

Pain-Coping Traits of Nontraditional Women Athletes: Relevance to Optimal Treatment and Rehabilitation

Michael C. Meyers, PhD, FACSM*; Robert Higgs, LAT, ATC, CSCS†; Arnold D. LeUnes, EdD‡; Anthony E. Bourgeois, PhD‡; C. Matthew Laurent, PhD§

*Department of Sport Science and Physical Education, Idaho State University, Pocatello; †Montana State University, Bozeman; ‡Texas A&M University, College Station; §Bowling Green State University, OH

Context: The primary goal of traditional treatment and rehabilitation programs is to safely return athletes to full functional capacity. Nontraditional activities such as rock climbing or rodeo are typically less training structured and coach structured; individualism, self-determination, and autonomy are more prevalent than observed in athletes in National Collegiate Athletic Association (NCAA)-sponsored sports. The limited research available on nontraditional athletes has provided the athletic trainer little insight into the coping skills and adaptations to stressors that these athletes may bring into the clinical setting, especially among the growing number of women participating in these types of activities. A better understanding of the pain-coping traits of nontraditional competitors would enhance insight and triage procedures while heading off potential athlete-related risk factors in the clinical setting.

Objective: To quantify and compare pain-coping traits among individual-sport women athletes participating in nontraditional versus traditional NCAA-structured competition, with relevance to optimal treatment and rehabilitation.

Design: Cross-sectional study.

Setting: Data collected during each participant's respective group meeting before seasonal activity.

Participants or Other Participants: A total of 298 athletes involved in either nontraditional, non-NCAA individual sports (n

= 152; mean age = 20.2 ± 1.3 years; downhill skiing, martial arts, rock climbing, rodeo, skydiving, telemark skiing) or traditional NCAA sports (n = 146; mean age = 20.3 ± 1.4 years; equestrian, golf, swimming/diving, tennis, track).

Main Outcome Measure(s): All participants completed the Sports Inventory for Pain, a sport-specific, self-report instrument that measures pain-coping traits relevant to competition, treatment, and rehabilitation. Trait measures were direct coping, cognitive, catastrophizing, avoidance, body awareness, and total coping response. Data were grouped for analyses by type of athlete (nontraditional, traditional).

Results: We found a significant main effect for type of athlete (Wilks' λ , $F_{6,291} = 12.922$; $P = .0001$). Nontraditional sport athletes scored lower on direct coping ($P = .0001$), cognitive ($P = .0001$), catastrophizing ($P = .0001$), and total coping response ($P = .0001$) than traditional athletes.

Conclusions: Women participating in nontraditional individual-sport activity revealed less pronounced pain-coping traits than women participating in more coach-structured, traditional NCAA sports. Sport and medical personnel should consider the type of athlete when prescribing training, treatment, and rehabilitation for optimal performance and return to play.

Key Words: cognition, injury, gender, outdoor sports

Key Points

- Women participating in nontraditional, less coach-structured sport activity had less pronounced pain-coping traits than women participating in more traditional sports.
- A single traditional sport paradigm is insufficient for examining nontraditional athletes.
- Goals and expectations, the perception of quality of life, the degree of self-determination, conformity to traditional standards of care, the opportunity for open communication, and an effective support system need to be considered when treating nontraditional athletes.
- Before prescribing training, treatment, and rehabilitation for optimal performance and return to play, the clinician should take into account the athlete's sport.

The primary goal of traditional treatment and rehabilitation programs is to return the athlete to full functional capacity as quickly and safely as possible.¹ This goal is achieved with an aggressive program that may range from conservative management and patient guidance to state-of-the-art surgical techniques and effective rehabilitative modalities. Efficacy of the rehabilitation program is improved when the patient is encouraged to remain active and motivated, patient safety is ensured, and

existing clinical outcomes (eg, range of motion, strength, patient satisfaction) are complemented.¹

An extensive interaction of physical and psychological risk factors has been discussed in prior research that primarily focused on the individual response to trauma within the natural environment.^{2–6} From these paradigms, an emerging body of evidence is providing a clearer picture of the common traits used to cope with trauma. For instance, individuals who have been exposed to increasing levels of physical stress or trauma over time often exhibit

more robust coping traits.⁷⁻⁹ Although this degree of stress inoculation or “steeling effect” may be influenced by numerous factors (eg, level of education, intelligence, genetics, perceptions, self-enhancement and self-esteem, social support), coping traits associated with surviving trauma, such as resilience, diverting attention from discomfort, and increased confidence, provide an individual with the ability to minimize distress and successfully function physically and psychologically.⁷⁻⁹ Of particular interest is the growing body of research addressing psychological and behavioral attributes specific to sport injury and subsequent performance by professional to organized club-sport athletes.^{3,6,10-15}

COPING WITH INJURY IN SPORT

When compared with the nonsport setting, a similar level of stress inoculation has also been observed within the sport training and rehabilitative setting. Coping response, outcome expectancy, an athlete’s perception of control, and the type and level of athletic challenge or stress have been documented among athletes.^{14,16,17} Therefore, an athlete’s attitude toward trauma and the subsequent coping disposition and mechanisms that are called upon while experiencing trauma should influence the level of rehabilitative