderbilt Assessment Scale, WMS-IV, WAIS-IV, WIAT-III, WISC-V, WRAT-4, WRAML-II, Grip Strength, Finger Tapping Test, Grooved Pegboard
- Provided cognitive and behavioral therapy for children and adults with traumatic head injury, learning deficits and mood disorders
- Developed, implemented and augmented outcome-based treatment plans for clients to help increase cognitive functioning and incorporate coping skills and strategies into daily living post-injury
- Composed comprehensive, integrated neuropsychological reports based on both cognitive and personality measure battery findings
- Completed medical and legal record reviews for forensic cases encompassing both children and adults presenting with a variety of injuries

- Received 2 hours of individual supervision per week and 1 hour per month of didactic training
- Presented de-identified clients at monthly group supervision meetings for feedback surrounding test battery findings, interpretation of diagnoses and post-assessment recommendations

Pepperdine Psychological and Education Clinic January 2016 to April 2018
Los Angeles, CA
Doctoral Psychology Extern (3 hours per week)
Training Supervisors: Aaron Aviera, Ph.D.
Setting: Community Counseling Center

- Conducted comprehensive intake interviews and provided weekly individual psychotherapy primarily utilizing Cognitive Behavioral Therapy to a diverse population of adults with mood disorders, PTSD and substance use disorders
- Administered routine outcome measures to evaluate therapeutic progress, maintain hierarchy of appropriate therapeutic goals and devise and update comprehensive treatment plans
- Received 1 hour each of weekly group and peer supervision to discuss treatment practices, ensure proper administration of therapeutic interventions and to review video-recordings of therapy sessions to monitor and improve clinical skills
- Received 1 hour of weekly individual supervision

Union Rescue Mission September 2015 to September 2017
Los Angeles, CA
Doctoral Psychology Intern (10 hours per week)
Training Supervisors: Aaron Aviera, Ph.D., Cary Mitchell, Ph. D.
Setting: Residential Treatment and Transitional Housing Program

- Provided weekly individual counseling primarily utilizing Psychodynamic and Cognitive Behavioral Therapy practices to a diverse population of Dual Diagnosis adult clients
- Assisted clients with a variety of presenting psychosocial problems including homelessness, gang affiliation and citizenship difficulties
- Conducted comprehensive intake assessments for new clients to assist in developing appropriate treatment plans which include coordination with chaplains, housing coordinators and medical staff to help minimize or extinguish maladaptive behaviors both in therapy and client's daily activities and GED coursework
- Assisted clients with referrals to outside agencies for housing, SNAP or other nutrition services, medication diagnosis, medical treatment and prescription fulfillment
- Received 1 hour of individual and 2 hours of group supervision per week

Exodus Recovery January to December 2014
South Los Angeles, CA
MFT Trainee (12 hours per week)
Training Supervisor: Richard Davis, LMFT
Setting: Outpatient Full Service Partnership Program

- Provided individual therapy through multiple clinical orientations including Behavioral

Therapy, Cognitive Behavioral Therapy and Acceptance and Commitment Therapy to underserved community clients with presenting problems including Bipolar Disorder, Post-traumatic Stress Disorder, Substance Use Disorder and Major Depressive Disorder
- Generated content for and facilitated group therapy sessions ranging from five to 35 clients to assist with identifying anxiety, panic attacks and bipolar symptomology
- Integrated multicultural counseling techniques in group therapy to facilitate dialectical discussions regarding outside or alternative perspectives to multicultural issues
- Incorporated spiritual and existential concepts and principles into group therapy sessions to reduce anxiety, fear, depression and isolation
- Received 2 hours of weekly individual supervision

Exodus Recovery January to December 2014
Culver City CA
MFT Trainee (16 hours per week)
Training Supervisors: Tiffany Dzioba, LMFT; Richard Davis, LMFT
Setting: Inpatient Full-Service Partnership
- Provided individual therapy to inpatient dual diagnosis clientele with a variety of presenting problems including Schizophrenia, Major Depressive Disorder, Bipolar Disorder, Generalized Anxiety Disorder and Substance Use Disorder
- Facilitated daily group therapy sessions to provide psychoeducation, increase insight and develop coping mechanisms
- Coordinated discharge and aftercare planning for clients by linking them with Full-Service Partnerships, outpatient therapy, housing and Social Security/Social Security Disability benefits
- Responsible for California Department of Mental Health documentation and notation processes to update session content and interventions utilized
- Reviewed client case files to stay current on medication, treatment plan and progress as part of interdisciplinary, comprehensive inpatient treatment
- Corresponded with client families to facilitate outreach and provide psychoeducation to assist with client care once they have been released
- Incorporated somatic and relaxation activities such as art, meditation, and music into individual and group therapy sessions to increase sensory awareness and creativity
- Received one hour of weekly individual supervision

PROFESSIONAL EXPERIENCE

Exodus Recovery February to September 2015
Los Angeles CA
Quality Assurance/Improvement Division (40 hours per week)
Supervisor: David Kneip
- Provided ongoing assistance in coordinating, maintaining and monitoring data obtained from a variety of sources, including client care, financial and demographic sources
- Audited client charts for multiple sites to ensure accurate completion of California Department of Mental Health-compliant paperwork, authorizations and consents

- Developed and implemented a data-entry system to monitor and improve compliance with documentation for multiple sites encompassing nearly 1,000 clients
- Assisted in organizing and maintaining HIPAA/confidential documents including incident investigations, staff trainings and related documents
- Facilitated incorporation of processes of continuous quality improvement by providing education to program managers and mental health staff

Mark Miller Law Firm July 2011 to May 2012
San Diego CA
Legal Assistant/Office Coordinator

- Maintained financial and legal case statuses of over 100 active accounts and 500 inactive/settled accounts via CM/ECF documentation management computer system
- Drafted, filed and edited legal documents for both the Bankruptcy County Court of San Diego and for clients
- Scheduled and booked court hearing dates, consultations, and legal review appointments for three lawyers and four legal assistants.
- Built and maintained rapport with clients through phone and email contact, surveys and case file updates

RESEARCH EXPERIENCE

Internship Research Project-VAMC Tennessee Valley Healthcare System
July 2018 to Present
Nashville, TN
Research Supervisors: Vivian Lotts, Ph.D. & Sabrina Down-Abele, Psy.D.

- Title: "Preparedness by Providers for Suicidality"
- Study focuses on Veterans Affairs suicidality protocols, how well providers in any discipline are aware of those protocols, and how well providers are able to execute these protocols. The project is a quality improvement project that assesses preparedness through drills and utilizes pre- and post-drill questionnaires which allow providers to asses preparedness, thoroughness and effectiveness of training. The project then provides education about the protocols to providers when necessary

Dissertation Research – Pepperdine University September 2015 to Present
Los Angeles, CA
Dissertation Chair: Louis Cozolino, Ph.D.

- Title: "Detecting Subtle Brain Injury in College Students"
- Dissertation focus is on providing a comprehensive literature review in manual form of assessments and interventions available to University Counseling Center providers for students who are associated with the military, student-athletes or are unassociated with either group
- Literature review and manual compilation also include methods for treatment planning and appropriate self-report outcome measures
- Dissertation proposal successfully defended in September 2018; no IRB approval needed

VA Long Beach Healthcare System August 2017 to May 2018
Long Beach, CA
Neuropsychology Assessment Clerk
Principal Investigator: Vanessa Zizak, Ph.D.
McDonnell, M., Mechure, M., Hochberger, W., **Steury, B.** & Zizak, V. The influence of ethnicity and education on cognition performance when comparing standard and regression-based norms in older adults. Presented at the 2019 Annual Convention of the International Neuropsychological Society, New York.

University of California October 2014 to March 2015
Los Angeles, CA
Semel Institute, Bearden Laboratory Research Assistant
Principal Investigator: Carrie Bearden, Ph.D.

- Administered a battery of cognitive assessments to children ages seven to 16 to research the effects of Neurofibromatosis
- Scored assessments of both control and treatment patients to compare normalized results to subject results
- Summarized and interpreted results in integrated reports which conveyed research results to the director of the research study and lab coordinator
- Utilized training with assessments to better understand how to administer, interpret, summarize and compare and contrast results for the WASI, WRAT, WISC-IV, BVMT, HVLT, WAIS-IV and verbal fluency tests

RELEVANT TRAINING

Homelessness in Los Angeles County
Provided by Cary Mitchell, Ph.D. on September 15, 2015

Drugs and Drug Abuse in Los Angeles' Skid Row Community Part I/II
Provided by Neva Chauppette, Psy.D. on September 22, 2015/October 13, 2015

Motivational Interviewing in Multicultural Settings
Provided by Robert Scholz, LMFT on November 3, 2015

MEMBERSHIPS

American Psychological Association 2015 to Present
Psi Chi National Honor Society, Pepperdine University 2013 to Present

ACADEMIC AWARDS

Conrad N. Hilton Foundation Fellow, Union Rescue Mission 2015 to 2018

ABSTRACT

Clinicians at University Counseling Centers (or UCCs) are at the epicenter of a unique demographic in that they may encounter individuals from diverse backgrounds in every sense of the term. In addition to the "traditional" college student, they may also provide clinical care to student-athletes and current or returning military personnel. One injury that impacts every demographic grouping a counselor will treat is head trauma.

Traumatic brain injuries (TBIs) have become a subject of increasing interest among clinicians with an emphasis on proper diagnosis and post-concussive care. TBIs have been shown to negatively impact cognitive capacity, emotional regulation, frustration tolerance, impulse control and contribute to the development of mood disorders. TBIs can go undiagnosed because their symptoms are often attributed to mood or personality disorders, which are commonly seen in college counseling centers and thus TBIs may go undiagnosed without proper training and attention.

While research regarding TBI assessment, efficacious intervention and TBI prevention has been done separately, no single manual has combined all three from the viewpoint of a University Counseling Center. This manual will provide just that, including recommending brief clinical assessment tools, identifying and developing treatment plans to assist clinicians in treating post-TBI psychological and social difficulties as well as how and when to refer to other providers such as neuropsychologists for extensive neuropsychological testing. This consolidated, setting-appropriate, easy to utilize manual would showcase the most effective interventions, treatment plans and prevention measures in one place.

In completing the goals above, this manual will cover prevention, assessment and treatment of TBIs in the context of a college counseling center and the clients they are likely to see. It will

provide guidance regarding appropriate scope of practice and how and when to refer out to specialty providers, and also tools to be used by clinicians and clients alike both in session and real-world scenarios via handouts or other visual aids. Finally, it will also contain a psychoeducation section clinicians will be able to share with TBI patients, their families, and administrative/faculty persons to assist with their understanding of TBIs and what effective treatment plans may require from them.

Introduction

Review of Relevant Literature

Traumatic Brain Injury or TBI has been studied with increased detail over the recent years, with a focus on specific populations including most notably, athletes and military personnel. While there has been a commensurate increase in literature available and studies conducted, no literature is available as it pertains to clinicians in a University Counseling setting in conjunction with treating head trauma. The various populations who present to a University Counseling setting may endorse a multitude of comorbidities, including substance abuse, mood disorders, or Posttraumatic Stress Disorder (PTSD) and it will be paramount that clinicians elicited to assist clients be aware of the potential for each given client context (Broshek, DeMarco, & Freeman, 2014; Martin & Chaney, 2018) .

TBIs, also known as concussions, are a growing problem with CDC statistics showing approximately 150 people die each day from injuries that include TBI and TBI-related emergency department visits. These have in fact increased by 47% during a six-year span (2007 to 2013) (https://www.cdc.gov/traumaticbraininjury/get_the_facts.html). A 2010 CDC study published in 2016 estimated 823.7 TBIs per 100,000 people or a .8237% prevalence for the general population (CDC, 2016). Annually, estimates range from between 1.5 to 3 million TBIs sustained each year, either individually or in conjunction with other injuries (American Psychiatric Association, 2013; CDC, 2017; Silver, Kramer, Greenwald, & Weissman, 2001). Of these, nearly 300,000 require hospitalization (Silver et al., 2001).

Comparatively, the rates for TBI in those who are either athletes or military personnel is markedly higher. Estimates for the rate of TBI in military personnel range from 15.2% to 22.8% in one literature review (McKee & Robinson, 2014) with multiple additional studies finding a broader but overall similar range of 11 to 36% (Bryan, 2013; Hoge et al., 2008; MacGregor et al.,

2010; Miller, Ivins, & Schwab, 2013). For athletes, a 2013 study hypothesized between 1.6 and 3.8 million sport-related concussions every year in the United States alone (Collins, Kontos, Reynolds, Murawski, & Fu, 2014). Additional studies show significant variation in the overall range of figures, however the lowest estimation from studies or literature reviews found was consistently approximately 1.4 million TBIs sustained annually due to engaging in athletics.

Recent concern has also been growing about the long-term effects of TBIs, most notably chronic traumatic encephalopathy or CTE, a result of TBI, which is a progressive neurodegeneration that has typically been associated with clinical symptoms such as irritability, increased aggression, memory loss and eventually more severe symptomatology such as dementia, declining motor function, increased suicidality and death (McKee et al., 2013; Wortzel & Arciniegas, 2013). This is most commonly found in both the military and in athletes, with youth sports in particular taking drastic action in an attempt to alleviate much of this risk by teaching coaches, parents and other authority figures how to properly coach children, what signs to look for when suspecting a child may have a concussion and how to safely make sure the child is able to return to play only after they fully heal (Bailey, McCrea, & Barth, 2013; Collins et al., 2014; Daniel, Rowson, & Duma, 2012).

Concussions or multiple subconcussive impacts present differently in adults and adolescents (Daniel et al., 2012) though the effects can be just as pronounced and the long-term ramifications as severe. However, proper education about prevention, recognition and treatment of concussions can assist in mitigating the cognitive and emotional effects of TBIs after they occur or prevent them from occurring to begin with (Collins et al., 2014; Daniel et al., 2012). Assessments such as the Glasgow Scale, the Sport Concussion Assessment Tool (SCAT5) for children 13 and older, the Child SCAT5 for children 12 and younger as well as screening tools

such as the King-Devick test and Concussion Recognition Tool 5 (CRT5) all allow for licensed healthcare professionals and/or laypersons to broadly assess for TBI, depending on the tool being used (Echemendia et al., 2017; Howitt, Brommer, Fowler, Gerwing, Payne, & DeGraauw, 2016).

Diagnosis of concussions can differ depending on length of time of lost consciousness, length of posttraumatic amnesia, and a higher initial Glasgow Coma Scale scores (American Psychiatric Association, 2013). A correct and accurate diagnosis may enable providers or other trained personnel to provide the proper care needed services, while misdiagnosis may increase the potential for lasting cognitive, emotional or physical impairments.

TBIs lead not only to cognitive impairment but can also contribute to or be the impetus for a whole host of other mood disorders including major depressive disorder, anxiety, panic disorder, OCD, dysthymia, bipolar disorder, drug and alcohol abuse/dependence and schizophrenia (Silver et al., 2001). One study found that the individuals who had sustained TBIs (361 of 5034) were 1.4 to 5.7 times as likely to be suffering from some combination of mood disorders, endorsing drug and/or alcohol abuse or dependence or endorsing a suicide attempt (Silver et al., 2001). While various resources have provided significant, in-depth perspectives as to each of these difficulties and through the lens of multiple population types, no one resource has done so through the perspective of a University Counseling Center provider nor specifically targeted the various student population types inherent to a university setting.

Comorbidities

Those who sustain at least one TBI have the potential to show increased rates for a variety of comorbidities including various mood disorders, substance abuse, PTSD or suicidality. Though each respective population may show varying figures for select comorbidities, one constant that routinely shows elevated numbers regardless of population is PTSD with a highwater mark of

military personnel showing between a 13.7% to 44% comorbidity rate (Hoge et al., 2008; MacGregor et al., 2010; Tanielian, & Jaycox, 2008). Mood Disorders, substance use or a combination of comorbidities range from 14% to 71% between athlete, military and general populations with variations for each category depending on the population. No individual from any group is excluded from the possibility of any or multiple comorbidities, as while prevalence may change from group to group, each comorbidity shows some presence in each population.

Critique and Need for Further Study

The findings stated above via conducted studies and literature reviews show the importance and necessity of a utilitarian manual for clinicians who may assist clients who come from a broad range of backgrounds within a University Counseling setting. These clinicians will of course come into contact with "traditional" students, that is to say, individuals who are part of the general population, have neither a military or athletic background and may have a great number of similarities with the majority of other students who typically utilize a University Counseling center. However, servicemen and servicewomen returning from active duty to achieve an advanced degree or student-athletes who wish to utilize a resource available to them may also enroll. It will be paramount clinicians become familiar with each population and their potential unique presentations, to be aware of what they are most likely to see. Currently there are no manuals that present this combined approach along with making treatment plan recommendations, discussing scope of practice, and both how and when to refer to more specialized providers. This manual will thus fill a gap in the literature and assist clinicians who may be unaware of the challenges that face various populations. As the knowledge surrounding TBIs continues to grow, this manual will also have the flexibility to adapt and incorporate new information.

Methods

Purpose of the Resource

This section delineates the methods used to develop a manual for clinicians working in a University Counseling Center with a student population that may encompass the general population, athletes and military personnel (See Appendix B). The manual will provide descriptive information about issues unique to each population along with overarching issues clinicians may encounter. Additionally, the manual will provide brief assessment recommendations, treatment planning and guidance for referrals to specialists, though this should not be construed as legal advice. Rather, the referral advice will be discussion surrounding scope of practice and the appropriateness of providing or not providing certain services. A literature review informed the development of this manual by investigating current research regarding TBIs in the various populations, the comorbidities that may arise with each, treatment planning for TBIs in both the cognitive and emotional realms, prevention and safety measures that are utilized, and the proportion of TBIs seen in each population. This manual integrates these research findings to assist University Counseling center clinicians with their brief assessment, therapeutic interventions and treatment planning in an effort to provide the most appropriate, complete care to the various individuals they may see.

Resource Development

Review of relevant literature. In developing this manual, current, relevant literature was studied to obtain information in the areas of: TBI in the general population; TBI in the military; TBI in the athletic population; TBI screening; TBI preventative measures; evaluation and testing measures; emotional interventions; behavioral interventions; and treatment planning for TBIs. Focus for the general population was given to “traditional” college-aged individuals; that is, those

between 18 and 25 years of age. This literature was obtained through a search of peer reviewed journal articles, academic books, relevant published therapeutic manuals and data from the United States Department of Veterans Affairs from the following online databases: Academic Search Complete, Alt-HealthWatch, Google Scholar, Health Source, ProQuest, PsycARTICLES, PsycINFO, PsychTests, PubMed, Sage Journals Online, Science Direct, SpringerLink, Wiley Online Library, and WorldCat.org. Keyword searches included the following terms in various combinations: *athlete, concussion, TBI, military, manual, cognitive rehab**, assessment, comorbid, suicid**, intervention, treatment, prevalence, diagnosis, prevention and head trauma.* Additional searches from the aforementioned databases using these and other similar search terms will be routinely conducted to ensure the most accurate, updated information is represented in the manual.

Mendeley was utilized to organize the reviewed literature. It was used to highlight relevant data, hypotheses or other information which was incorporated and synthesized into the manual. Articles are organized by author, year and topic and separated based upon the topic and so as to ease analysis of each.

Inclusion criteria. Inclusion criteria of literature utilized in the development of this manual was limited to military personnel, athletes and the general population that will typically be seen in a University Counseling center setting. While individuals in these populations may encompass and embody a variety of demographics, a focus was placed on the "likely" individuals that clinicians will see in regard to age, cultural background and context relating to how the TBI was sustained. To inform these data, studies regarding both military personnel and athletes were included that also incorporated older adults and, in some cases, geriatric populations. These studies were used

to enhance the knowledge surrounding TBIs and comorbidities throughout the lifespan as well as to inform efficacious evidence-based treatments.

The clinical recommendations for assessing and treating each population will be informed by a critical study of the literature, brief assessment tools and evidence-based treatment protocols. This study will look at what is relevant to each population's specific needs and what are accepted tools for the general population as a whole.

The literature reviewed included peer-reviewed articles, scholarly books, academic presentations, published expert interviews and existing resources for practitioners and clinicians working with students who have sustained one or more TBIs. An emphasized focus was placed on literature published in the last 5 years; however, all relevant findings of significance were reviewed. Sample sizes for literature were also considered, as those findings with greater sample sizes were given greater weight dependent upon the goal of the study and depth of analysis. Both Fraley and Vazire (2014) and Stokes and Allor (2016) discuss evaluation of the quality and quality of a sample, noting that a high degree of statistical power indicates a study that is more easily replicable and also provides an accurate estimate of the effect(s) being studied. Thus, larger studies may be able to provide a more accurate representation of the population being studied. This may be even more true for specific populations such as athletes or the military. Fraley noted that the average sample size in social-personality research is 104 with a matching statistical power rate of 50%, thus larger studies such as Hoge et al., (2008) and Rona et al., (2012) were given greater weight than case examples of several individuals or only a single person. Additionally, studies conducted through institutions such as the VA were given greater weight as there is a greater ability to collect data in a consistent manner that transcends region, thus making the results more exhaustive.

Stokes and Allor (2016) go further, stating that the fidelity of the data gleaned from research is dependent not on just the quality of the sample itself but also from the validity and reliability of the measures used. This also impacted the literature reviewed here, as weight was given to studies that utilized more valid, reliable assessment tools. These are often found at places such as the VA, making studies that incorporate VA batteries such as the RAND (Tanielian and Jaycox, 2008) manual more valuable.

Methods for weighting and selecting studies included recency (more recent being given heavier weight), size of population (the greater the N the higher the weight), type of population (general, military or athlete), pre-morbid health of population (studies that utilized inpatient psychiatric populations were discouraged for example) utilization of popular/reputable assessment tools (those studies utilizing "mainstream" assessment protocols such as the WAIS, WMS or D-KEFS were given heavier weight than those utilizing protocols developed solely for that study) and focus of study, with those studies focusing on the correlation between head trauma and a single/few resulting co-morbidities given heavier weight than studies that had a broader range or focus.

The manual takes a step-by-step, linear approach in assessment, diagnosis and treatment of TBI and the cognitive and emotional deficits that may follow along with providing consideration for current research and interventions empirically proven to reduce the potential for or impact of TBI. This manual provides a rudimentary scaffold of the medical literature for injuries and symptomatology of specific brain locations, however as the goal of this manual is not to address particular neurological issues, such as penetrating head wounds or skull fractures to one part of the brain compared to another, the scope of this manual primarily focuses on prevention, assessment, diagnosis and intervention of TBIs.

Consideration of Existing Resources

A comprehensive review of literature pertaining to TBIs in the general, military and athletic populations whom University Counseling center providers are likely to see showed that while there are various studies and manuals that encompass each individual population and/or discuss the comorbidities related to each population, there is not one source that specifically compiles and integrates these materials into one reference. Thus, this manual will synthesize and combine research findings, statistically sound brief assessment protocols, evidence-based treatment approaches and appropriate referral discussion.

A review of similar resources found that the focus was often placed on diagnostic/assessment measures or treatment/intervention options but not a combination that included both to a significant degree. Manuals that weighed more heavily on the assessment or diagnostic side often include a small section about the importance of an accurate and utilitarian treatment plan but do not go on to explain what this would consist of and how to delineate accurate versus less empirically supported interventions. Resources that focus more on interventions available to clinicians are directed more towards these practitioners and do not continue past providing a review of these interventions and proper implementation.

TBI diagnostic tools for the general population, military and athletic population were thoroughly examined, including manuals, test development and validity. Relevant websites, resources and presentations are included so as to better grasp the current studies being done related to TBI prevention, assessment, diagnosis and treatment. Thus, this manual acts as a guide providing information that will allow clinicians to both assess and provide accurate intervention and treatment recommendations for TBI. The fundamental principal of the manual is to allow for the most appropriate assessment of and treatment recommendations in order to ensure optimal

treatment depending on their population and resources at hand. It rejects the idea that one treatment is the best option for every adult.

Results

A resource manual was created for University Counseling clinicians working with individual who have suffered TBIs. The research which informed the manual partitioned the population into three parts, general, athlete and military. The goal of this manual is to provide a resource for clinicians who are working with any of these populations in a University Counseling center who may or may not be familiar with diagnostic, brief assessment and treatment protocols. The manual is intended to be concise, easy to navigate and comprehensible for said clinicians. The target audience for the manual are clinicians (e.g. psychologists, Marriage and Family Therapists, Licensed Clinical Social Workers, etc.) practicing in a University Counseling center setting working with any of the populations mentioned above and who are interested in learning how to develop comprehensive treatment plans while gaining a greater understanding of TBIs for their respective populations..

As a review of currently available similar resources suggested a gap in the connection between the prevention, process of evaluation or assessment of TBI and intervention, this manual intends to link the gap between all three, emphasizing the importance of prevention and accurate diagnosis along with making appropriate treatment recommendations based on the results of a comprehensive neuropsychological and emotional evaluation.

This manual does not intend to be a comprehensive, complete manual that covers all assessment, treatment planning and intervention. Further, when discussing scope of practice and referrals of clients to other specialty providers (e.g. referring to a neuropsychologist for a full neuropsychological testing battery), this manual is not intended as a legally binding or authority document, instead rather a guideline based on the American Psychological Association ethics code. Finally, this proposed manual would look to fill a gap in resources available to clinicians in

this particular setting, as this does not currently exist. The resource manual in its entirety can be found in Appendix B.

Format, Structure, and Content

The manual will be split into five chapters in order to accomplish this goal: (a) Defining TBIs, (b) Who Can Experience a TBI? (c) What Can I Do as a UCC Provider? (d) Tracking Progress with SMART Goals and (e) TBI Prevention. A brief introduction including how to utilize the manual and the goals of the manual will precede this. Resources will be included throughout the manual and listed again after the conclusion, along with an appendix of a brief guidelines for parents, administrators and professors.

Chapter 1: Defining TBIs

After a brief discussion of the goals and correct use of this manual in the introduction, this first section will focus on the prevalence and increased awareness of TBIs, the role a UCC provider will play within this manual and introductory education as to what a TBI is, applicable DSM 5 criteria, the various severity designations and cognitive and emotional symptoms once a student has sustained a TBI. Additionally, the most common comorbidities seen post-injury will also be summarized with a prevalence range given for each. This section's primary goal is an introductory primer into what a TBI is and how it may manifest for clinicians who have little to no experience with those who have sustained a TBI.

Chapter 2: Who can experience a TBI

This section will build upon the last by discussing the various populations that a UCC provider will encounter clinically, and common similarities and differences seen inter- and intragroup. This chapter will be broken into three main population types that are then followed and

compared throughout the remainder of the manual: traditional student, student with military experience, and student-athlete.

Chapter 3: What can I do as a UCC Provider?

Chapter 3 will introduce direct interventions the UCC provider will be able to utilize to assist in diagnosing TBIs along with introducing specialty providers (neuropsychologist, neurologist), what they may be able to add diagnostically, and how best to refer and prepare students. Additionally, rudimentary psychoeducation UCC practitioners can offer to various groups who routinely come into contact with the student is described. This is broken down into psychoeducation for the student themselves as well as for professors, administrators, coaches and families. The purpose of these sections is to provide targeted psychoeducation specific to how each group may benefit and appropriately augment interactions to best support the student and their recovery. Further, this chapter discusses the various comorbidities that may be present and that UCC providers should be vigilant for and which comorbidities are likely for each population. These distinctions will be important, as not all student populations are the same, thus difficulties each group experiences may differ.

Chapter 4: Tracking Progress with SMART Goals

This chapter introduces the concept of SMART goals, initially by defining what the acronym means and what role each letter plays in defining and outlining goals. Following this, examples of how to implement these goals into treatment are offered, as utilizing SMART goals allows for various scalability of goals to meet the need at hand (Bovend'Eerdt, Botell, & Wade, 2009). The purpose of this chapter is to introduce a way of measuring progress (or the lack thereof) by use of flexible yet descriptive goals that can be individualized to the needs of the student.

Chapter 5: TBI Prevention

This manual wants to provide clinicians with a comprehensive, contemporary review of interventions, assessment and treatment as well as be a resource to educate about preventative measures being developed and researched. These will include measures being taken that may affect the general populous such as new safety equipment implemented in automobiles, in athletics such as new helmets or padding or in the military such as implementation and development of in-field TBI gauges to prevent multiple sub-concussive traumas from accumulating. Following the reference section will be a short appendix which will include a brief guide clinicians can share with parents, professors or administrators in order to help educate them broadly about what a TBI may look like, what recovery generally may entail and how each outside source may be helpful.

Summary

Overall, the purpose of this manual is to clarify a complex process. It aims to provide clinicians with an explanation of the value of a comprehensive evaluation, proper diagnosis and comprehensive, appropriate interventions and treatment planning. This manual will be reviewed by three faculty committee members will serve as additional support, providing insight and recommendations. This manual will be subject to ongoing review by experts in the field of TBI along with the various subpopulations this manual encapsulates. These experts may provide insight into the usefulness of the manual and offer feedback which may be incorporated into future iterations of this manual.

Discussion

Overview

Manuals, research, and literature reviews have all been compiled in any number of combinations surrounding the topics of TBIs, their comorbidities, brief assessment tools, treatment planning and interventions. Some go further, narrowing down specific populations or age ranges, cultural backgrounds or gender. However, none of the manuals, research or literature reviews found encompass the populations seen by a University Counseling center when viewed through the lens of the general population ("traditional" students), athletes (student-athletes) or military personnel. Each population, while having many overlapping similarities, will also have their own unique challenges and forms of effective treatment, both in the planning and intervention stages. If left undiagnosed, emotional and/or cognitive deficits from a sustained TBI can linger and impact individuals for a prolonged range of time.

To that end, this manual seeks to provide clinicians in this area with an overview and guide to briefly assess, diagnose, treatment plan and ultimately treat those who have sustained a TBI, while being mindful of their unique background. This manual will utilize a variety of interventions and treatment styles, which have been found to be evidence-based and are widely found for reference. Additionally, the manual will dedicate a portion of its content to addressing language providers can use to discuss care and treatment for those who have sustained a TBI with lay individuals. The impetus for this is to enable providers, clients and lay individuals who interact with the clients to all have a shared language to communicate.

Strengths of the Manual

At its core, this manual will fill a void in the literature in regard to University Counseling center clinicians and their ability to provide services to a variety of clientele. The manual will look to serve as an innovative mental health intervention and highly needed clinical tool for providers working with a multivariable population. Within the manual, both psychoeducational and interventional aspects will be integrated along with brief assessment measures, treatment planning and scope of practice ethical guidelines.

This manual will, in its five subsections, provide clinicians with a broad, overarching comprehensive plan that will assist them with everything from initial brief assessment and diagnosis to treatment planning and ethically referring to specialty providers if necessary. It will also do so within the framework of the aforementioned populations, thus building upon previously reviewed and accepted literature and research as its foundation for integration. Yet another strength of the manual will be to integrate this knowledge through the lens of a University Counseling clinician and thus also under the assumption that the consumers of treatment will be enrolled in a place of higher education. Thus, the manual will fill a gap of integrating treatment into the academic and social aspects an individual client may be interacting with.

Yet another strength of the manual will be its "one-stop" aspect, where it provides clinicians with a number of brief assessment and intervention tools in an integrated setting. While this manual will not pretend to be overly comprehensive or incorporate or catalogue every appropriate intervention and brief assessment tool, it will be a broad base from which clinicians can gain knowledge about a sample of both interventions and assessment tools they know to be efficacious and valid. It will be incumbent upon the clinicians to do additional research and study

on their own, however this manual will look to be a dynamic starting point for gaining further knowledge.

Finally, a strength of this manual will be incorporating a section which will give providers, consumers and others within the sphere of the consumers a common language with which to discuss TBIs, treatment and necessary steps to take. The purpose of this section is to benefit each group in a manner that allows the client to succeed while those around the client, whether they be family members, friends, professors, administrators, gain knowledge about what to expect and how to assist in treatment. This in turn will encourage clinicians to perform their own critical thinking into what treatment aspects are appropriate for each individual and take each individual's cultural context into consideration. This will assure that each treatment plan is culturally competent, individualized to each client's needs and will be so based on empirically based research.

Limitations of the Manual

The primary limitation of this manual will be that it addresses a narrow scope of the adult population, and while it may be applicable to various age ranges across the adult lifespan, the focus is on those who are the primary users of a University Counseling Center. While the data surrounding interventions, brief assessment tools, referral assistance, and so on may also be valid for others, the focus of this manual will be tailored to the clients typically seen in a University Counseling center setting. To this same end, a limitation of the manual will be that it does not present a specific and targeted focus on one particular population. It will attempt to broadly assist clinicians within this particular setting instead of solely discussing one specific population in greater depth.

Additionally, this manual will not be comprehensive in terms of cataloguing interventions, assessments or treatment planning possibilities. While it will be a strength that all of these categories are synthesized into one manual, this manual will not look to disseminate and discuss each potential input or variation. To this end, a further limitation will be the focus on brief cognitive assessment tools. Specialty providers such as neuropsychologists may be able to incorporate full assessment batteries into their diagnoses, treatment plans and reports, however that will not be the case here, as the focus will be on brief assessment and discussing appropriate referral options instead for more comprehensive batteries.

Finally, a limitation of this manual is that it does not discuss all comorbidities, mood disorders and medical or psychological issues that clinicians may encounter along with TBIs. The focus instead will broadly be on those most commonly seen, in an effort to assist in the most wide-ranging way rather than the most concentrated. Thus, the application of the manual to specific individuals with individualized problems not discussed may not be appropriate. To this same end, the treatment planning and interventions discussed will also be limited to those comorbidities discussed and will not be all-encompassing.

Future Directions for the Manual

Future revisions of the manual should include updated research, data and literature on any one of the specific populations mentioned within and it should also incorporate this new data through the lens of a University Counseling center provider. Revisions may also occur if any literature discussed or cited in the literature review is expanded upon. Future revisions may also be able to be made based on the *Limitations of the Manual* section which may include more up to date interventions, treatment planning theories, brief assessment measures or diagnostic criteria.

Another future direction for the manual may be to expand to alternative populations such as young children, adolescents, middle age adults or geriatric populations. While this manual will be narrow in scope, it may be a broad foundation from which future versions can base their data or formatting. Additionally, as this manual will not incorporate any first-hand data collection or human subjects, future iterations may desire to include this approach and incorporate the results accordingly.

Plan for an Evaluation of the Current Manual

After initial dissemination of the manual to UCC providers, feedback regarding clinical effectiveness of the interventions would be assessed. While all interventions included in this manual are evidence-based, there may be additional appropriate interventions UCC providers utilize that yield more complete recovery from students who have sustained a TBI. Clinicians would be asked to review and provide feedback about which interventions and strategies they found helpful and which significant information may have been excluded, so as to be included in future editions if appropriate. Additionally, as this manual did not gather direct clinician to client data, it may be an added strategy to evaluate the effectiveness of this manual. Should this be a method to evaluate the manual, informed consent and similar procedures would be implemented along with institutional board review approval to ensure student safety.

Plan for Dissemination

After outside feedback, updated data and review from specialty clinicians is collected and incorporated, the manual should be dispensed to a pilot University Counseling Center and its providers to incorporate into their treatment protocols. Once integrated, the providers will be able to assess the efficacy of the manual and benefits seen by clients. Additionally, these providers will be able to make recommendations for future versions of the manual that will make it more

appropriate, clearly targeted and applicable on a larger scale to other providers. Releasing the manual to various university systems or through some sort of online messaging board may increase accessibility, in addition to contacting clinicians in the VA system, particularly the VA systems that partner with universities in a consortium fashion.

REFERENCES

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https:// https://doi.org/10.1176/appi.books.9780890425596

Bailey, C., McCrea, M., & Barth, J. (2013). Athletes and Sports-Related Concussion. *Management of Adults With Traumatic Brain Injury*. American Psychiatric Publishing. https://doi.org/10.1176/appi.books.9781585625154.da18

Bovend'Eerdt, T. J. H., Botell, R. E., & Wade, D. T. (2009). Writing SMART rehabilitation goals and achieving goal attainment scaling: A practical guide. *Clinical Rehabilitation*, *23*(4), 352–361. https://doi.org/10.1177/0269215508101741

Broshek, D. K., DeMarco, A. P., & Freeman, J. R. (2014). A review of post-concussion syndrome and psychological factors associated with concussion. *Brain Injury, 29*(2), 228-237. https://doi.org/10.3109/02699052.2014.974674

Bryan, C. J. (2013). Multiple traumatic brain injury and concussive symptoms among deployed military personnel. *Brain Injury*, *27*(12), 1333–1337. https://doi-org/10.3109/02699052.2013.823651

Centers for Disease Control and Prevention. (2016). *Rates of TBI-related emergency department visits, hospitalizations, and deaths — United States, 2001–2010*. Retrieved from https://www.cdc.gov/traumaticbraininjury/data/rates.html.

Centers for Disease Control and Prevention. (2017). *TBI: Get the facts*. Retrieved from https://www.cdc.gov/traumaticbraininjury/get_the_facts.html.

Collins, M. W., Kontos, A. P., Reynolds, E., Murawski, C. D., & Fu, F. H. (2014). A comprehensive, targeted approach to the clinical care of athletes following sport-related concussion. *Knee Surg Sports Traumatol Arthosc, 22*, 235-246. doi:10.1007/s00167-013-2791-6

Daniel, R. W., Rowson, S., & Duma, S. M. (2012). Head Impact Exposure in Youth Football. *Annals of Biomedical Engineering*, *40*(4), 976-981. https://doi.org/10.1007/s10439-012-0530-7

Echemendia, R. J., Meeuwisse, W., McCrory, P., Davis, G. A., Putukian, M., Leddy, J., … Herring, S. (2017). The Sport Concussion Assessment Tool 5th Edition (SCAT5): Background and rationale. *British Journal of Sports Medicine*, *51*(11), 848 LP-850. Retrieved from http://bjsm.bmj.com/content/51/11/848.abstract

Fraley, R. C., & Vazire, S. (2014). The N-pact Factor: Evaluating the quality of empirical journals with respect to sample size and statistical power. *PLoS ONE*, *9*(10). doi: 10.1371/journal.pone.0109019

Hoge, C. W., McGurk, D., Thomas, J., Cox, A. L., Engel, C. C., & Castro, C. A. (2008). Mild traumatic brain injury in US soldiers returning from Iraq. *The New England Journal of Medicine*, *358*(5), 453–463. https://doi.org/10.1056/NEJMoa072972

Howitt, S., Brommer, R., Fowler, J., Gerwing, L., Payne, J., & DeGraauw, C. (2016). The utility of the King-Devick test as a sideline assessment tool for sport-related concussions: A narrative review. *Journal Of The Canadian Chiropractic Association, 60*(4), 322-329.

MacGregor, A. J., Shaffer, R. A., Dougherty, A. L., Galarneau, M. R., Raman, R., Baker, D. G., … Corson, K. S. (2010). Prevalence and psychological correlates of traumatic brain injury in Operation Iraqi Freedom. *The Journal of Head Trauma Rehabilitation*, *25*(1), 1–8. https://doi.org/10.1097/HTR.0b013e3181c2993d

Martin, R. J., & Chaney, B. H. (2018). Exploration of the relationship between concussions and depression symptoms, anxiety symptoms and hazardous drinking among a sample of college students. *Journal of Dual Diagnosis, 14.* https://doi.org/10/1080/15504263.2018.1473906

McKee, A. C., Stein, T. D., Nowinski, C. J., Stern, R. A., Daneshvar, D. H., Alvarez, V. E., … Cantu, R. C. (2013). The spectrum of disease in chronic traumatic encephalopathy. *Brain*, *136*, 43–64. https://doi.org/10.1093/brain/aws307

McKee, A. C., & Robinson, M. E. (2014). Military-related traumatic brain injury and neurodegeneration. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, *10*(3, Suppl), S242–S253. https://doi.org/10.1016/j.jalz.2014.04.003

Miller, K. J., Ivins, B. J., & Schwab, K. A. (2013). Self-reported mild TBI and postconcussive symptoms in a peacetime active duty military population: Effect of multiple TBI history versus single mild TBI. *The Journal of Head Trauma Rehabilitation*, *28*(1), 31–38. https://doi.org/10.1097/HTR.0b013e318255ceae

Rona, R. J., Jones, M., Fear, N. T., Sundin, J., Hull, L., & Wessely, S. (2012). Frequency of mild traumatic brain injury in Iraq and Afghanistan: Are we measuring incidence or prevalence? *The Journal Of Head Trauma Rehabilitation*, *27*(1), 75-82. Doi:10.1097/HTR.0b013e31823029f6

Silver, J. M., Kramer, R., Greenwald, S., & Weissman, M. A. (2001). The association between head injuries and psychiatric disorders: Findings from the New Haven NIMH Epidemiologic Catchment Area Study. *Brain Injury*, *15*(11), 935–945. https://doi.org/10.1080/02699050110065295

Stokes, L., & Allor, J. H. (2016). A power analysis for fidelity measurement sample size determination. *Psychological Methods*, *21*(1), 35-46. doi:10.1037/met0000069

Tanielian, T., & Jaycox, L. H. (Eds.). (2019). *Invisible Wounds of War: Psychological and Cognitive Injuries, Their Consequences, and Services to Assist Recovery*, Santa Monica, Calif.: RAND Corporation, MG-720-CCF, 2008. https://www.rand.org/pubs/monographs/MG720.html

Wortzel, H. S., & Arciniegas, D. B. (2013). A forensic neuropsychiatric approach to traumatic brain injury, aggression, and suicide. *The Journal of the American Academy of Psychiatry and the Law*, *41*(2), 274–86. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/23771941

APPENDIX A

Extended Review of the Literature

Extended Review of the Literature

Definitions and Background Literature of TBIs

This proposed manual intends, as noted above, to be an all-encompassing literature review which will discuss and critically analyze interventions, first-hand data collected, other previously constructed literature reviews and preventive measures currently being used to define, quantify, analyze and otherwise measure concussions, their effects and how to prevent them. To provide context for these goals, this background section will provide and summarize current definitions of terms and sequelae and disseminate the current state of research. This will be broken down into the general population, the military and athletes, as the latter two are two of the most prevalent TBI-sustaining populations. Additionally, this background section will discuss current interventions and the methodology behind their utilization. Finally, there will be a critique of the current literature reviews and manuals available to providers with an emphasis on where this manual will fill a previously vacant niche.

Definitions

What is a concussion? The DSM-5 does not provide a static definition of "concussion", rather it provides criteria for a Major or Mild Neurocognitive Disorder Due to Traumatic Brain Injury. There are three primary criteria, the first of which is (A) the criteria are met for major or mild neurocognitive disorder. Criterion (B), partially described above, requires "there is evidence of a traumatic brain injury - that is, an impact to the head or other mechanisms of rapid movement or displacement of the brain within the skull, with one or more of the following: "loss of consciousness, posttraumatic amnesia, disorientation and confusion, neurological signs (e.g. neuroimaging demonstrating injury; a new onset of seizures; a marked worsening of a preexisting seizure disorder; visual field cuts, anosmia; hemiparesis). Criterion (C) requires "the

neurocognitive disorder presents immediately after the occurrence of the traumatic brain injury or immediately after recovery of consciousness and persists past the acute post-injury period" (American Psychiatric Association, 2013). Additionally, the DSM-5 provides coding for TBI both with and without posttraumatic behavioral disturbances. The figure below shows the distinction between the three levels of severity:

Injury Characteristic	Mild TBI	Moderate TBI	Major TBI
Loss of Consciousness	<30 minutes	30 minutes-24 hours	>24 hours
Posttraumatic amnesia	<24 hours	24 hours-7 days	>7 days
Glasgow Coma Scale score	13-15 (not below 13 at 30 minutes	9-12	3-8

Figure 1. Concussion levels of severity.

While the DSM has defining characteristics set out for severity of TBI for coding purposes, it additionally cautions that the initial severity rating may not correspond to the severity of the resulting neurocognitive deficits. Additionally, it corroborates consistent findings from a multitude of other studies that state the course of recovery from a TBI, regardless of severity, is dependent on a multitude of variables and cofactors including prior TBI history, substance abuse and age (under four years old and over 65 years old).

TBI Prevalence in General Population/Overview

Statistics regarding the prevalence of concussions vary, but a consistent range of values is noted throughout diagnostic literature. Prevalence rates may vary dependent upon population described, scope of study, year of study or other factors The aforementioned CDC indicated in their statistics that in 2013, there were a combined 2.8 million TBI-related emergency department visits, hospitalizations and deaths in the United States, though it qualifies this number by saying these 2.8 include both TBI alone or in conjunction with other injuries (Centers for Disease Control and Prevention [CDC], 2017).

The DSM-5 has a much lower number at 1.7 million annual TBIs resulting in approximately 1.4 million emergency department visits, 275,000 hospitalizations and 52,000 deaths (American Psychiatric Association, 2013). However, the DSM-5 also states that 2% of the population lives with a TBI-associated disability from a TBI at any point in the lifetime while also noting that 59% of TBI incidents involve males. A 2001 Silver, Kramer, Greenwald and Weissman study puts their estimate in between these two figures, believing that more than two million individuals sustain a TBI each year in the United States and that nearly 300,000 of those two million require hospitalization (Silver et al., 2001).

The purpose of this manual will attempt to broadly assist all adults who have sustained a TBI and the providers who are charged with their care but will apply a narrower focus for those who are in the military and athletics. These two areas have greater prevalence for head injuries and other comorbidities not found in the general population (Daniel, Rowson, & Duma, 2012).

TBI Prevalence in The Military

Historically, TBI has been a part of combat warfare, traditionally known as "shell shock", commonly characterized by "headache, amnesia, inability to concentrate, difficulty sleeping, depression and suicidality" (Mott, 1916). Though impacts may be sub concussive, repeated traumas can lead to the development of cognitive and behavioral changes (McKee & Robinson, 2014). Additionally, McKee and Robinson point out that effects of mTBI may be exacerbated by the psychological impacts of combat, additional stressors placed on personnel and lack of ability to ensure proper recovery.

The prevalence of TBI in military personnel appear to be significantly higher than the rates found in the general population. TBI and other head traumas have been called a "hallmark" of recent military operations, with mild TBIs (mTBI) being the most common traumatic brain injury

affecting military personnel deployed in Operation Enduring Freedom (OEF) (Afghanistan and Iraq) Operation Iraqi Freedom (OIF) (Iraq) and Operation New Dawn (OND (Afghanistan and Iraq) (McKee & Robinson, 2014).

This study from McKee and Robinson (2014) estimates the prevalence of mTBI in returning service members at anywhere from 15.2% to 22.8% and affecting as many as 320,000 troops. This is significantly more prevalent than a 2010 CDC study, which found 823.7 TBIs per 100,000 people, or .8237% for the general population (Centers for Disease Control and Prevention [CDC], 2016). This would be statistically consistent with the number of individuals estimated to have suffered a TBI in the general population (under 4 million) which represents just over 1% of the current United States. Other studies have posited a similar range (Bryan & Clemans, 2013; Hoge et al., 2008; MacGregor et al., 2010; Miller, Ivins, & Schwab, 2013), indicating that there is some certainty as to the rates of occurrence both for military and general public persons.

Further, while the number of individual concussions sustained remains higher for service men and women, they are also at greater risk for sustaining multiple concussive or sub concussive impacts prior to recovery. This will be important for providers to note, as it may be clinically relevant to rehabilitation should the individual have sustained multiple concussions during deployment. Several individual studies have investigated this with similar findings. A 2013 study of 161 individuals (157 veterans and 4 civilian contractors), demographically stratified, serving in Iraq and Afghanistan, discovered 52.8% had sustained multiple TBIs while 11.2% has sustained none and 36% had sustained one (Bryan & Clemans, 2013). An additional 2017 cohort study of 229 male Gulf War veterans discovered that 57.2% (131 of 229) sustained two or more TBIs with 31.4% not sustaining a TBI and 11.4% sustaining one TBI (Yee et al, 2017). A third, larger study of 2525 soldiers returning from year-long deployments in Iraq, given questionnaires regardless of

injury sustained or lack thereof, found 4.9% reporting an injury with a loss of consciousness combined with another 10.3% reporting an injury "with altered mental status not involving loss of consciousness" (Hoge et al., 2008, p. 455). Of note, 1706 or 67.6% reporting sustained no injury while deployed.

Length of deployment may also be critical for a provider to assess as length of time deployed may impact TBI likelihood or manifestation. Rona et al. (2012) published a study utilizing comparison groups including US troops deployed for two years and UK troops deployed for a single year in the same region (Iraq or Afghanistan). The questionnaires used in this measure were administered to 3,763 US and UK personnel in total. The result of this study showed that length of deployment did in fact influence mTBI odds which remained significant after confounding variables specific to each deployed group were removed. The odds fell at 1.31 per month of deployment which indicated that the longer the deployment, the increased odds of sustaining a TBI. Interestingly enough, Rona et al.'s findings showed no other outcome was associated with length of deployment dependent solely on length, however the summary was quick to caution that solely eliminating length of deployment would likely not eliminate all discrepancy in TBIs sustained by the two military groups.

TBI Prevalence in Athletes

TBIs in athletics of all ages and levels of play have drawn increased scrutiny in recent years. Most notably, *Concussion*, a 2015 movie surrounding the story of forensic pathologist Dr. Bennet Omalu, his research on chronic traumatic encephalopathy (CTE) and the National Football League (NFL) crossed over from the academic world to the mainstream. A more recent 2017 study of the brains of 202 deceased American football players showed that 87% (177 of 202) met criteria

for CTE across all levels of competition while of 111 former NFL players, 110 were diagnosed (Mez et al., 2017).

Critics of this article were quick to note that this study may have been influenced by "selection bias" in that players who noticed cognitive issues may have been more likely to donate their brains, the number of players studied here is not indicative of the tens of thousands who have played the sport and thus the data not fully extrapolatable, or that interviews with family members or close friends may have yielded descriptions of non-specific symptoms (Mcgrew, Pusateri, & Hockenberry, 2017). However, the proportion of players that met CTE criteria remained staggering. Multiple suicides over the past several years of high-profile professional athletes have also shone a light on the dangers of sport-related concussions. Professional baseball player Ryan Freel in 2012, former NFL players Junior Seau also in 2012, Dave Duerson in 2011 and most recently Aaron Hernandez in 2017 all had post-mortem autopsies that confirmed the presence of CTE.

A 2013 study discussing clinical care of athletes hypothesizes that there are between 1.6 and 3.8 million sport-related concussions every year in the United States alone (Collins, Kontos, Reynolds, Murawski, & Fu, 2014). While there are significant variations in the overall range of potential figures, the low and high boundary figures of these and many other studies appear to fall between and 1.4 and 4 million individuals who sustain some level of TBI annually. To put these numbers in perspective, it is estimated that 38 million children and adolescents participate in organized sports in the United States in 2011 alone while another 8.4 million young adults have participated in collegiate level sports between the 1982-83 and 2007-08 academic school years (Daneshvar, Nowinski, McKee, & Cantu, 2011). This manual will also look to address the various dangers posed and what age-appropriate preventive measures and interventions may be introduced

for adults. Noting previous athletic endeavors will be crucial for providers to ask about and note, as concussions or mTBI occurring long ago may impact cognitive functioning later on. Clients and providers may not be aware of these potential lingering effects, and thus asking about it during a clinical interview may assist a provider in constructing an appropriate rehabilitation plan and diagnosis.

Of particular note in the athletic community at all levels is the potential for second-impact syndrome (SIS), during which an athlete sustains a second concussion or sub-concussive impact before a prior concussion has resolved (Nowinsky). Though rare, SIS had a 50% mortality and 50% morbidity rate as of the 2013 study. This in turn led to precautions and safeguards being implemented at all levels to prevent concussed or potentially concussed athletes from returning to play prior to being fully evaluated. Part of this manual's purpose will be to discuss not only the repercussions from TBIs or multiple TBIs under the cloak of athletics but also to discuss the strides being made to prevent TBIs from occurring in the first place.

Resulting Pathology From TBI

The graphic below summarizes the several main pathologies found in literature reviews, studies and manuals researched as well as gives a range of prevalence rates that were found. Discussion surrounding the findings will follow.

Pathology	PTSD	Mood Disorders	Substance Use	Multiple Comorbidities
Prevalence	4-44%	22-50%	14-71%	14-31%

Figure 2. TBI and comorbidity rates.

As seen above, there is a wide range of prevalence rates that may apply to each pathology. In part, this is due to the different populations utilized by each study and it is important to note that for military personnel and athletes, data for each co-morbid pathology skewed towards the higher

end for each comorbidity rate. Athletes in particular comprised a larger proportion of those suffering from co-morbid substance use or abuse due to non-brain physical injuries sustained while playing that required prescribed pain medication. Within each prevalence range, "normal" individuals from the general population tended to be on the lower side. Clinicians should still take note however that simply because a patient was not a member of either one of these groups does not mean he or she may not have multiple comorbidities present after a traumatic brain injury.

The most common, consistent, comorbid pathology in the general population is PTSD. Fann et al. (2004) and Vanderploeg et al. (2007) both noted civilians suffer from "elevated" rates of psychiatric disorders post-TBI even at a mild level, though the increase occurs at a more drastic rate in military populations. For military personnel with at least one concussion, PTSD was found to be comorbid 44% of the time in one study (Hoge et al., 2008) with the 2008 RAND study placing the comorbidity at a similar 33% ("with a probable TBI also met criteria for probable PTSD" as the operant definition utilized) (Tanielian & Jaycox, 2008). Few studies or literature reviews found reliable data for PTSD in athletes that differed from the general population, with mood disorders and substance use being more prominent in that specific population.

One common thread found which explained the significantly higher PTSD rates in the military was deployment and combat in conjunction with head trauma. Those who had been in firefights or other sorts of military action displayed PTSD at a prominently higher rate than the normative population (Belanger, Kretzmer, Yoash-Gantz, Pickett, & Tupler, 2009; Sayer et al., 2008). MacGregor et al. (2010) in a study of 781 soldiers deployed in Operation Iraqi Freedom revealed that the largest proportion of injuries was related to improvised explosive devices at 41.3% of the sample which was found to heavily correlate to at least mild TBI.

A more expansive study of the health records of 13,201 OEF/OIF veterans compiled by Carlson et al. (2010) found that 22% screened met at least "probable" criteria for TBI and half (47.6%) of the 13,201 sample met criteria for at least one psychiatric diagnosis. The most prevalent diagnoses found in this larger sample were PTSD (25.9%) and depression (25.6%). Of note, of the 836 who had confirmed TBIs, 85% of them (713) had a comorbid psychiatric diagnosis. A caveat offered by many studies was differences in co-morbid prevalence rates could be impacted by premorbid functioning such as psychiatric diagnoses made pre-TBI.

Additionally, the potential for comorbidities may be linked to both number and severity of TBIs, though data from several studies conflicts with one another. Bryan and Clemans (2013) noted that although the sample size was small (161 individuals), the probability for previous TBI to be a predictor of both future TBI and future issues with a variety of comorbidities rose with each TBI sustained. Any TBI showed an increase in reports of physical or emotional symptoms, but the trend of these symptoms curved upward with greater correlation for sleep disturbances, reduced stress tolerance, suicidality, depression and severity of PTSD dependent upon number of TBIs sustained and for single TBIs with greater severity.

MacGregor (2010) found differently, noting that while any TBI increased the probability for substance abuse and adjustment disorders compared to non-TBI injuries, PTSD specifically did not look to be correlated to TBI severity (PTSD was found at a rate of 13.7% for those with any TBI compared to 17% for those with other injuries). However, this study of 781 individuals found that comorbidity of "any mental health diagnoses" with TBI was 27.6% for mild TBI and 47.4% for moderate or severe TBI, indicating that moderate or severe TBI was significantly more likely to lead to a mental health diagnosis of some sort when compared to any other group.

Gros, Korte, Horner, Brady, and Back (2015) found significantly higher rates, though this study of 115 individuals solely included those who had sustained at least one TBI, and thus was a somewhat skewed sample. Of this sample, 83% met criteria for PTSD and 80% met criteria for Alcohol Dependence. Gros acknowledged that the sample size was small and a prerequisite for participation was at least one confirmed TBI, however these odds far outstrip what is found in the general population both for those who sustain TBIs and those who do not.

The 2008 RAND study which surveyed 1,965 individuals deployed in either OEF or OIF discovered while TBI occurred at a rate of 19%, "probable" PTSD occurred at a rate of 33%, depression occurred at a rate of 19% and comorbid PTSD and depression occurred at a rate of 14%. By comparison, Hoge et al. (2008) surveyed 2,525 individuals returning from Iraq and discovered similar numbers, while delineating between those who lost consciousness and those who suffered from altered mental state but without loss of consciousness. TBIs were calculated at 15% of the 2,525 surveyed, with 43.9% of those who lost consciousness reporting a PTSD diagnosis. Comparatively, 27.3% who had an altered mood state, but no loss of consciousness met PTSD criteria. Depression appeared to run at a similar rate regardless of loss of consciousness, found in approximately 13% of both populations. While the RAND study, MacGregor and Hoge all show differing levels of comorbidities, much of this may be attributed to smaller sample sizes, differing locations in terms of deployment and different screeners being used to distinguish pathologies and comorbidities.

Utilizing this data will be beneficial for providers both for context of injury as well as previous head trauma a client may report. Clinicians can also utilize the data mined from these studies to ascertain the origin for mood disorders. Whether or not a mood disorder was present

pre-TBI may impact diagnosis and/or severity of post-TBI symptoms, which the manual will also address.

Diagnostic Tools

Various cognitive assessment measures can notate deficits in a number of cognitive domains, and the results of assessment measures given can assist clinicians and providers with providing the correct type of cognitive or mood-based rehabilitation. Emotion-based screeners and assessment measures can also be used to supplement and determine any mood issues that may be plaguing the individual. Along with both cognitive and emotionally-based measures, useful validity measures allow clinicians to interpret results with confidence.

Cognitive assessment measures such as the WAIS-IV, WMS-IV, DKEFS, RBANS, WRAT-IV and WRAML-2 will be important for clinicians and providers to familiarize themselves with, as subtests within each measure a number of domains including working memory, visual and verbal memory, recall, recognition and encoding abilities, language functioning, attentional and concentration abilities, overall full-scale intellectual abilities and potentially most important, executive functioning. While not all cognitive measures will need to be administered to every individual, a battery that incorporates multiple domains will help provide clinicians with a fuller picture of the cognitive functioning and where any deficits may lie. This can then be used to plan rehabilitation in the most productive manner. These measures were chosen in particular due to their extensive normative populations, their high rate of validity and reliability and the interrater reliability that is associated with finding consistent results. Additionally, these measures provide valid assessment data across the lifespan and results can be cross-referenced between tests to find commonalities for both individual strengths and deficits. While not an exhaustive list, these are

some of the most common measures found which can translate to a variety of populations and help with discovery of multiple deficit types.

Familiarity with the above measures will be important for competent clinical work, however the manual itself will focus on the cognitive screening tool known as the Montreal Cognitive Assessment, or MoCA. This brief screening tool will provide a good cognitive baseline to measure cognitive difficulties as well as the potential for longitudinal screening capabilities. Additional alternative screening measures that can be utilized are discussed below, as these may also be useful for clinicians and providers and can be given to track progress or deficits from baseline functioning.

One product in particular, the ImPACT (Immediate Post-Concussion Assessment and Cognitive Testing), has FDA approval and has been administered a reported 12 million times in a variety of settings to people of all ages and utilizes peer reviewed and independent studies as well as a normative database in order to increase both validity and reliability of the results (Impact Applications, Inc., 2017). The ImPACT in particular has shown to have unparalleled sensitivity to head trauma and combined with other measures such as self-reported symptoms and pencil-and-paper assessment of neurocognitive function, sensitivity exceeded 90% (Broglio, Macciocchi, & Ferrara, 2007).

A second screening measure that has proven quick and effective is the Sport Concussion Assessment Tool – 5th edition or (SCAT-5), released in April of 2017. This measure is yet another that can be given for baseline testing. Though validity and reliability for the 5th edition has yet to be established due to its recent release, the 3rd edition or SCAT-3 (introduced in 2012) has shown both reliability and validity at least in regard to a quick screening tool, with the caveat it should be supplemented with additional measures, especially if an individual is thought to have just sustained

a concussion (Harrold et al., 2017). Although this manual will be focused on adults, there are also child versions of the SCAT as well, making it a utilitarian screener for clinicians working with all ages.

A third screening tool that will be important for providers to familiarize themselves with is the King-Devick test, which can be utilized as a sideline assessment tool to evaluate for concussions. Howitt, Brommer, Fowler, Gerwing, Payne, and Degraauw reviewed the King-Devick in 2016 and found that it, like the SCAT, is an "efficient tool for sport-related concussions" (Howitt, Brommer, Fowler, Gerwing, Payne and Degraauw, 2016). They also point out that rapid, accurate screening for questionable concussions can prove useful, as during most sporting events, clinicians will not be present. However, coaches armed with this tool may be able to prevent additional damage from occurring. When compared to the SCAT-3, Howitt et al. found that both screeners performed comparably, and both could equally be utilized as baseline measures.

Emotional measures will also be effective diagnostic tools and should prove effective in allowing clinicians to address potential emotional distress. The most common full-length mood measures include the Personality Assessment Inventory (PAI), Pain Patient Profile (P3), and Minnesota Multiphasic Personality Inventory, 2nd edition (MMPI-II). Regardless of population, Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADLs) should also be measured. This will give providers and clinicians some idea surrounding the level of functioning pre- and post-injury and which areas have been impacted the greatest. The longer measures, such as the PAI will provide a more in-depth summary of any mood elevations while also including embedded validity measures that can detect false representation.

Shorter measures can be given intermittently dependent upon presentation while still producing a valid outcome such as the Patient Health Questionnaire (PHQ-9) for depression, Mood

Disorder Questionnaire (MDQ) for bipolar symptoms, Generalized Anxiety Disorder 7-item (GAD-7) for anxiety symptoms. These should also be given in conjunction with measures like the aforementioned AUDIT and Drug Abuse Screen Test (DAST-10) for potential substance abuse or increased use; the PTSD Checklist (PCL for military or PCL-C for civilians) or the Primary Care PTSD Screen (PC-PTSD) for PTSD symptomatology; the Patient Stress Questionnaire which is adapted from the PHQ-9, GAD-7, PC-PTSD and AUDIT for a combined profile and also the Suicide Assessment Five-Step Evaluation and Triage (SAFE-T) which screens for suicidality. Similar to the cognitive measures listed above, this is not an exhaustive list for emotion-based measures however it would provide clinicians with a broad base from which to start. The manual in particular will focus on the PHQ-9 and BAI.

The manual will be useful not only as a resource guide but as a reminder to providers that TBIs and co-occurring psychiatric disorders can be assessed from numerous different cognitive and emotional domains and the correct assessment measures to administer will differ based on the individual, their age, the presenting issues and the acuity of the TBI they sustained.

How Brain Damage Affects Each Part of the Brain

While damage to various parts of the brain, including skull fractures, can be implicated in various presentations post-injury, this review and the corresponding manual will not discuss these differences. Though potentially significant from the viewpoint of other professions such as neurology, inundating providers with medical data is beyond the scope of this manual. Concussions can be caused both by closed and open head injuries and while important to note from a medical care perspective, will add additional layers that are unnecessary for the service this manual looks to provide. Similarly, neurological imaging (SPECT scans, MRIs, CTs etc.) can be used to inform providers about the nature of physiological injuries while giving a more definitive

scope of the injured area, however these also will not be discussed. Though also important to note for both treatment planning and cross-referencing possible deficits that appear through neuropsychological testing, burdensome explanation of each would deter from the main goal of the manual.

Summary of Emotional Issues/Prevalence of Mood Disorders after Sustaining a TBI

This document has outlined a significant number of mood disorders that may occur either singularly or concurrently after an individual sustains one or more TBIs throughout the previous sections. However, it is important there is a section in the manual specifically devoted to these issues and these issues alone, in no small part due to the potential life-threatening danger some of these diagnoses pose and the ethical dilemmas that can present themselves to providers.

The manual will first discuss the increased risk of suicidality that has been linked to concussions (Teasdale & Engberg, 2001). Though the severity and number of concussions looks to have an impact on the increase of this risk, the deadly aspect of this risk in particular requires an in-depth look at the potential dangers TBIs and by extension CTE pose to emotional well-being and the link to suicide. This brief section will incorporate previously mentioned issues such as decreased overall cognitive ability, decreased executive functioning to plan, organize and recognize consequences, and in that same arena, the increased risk-taking or other extreme behaviors that may occur in those who have sustained one or more TBIs (Olson-Madden, Brenner, Corrigan, Emrick, and & Britton, 2012).

Similarly, a portion of this emotional issues section will also be devoted to the increase in self-medication through substances. Some of the studies and outcomes previously noted will be compiled in this section in order to have a single area which comprehensively addresses the increase in substance use and abuse by those who have suffered TBIs regardless of population

setting (general, athletic or military personnel). Additionally, a summary of potential emotional/mood disorders clinicians should be mindful of and note if present will also be included. While cognitive issues are the main crux of this manual, they do not exist in a vacuum and providers should be mindful of concurrent mental health changes.

TBI/Concussion in Context

As noted in the introduction, Traumatic Brain Injuries (or TBIs) and concussions are typically defined in current parlance as an insult to the brain that includes at least temporary loss of brain function and may also include loss of consciousness, though this is not required. Though concussions as a concept have been recognized in some form or another for centuries, it has only been in the past two centuries that concussions have been associated with lasting, physical, visible damage to the brain. Previously, concussions had been known by their clinically recognizable features, such as memory issues, confusion, emotional changes and so on, though it was thought that these did not result from physical damage to structural components of the brain. With the introduction of the microscope, it became clearer that concussions not only resulted in altered functioning and mental state but also at least short-term negative alterations to the brain's structure.

Greater knowledge surrounding concussions necessitated more detailed research, not into just concussions/TBIs themselves but also into effective preventative measures, implications for post-concussive medical care and long-term effects of concussions. The clinical definition itself has changed as well. In the DSM-IV (1994), there was no specific section related to traumatic brain injury, instead "head trauma" was classified as a specifier for "Delirium, Dementia, and Amnestic and Other Cognitive Disorders", where by clinicians could delineate head trauma as the main impetus for a cognitive disorder. With the advent of the DSM-V (2013), there is now a section devoted to neurocognitive disorder due to traumatic brain injury which delves further into specific

necessary criteria while noting that disorder traumatic brain injury can present in a multitude of ways.

Currently, it is estimated that 150 people die each day from TBI and TBI-related injuries with visits to the emergency department increasing 47% between 2007 and 2013 (CDC, 2017). Additionally, further estimations state approximately two million individuals in the US suffer a TBI each year and 300,000 of those require some level of hospitalization (Silver et al., 2001). Not only are there now more accurate and comprehensive clinical definitions used to describe concussions and the potential consequences but awareness regarding what these symptoms may be has also grown exponentially.

Following this will be a brief discussion of diagnostic tools utilized to diagnose a concussion. Below that will be the most common, current preventative measures utilized both for military and athletic individuals as they are the two populations in which concussions are most prevalent and may show efficacy when applied to the general population, and finally a concise discussion surrounding the current state of cognitive rehabilitation interventions and methods.

Diagnosing Concussions

As noted in the introduction, one of the most often-utilized, concrete methods for diagnosing the severity of a concussion is the Glasgow Scale. This scale is used all over the world by acute trauma medical staff since its invention in 1974 and divides severity into three groups based on eye response, verbal response and motoric response. While there is some controversy over where the severity classifications are made, it is generally known as a good indicator as to the relative severity of a head injury.

Similar scales include the Rancho Los Amigos Scale which assesses cognitive functioning after closed head injuries, and the two are often paired together. Additionally, the Full Outline of

UnResponsiveness (FOUR) Score, developed at the Mayo Clinic in 2005 and the Simplified Motor Scale (SMS) developed in 2012 are also utilized, though the sample size for these is not nearly as broad as the former two scales. The Glasgow is typically the most recognized and utilized measurement system of the four, though small-sample studies of the FOUR score and SMS show slightly higher inter-rater reliability with the FOUR score also yielding slightly better sensitivity, specificity, accuracy and positive predictive value (Khanal, Lorenzi, Ayache, & Pennec, 2016). These scales will be discussed in greater depth in the manual as to administration instructions and what scores reflect for clinical purposes.

Familiarization with the above brief scales will be important for clinicians as will familiarity with other, longer cognitive measures also discussed in the introduction (WAIS-V, WMS-IV, etc.). Use and interpretation of these measures should only be done within the scope of practice, however and referral to outside neuropsychologists should be attempted should any complex testing be completed. The manual will also encompass the importance of these cognitive tests as well as diagnostic considerations possible after administration and scoring.

Current Prevention Measures in the Military

Due to increasing knowledge surrounding the prevalence of and resulting trauma from TBIs, prevention of TBI in the military has taken greater precedent of late. A literature review was conducted by Adams, Corriga, & Larson (2012) to find efficacious preventative measures to reduce TBI-related pathology. They found the most effective interventions include things such as integrated treatment which provides psychoeducation on both TBIs and common comorbidities (French & Parkinson, 2008). Similarly, a toolkit sponsored by both the Department of Defense and VA called the *Co-occurring Conditions Toolkit: Mild Traumatic Brain Injury and Psychological Health for Concussion, Posttraumatic Stress, Depression, Chronic Pain, Headache, Substance*

Use Disorder (Defense Centers of Excellence for Psychological Health & Traumatic Brain Injury, 2011) provides ample information that can be relayed and instruct military personnel on what changes may occur post-TBI.

More active preventative measures include implementation of blast gauges that measure force on an individual's body, utilization of on-site screening measures to reduce the potential for second-impact syndrome (SIS) and a host of other methods utilized in an effort to reduce or eliminate the potential for battlefield concussions (Khalili, 2017; Logan, Goldman, Zola, & Mackey, 2013). Additional preventive measures include things such as pre-deployment screeners to assess whether a soldier has suffered a TBI prior to enlistment, which alerts medical staff to closely monitor the individual should injury occur. As recent prior head injury can lead to poor outcomes following subsequent TBI's (Belanger, 2010), it is imperative medical staff be aware of individuals with prior TBIs, especially recent instances.

While there are few consistently effective pre-TBI measures that have been discovered, the post-TBI recovery process and by extension, prevention of co-morbidities once a TBI has occurred is a second focus. Increased use of screeners such as the AUDIT for those who have returned home with a TBI helps promote a healthy recovery and attempts to reduce co-morbidities that commonly occur before they have a chance to start.

Adams, Corriga and Larson (2012) also discuss emotional preventive measures for returning veterans such as identifying and anticipating triggers, developing alternate, healthy coping strategies, utilizing friends and family and engaging in multiple types of individual and group therapies. Additionally, if the veteran was engaged in risky/significant alcohol use pre-TBI, staying abreast of their post-TBI use coupled with developing coping strategies may help stem abuse or prevent it before it begins.

Other studies and literature reviews have found similarly. MacGregor et al. (2010) found that while 30% have "any mental health outcome" and 22% have a mood or anxiety disorder, quick implementation of effective interventions can reduce the severity of symptoms. Likewise, Gros et al. (2015) noted that early discovery of increased substance use by either the veteran or someone near them was a strong indicator of receiving proper interventional care that addressed both the TBI and the increased substance use. As is apparent in this section, "prevention" is a two-fold process; one step to prevent TBIs and concussions from occurring and a second step to ensure proper and necessary treatment which prevent and accurately assess comorbidities.

Current Prevention Measures in Athletics

Athletics has made significant strides in recent years regarding development and implementation of preventative measures at every age range and ability level. Examples of preventative measures to be included in the manual are the Heads Up Football coaching protocols which began in 2012 to instruct coaches, parents, teachers and adolescents on the proper way to prevent, recognize and respond to injuries and has since been expanded to over 7,000 middle school, high school and youth football programs across the country. An example of TBI prevention within the Heads Up Football protocol is how to properly fit equipment. This stresses the importance of safety gear fitting correctly which can decrease the risk of injury and instructs coaches and parents in what to look for to make sure their child's helmet and shoulder pads fit as they should.

Additionally, safety equipment has become more advanced while showing promising returns. A study of 2,141 high school football players conducted in 2006 by Collins et al. tested a new helmet (the Riddell Revolution) which purportedly provided more flexibility and absorbed more impact than previous models. At the end of the study, it was calculated 7.6% of those who

wore the old model helmet sustained at least one concussion while those wearing the new model sustained concussions at a 5.3% rate. While the helmet did nothing to reduce the mechanism of injury or presentation of concussion, it showed a 31% decreased relative risk through wear. Since then, the NFL has gone a step further, unveiling a multi-layered helmet (the Vicis Zero1) which is composed of four layers designed to help reduce concussion prevalence and severity. The difference is an added layer of polymer columns that move in different directions to absorb and redirect force (National Football League, 2017).

Prevention measures, as noted in the military section, do not just attempt to stop TBIs, as that is near-impossible, instead they also look to minimize resulting cognitive and mood changes whenever possible after a TBI has been sustained. To this end, several cognitive and emotional preventive measures have been developed to more easily discern when a concussion has occurred, preventing a player from returning to play before a full recovery has taken place.

Sandel, Reynolds, Cohen, Gillie and Kontos (2017) reviewed mood disorder prevention interventions, with a summary of several studies finding interventions similar to those tailored for military personnel. In Sandel et al.'s (2017) review of Lane and Terry (2000) their prescription to learn coping skills, expand capacity for emotional regulation and clinically mandating a return to safe daily activities as soon as possible in particular was noted. Sandel et al.'s literature review also summarizes the importance of social support, the dangers of malingering (both intentional and unintentional) and their influence on motivation and recovery from TBI.

Baseline cognitive testing has also been introduced for players of all ages to measure suspect functioning against known healthy functioning. Many of these tests including the ImPACT (Immediate Post-Concussion Assessment and Cognitive Testing) have malingering or false negative safeguards, that while imperfect, make it more difficult for an individual to undersell their

abilities, making the bar lower to return. This cognitive baseline testing has been implemented across all major professional sports and has worked its way into collegiate and high school sports, making participation in athletics safer not just at the highest level but also ensuring adolescents and young adults can participate safely.

Another recent addition to professional sports is the implementation of disabled lists specifically designed to allow a player to recuperate from head trauma which disincentivize teams from rushing a player back and potentially causing further injury. Football, baseball and hockey have incorporated new rules that penalize teams and individuals for dangerous or intentional actions that can jeopardize the safety of another player, especially for injuries that occur in the head and neck area. Football has also decreased or eliminated contact practices, depending on the competition level, to reduce the number of potential head injuries suffered during practice. Like recovery practices for both the military and general population, interventions incorporate not just cognitive skills but emotional skills. The difference in the athletic population is pain that may exist from non-TBI injuries that must be accounted for concurrently.

It will be important for clinicians to familiarize themselves with this portion of the manual not just for the sake of familiarity with what preventative measures are utilized for athletes, but also should parents in the community have questions surrounding the safety of sports for their children. While no sport is entirely safe, it is important to note the increased attention given and technology devoted to making athletics safer for all individuals.

Cognitive Rehabilitation Interventions & Methods

There are various interventions and methods that can be effectively utilized for those who have sustained one or more TBIs. Rehabilitation methods will not be limited to cognitive measures but also encompass emotional measures and interpersonal/social measures as all three areas can

be negatively impacted. While this section, similar to others, will not contain an exhaustive list of interventions and methods for cognitive rehabilitation, it will annotate several of the most prominent studies and methods, so as to provide clinicians with a substantial base from which to further their knowledge.

As was discussed in both the athletic and military prevention sections, studies have shown that rehabilitation measures introduced early and at a high intensity may improve the outcome of both functional skills and social behaviors in patients and may even be an indicator of further improvements once direct therapy has ceased. Acute mTBI symptoms typically resolve within three months (Iverson, 2005), however the longer the resolution timeframe, the worse the overall outcome may be (Iverson, Zasler, & Lange, 2007). Hence, proper and intensive rehabilitation measures can assist in ensuring a more complete recovery. Cooper et al. (2017) looked to prove this through a four-pronged, six-week treatment approach utilizing 126 military personnel. They concluded that while any intervention would likely assist with returning cognitive and emotional abilities to baseline functioning, intensive, therapist-directed cognitive rehabilitation augmented with a restorative emotional component provides the best prognosis.

Walter, Jak, and Twamley (2015) found similarly when studying veterans with PTSD and the benefits of intensive therapy on employment. They compared using assistive measures in employment (meaning employment was enhanced to allow for accommodations) with simultaneously incorporating these measures along with participation in CogSMART rehabilitation therapy. They found that assisting individuals during employment while also involving them in intensive, weekly cognitive rehabilitation treatment significantly reduced their post-concussive symptoms and was equally effective for veterans with and without PTSD. For the

purposes of the manual, this will indicate to clinicians that cognitive rehabilitation therapy can be appropriate and effective, even for those who suffer from PTSD symptoms.

Engagement in intensive treatment also shows increased positive benefit for athletes. Sandel et al. (2017) found similar results while utilizing an athletic population, finding that individualized, intensive treatment including psychoeducation surrounding expected signs and symptoms, behavioral regulation tactics, sleep hygiene and encouraging noncontact typically leads to the best recovery prognosis.

In terms of the general population, Covassin et al. (2017) corroborated much of what previously cited studies stated, indicating that developing coping behaviors such as planning and engaging in cognitive tasks, mindfulness, acceptance and depending on the individual, religion, all provide positive adaptation and suggest an increase in positive outcome. Several other studies concluded similarly (Anson & Ponsford, 2006; Curran, Ponsford & Crowe, 2000; Kontos et al., 2013). This 2017 study reviews and builds off a previous Covassin et al. study from 2013 which reported relaxation techniques, positive visualization, and deep breathing as all showing signs of being healthy, easy to perform coping skills.

Multiple studies (Brewer, 2001; Johnston & Carroll, 1998; Podlog & Eklund, 2006; Udry, Gould, Bridges, & Tuffey, 1997; Wiese-Bjornstal, Smith, Shaffer, & Morrey, 1998) all reviewed the benefit of social support as a resource, with the consensus being that receiving social support may increase motivation, indicate reduced distress and decrease feelings of isolation while simultaneously lowering the prevalence of anxiety, depression and mood disturbance. These studies are important for clinicians to note, as they provide a litany of easily implemented, beneficial interventions that can be utilized regardless of the demographics of the client whom a provider is treating.

Further, quality of sleep appears to play a large role in quicker and more complete recovery. The most impactful of these basic interventions is sleep hygiene. Kostyun, Milewski and Hafeez (2015) and Lu, Krellman and Dijkers (2016) both state that insomnia is the most common sleep disorder reported post-concussion and the effect of this can (as many clinicians know) not only impact cognitive functioning but also impact anxiety and depression, worsening symptoms that may have already increased solely based on sustaining a concussion. Sandel et al. (2017) also believe that CBT for insomnia (CBT-i) would focus on the more prominent sleep issues while also having the ancillary benefit of reducing anxiety and depression. This hypothesis is corroborated by several studies conducted prior to Sandel et al. (Lu et al., 2016; Martinez et al., 2014; Tang et al., 2011). Also stressed is the importance of psychotherapy in conjunction with psychoeducation. Though Sandel et al. (2017) state that stress initially after injury may not warrant therapy or medication, if an individual continues to demonstrate persistent dysregulation that impacts recovery, therapy and pharmacological intervention may be necessary.

Also important for providers to consider will be the severity of the TBI sustained by the individual they are treating and use this severity as an indicator as to how best create an individualized, effective treatment plan. Several studies posed hypotheses surrounding the contrast between mild TBIs and more severe TBIs and the impact severity can have on recovery. Corresponding to this, studies also took into consideration pre-morbid functioning, that is the estimated baseline cognitive abilities subjects had pre-concussion.

Scott, Strong, Gorter, and Donders (2016) studied outcomes for individuals participating in an outpatient mTBI rehabilitation program utilizing the MPAI-4 (Mayo-Portland Adaptability Inventory) which measures the potential for physical, cognitive, emotional, behavioral and social problems post-TBI. Their hypothesis was that while most symptoms of mTBI resolve themselves

in three months, there would be predictive factors in the MPAI-4 results that would identify who would have remaining symptoms or worse treatment outcomes after that time frame, even after rehabilitative treatment. Additionally, they hypothesized that better performance on baseline cognitive measures would be associated with better MPAI-4 Ability scores at a three-month follow-up.

They found that after implementing education-focused rehabilitation, physical therapy (if necessary), occupational therapy, speech therapy and psychological treatment all individualized to each patient, patients who had a worse initial MPAI-4 also typically had a worse MPAI-4, BDI, GAD-7 and performance on the Trail Making Test after the three-month rehabilitation course indicating that regardless of intervention and treatment protocol, lower initial functioning from both a cognitive and emotional perspective can be factors that predict outcome and long-term functioning. This may allow providers who utilize this manual to then prepare for and create a treatment plan that is more intensive depending on the level of functioning of the individual.

Zhu, Poon, Chan, and Chan (2007) found similarly in Hong Kong, providing evidence for the notion that regardless of culture, lower post-TBI cognitive functioning can be indicative of treatment efficacy. However, Zhu, Poon, Chan, and Chan also stressed the importance of intensive therapy, as these high intensity rehabilitation programs (which consisted of physiotherapy, occupational therapy and speech therapy) yielded greater benefit and showed engaging in intensive therapy shortly after sustaining a moderate or severe TBI provided greater and more efficient progress, in turn sending patients back to work or returning to their daily activities sooner. The average stay reduction for these intensive patients compared to typical treatment was 31%. This study is of note as not all individuals being treated will have mild TBIs and providers will be able to use this study as guidance for treatment planning and goal-setting regardless of population.

Additionally, this will help providers confidently approach treatment with greater intensity, with the knowledge that intensive rehabilitation with proven interventions will help patients recover more quickly.

The aforementioned studies are relevant for providers not only to show that a variety of treatments should be considered and implemented, but to highlight that quickly implemented interventions, customized to the client's needs, can posit a better and more comprehensive recovery. Thus, it is important not only to address the cognitive measures that show efficacy but other measures that will help to improve overall emotional functioning for the individual.

As mentioned throughout this document, TBI cognitive deficits may not appear in a vacuum and may be linked with other emotional or mood disorders, such as PTSD as mentioned above in the military or substance use or abuse throughout the general population who have sustained TBIs. A subsection will be devoted here to potential efficacious interventions that have shown to work including such things as increased social support for both the patient and their caregiver (Ergh, Rapport, Coleman, & Hanks, 2002) as well as providing education for clinicians as to how best assess for substance abuse and how to monitor patients (Olson-Madden et al., 2012; Taylor, Kreutzer, Demm, & Meade, 2003). This social support section will also address ways in which families can become involved, how to develop and maintain social support systems and link the importance of establishing safety plans within those support systems.

These cognitive and emotional interventions, shown to be effective in the above literature, will provide clinicians and patients with a range of options that will encourage and assist with rehabilitation while also offering enough variation so that the damaged brain will not be subject to learning effects and motivation with the patient remains high. The aim of this rehabilitation section

will be that providers, family members and individuals who have sustained a TBI will be able to implement coping mechanisms into the treatment plan to promote recovery in a variety of areas.

REFERENCES

Adams, R. S., Corriga, J. D., & Larson, M. J. (2012). Alcohol use after combat-acquired traumatic brain injury: What we know and don't know. *Journal of Social Work Practice in the Addictions, 12*(1), 28–51. http://doi.org/10.1080/1533256X.2012.647580

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5.* Arlington, VA: American Psychiatric Association

Anson, K., & Ponsford, J. (2006). Coping and Emotional Adjustment Following Traumatic Brain Injury. *The Journal of Head Trauma Rehabilitation*, *21*(3), 248–259. https://doi.org/10.1097/00001199-200605000-00005

Bailey, C. M., McCrea, M. A., & Barth, J. T. (2013). Athletes and sports-related concussion. In D. B. Arciniegas, N. D. Zasler, R. D. Vanderploeg, & M. S. Jaffee (Eds.), *Management of adults with traumatic brain injury.* (pp. 443–460). Arlington, VA: American Psychiatric Publishing, Inc. https://doi.org/10.1176/appi.books.9781585625154.da18

Belanger, H. G., Kretzmer, T., Yoash-Gantz, R., Pickett, T., & Tupler, L. A. (2009). Cognitive sequelae of blast-related versus other mechanisms of brain trauma. *Journal of the International Neuropsychological Society*, *15*(1), 1–8. https://doi.org/10.1017/S1355617708090036

Brewer, B. W. (2001). Psychology of sport injury rehabilitation. In G. Tenenbaum & R. C. Eklund (Eds.), *Handbook of sport psychology* (3rd ed., pp. 404–424). Hoboken, NJ: John Wiley & Sons

Broglio, S. P., Macciocchi, S. N., & Ferrara, M. S., A.T.C.; Sensitivity of the concussion assessment battery, *Neurosurgery, 60*(6), 1050–1058. https://doi.org/10.1227/01.NEU.0000255479.90999.C0

Bryan, C. J. & Clemans, T. A. (2013). Repetitive traumatic brain injury, psychological symptoms, and suicide risk in a clinical sample of deployed military personnel. *JAMA Psychiatry*. *70*(7), 686–691. doi:10.1001/jamapsychiatry.2013.1093

Carlson, K. F., Nelson, D., Orazem, R. J., Nugent, S., Cifu, D. X., & Sayer, N. A. (2010). Psychiatric diagnoses among Iraq and Afghanistan war veterans screened for deployment-related traumatic brain injury, *Journal Of Traumatic Stress, 23*(1), 17-24. doi:10.1002/jts.20483

Centers for Disease Control and Prevention. (2016). *Rates of TBI-related emergency department visits, hospitalizations, and deaths — United States, 2001–2010*. Retrieved from https://www.cdc.gov/traumaticbraininjury/data/rates.html

Centers for Disease Control and Prevention. (2017). *TBI: Get the facts*. Retrieved from https://www.cdc.gov/traumaticbraininjury/get_the_facts.html

Collins, M., Kontos, A., Reynolds, E., Murawski, C., & Fu, F. (2014). A comprehensive, targeted approach to the clinical care of athletes following sport-related concussion. *Knee Surgery, Sports Traumatology, Arthroscopy, 22*(2), 235-246. doi:10.1007/s00167-013-2791-6

Cooper, D. B., Bowles, A. O., Kennedy, J. E., Curtiss, G., French, L. M., Tate, D. F., & Vanderploeg, R. D. (2017). Cognitive rehabilitation for military service members with mild traumatic brain injury: A randomized clinical trial. *The Journal Of Head Trauma Rehabilitation*, *32*(3), E1-E15. doi:10.1097/HTR.0000000000000254

Covassin, T., Elbin, R. J., Beidler, E., LaFevor, M., & Kontos, A. P. (2017). A review of psychological issues that may be associated with a sport-related concussion in youth and collegiate athletes. *Sport, Exercise, And Performance Psychology*, *6*(3), 220-229. doi:10.1037/spy0000105

Curran, C. A., Ponsford, J. L., & Crowe, S. (2000). Coping strategies and emotional outcome followiing traumatic brain injury: A comparison with orthopedic patients. *The Journal of Head Trauma Rehabilitation*, *15*(6), 1256–1274. https://doi.org/10.1097/00001199-200012000-00006

Daneshvar, D. H., Nowinski, C. J., McKee, A., & Cantu, R. C. (2011). The Epidemiology of Sport-Related Concussion. *Clinics in Sports Medicine, 30*(1), 1–17. http://doi.org/10.1016/j.csm.2010.08.006

Daniel, R. W., Rowson, S., & Duma, S. M. (2012). Head Impact Exposure in Youth Football. *Annals of Biomedical Engineering, 40*, 976. https://doi.org/10.1007/s10439-012-0530-7

Defense Centers of Excellence for Psychological Health & Traumatic Brain Injury (2011). *Co-occurring conditions toolkit: Mild traumatic brain injury and psychological health.* Retrieved from http://www.ncdsv.org/images/DefCenExcel_Co-occurringConditionsToolkitMildTBIInjuryAndPsychoHealth_2011.pdf

Ergh, T. C., Rapport, L. J., Coleman, R. D., & Hanks, R. A. (2002). Predictors of caregiver and family functioning following traumatic brain injury: Social support moderates caregiver distress. *The Journal Of Head Trauma Rehabilitation*, *17*(2), 155-174. doi:10.1097/00001199-200204000-00006

Fann, J. R., Burington, B., Leonetti, A., Jaffe, K., Katon, W. J., & Thompson, R. S. (2004). Psychiatric Illness Following Traumatic Brain Injury in an Adult Health Maintenance Organization Population. *Archives of General Psychiatry*, *61*(1), 53–63. https://doi.org/10.1001/archpsyc.61.1.53

French, L. M., & Parkinson, G. W. (2008). Assessing and treating veterans with traumatic brain injury. *Journal of Clinical Psychology*, *64*(8), 1004–1013. https://doi.org/10.1002/jclp.20514

Gros, D. F., Korte, K. J., Horner, M. D., Brady, K. T., & Back, S. E. (2015). Co-occurring traumatic brain injury, PTSD symptoms, and alcohol use in veterans. *Journal Of Psychopathology And Behavioral Assessment, 38*(2), 266-273. doi:10.1007/s10862-015-9513-y

Harrold, G. K., Hasanaj, L., Moehringer, N., Zhang, I., Nolan, R., Serrano, L., … Balcer, L. J. (2017). Rapid sideline performance meets outpatient clinic: Results from a multidisciplinary concussion center registry. *Journal of the Neurological Sciences*, *379*, 312–317. https://doi.org/10.1016/j.jns.2017.06.038

Hoge, C. W., McGurk, D., Thomas, J., Cox, A. L., Engel, C. C., & Castro, C. A. (2008). Mild traumatic brain injury in US soldiers returning from Iraq. *The New England Journal of Medicine*, *358*(5), 453–463. https://doi.org/10.1056/NEJMoa072972

Howitt, S., Brommer, R., Fowler, J., Gerwing, L., Payne, J., & DeGraauw, C. (2016). The utility of the King-Devick test as a sideline assessment tool for sport-related concussions: a narrative review. *Journal Of The Canadian Chiropractic Association, 60*(4), 322-329. PubMed Central PMCID: PMCPMC5178017

Impact Applications, Inc. Retrieved from https://www.impacttest.com on September 22nd, 2017

Iverson, G. L. (2005). Outcome from mild traumatic brain injury. *Current Opinion in Psychiatry*, *18*(3), 301–317. https://doi.org/10.1097/01.yco.0000165601.29047.ae

Iverson, G. L., Zasler, N. D., & Lange, R. T. (2006). Post-concussive disorders. In: Zasler, N. D., Katz, H. T., & Zafonte, R. D. Editor (Eds.), *Brain injury medicine: Principles and practice* (pp. 373–405). New York: Demos Medical Publishing.

Johnston, L. H., & Carroll, D. (1998). The provision of social support to injured athletes: a qualitative analysis. *Journal of Sport Rehabilitation,* 7, 267-284. https://doi.org/10.1123/jsr.7.4.267

Khalili, R. A. (2017, August 30). *Multiple choices, multiple answers as brain injury research evolves for future battlefield.* Retrieved from http://mrmc.amedd.army.mil/index.cfm?pageid=media_resources.articles.brain_injury_research_evolves_for_future_battlefield

Khanal, B., Lorenzi, M., Ayache, N., & Pennec, X. (2016). A biophysical model of brain deformation to simulate and analyze longitudinal MRIs of patients with Alzheimer's disease. *NeuroImage*, *134*, 35–52. https://doi.org/10.1016/j.neuroimage.2016.03.061

Kontos, A. P., Kotwal, R. S., Elbin, R. J., Lutz, R. H., Forsten, R. D., Benson, P. J., & Guskiewicz, K. M. (2013). Residual effects of combat-related mild traumatic brain injury. *Journal of Neurotrauma*, *30*(8), 680–686. https://doi.org/10.1089/neu.2012.2506

Kostyun, R. O., Milewski, M. D., & Hafeez, I. (2015). Sleep disturbance and neurocognitive function during the recovery from a sport-related concussion in adolescents. *The American Journal of Sports Medicine, 43,* 633–640. http://dx.doi.org/ 10.1177/0363546514560727

Lane, A. M., & Terry, P. C. (2000). The nature of mood: Development of a conceptual model with a focus on depression. *Journal of Applied Sport Psychology*, *12*(1), 16–33. https://doi.org/10.1080/10413200008404211

Logan, B. W., Goldman, S., Zola, M., & Mackey, A. (2013). Concussive brain injury in the military: September 2001 to the present. *Behavioral Sciences & The Law, 31*(6), 803-813. doi:10.1002/bsl.2092

MacGregor, A. J., Shaffer, R. A., Dougherty, A. L., Galarneau, M. R., Raman, R., Baker, D. G., Corson, K. S. (2010). Prevalence and psychological correlates of traumatic brain injury in Operation Iraqi Freedom. *The Journal Of Head Trauma Rehabilitation, 25*(1), 1-8. doi:10.1097/HTR.0b013e3181c2993d

Martínez, M. P., Miró, E., Sánchez, A. I., Díaz-Piedra, C., Cáliz, R., Vlaeyen, J. W., & Buela-Casal, G. (2014). Cognitive-behavioral therapy for insomnia and sleep hygiene in fibromyalgia: A randomized controlled trial. *Journal of Behavioral Medicine, 37,* 683–697. http://dx.doi.org/10.1007/s10865-013-9520-y

Mcgrew, C. A., Pusateri, M., & Hockenberry, B. (2017). Chronic traumatic encephalopathy in players of American football. *Primary Care.* Retrieved from http://www.practiceupdate.com/content/chronic-traumatic-encephalopathy-in-players-of-american-football/56238/17/6/1

McKee, A. C., Stein, T. D., Nowinski, C. J., Stern, R. A., Daneshvar, D. H., Alvarez, V. E., … Cantu, R. C. (2013). The spectrum of disease in chronic traumatic encephalopathy. *Brain*, *136*, 43–64. https://doi.org/10.1093/brain/aws307

McKee, A. C., & Robinson, M. E. (2014). Military-related traumatic brain injury and neurodegeneration. *Alzheimer's & Dementia : The Journal of the Alzheimer's Association, 10*(30), S242–S253. http://doi.org/10.1016/j.jalz.2014.04.003

Mez, J., Daneshvar, D. H., Kiernan, P. T., Abdolmohammadi, B., Alvarez, V. E. ...McKee, A. C. (2017). Clinicopathological Evaluation of Chronic Traumatic Encephalopathy in Players of American Football. *JAMA. 318*(4), 360–370. doi:10.1001/jama.2017.8334

Miller, K. J., Ivins, B. J., & Schwab, K. A. (2013). Self-reported mild TBI and postconcussive symptoms in a peacetime active duty military population: Effect of multiple TBI history versus single mild TBI. *The Journal Of Head Trauma Rehabilitation, 28*(1), 31-38. https://doi.org/10.1097/HTR.0b013e318255ceae

Mott, F. W. (1916). The Lettsomian lectures on the effects of high explosives upon the central nervous system. *The Lancet*, *187*, 331–338. https://doi.org/10.1016/S0140-6736(01)52122-4

Nowinski, C. (2013). Hit Parade: The Future of the Sports Concussion Crisis. *Cerebrum: The Dana Forum on Brain Science, 2013*, 2.

Olson-Madden, J. H., Brenner, L. A., Corrigan, J. D., Emrick, C. D., & Britton, P. C. (2012). Substance use and mild traumatic brain injury risk reduction and prevention: A novel model for treatment. *Rehabilitation Research and Practice*, *2012*, 174579. http://doi.org/10.1155/2012/174579

Podlog, L., & Eklund, R. C. (2010). Returning to competition after a serious injury: The role of self-determination. *Journal of Sports Sciences*, *28*(8), 819–831. https://doi.org/10.1080/02640411003792729

National Football League (2017). Helmet Laboratory Testing Performance Results. Retrieved from https://www.playsmartplaysafe.com/resource/helmet-laboratory-testing-performance-results/

Rona, R. J., Jones, M., Fear, N. T., Hull, L., Murphy, D., Machell, L., & ... Wessely, S. (2012). Mild traumatic brain injury in UK military personnel returning from Afghanistan and Iraq: cohort and cross-sectional analyses. *The Journal Of Head Trauma Rehabilitation*, *27*(1), 33-44. doi:10.1097/HTR.0b013e318212f814

Rona, R. J., Jones, M., Fear, N. T., Sundin, J., Hull, L., & Wessely, S. (2012). Frequency of mild traumatic brain injury in Iraq and Afghanistan: Are we measuring incidence or prevalence? *The Journal Of Head Trauma Rehabilitation*, *27*(1), 75-82. doi:10.1097/HTR.0b013e31823029f6

Sandel, N., Reynolds, E., Cohen, P. E., Gillie, B. L., & Kontos, A. P. (2017). Anxiety and mood clinical profile following sport-related concussion: From risk factors to treatment. *Sport, Exercise, And Performance Psychology*, *6*(3), 304-323. doi:10.1037/spy0000098

Sayer, N. A., Spoont, M., Nelson, D. B., Clothier, B., & Murdoch, M. (2008). Changes in psychiatric status and service use associated with continued compensation seeking after claim determinations for posttraumatic stress disorder. *Journal of Traumatic Stress*, *21*(1), 40–48. https://doi.org/10.1002/jts.20309

Scott, K. L., Strong, C. H., Gorter, B., & Donders, J. (2016). Predictors of post-concussion rehabilitation outcomes at three-month follow-up. *The Clinical Neuropsychologist*, *30*(1), 66-81. doi:10.1080/13854046.2015.1127427

Silver, J. M., Kramer, R., Greenwald, S., & Weissman, M. (2001). The association between head injuries and psychiatric disorders: findings from the New Haven NIMH Epidemiologic

Catchment Area Study. *Brain Injury, 15*(11), 935-945. doi:10.1080/02699050110065295

Tang, L., Ge, Y., Sodickson, D. K., Miles, L., Zhou, Y., Reaume, J., & Grossman, R. I. (2011). Thalamic resting-state functional networks: Disruption in patients with mild traumatic brain injury. *Radiology, 260,* 831–840. http://dx.doi.org/10.1148/radiol.11110014

Tanielian, T., & Jaycox, L. (Eds.). (2008). *Invisible wounds of war: psychological and cognitive injuries, their consequences, and services to assist recovery.* Retrieved from http://www.jstor.org/stable/10.7249/mg720ccf

Taylor, L. A., Kreutzer, J. S., Demm, S. R., & Meade, M. A. (2003). Traumatic brain injury and substance abuse: A review and analysis of the literature. *Neuropsychological Rehabilitation*, *13*(1-2), 165-188. doi:10.1080/09602010244000336.

Teasdale, T. W., & Engberg, A. W. (2001). Suicide after traumatic brain injury: a population study. *Journal of Neurology, Neurosurgery & Psychiatry 71***:**436-440. doi: 10.1136/jnnp.71.4.436

Udry, E., Gould, D., Bridges, D., & Tuffey, S. (1997). People helping people? Examining the social ties of athletes coping with burnout and injury stress. *Journal of Sport & Exercise Psychology*, *19*(4), 368–395. https://doi.org/10.1123/jsep.19.4.368

Vanderploeg, R. D., Curtiss, G., Luis, C. A., & Salazar, A. M. (2007). Long-term morbidities following self-reported mild traumatic brain injury. *Journal of Clinical and Experimental Neuropsychology*, *29*(6), 585–598. https://doi.org/10.1080/13803390600826587

Walter, K. H., Jak, A. J., & Twamley, E. W. (2015). Psychiatric comorbidity effects on compensatory cognitive training outcomes for veterans with traumatic brain injuries. *Rehabilitation Psychology*, *60*(3), 303-308. doi:10.1037/rep0000049

Wiese-Bjornstal, D. M., Smith, A. M., Shaffer, S. M., & Morrey, M. A. (1998). An integrated model of response to sport injury: Psychological and sociological dynamics. *Journal of Applied Sport Psychology*, *10*(1), 46–69. https://doi.org/10.1080/10413209808406377

Yee, M. K., Janulewicz, P. A., Seichepine, D. R., Sullivan, K. A., Proctor, S. P., & Krengel, M. H. (2017). Multiple mild traumatic brain injuries are associated with increased rates of health symptoms and gulf war illness in a cohort of 1990–1991 gulf war veterans. *Brain Sciences, 7*(7), 79. http://doi.org/10.3390/brainsci7070079

Zhu, X.L., Poon, W.S., Chan, C.H. & Chan, S. H. (2007). Does intensive rehabilitation improve the functional outcome of patients with traumatic brain injury (TBI)? A randomized controlled trial. *Brain Injury, 21*(7). http://dx.doi.org/10.1080/02699050701468941

APPENDIX B

A Brief Guideline for Parents, Administrators and Professors

RESOURCES FOR STUDENTS, PARENTS, COACHES, FACULTY AND OTHERS

What are TBIs?

TBIs are traumas to the head that may or may NOT result in loss of consciousness or "being knocked out".

What do TBIs look like?

They can look like any number of things, but can present immediately after occurring as confusion, disorientation, difficulty walking or talking, not knowing where one is, the date or other similar ways

How long does a TBI take to go away?

This also depends. Some TBIs and their symptoms go away over the course of a day or two, if particularly minor. Others may show symptoms for several months or longer. Most TBIs will resolve within a month if the individual who sustained a TBI refrains from strenuous physical activity or cognitive tasks and does not re-injure themselves. You should ask the UCC provider at your location, they can provide you with better information about your specific situation!

What should I do next?

If you are the individual who sustained the TBI you may want to schedule an appointment with your physician or if you are concerned about particular symptom(s) you have, a trip to the Emergency Room may be warranted. You should take care to not strain yourself physically or cognitively. You might feel some discomfort around loud noises or bright lights as well. Take time to rest, your brain and body need this to recover quickly and completely.

I have a student/friend/partner/family member who may have sustained a TBI, what does this look like?

Those who sustained a TBI may show increased difficulty in subjects at school they previously did not struggle with, at least in the immediate days following their injury. They may be more irritable, show greater depression and/or anxiety, may have trouble sleeping and may find concentrating or paying attention more difficult. If you are worried about this person, urge them to call their physician or offer to do it for them.

Educational Resources About Mild Traumatic Brain Injury (mTBI)
(Taken from Peskind, Brody, Cernak, McKee, & Ruff, 2013)

Defense and Veterans Brain Injury Center
Free educational materials for service members, veterans, families, and clinicians
www.dvbic.org/resources

Centers for Disease Control

Free training and fact sheets for coaches, parents, athletes, and clinicians (Heads Up)
www.cdc.gov/concussion/sports

Brain Injury Association of America

Network of state affiliates, local chapters, and support groups to advance brain injury prevention, research, treatment, and education and to improve the quality of life for people affected by brain injury
www.biausa.org

PACE: Protecting Athletes Through Concussion Education

Program to encourage a preseason "baseline" evaluation of athletes for subsequent postinjury comparison
www.dsgpace.org

APPENDIX C

Non-human Subjects IRB Approval

July 26, 2019

Protocol #: **07262019**

Project Title: Detecting Subtle Brain Injury in College Students

Dear Bryant:

Thank you for submitting a "GPS IRB Non-Human Subjects Notification Form" *Detecting Subtle Brain Injury in College Students* project for review to Pepperdine University's Institutional Review Board (IRB). The IRB has reviewed your submitted form and all ancillary materials. Upon review, the IRB has determined that the above titled project meets the requirements for *non-human subject research* under the federal regulations 45 CFR 46.101 that govern the protection of human subjects.

Your research must be conducted according to the form that was submitted to the IRB. If changes to the approved project occur, you will be required to submit *either* a new "GPS IRB Non-Human Subjects Notification Form" or an IRB application via the eProtocol system (httpw://irb.pepperdine.edu) to the Institutional Review Board.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite our best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the IRB as soon as possible. We will ask for a complete explanation of the event and your response. Other actions also may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the IRB and documenting the adverse event can be found in the *Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual* at https://community.pepperdine.edu/irb/policies/.

Please refer to the protocol number denoted above in all further communication or correspondence related to this approval.

On behalf of the IRB, we wish you success in this scholarly pursuit.

Sincerely,

Institutional Review Board (IRB)
Pepperdine University

cc: Mrs. Katy Carr, Assistant Provost for Research

Dr. Judy Ho, Graduate School of Education and Psychology IRB Chair

APPENDIX D

Detecting Subtle Brain Injury in College Students

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Introduction

As a University Counseling Center (UCC) clinician at the epicenter of myriad populations, let me start by first thanking you for choosing this manual to assist you with assessing, diagnosing, and rehabilitating individuals who have sustained Traumatic Brain Injuries (TBIs), traditionally referred to as concussions. As UCC providers, you know that no two students are alike and the interventions used for students with TBIs should be customized to each student. To that end, this introduction is meant to help you navigate and utilize this manual to meet the wide variety of you will encounter working with this population.

Significant research has been done in recent years to examine the cognitive and emotional consequences of TBIs. Typically, changes in emotion such as becoming more irritable, cognitive difficulties and vegetative dysfunction (such as increased sleep) can occur, even for those who have sustained a mild TBI. With increased severity comes more significant symptomatology along with an increased risk of suicidality. This manual will assist UCC clinicians in carefully and accurately assessing these symptoms for three distinct student populations; (a) "traditional" student (ages 18-24), (b) student-athlete, and (c) and student with prior military experience.

Who is This Manual For?

This manual is designed for UCC providers, particularly for those who have little to no experience with TBIs, neuropsychology or assessment. You will also find resources that you can share with administrators, faculty members, coaches, and family members of your clients.

How to Use the Manual

This manual has been constructed in a step-wise fashion, beginning first with the signs of potential TBIs along with the appropriate comorbidities, followed by treatment planning encompassing both physiological and psychiatric conditions based on the scope of your practice.

It will also include the professionals to whom you will need to refer to for additional assessments, a description of what each does, and how to prepare students for these appointments.

You will find the second section incorporates multiple tools you as UCC provider can use to assist in the psychoeducation of students, professors, administrative faculty and family members. This section will introduce and expand upon methods to broaden the knowledge base of individuals with little to no previous experience with TBIs and focuses on treatment planning and appropriate interventions to best assist the student. The goal of this section is not solely to provide education about TBIs and how they manifest but also to develop a collaborative approach to form an overarching and comprehensive treatment plan with several levels of care.

A third section about brief cognitive and emotional testing you can do as a provider, along with a discussion as to how to refer out to specialty providers will follow. Several brief measures used to longitudinally track cognitive and emotional progress are described here along with additional interventions empirically found to be beneficial for each student "type". These interventions encompass specific comorbidities found to be prevalent for each grouping, which may shape treatment and alert providers to the typical comorbidities seen.

After utilizing the first three sections to learn about what TBIs are and how to educate others, you should refer to the fourth section which will introduce SMART goals and how they can be utilized to track progress.

Finally, a stand-alone section incorporating TBI prevention, changing and improving technology, screening measures and attitudes about TBIs will conclude the manual. This will be a reference section to be referred to when discussing the future course of TBI treatment and prevention. It will not be as applicable to the current treatment of those who already sustained a TBI.

Should you desire further information, a literature review will also be included as an appendix. This will go further in-depth regarding emotional and cognitive testing, various interventions not discussed in the manual, alternative approaches to treatment and other resources that UCC providers may find beneficial. While the goal of this manual was to be as complete yet efficient as possible, including all of these additional resources within the manual itself would have made it cumbersome and difficult to use as intended.

What Does the Manual Hope to Achieve?

This manual hopes to provide you with a resource that will educate you about TBIs, how they may present in a variety of student populations, and how to best assess, diagnose and treat TBIs via appropriate methods for referrals, various interventions and ways to track progress. It also hopes to be a vehicle by which you learn how to provide psychoeducation to others. As this manual outlines the importance of proper referrals, an additional hope is providers who may have not previously referred students to other specialties will become better versed and more comfortable in doing so, and more familiar with where their scope of practice fits within the TBI rehabilitation process.

Diversity and Multiculturalism

Sometimes overlooked in cognitive testing is the role of diversity and multiculturalism, though the two are becoming more intertwined. This manual acknowledges the wide spectrum of students whom a provider may see yet does not directly discuss diversity and multiculturalism. This was done intentionally. The purpose of this manual is solely to provide clinicians with a resource to assist with assessment, diagnosis and treatment of TBIs. Part of that treatment may be incorporating and utilizing aspects of the student's background and identity to inform treatment, and this may be discussed with the student during the clinical intake and throughout treatment.

Being mindful of any diversity or multicultural challenges or differences will likely play an instrumental part of treatment, and clinicians are ethically obligated to attend to these. However, attempting to include these wide range of potential identifying factors is not practical for this manual and may prove to make the manual too cumbersome and take away from its primary intent. In future iterations, diversity and multiculturalism may play a larger role in the discussion of TBIs and how UCC providers can best include these factors, though that will not be the case for this particular version. The assessment measures and interventions selected were intended to be broadly appropriate for a variety of cultures, or at least flexible to be altered as necessary. Providers are encouraged to research additional interventions or assessment measures that better suit individual clients should there be culturally appropriate or congruent interventions that are a better fit.

Chapter 1 - DEFINING TBIS

The Current State of TBIs

Awareness and discussion surrounding traumatic brain injuries (TBI) has increased markedly in the past decade or so. This discussion is most prominently seen in athletics at all age ranges, though discussion of TBIs in both the military and general population has also increased. Annual estimates for TBIs sustained in the United States range from 1.5 to 3 million, either individually or in conjunction with other injuries (American Psychiatric Association, 2013; Centers for Disease Control and Prevention [CDC], 2017; Silver et al., 2001). Nearly 300,000 then require hospitalization (Silver et al., 2001).

The Role of the UCC Provider

University Counseling Center clinicians will provide services for potentially thousands of students each year, and with an ever-changing student roster, it will be imperative that clinicians are able to accurately yet within their scope assess, diagnose and if necessary, appropriately refer students who have sustained a TBI. Further, students come from a multitude of backgrounds including active or discharged military personnel and student-athletes. Knowledge of the various comorbidities commonly seen in each population will be discussed and it will be important for you as a UCC provider to assess for these throughout the time you care for each student.

What is a TBI?

TBIs, much like the students you will see as a UCC provider, are entirely unique in their expression and no two are alike. Yes, there will be significant overlap in the cognitive and emotional symptoms that manifest, but each case will have its own challenges. Similarly, each student whom you see will have their own strengths which will have a beneficial impact on treatment. It is important to start, however, with establishing what the signs and symptoms of a

TBI might be and how these are susceptible to change based on TBI severity, in order to provide a framework on which to build the rest of the manual.

The DSM-5 does not provide a static definition of "concussion", rather it provides criteria for a Major or Mild Neurocognitive Disorder Due to Traumatic Brain Injury. There are three primary criteria: Criterion (A) the criteria are met for major or mild neurocognitive disorder. Criterion (B), partially described above, requires "there is evidence of a traumatic brain injury - that is, an impact to the head or other mechanisms of rapid movement or displacement of the brain within the skull, with one or more of the following: loss of consciousness, posttraumatic amnesia, disorientation and confusion, neurological signs (e.g. neuroimaging demonstrating injury; a new onset of seizures; a marked worsening of a preexisting seizure disorder; visual field cuts, anosmia; hemiparesis)". Criterion (C) requires "the neurocognitive disorder presents immediately after the occurrence of the traumatic brain injury or immediately after recovery of consciousness and persists past the acute post-injury period" (American Psychiatric Association, 2013). Additionally, the DSM-5 provides coding for TBI both with and without posttraumatic behavioral disturbances.

TBI Severity Levels

TBIs come in three severity designations: mild, moderate or severe. Of note, the vast majority of students you will come into contact with who have sustained a TBI will have suffered from the "mild" severity level. Individuals who have sustained a moderate or severe TBI will be acutely aware of the severity of their trauma and will likely already be managed in part by at least a physician and neurologist, if not some additional form of physical or speech therapist. By contrast, those students who experienced a mild TBI may not even be aware they did so. A common misconception is that you need to have lost consciousness to have sustained a TBI, this is not so!

A quick reference to the DSM 5 shows that the Glasgow Coma Scale (Table 1 below) is typically used to categorize the severity of a TBI. Note that for mild TBI in particular, loss of consciousness is any length of time under 30 minutes, including no loss of consciousness whatsoever.

Table 1.

TBI Levels of Severity

Injury Characteristic	Mild TBI	Moderate TBI	Major TBI
Loss of Consciousness	<30 minutes	30 minutes-24 hours	>24 hours
Posttraumatic amnesia	<24 hours	24 hours-7 days	>7 days
Glasgow Coma Scale score	13-15 (not below 13 at 30 minutes	9-12	3-8

While the DSM set these guidelines out for the purposes of coding TBI severity, it cautions the initial severity rating may not correspond to the severity of the resulting deficits. Additionally, findings numerous other studies including the DSM state recovery from a TBI, regardless of severity, is dependent on a multitude of variables and factors including prior TBI history, substance abuse and age (under four years old and over 65 years old making recovery more difficult for example).

What are the Signs of a TBI?

A student who is unaware they have sustained a mild TBI may experience a number of cognitive, emotional and behavioral changes that may lead them to seek counseling. These changes include emotional difficulties like new or worsened anxiety or depression, becoming easily irritable or isolating from friends or previously enjoyable activities, vegetative or physical symptoms such as decreased sleep or sensitivity to light and sound and cognitive difficulties with things such as concentration or memory. These changes themselves may lead to confusion for the

student, from their parents, coaches, friends and professors. Due to this and the potential for other serious comorbidities such as increased substance use, it will be important for providers to be aware and up to date on the signs of what typically manifests in mild TBIs along with how to screen and refer for these.

Below incorporated into Table 2, is the typical impact seen in individuals who have sustained a mild TBI along with the associated Glasgow Coma Scale guidelines. While this list of emotional and cognitive/symptoms will not be exhaustive, it is a list of the most typical difficulties seen. This will act as a brief reference tool you as a UCC provider can use to later facilitate a clinical interview to expand on any symptoms noted by the student or any other secondary "collateral" source.

Table 2.

Overall Impact of Mild TBI

LOSS OF CONSCIOUSNESS	Under 30 minutes (1)
POSTTRAUMATIC AMNESIA	Under 24 hours (1)
GLASGOW COMA SCALE SCORE	Between 13 and 15, not below 13 after 30 minutes post-event (1)
EMOTIONAL SYMPTOMS	Transient anxiety, irritability and/or depression Lower stress tolerance, emotional excitement (2) Any change in mood is likely to be brief, consider PTSD criteria if the event itself was traumatic
COGNITIVE/PHYSICAL SYMPTOMS	Difficulty concentrating (2) Problems with memory, processing speed, executive functioning (also known as planning abilities) Dizziness, headaches and difficulty sleeping/insomnia Light sensitivity

Note. All data in this table comes from Cole & Bailie (2016) and their annotated references, unless marked with a (1) or a (2). Data marked with a (1) comes from the DSM-5 *Severity Ratings for Traumatic Brain Injury*. Data marked with a (2) comes from Ettenhofer & Barry (2012).

Comorbidities of TBIs

Table 3 below summarizes the several main comorbid pathologies found in literature reviews, studies and manuals as well as the range of prevalence rates found for each. The variations in these comorbidities is also highly dependent upon the type of student, leading to the wide range for each. The section following Table 3 will discuss each of the three student types typically seen, the similarities and differences for each group and the unique challenges each group may present with, which will pose as a precursor to discussions of the variability of comorbidities found within each group.

Table 3.

TBI and General Comorbidity Rates

Pathology	PTSD	Mood Disorders	Substance Use	Multiple Comorbidities
Prevalence	4-44%	22-50%	14-71%	14-31%

Chapter 2 – Who can Experience a TBI?

Simply put, anyone can experience a concussion or TBI. Of course, there are factors that impact the likelihood of an individual sustaining a TBI, though no one is immune from a TBI, concussion or their after-effects. University Counseling Center providers will typically see students that fall into one of three groups: traditional students (ages 18-24), military students (those returning from duty) and student-athletes. These three groups will make up the vast preponderance of cases seen, and thus they are the primary focal points of this manual Additionally, each respective group will have differing associated concerns, and thus dividing students up in this manner will make approaching diagnosis, treatment and any referral significantly easier.

Traditional Students

This student group is the de facto, stereotypical group that you as a UCC provider will encounter. These will be students ages 18 to 24, from diverse backgrounds and with diverse experiences. As such, this group will also have varying levels of expertise as to what a TBI is, what to do or not do after sustaining a TBI, and the descriptive terminology that will best assist with accurate diagnosis and intervention. However, it will be likely that individuals in this group will routinely have the least knowledge about TBIs and thus it will be extremely important to perform a complete, thorough intake as well as provide ample psychoeducation. These students may also present with a variety of comorbidities, some of which were discussed in the previous section. These comorbidities may manifest as new or worsening mood difficulties (depression, anxiety, etc.), new or worsening substance abuse or participation in other risky behaviors.

Intakes with these students will likely be somewhat straightforward, however any additional collateral information that can be gathered will only be beneficial. A detailed personal history of the student gathered from parents or guardians may be helpful for premorbid medical or

mental health conditions and may also provide insight into any notable behavior changes. Collateral information gained from roommates, partners or other sources who encounter the student on a daily basis may also yield benefit. This is not always possible of course as the student must consent to this, but if consent is given, this may provide additional beneficial understanding as to the current situation.

Students with Military Experience

This student group will likely be several years older than your "traditional" student, given that enlistment typically occurs at 18. Some students may be significantly older, as individuals may be enlisted for a decade or longer prior to discharge and subsequent return to school. Regardless of age, this group is statistically the most likely to have sustained a mild TBI, as studies have found that as many as 25% of military personnel report a mTBI during some point of their service.

You as provider will need to assess not just for the TBI itself but also the context in which that TBI was sustained. The context and potential resulting psychological distress will determine whether or not there is an appropriate secondary diagnosis that also requires treatment. While traditional students may sustain their TBI participating in every day (even enjoyable) activities, military personnel may sustain their TBI during more strenuous conditions including training or direct combat. If the TBI was sustained during combat a concurrent diagnosis of Posttraumatic Stress Disorder may be appropriate, though that will require professional judgment and is outside the scope of this manual. Additionally, there may be no additional diagnosis or a decrease in the potential for harmful comorbidities if the TBI was sustained prior to service. This would indicate a remote injury remotely and it thus will likely not have nearly the impact a TBI sustained during combat would.

Many military personnel are connected in some capacity to a local Veterans Affairs center. This connection may range from comprehensive to minimal and while it may aid you in some capacity as UCC provider, it will be important to ensure there is no duplicate care. Similarly, military students may be what is called "service connected" (the veteran is disabled due to injury or illness incurred in or aggravated by military service) and may be receiving compensation for this connection. Providers should take note of this to ensure that any physical or emotional based difficulties are taken into consideration when treatment planning or introducing various interventions.

Mild TBIs present their own problem for military personnel but these individuals in particular may suffer from additional difficulties, such as transitioning back to civilian life from the regimented and highly structured military daily schedule, transitioning back to being with their families full-time, PTSD associated with combat (regardless of association with TBI) and elevated substance use just to name a few. Military personnel in particular have routinely been documented as having elevated levels of substance use and abuse and added inter- and intrapersonal stressors may exacerbate this potential abuse. Providers should take care not just to assess for difficulties relating to the TBI but to take the whole of the individual into account, particularly when that individual is a military student.

Student-Athletes

Nearly every college and university have student-athletes and endemic to athletic competition is the potential for head injury. Recent media attention and the increased focus on athletic-based TBIs particularly in American football have increased the awareness of potential head trauma for athletes. This may mean student-athletes who present for treatment are acutely aware of TBI terminology and have a higher amount of knowledge relative to the other two student

groups. Coaches, trainers and other athletic staff are also typically well-versed in TBI knowledge when compared to friends, teachers and parents. To that end, they may prove to be valuable collateral, secondary sources of information not just for the incident which caused the TBI but also to assist with tracking recovery. New TBI prevention technology, "return to play" guidelines, stringent screening measures and significant oversight all structured to keep student-athletes safe has been implemented in many areas, which providers may benefit from utilizing as well.

A challenge seen in the student-athlete population more than any other are comorbid physical injuries in conjunction with suffering from TBIs. Broken bones, torn ligaments and so forth also need to be treated by medical staff should they be present, and this may lead to interference with treatment in the form of polypharmacy (i.e. prescription pain medication causing cognitive difficulties for example). Similar to military students, student-athletes may endorse distress in adjustment to decreased functioning, both cognitive and physical. Athletes may not be allowed to travel with their teammates, will likely be missing practices and games and the camaraderie that goes along with team sports. These difficulties may exacerbate mood symptoms and student-athletes may self-medicate (and take up their new-found free time) by increasing substance use, participating in risky behaviors and isolating from others. This isolation in particular will be something you as UCC provider will need to monitor in student-athletes, as it may mean that increased risky behavior or substance use goes unnoticed for long periods of time.

Each synopsis mentioned above is not all-inclusive and UCC providers should not take each short description as comprehensive. Different groups will pose their different difficulties though the focus regardless is treatment, a full recovery and as close of a return to baseline functioning as possible. While each group may have their own unique predilections, no group is immune to the difficulties typically found in other groups and it will be important to assess for all

changes and take note of whatever distress the student is reporting. Next, this manual will discuss what specifically you can do as a UCC provider and provide a framework from which to take the next step in assessment and treatment of TBIs.

Chapter 3 – What Can I Do as UCC Provider?

Proper treatment and appropriate intervention of students with TBIs means not just knowing your own scope of practice as a UCC provider but the scope of practice for specialty providers around you. Treatment will take a wraparound approach, and it will integral to ask the correct questions during the diagnostic conceptualization process as well as provide psychoeducation to several groups of individuals with whom the student frequently comes into contact. You will be the expert in many of these cases, as often times family members, professors, administrative personnel and even the students themselves may not know what to expect in regard to TBI recovery or the various ways in which TBIs manifest both in and out of the classroom. This section will assist you in those three aspects of care (know what to ask; know who to refer to and provide psychoeducation) along with discussing basic cognitive and emotional testing that *you* can do, interventions to consider and introducing SMART goals to track rehabilitative progress.

Know What to Ask

Knowing what to ask may be the most crucial aspect of correct diagnosis, as it will inform any referrals made, treatment plan conceptualization and interventions attempted. The student may be appearing for treatment unsure of what to expect, how you can help them or even what the symptoms they're feeling mean. Questions asked particularly during the intake process are most beneficial when a timeline is constructed of symptom onset, increase or decrease in frequency and intensity and how the symptom is impacting the student in their daily lives. These questions should encompass as much of the student's life as possible, not strictly difficulties they are having in the classroom.

Perhaps the most important initial question you as a UCC provider can ask is "Have you recently been hit in the head or subjected to an overly quick stop or start?" This will clue you in

as to the possibility of a sustained TBI or not, as if a student responds with "no", that is a very likely indication that no TBI has occurred. If the student responds, "yes", asking follow-up questions about the incident including any loss of consciousness, altered mental status (feeling groggy, foggy or generally "out of it") and for how long, was any hospitalization needed or medical attention sought will help paint a more complete picture of the incident at hand. It is a common misperception that if there was no period of unconsciousness, there is no TBI. This is not the case; individuals may have sustained a mild TBI even without any loss of consciousness. Hence asking these questions may yield valuable information even when no loss of consciousness has occurred.

Table 4 below will offer additional questions to ask you might find helpful along with the reasoning behind each question. Information gathered from the student themselves is beneficial, but ideally there will be collateral or secondary individuals who can confirm or give better insight into any incident.

Table 4.

Questions to ask

Have you had new difficulty studying when you previously did not? • This symptom may be present for a variety of reasons, but head injuries often cause problems with memory and executive functioning activities i.e. planning Have you had new difficulty sleeping nightly/near nightly? • This may either be due directly to a TBI or also emotional difficulties post-injury (i.e. PTSD in military students). Follow-up questions of onset, frequency and intensity may help provide more context Have you had new trouble concentrating, planning, or with your memory? • Similar to difficulties with studying, the student may be struggling to attend to daily tasks such as remembering to bathe, wash clothes or shop for food Have you had new headaches, dizziness and/or sensitivity to light or sound? Have you experienced new/worsening depression, anxiety, irritability, or impulsivity? • A "yes" to either of these last two questions may be cause to refer to a neurologist or other imaging specialist to see if the brain sustained physical damage. These issues may resolve as the student recovers, but they will be important to track over time

Glasgow Coma Scale Score

Similarly, collecting any information from available medical records (including if a "Glasgow Coma Scale" was completed on the student) may also assist in TBI diagnosis or a TBI was not considered shortly after the time of injury. Table 5 below is the standard Glasgow Coma Scale (GCS) measure. Below are the criteria used in the GCS. While a student may or may not know the information used to determine severity, a composite of even approximate information may be of diagnostic assistance.

Table 5.

Glasgow Coma Scale Criteria

Injury Characteristic	Mild TBI	Moderate TBI	Major TBI
Loss of Consciousness	<30 minutes	30 minutes-24 hours	>24 hours
Posttraumatic amnesia	<24 hours	24 hours-7 days	>7 days
Glasgow Coma Scale score	13-15 (not below 13 at 30 minutes	9-12	3-8

If the student does in fact endorse one or more of these symptoms, including affirmatively answering to if they were recently been hit in the head or subjected to an overly quick stop or start, they may have sustained a mild TBI. This may be cause to refer to a neuropsychologist for a full neurocognitive battery and/or an imaging specialist to assess for physical injury to the brain. The next section, "Know Who to Refer to" will go further in-depth as to what each provider does, how they can be of assistance, and what you as a UCC provider can do to prepare your student client for any referral appointments.

Know Who to Refer to

Specialty providers can assist UCC providers with diagnosis, treatment and in helping to inform the future direction of clinical work relating to TBIs. Two of the most common specialty

providers that UCC providers will refer to when working with students who sustained a TBI will be neuropsychologists and neurologists. These titles sound similar but the two perform very different functions. Notably, if the student is a military student, they may have already seen one or both of these providers through their local Veterans Affairs center, as these will be covered by their insurance. It may also be possible (depending on the university) to refer "out" to both of these providers while still remaining within the university itself, which can also expedite the process.

Neuropsychologist. A neuropsychologist is a doctorate-level psychologist who has gone on to specialize in neuropsychological testing. Testing typically includes a clinical interview during which a history of the student will be gathered, a battery of tests (typically of both cognitive and personality/emotionality measures) that will assess current functioning to compare against previous functioning, and then a final report, which takes into account the history, performance on the battery and any difficulties and will include a diagnosis (or lack thereof) as well as potentially recommendations to help bring the student back to their pre-injury level of functioning.

What you as a UCC provider can do to assist with this particular referral is inform the student of the length of time required for this appointment (typically several hours or more), remind them to perform to the best of their abilities and if possible, make the introduction as a sort of "warm hand-off". Some students will be tempted to not perform as well on the tests as they know they can, since they are genuinely in distress and want to make sure their symptoms resonate in the testing. This can lead to testing that is unusable due to various "performance validity" or "symptom validity" measures that can be stand-alone or embedded. If these are triggered, all the testing will have been done for nothing, as the neuropsychologist will not be able to derive conclusions from the data. If your university has a psychology program, professors in this

department may be able to assist with recommendations for referrals to competent providers they trust.

Neurologist. While neuropsychologists perform testing to compare and contrast current functioning against baseline functioning, neurologists instead focus on imaging. Typically, this will involve procedures like magnetic resonance imaging (commonly known as a MRI) or a computed tomography scan (also called a CT scan). These scans can help discover any abnormalities in the brain, which should show up particularly for more severe TBIs (moderate and above). Students with a single instance of a mild TBI typically will not see changes to imaging, but it is important to conduct these tests to ensure there is no physiological reason for their difficulties, even if the initial trauma is "only" characterized as mild.

Any data or abnormalities found in scans conducted by the neurologist can be incorporated into the neuropsychologist's final report, as abnormalities in certain areas of the brain likely lead to specific and typical deficits. These can be the cause of the symptoms reported and impact daily functioning. You as a UCC provider can assist in preparing the student for this referral by compiling a list of specific concerns for the neurologist, detailing the injury incident as much as possible, and alerting them that some of these scans are done in small, confined areas. Not everyone is comfortable with these close encounters and if they are unable to stay inside the machine for the required time for the neurologist to conduct a full scan, data may be missing or unable to be interpreted. This would also be a concern for the neurologist to know ahead of time.

How to refer out. One or both of these specialty providers may be within your university, which will make referrals easier and may make creating a treatment plan easier as well. If neither exists within your university, finding a reputable provider covered by the student's university health insurance or their private insurance would be the next step. Additionally, if your university

has a psychology or neurology department, asking faculty within those departments for recommendations may also prove beneficial. Once you have a list of names to give to the student, it will incumbent upon them to schedule the appointment.

Provide Psychoeducation

TBIs can be very confusing not just for the student who sustained it but also for many individuals within that student's "personal bubble". These can include professors, administrative members at the university, coaches for student-athletes and the family of the student. While assisting the student in a number of ways will take priority, the best outcome is possible when everyone involved in the student's day to day life is aware of the issues at hand and can create an adaptive, supportive environment that can help the student function again at their baseline, both cognitively and emotionally. Many individuals might not be aware that a TBI is the cause for a student struggling in the classroom or interpersonally, and thus they likely will not think to make accommodations on their own. They may in fact not even know the student sustained a TBI in which case it is almost certain no alterations to assist the student will be made. It is likely that any changes or accommodations made will be short-lived and can be removed after the student fully recovers; however, these accommodations can make a substantial difference in the student's recovery. Below will be described psychoeducation you as UCC provider can do with each group listed and accommodations that each group may be able to assist with.

Educating the student. Even though the student may be aware that cognitive and emotional changes have occurred after they sustained an injury, they may be entirely unaware that these changes are due in fact to the TBI itself. As previously noted, especially if no loss of consciousness was experienced, the student may not think to connect the injury to the problems they are currently experiencing. To that end, discussing what a TBI is with the student, how it can

manifest cognitively and emotionally, and how these difficulties are normal at least for a short while can alleviate much of the distress the student is feeling. The largest role you as UCC provider will play at this point will be in assisting to this adjustment to any limitations the student is experiencing, while asking the student about goals they have in mind. Physical limitations may also be present in conjunction with the TBI if the student was injured in a car accident, hurt in an athletic event, or injured while serving the country. These physical limitations may be temporary as well, but depending upon the injury, may be permanent. It will also be important to address any adjustment to these changes, as there may be a lingering emotional component that remains long after the TBI itself resolves.

Students may also suffer from new or worsening anxiety and/or depression. It will be important to get an accurate history of what, if any, diagnoses were present prior to the injury and if these have gotten worse since. Emotional dysregulation such as becoming easily irritable, sadness, panic and anger are common directly after a TBI and may be impacting the student's interpersonal interactions as much as if not more so than cognitive difficulties they are experiencing. Additionally, military students who sustained the TBI in the context of combat may also struggle with posttraumatic stress disorder (PTSD). Providers will need to delineate which emotional difficulties are directly related to the TBI itself and which may be pre-existing or acquired difficulties such as PTSD. While emotional difficulties need to be addressed regardless of their genesis, it will be important to paint an accurate picture of their development.

Further, students may benefit from education about common comorbidities that may also be impacting their functioning such as a tendency to isolate from social activities they typically enjoy and substance abuse. Students may feel that they are not able to enjoy activities as much as they once could, may feel "out of place" given new emotional difficulties or physical limitations

or may simply want to be left alone which in turn can lead to self-medication. Students may do this without realizing the dangers of doing so, and thus additional education such as gradually re-introducing previously enjoyed activities will benefit them.

Educating administrators. University administrators will be important to collaborate with for in-classroom adjustments that can have a day to day impact on tasks the student needs to accomplish. These administrative personnel play a large role in helping to return students to their previous level of functioning by facilitating in-class changes and accommodations. Additionally, they can assist with facilitating discussions (if necessary) between the student, the UCC provider and specific professors should individualized interventions need to be put into play. Many professors (and for that matter, administrative personnel) may rarely if ever have encountered a student who sustained a TBI and thus they may not be aware of the cognitive and emotional changes present and their role to play in remedying these difficulties.

Education for professors themselves is of course important, however for the purpose of this manual along with the potential benefit for the student, the focus remains on the administrative personnel. Ultimately, it will be their decision as to what accommodations and interventions are approved and they will hold the power to implement these uniformly across the student's course load. A table outlining several accommodations and interventions beneficial to the student are found in Table 6 below. While these accommodations and interventions range from more basic to more intensive, it will be important that whichever are implemented are individualized to the needs of the student and modified as appropriate.

There are a variety of accommodations administrators can implement; some ranging from more extensive changes (i.e. moving to a single-occupancy room instead of a typical dorm setting to avoid distractions, allowing the student to maintain a reduced course load for an academic year)

to simpler changes (i.e. extra time for homework and tests, additional allotted time with teaching assistants). Additionally, administrative personnel may be able to implement a reduced course load for the student. This may mean an extra year at school for the student; however, it will allow for a full recovery and not overly strenuous or rigorous academic work which in turn may lead to burnout and/or emotional distress.

Finally, the student may find a unified front of administrators, professors and you as UCC counselor combined with a multi-tiered approach focused on helping them return to pre-injury levels of functioning is in and of itself emotionally beneficial. The student is likely to realize they're not being asked to "go it alone" and support is available to them in a multitude of ways.

Table 6.

Administrative Interventions

Basic	Moderate	Extensive
Extra time for tests/homework	Individual dorm room to avoid distractions and noise	Reduced course load for one semester or longer
Take home tests	Allowed to take tests individually or outside of normal class hours	Financial assistance for cognitive rehabilitation or other rehabilitation
Extra allotted individual time with teaching assistants		Delayed graduation
Use of study aides during tests		

Educating coaches. Many coaches are now well-versed on the immediate signs of TBIs when they are sustained on the field of play. They along with numerous sanctioning bodies throughout college athletics place strict regulations on return to play protocols and most universities also incorporate baseline testing prior to the season beginning. Should the athlete not be able to pass their baseline testing performance, they will not be allowed to return to practice or games until they can do so. Coaches may not be as well-versed, however, on the after-effects of

the TBI beyond these return to play protocols. When provided with ample psychoeducation, they can be utilized as extremely helpful collateral informants for student-athletes in regard to their emotional functioning, noticeably cognitive changes during practice and games and any lingering physical difficulties. These return to play protocols along with baseline pre-season testing should keep student-athletes away from danger for the correct length of time, however if they do not, coaches may be a secondary safety net that can assist in ensuring the safety of the student-athlete.

Psychoeducation for coaches, training staff and other athletic training personnel should encompass the dangers of Second Impact Syndrome (SIS) which is what can occur if athletes return to the field of play prior to being fully healed from a previous concussion. SIS has the potential to be fatal, as while rare, the fatality rate has been found to be as high as 50% in various studies. Additionally, psychoeducation about attending to and reporting emotional or cognitive difficulties in practice or during games where there previously were not any may indicate that an athlete is not yet ready to return, even if physically cleared by team medical staff members. While this group of individuals will typically only apply to student-athletes seen by UCC providers, they can play a large supporting role that is often overlooked.

Educating families. Families of students, particularly students who are a long distance away while in college, may show significant, appropriate concern about the health and well-being of the student. Families, much like students, will have varying levels of knowledge about TBIs, the recovery process and the permanency of change. It will be your duty as UCC provider to help fill in gaps and provide proper psychoeducation about any misnomers that are present. Cognitive and emotional changes will be the most obvious to family members and a likely concern will be that these changes are permanent. Unless the student sustained a moderate or severe TBI, this is highly unlikely. While recovery can take various lengths of time depending on multiple factors,

mild TBI sufferers typically see a full recovery in six months, with the vast majority seeing a full recovery between three months and a year.

In addition to the typical cognitive and emotional changes seen along with the usual course of recovery, a second duty will be to advise and educate families on how a "team" method is being utilized within the university. Knowing that the student is supported by a plan that includes multiple individuals in multiple positions from the university will likely help assuage fears family members will have and show the student's best interest is being looked after. Additionally, if a specialty provider is being referred to, education about what each provider does along with encouraging family members to take an active role in assisting with useful background knowledge such as medical history may allow family members to feel they have more agency in a trying situation.

Finally, families can also assist with incorporating coping strategies either for cognitive or emotional difficulties. This can be as basic as being an extension of strategies learned in individual psychotherapy between the student and yourself, actively participating in the creation and implementation of SMART goals (discussed later on), setting up strategies and routines specific to the family home or any other strategies that the student will find beneficial. Each situation will be unique, and strategies should be created to fit each circumstance with the student's input taking precedent. Families can also (with the student's consent) be another good source of collateral information. Family members will likely know the student best, and thus any changes in substance use, isolation and mood should stand out. While students may not live at home with immediate family members during their collegiate years, there are still many ways the family can participate in the student's care.

Multicultural Considerations

College students can come from all over the world, as you're likely already aware. These students have their own unique backgrounds, stories, language and family of origin and cultural values. The American Psychological Association (APA) appropriately and necessarily requires that clinicians treat the individual not just for the presenting problems endorsed but also that the treatment be culturally sensitive and fitting for the student and their diverse worldview. To that end, UCC providers are strongly encouraged to review the APA's guidelines for multicultural education, training, research and practice. A link to these guidelines can be found in the reference section below. Put more bluntly, it is the ethical responsibility of you as UCC provider to take into consideration all aspects of a student's person and to then develop treatment plans, refer and so on accordingly. A statement was made at the beginning of the manual that the specific differences of each culture will not be discussed within the manual. That remains true. However, the need to discuss how UCC providers approach multicultural aptitude is a necessary section of this manual and just as important as any intervention or referral that may follow.

Clinicians may find that students speak English as a second, third or fourth language (or beyond). Discussing symptoms and distress that the student is feeling in a manner they feel comfortable with is of principal importance. It may be necessary to involve some sort of interpretation and the manner in which this occurs may be dependent upon the resources of the school, the student or the counseling center itself. Regardless, every effort should be made to allow the student to comfortably report symptoms and for you as UCC provider to competently address these concerns.

Interventions and testing should also be culturally centered and done with appropriate diversity and multicultural factors in mind. Testing and interventions have historically been

developed on white, western individuals typically of European descent. While the student being seen may be able to complete testing or participate in a variety of interventions, the results of any testing or interventions may be skewed from reality due to cultural standards and practices of the student. The provider seeing these students should take it upon themselves to "commit to cultural awareness" as it were; meaning, providers should take the time to research and discover aspects about the student's background and multicultural identity that may impact what they choose to endorse or more importantly not endorse. To that same end, clinicians are advised to not view students as "resistant" if they do not follow through with interventions nor to assume "things are going well" if students are adhering to any and all recommendations made. Either side of this spectrum may be occurring in part due or wholly due to cultural values held about mental health, the power differential that can be present between the student and UCC provider, or the cultural appropriateness of a specific test or intervention. Clinicians should be prepared to change treatment plans or how sessions with a student are conducted at any time, should cultural factors necessitate such.

Comorbidities

Comorbidities have been briefly discussed several times thus far, however this section will provide a deeper look into what they typically are for a TBI population as a whole and how they may change depending upon student group type (traditional, military, or athlete). These comorbidities should be assessed for during the initial intake session and throughout subsequent sessions as they may become problematic at any point in treatment. Table 3 on page 12 providers a brief statistical summary of the three main comorbidities seen along with the rate of multiple comorbidities existing at once. Each comorbidity listed in Table 3 will be broken down further here.

Substance use. New or increased substance use is the most typical comorbidity seen, regardless of student group. Students may turn to substances for a variety of reasons, though any time substances are used to self-medicate, the time required for a full recovery will likely increase. Increased substance use is most often seen in military students, in part due to already high substance use rates throughout the military. Injury can exacerbate this use, especially if the student has just returned from duty or is recently discharged. The adjustment back to civilian life in conjunction with the injury can lead to substance use as a coping method both for the stressors of life as well as the acquired TBI.

Similarly, student-athletes who have sustained a physical injury as well as a TBI (i.e., fractures or torn ligaments) are also at risk for increased substance use to cope with pain. This can be particularly dangerous if they are prescribed pain medication (i.e. opioids) during this time, as both opioids and substances can suppress respiration and ultimately cause death. Student-athletes may also turn to substances as a way to manage emotional distress due to not being able to participate in the team activities which they were accustomed. While this can be true for any individual forced to adjust to a diminished activity level, studies indicate that this is especially true for student-athletes. An additional factor in this increase for student-athletes is the newfound time that was previously filled by the sport they participated in. Not only will they be removed from a team sport setting, they will have ample time previously filled by that activity.

Regardless of student type, you as UCC provider should ask pertinent, direct questions about current substance use and its comparison to previous substance use. Students may not provide accurate answers initially, so it will be important to continually assess this throughout treatment. Additionally, should a referral to a specialty provider be made, it will be important the student know to not show up to their appointment altered, as that may impact the results.

Mood disorders. Altered mood after a TBI is also abundantly common with between a quarter and half of those who sustained a TBI reporting symptoms of some variety. While these manifest typically as anxiety or depression, both can be present and there is the potential for other mood-based difficulties which may be due in part to physical damage sustained by the brain. Adjustment to diminished cognitive and/or physical functioning may also be the cause of new mood difficulties, as students may struggle to cope with their reduced capacity. Several measures discussed in the "Testing You Can Do" section can be utilized to measure and track emotional difficulties over time.

You as UCC provider should also be sure to provide psychoeducation about the impact that sleep, medication, stress, activity level, diet and substances have on mood. Changes in emotion and mood may be present without any increase in substance use or diminished sleep for instance, but when a TBI is combined with a less healthy or restful lifestyle, mood difficulties can worsen further. It will also be incumbent upon you to provide psychoeducation that some frustration and mood challenges will be normal, however they are extremely likely to be temporary. Additional interventions will be discussed in a later chapter which you can assist in implementing that can help to improve mood, understand the changes that have occurred and increase mindfulness surrounding how to reduce the impact of these changes.

Posttraumatic Stress Disorder. Posttraumatic Stress Disorder (or PTSD) is a commonly seen comorbidity, particularly for military students. While rates will be relatively low for the "traditional" student group, studies have found PTSD comorbid with TBIs in military personnel at rates as high as 44%, and routinely over 25%. Thus, when providing services for military students in particular, you as UCC provider should ask about in what context the TBI was sustained. In addition to interventions utilized to assist with cognitive decline, other therapeutic work may need

to be initiated to assist with the potential comorbid trauma that accompanies it. Student athletes have been found to experience PTSD at rates similar to traditional students, making military students a significant and important outlier within this particular comorbidity. Should a military student be uncomfortable working through PTSD difficulties through the UCC setting, they should be invited to enroll at a Veterans Affairs center, where they may feel more comfortable doing so.

Thought Disorders

Similar to both mood disorders and PTSD, thought disorders such as schizophrenia or psychosis and personality disorders such as borderline personality disorder (BPD) can impact cognitive and emotional functioning. These disorders however typically onset at or around the age range of traditional college students, and thus it will be paramount for UCC providers to be aware of any new or worsening symptoms that fall into this category. Additionally, studies are inconclusive as to if sustaining a TBI is a precursor to or cause of a higher likelihood of future psychosis or another similar disorder and thus, it may be possible that a TBI incites the onset of future severe mental illness.

It will also be important to parse apart and accurately differentiate between what may be hallucinations and delusions strictly based within the context of the TBI itself (directly after the injury for instance, where these changes are referred to as “altered mental status”) and lingering psychiatric issues that remain well after the direct injury has been addressed. Similarly, stimulant medications such as Adderall or Ritalin, commonly prescribed for ADHD, have been reported to cause psychotic side effects. If the student has begun to take these medications or has recently increased their dosage, this may be the cause of any psychotic symptoms endorsed or noted. It will be important to discuss these or any psychiatric issues with the student’s psychiatric prescriber if possible.

Multiple Comorbidities

Students experiencing one TBI comorbidity are not excluded from experiencing others and to this end, it will be important to consistently and routinely monitor for any increasing symptoms of distress. As noted within the PTSD comorbidity section, military personnel may struggle with resulting trauma from a TBI experienced in combat but may also concurrently experience anxiety or depression due to their decreased level of functioning. Comorbidities may also interplay off one another. For example, depression or anxiety that begins after sustaining a TBI may lead to self-medication through increased substance abuse which in turn may exacerbate any depression or anxiety being experienced while also impacting sleep, nutrition and motivation. It will be important to not just assess for a single comorbidity or stop assessing for comorbidities simply because one is present. A watchful eye will need to be kept on symptoms throughout treatment. Additional information about comorbidities, studies conducted and the specificity for each student group can be found in Appendix C at the end of this manual.

Pre-existing Conditions

Pre-existing conditions, similar to comorbidities, may also impact the cognitive or emotional functioning of the student and will require focus and attention from both you as UCC provider and university administrative personnel. These pre-existing conditions may not just impact functioning but may inform treatment planning and/or interventions utilized to assist the student. These conditions can include things such as Attention-deficit/hyperactivity disorder (ADHD), Autism Spectrum Disorder (ASD), diagnosed learning disabilities or other neurologically based developmental disorders.

TBIs sustained in childhood, even those in the mild severity category may increase the risk of developing ADHD later on. This may be exacerbated by future TBIs which lead to additional

cognitive difficulties particularly with attention, planning and focus, thus providers will be wise to assess not just for these pre-existing conditions themselves but also for prior TBIs that potentially may be a cause for these conditions. Medications for ADHD or other developmental disorders may also play a role in cognitive or emotional difficulties and as with polypharmacy for pain medication, it will be important to receive a full list of any medications the student is taking and to ascertain how long they have been on these medications.

Students with diagnosed ASD may require treatment planning that differs from what might be considered typical treatment planning. Caregivers (parents or guardians) having an increased role in informing treatment planning, structuring schedules and directly caring for the student may prove beneficial. Somatic and sensory processing difficulties are already prominent in individuals with ASD and a sustained TBI is likely to further exacerbate these symptoms. Additional or more rigorous interventions may need to be implemented in order to assure the academic and social success of the student. Students with ASD may also tend to socially isolate from other individuals naturally and sustaining a TBI may cause them to withdraw even more. Addressing the importance of healthy social outlets and ways to interact with peers are simple interventions UCC providers can be aware of and discuss with the student and allow the student to participate in these outlets as they feel comfortable.

Similarly, discussions with the student and any caretaker or family member about the link between TBIs and self-regulation may also be important. Individuals with ASD may already show difficulties with emotional decision making or abilities to regulate behavior, and these difficulties fall in line with difficulties seen post TBI. This in turn may lead to increased likelihood of participation in risky behaviors or substance use. Thus, it will be important to discuss these possibilities, at the very least with the student themselves.

When diagnosing, referring and treating individuals with diagnosed learning disabilities, it will be important to ascertain what difficulties were present prior to the injury occurring? Asking questions such as when did these difficulties appear, how have they been addressed if at all, do they still impact the student's life and so on may help to form appropriate treatment plans that are individualized to the students strengths and do not penalize them or create additional difficulties for them related to their learning disabilities. It will be important to impart this information to any referral source made as well so that any deficits noted can be addressed within the appropriate context.

Testing You Can Do

While more extensive batteries and interpretation should be left to neuropsychologists and all imaging should be left to medical professionals, there is still testing (both cognitive and emotional) that you can perform as UCC provider. These specific measures have the benefit of being able to be administered longitudinally and tracked over time, as repeat use will not lead to "learning the test" especially for emotional measures.

Cognitive. A standard cognitive screening measure than can be administered in the Montreal Cognitive Assessment or MoCA. It is scored out of 30 points and briefly assesses numerous cognitive domains including language, short-term recall, visuospatial abilities, executive functioning and attention, concentration and working memory (Nasreddine et al., 2005). A score of 26 or higher out of 30 is considered "normal" (Nasreddine et al., 2005) with some studies indicating that 23 is a more accurate diagnostic cut off which lowers the false positive rate (Carson, Leach, & Murphy, 2018). You may find the MoCA helpful not only in the assessment of cognitive impairment but also for which domains are impacted if any. Additionally, one aspect of the MoCA, the clock drawing test, has shown in studies to be individually effective at screening

for TBI cognitive impairment (Hazan, Zhang, Brenkel, Shulman, & Feinstein, 2017). The MoCA can be found in several different languages as well as several iterations, with the original version and scoring criteria found online for free.

Emotional. A MoCA will assist with screening cognitive changes, however anxiety and depression can be assessed for via a BAI and PHQ-9, respectively. Both are brief, self-report measures that utilize a Likert scale and describe commonly experienced symptoms of depression and anxiety. While the BAI assesses for anxiety, the PHQ-9 assesses for depression and includes a direct question regarding suicide and self-harm. This question in particular may be valuable for you as UCC provider as it may encourage endorsements of severe distress the student is not otherwise making known. Both measures take under 5 minutes to administer and score and both can be found online for free. Furthermore, both require low reading levels, ensuring international students presenting for treatment can easily endorse difficulties distressing them. Administering one or both every session can assist in tracking progress or the lack thereof for mood difficulties and may also help in informing treatment goals and planning.

In addition to both the formal cognitive and emotional measures listed here, an open line of communication into how the student feels both cognitively and emotionally will be important. These screening measures will be beneficial to track progress over time, however a direct report from the student as to their cognitive or emotional improvements or worsening will be just as significant.

Interventions

Numerous interventions exist that you as UCC provider can utilize with the student, regardless of student type. Several strategies were discussed above to assist with cognitive difficulties, and these strategies will require input by the student to develop and appropriately

define. However, there are several emotional interventions that can be implemented as well. These three interventions in particular look to tap into emotional distress that can be experienced by a student who sustained a TBI and work to reduce this distress through several outlets.

Emotional self-management worksheet. The Emotional Self-Management Worksheet was developed by the US Army Medical Assessment School; however, it is applicable to any of the three student groups. This worksheet can be used in conjunction with psychoeducation about the emotional changes and difficulties associated with TBIs, with the overarching goal of this intervention being to "reduce the 'emotional noise' and negative self-talk that undermine decision making and work to overcome the tendency to react impulsively or to do nothing" (Michel & Mateer, 2006, p. 62). This sheet asks students to identify patterns of instances where emotions have previously been hard to control. Similar to an antecedent/behavior/consequence chart, this sheet instead focuses on having the student identify triggers and situations that lead to loss of emotional control

You as UCC provider can introduce this sheet during initial sessions and work with the student to identify stressors that may lead to negative outcomes and then to recognize chances for development and implementation of coping strategies to reduce these instances, both in intensity and frequency. Gradual work in this direction will assist in improving the student's mood while providing real-world interventions they can utilize and giving them agency to do so outside of the therapy room.

Social isolation. Social isolation and perceived or actual social ostracism can also require intervention as students of all types with premorbid or newly acquired psychiatric conditions may have their symptoms magnified by a mild TBI. You as the UCC provider will need to remain alert for increased suicidality, depression or other distress signals, as reduced self-concept, feelings of

lower self-efficacy, and a focus on cognitive shortcomings can result (Conneeley, 2002; Ponsford, Kelly, & Couchman, 2014; Tsaousides, Cantor, & Gordon, 2011). Students may also feel stigmatized by their injury and that seeking disability services may do so further (Cahill, Rotter, Lyons & Marrone, 2014). Thus, discussion early on surrounding the benefit of seeking UCC services and the duty of confidentiality each provider ethically stands behind may help the student be less wary in attending.

Social isolation particularly impacts students with pre-existing psychiatric conditions, as those with pre-existing mood disorders exhibited higher suicidality and lower psychosocial functioning when compared to those who endorsed emotional difficulties solely after a TBI injury (Tsaousides et al., 2011). Therefore, it is of the utmost importance student with pre-existing mood diagnoses routinely be asked about increased social isolation in conjunction with either of the emotional screening tools previously mentioned. In particular, the PHQ-9 question directly assessing suicidality will be especially important to attend to.

To combat social isolation, the feeling of being an 'outsider' and the potential for co-occurring increased mood symptoms, you should collaborate with the student to find social gatherings they feel comfortable attending, make plans to call or text various friends or family members, and to participate in spiritual gatherings if that is their inclination. Social engagements will likely help improve overall mood while reducing frustration that may occur with ongoing cognitive difficulties (Cahill et al., 2014).

Social support and perceived social support (or the lack thereof) also particularly impacts female military students, both for cognitive and emotional recovery from a mild TBI. Female Veterans who higher stress levels post-combat exhibit concurrent higher rates of mental health symptoms (McGraw, 2016). Additionally, there is a strong relationship between perceived lack of

social support and elevated post-traumatic symptoms among female veterans compared to male veterans. Thus, you as a UCC provider seeing female military students should take special care to assess for social support, perceived social isolation and any traumatic symptoms resulting from the feeling of social isolation.

Emotional resilience/volunteering. Promoting the idea of "emotional resilience", or the concept of agency and capability despite injury, to a student who is seeking services can assist with improving emotional distress and reduce mood disorder symptoms the student is feeling. Promoting emotional resilience, particularly to military students, at multiple levels (individual, family, school and community) leads to overall better mental health outcomes and for military student an easier transition back from deployment to the civilian world (Meredith, Branstrom, Azocar, Fikes, & Ettner, 2011). You as UCC provider can introduce this concept and enhance the notion of overall resilience by challenging the student to identify and adopt positive coping skills, encouraging positive affect, identifying emotional ties and supports, and encouraging belongingness to various groups the student finds important. Not only does this intervention seek to promote agency but also to build a social network on which the student can draw outside of session. This in turn may then lead to a reduction of social isolation and/or problematic substance use.

Other emotional resilience techniques that can be introduced in session include relaxation techniques, mindfulness, positive visualization, and deep breathing. All of these are easy to perform coping skills that engage the student with their emotions in a healthy, grounded manner. These particular techniques, along with emotional resilience as a whole, are also generalizable to difficulties outside of those experienced due to TBI.

A final form of emotional resilience is volunteering. Volunteering, especially for returning military students, can decrease PTSD symptomatology and feelings of isolation and loneliness while improving overall health, increasing perceived availability of social support and increasing perceived self-efficacy (Lawrence et al., 2017). Veteran students in particular have shown increased mood and decreased frustration when volunteering with other Veterans, as that may be a comfortable form of camaraderie. Students should be encouraged to volunteer in something they find meaningful, as this will likely lead to greater engagement and a greater increase in perceived self-efficacy.

Chapter 4 – Tracking Progress with SMART Goals

Tracking progress for multiple goals at once may appear difficult, but there are ways you as UCC provider can collaborate with the student to develop goals that address their needs while also being flexible enough to change should the circumstance call for it. The primary way of doing this is to introduce and implement what are called SMART goals.

What are SMART Goals?

"SMART" stands for Specific, Measurable, Achievable, Relevant and Time-bound. The idea is that specific goals will be targeted with a specific plan in mind to achieve these goals. For students who have sustained a TBI, these goals can be anything that works to return them to complete baseline functioning.

How can they be Incorporated into Treatment?

Treatment can incorporate SMART goals in any number of ways. In fact, multiple SMART goals can be utilized during treatment at once. While the student should take the lead as to what these goals will be, collaboration between yourself as UCC provider and the student can result in well-detailed goals that define criteria as to how they will be met, how they will be shaped along the way and markers that will be used to chart progress. Additionally, should there be long-term or permanent decreased cognitive or physical functioning, SMART goals can also assist with the adjustment to this decreased level of functioning while still enabling the student to achieve.

SMART goals are not limited by the confines of the therapy room. An example of a SMART goal would be to set a schedule to work with tutors to catch up on classwork for a specific number of hours per week, with the end goal being the student is completely caught up on their course-work by the end of the semester and has a grade they are satisfied with. This goal can also

take into account accommodations made for the student by the professor and/or university administrative professionals to enhance how the goal is tracked.

Another example of a SMART goal more closely tied to emotional distress is to decrease depressive symptoms via PHQ-9 scores by a certain amount in a certain number of weeks. The student then can take the lead as to how this will be attempted, whether it be volunteering, participating in pleasurable activities and so on. The structure of SMART goals is also such so that the target of the goal can be altered should the student complete it sooner or require more time. Do not be hesitant to be creative in collaborations with the student or to alter goals should it become apparent they will not be met. SMART goals are not strict rules but rather guideline by which to measure progress. The student can be assured during this time that even slow progress is still progress and that they have a high level of autonomy throughout this process. The student may in fact enjoy the process of setting up goals and proverbial mile-markers, as completing tasks can improve emotional symptoms and give a greater feeling of self-efficacy and recovery.

Chapter 5 – Prevention of TBI

Introduction

TBIs will sadly always be a potential part of the human condition. As long as there are humans with skulls and delicate brains inside of them only protected by cerebrospinal fluid, the threat of sustaining even a mild TBI is omnipresent. Thankfully, only about 1% of the United States population suffers a TBI in any form in any given year and a relatively low 2% of the population will suffer some sort of disability due to TBI over their lifetime (APA, 2013 CDC, 2016; CDC, 2017). This risk is markedly higher both for athletes and military personnel, and thus this chapter will have a more pronounced focus on TBI prevention for those populations as compared to traditional students who are not engaged in either military or athletic activities.

Thankfully, public awareness of TBIs, their potential short- and long-term impact on individuals and research and development for preventative protective gear and other protective measures have significantly increased in recent years, in no small part due to the National Football League's legal difficulties with aging retired players as well as the movie "Concussion" about Dr. Bennet Omalu. Along with this, youth sports leagues and schools have had a renewed commitment to teaching proper fundamentals aimed at preventing concussions from occurring in the first place through coach and parent instruction. Multiple empirically-validated programs have been established to educate both coaches and parents, the National Athletic Trainers' Association has written a position statement outlining guidelines for athletic trainers at schools of all levels, laws are being written to protect youth athletes, and baseline screening measures are being utilized at higher rates than ever to protect athletes and particularly youth athletes from sustaining a TBI in the first place or returning to play too quickly if they do (Langthorn & Wendling, 2012).

Improvements to safety equipment

Safety equipment for athletes of all types have improved dramatically in recent years. Helmets for football players in particular have made potentially the most visible strides, the most notable of which was a helmet which purportedly provided more flexibility and absorbed more impact than previous models. Studies utilizing this helmet revealed that while the helmet did nothing to reduce the mechanism of injury or presentation of concussion, it showed a 31% decreased relative risk through wear, a substantial decrease. The NFL has gone further yet, developing and unveiling a multi-layered helmet composed of four layers designed to help reduce concussion prevalence and severity. The mechanism of action for this helmet is an added layer of polymer columns that move in different directions to absorb and redirect force.

Competitive football leagues from youth to the professionals have also instituted "targeting" rules, which penalize players who intentionally attempt to strike the head and neck area. Because of this, reported concussions in the NFL have decreased each of the past 4 years. The goal of implementing these rules not just in the advanced levels but also in the youth leagues is that the next generation of players will have grown up and will be accustomed to this new manner of tackling, and thus no adjustments will need to be made throughout their careers.

While safety equipment has been developed further for athletes than for military personnel, sports leagues (particularly the NFL) and the military have begun combining resources to mine data about TBIs, their prevention and treatment along with the reduction of stigma. The Army began to use blast sensors in helmets starting in 2007, in an effort (similar to the effort in football) to assess when soldiers have taken forcible blows to the body and/or head that may have resulted in a concussion. These sensors have progressed to a full body system built to capture blast forces felt across the body of a soldier regardless of if they are on foot or in a vehicle. This "Integrated

Blast Effects Sensor Suite" has also shown promising early returns, though there is caution surrounding the integration and collection of accurate data in extreme weather conditions.

Educational Programs for coaches of student-athletes

Two of the more well-known educational programs for coaches and athletes are the Heads Up protocols developed by the CDC in 2012 as well as ACTive (Athletic Concussion Training using Interactive Video Education) developed in 2011 by the National Institute of Child Health and Human Development. ACTive in particular utilizes content based on recommendations from the National Athletic Trainers' Association and the International Conference on Concussion in Sport. Both are brief, interactive trainings that assist in educating coaches and training staff about concussion recognition, prevention and management.

Participation by adults in either program, regardless of pre-training knowledge of how to recognize and manage concussions, yielded significantly improved knowledge of symptoms, recognition and management. (Glang, Koester, Beaver, Clay, & McLaughlin, 2010; Baldwin, Breiding, & Sleet, 2016). This looked to indicate that adults who will spend significant time with student-athletes, upon enrolling and completing either of these programs will be better prepared to address concussions in a confident and educated manner when they occur.

Development of Return to Play Guidelines

While significant strides have been made towards the education of coaches, athletes and parents, additional improvements have been made in developing and understanding baseline cognitive testing. This baseline metric is one aspect of what is called "return to play testing" which assesses when it is safe for an athlete to return to competition and prevents them from doing so until all requirements are satisfied. Establishing these guidelines is now commonplace, however some differentiation still occurs in the language and application. Currently, while return to play

policies are common, they are routinely met with inconsistent enforcement at the lower competitive levels (high school and below). This may be due in part to the fact that these are not uniform and standardized, and thus are not subject to the jurisdiction of one governing body, like collegiate athletics or the NFL.

Additionally, while return to play guidelines are typically accurate in their assistance with delineating when an athlete is capable of safely returning to play, the potential always exists of invalid baseline results, either through genuine error or an attempt to manipulate a baseline outcome into a lower level, allowing an athlete to potentially return before he or she has completely healed. An aspect of the psychoeducation that can take place between you as UCC provider and athletic training staff is the caution that vigilance is necessary to identify these invalid results and to use caution when interpreting results at all times. Currently, many administrators and interpreters of baseline tests do not receive standardized training prior to any active interpretations. This education could help eliminate the potential for ill-prepared faculty or coaches incorrectly allowing an invalid baseline profile to be utilized for injury comparison.

Similarly, a 2014 position paper from the National Athletic Trainers' Association outlined more stringent, "best-practice" guidelines for athletic trainers. These included how to document TBIs, their management and treatment, how to communicate legal information with relevant governing bodies (i.e. state athletic conferences), discussion of appropriate assessment and use of safety equipment and how to encourage genuine reporting of symptoms from athletes. This paper and its stance are especially of note for student-athletes who may be seeking services as they may find it beneficial to learn how best to report their symptoms to athletic training staff. Since this time, an additional standard of collegiate-level return to play guidelines has been established.

These new guidelines match with many previously acknowledged and utilized evidence-based methods, allowing for one accepted standard of care.

DoD/VA Toolkit

Military students may find a toolkit sponsored by both the Department of Defense and Veterans Affairs particularly interesting. Called the *Co-occurring Conditions Toolkit: Mild Traumatic Brain Injury and Psychological Health for Concussion, Posttraumatic Stress, Depression, Chronic Pain, Headache, Substance Use Disorder* (Defense Centers of Excellence for Psychological Health & Traumatic Brain Injury, 2011), this toolkit provides education for post-TBI symptoms as well as how to report these symptoms to medical staff in a manner that alerts them that a TBI may have been sustained. While written for a military audience, this toolkit may provide benefit for all student groups.

Changing Attitudes & Knowledge

Perhaps the biggest factor in preventing TBIs for all populations is education of parents and athletes from an early age onward. There is a promising trend of parents of youth athletes being aware of what to look for, correctly using TBI terminology, and discouraging old stereotypes to "tough it out" (Dams-O'Connor et al., 2015). In a recent study of views on TBIs and knowledge of treatment, nearly 80% of youth athletes and their parents had heard of concussions, with youth athletes believing TBIs to be a "critical issue". Additionally, over half of youth athletes disagreed with the premise their friends would think they were "dumb for caring about concussions" and nearly three-quarters of parents cited the CDC as a reliable source of information about TBIs. Still, healthcare providers and coaches are the preferred sources of information for many athletes and parents, thus instances where psychoeducation from the UCC provider can be disseminated to the student-athlete through the coach remain valuable.

When surveying strictly athletes, commonly cited helpful information sources included parents, doctors and coaches, indicating that these groups should be targeted for education about TBIs and how to report them. Similarly, collegiate student-athlete attitudes about the realistic expectation of sustaining a TBI have changed. These expectations only increase once an athlete has actually sustained a TBI. Most notably, athletes now endorsed an awareness of the potential long-term health risks to participating in contact sports while being mindful they are participating in an activity that could lead to future negative health ramifications. This historically has not been a commonly seen attitude. UCC providers can utilize these newfound expectations and attitudes to discuss the odds of sustaining a TBI, how to best report it if one does occur, and how to communicate with coaches if a suspected TBI occurs.

Following this chapter is a brief appendix that UCC providers can share with parents, students, administrators and coaches with the hope that even rudimentary information may assist in education about how a TBI presents, what recovery may entail and direct them to outside resources they may find beneficial. Thank you for choosing to utilize this manual, hopefully it proved beneficial not just in theoretical practice but also in practical clinical application and will continue to do so.

REFERENCES

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders: DSM-5 (5th ed.)*. Arlington, VA: American Psychiatric Publishing.

Baldwin, G., Breiding, M., & Sleet, D. (2016). Using the public health model to address unintentional injuries and TBI: A perspective from the Centers for Disease Control and Prevention (CDC). *NeuroRehabilitation*, *39*(3), 345–349. https://doi.org/10.3233/NRE-161366

Cahill, S. M., Rotter, J. M., Lyons, K. K., & Marrone, A. R. (2014). Survivors of brain injury: The narrative experiences of being a college or university student. *Canadian Journal of Occupational Therapy / Revue Canadienne D'Ergothérapie*, *81*(2), 93–101. https://doi.org/10.1177/0008417414533185

Carson, N., Leach, L., & Murphy, K. J. (2018). A re-examination of Montreal Cognitive Assessment (MoCA) cutoff scores. *Int J Geriatric Psychiatry 33*(2), 379-388. doi: 10.1002/gps.4756

Centers for Disease Control and Prevention. (2016). *Rates of TBI-related emergency department visits, hospitalizations, and deaths — United States, 2001–2010*. Retrieved from https://www.cdc.gov/traumaticbraininjury/data/rates.html.

Centers for Disease Control and Prevention. (2017). *TBI: Get the facts*. Retrieved from https://www.cdc.gov/traumaticbraininjury/get_the_facts.html.

Conneeley, A. L. (2002). Social integration following traumatic brain injury and rehabilitation. *The British Journal of Occupational Therapy*, *65*(8), 356–362. https://doi.org/10.1177/030802260206500802

Cole, W. R., & Bailie, J. M. (2016). Neurocognitive and Psychiatric Symptoms following Mild Traumatic Brain Injury. In: Laskowitz D, Grant G, editors. *Translational Research in Traumatic Brain Injury*. Boca Raton (FL): CRC Press/Taylor and Francis Group. Chapter 19. Available from: https://www.ncbi.nlm.nih.gov/books/NBK326715/

Committee on the Assessment of Ongoing Effects in the Treatment of Posttraumatic Stress Disorder; Institute of Medicine. Treatment for Posttraumatic Stress Disorder in Military and Veteran Populations: Initial Assessment. Washington (DC): National Academies Press (US); 2012 Jul 13. 8, Co-Occurring Psychiatric and Medical Conditions and Psychosocial Complexities. Available from: https://www.ncbi.nlm.nih.gov/books/NBK201109/

Dams-O'Connor, K., Cantor, J. B., Brown, M., Dijkers, M. P., Spielman, L. A., & Gordon, W. A. (2014). Screening for traumatic brain injury: Findings and public health implications. *The Journal of Head Trauma Rehabilitation*, *29*(6), 479–489. https://doi.org/10.1097/HTR.0000000000000099

Defense Centers of Excellence for Psychological Health & Traumatic Brain Injury (2011). *Co-occurring conditions toolkit: Mild traumatic brain injury and psychological health.* Retrieved from http://www.ncdsv.org/images/DefCenExcel_Co-occurringConditionsToolkitMildTBIInjuryAndPsychoHealth_2011.pdf

Ettenhofer, M. L., & Barry, D. M. (2012). A comparison of long-term postconcussive symptoms between university students with and without a history of mild traumatic brain injury or orthopedic injury. *Journal of the International Neuropsychological Society*, *18*(3), 451–460. https://doi.org/10.1017/S1355617711001895

Glang, A., Koester, M. C., Beaver, S., Clay, J., & McLaughlin, K. (2010). Online training in sports concussion for youth sports coaches. *International Journal of Sports Science & Coaching*, *5*(1), 1–11. https://doi.org/10.1260/1747-9541.5.1.1

Hazan, R., Zhang, J., Brenkel, M., Shulman, K. & Feinstein, A. (2017). Getting clocked: screening for TBI-related cognitive impairment with the clock drawing test. *Brain Injury 31*(11), 1501-1506. doi: 10.1080/02699052.2017.1376763

Langthorn, L., & Wendling, T. (2012). Young athletes protected by concussion law. *Journal of Safety Research*, *43*(4), 311–312. https://doi.org/10.1016/j.jsr.2012.08.013

McGraw, K. (2016). Gender differences among military combatants: Does social support, ostracism, and pain perception influence psychological health? *Military Medicine, 181*(1, Suppl), 80-85. https://doi.org/10.7205/MILMED-D-15-00254

Meredith, L. S., Branstrom, R. B., Azocar, F., Fikes, R., & Ettner, S. L. (2011). A collaborative approach to identifying effective incentives for mental health clinicians to improve depression care in a large managed behavioral healthcare organization. *Administration and Policy in Mental Health and Mental Health Services Research*, *38*(3), 193–202. https://doi.org/10.1007/s10488-010-0313-0

Michel, J.A., & Mateer, C.A. (2006). Attention rehabilitation following stroke and traumatic brain injury. A review. *Europa medicophysica, 42 1*, 59-67. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/16565688

Nasreddine, Z.S., Phillips, N.A., Bedirian, V., Charbonneau, S., Whitehead, V., Collin, I., Cummings, J.L. & Chertkow, H. (2005). The Montral Cognitive Assessment, MoCA: A brief screening tool for mild cognitive impairment. *Journal of the American Geriatrics Society, 53*(695-699). doi: 10.1111/j.1532-5415.2005.53221.x

Peskind, E. R., Brody, D., Cernak, I., McKee, A., & Ruff, R. L. (2013). Military- and sports-related mild traumatic brain injury: Clinical presentation, management, and long-term consequences. *The Journal of Clinical Psychiatry*, *74*(2), 180–188. https://doi.org/10.4088/JCP.12011co1c

Ponsford, J., Kelly, A., & Couchman, G. (2014). Self-concept and self-esteem after acquired brain injury: A control group comparison. *Brain Injury*, *28*(2), 146–154. https://doi.org/10.3109/02699052.2013.859733

Silver, J. M., Kramer, R., Greenwald, S., & Weissman, M. (2001). The association between head injuries and psychiatric disorders: findings from the New Haven NIMH Epidemiologic Catchment Area Study. *Brain Injury, 15*(11), 935-945. doi:10.1080/02699050110065295

Tsaousides, T., Cantor, J. B., & Gordon, W. A. (2011). Suicidal ideation following traumatic brain injury: Prevalence rates and correlates in adults living in the community. *The Journal of Head Trauma Rehabilitation*, *26*(4), 265–275. https://doi.org/10.1097/HTR.0b013e3182225271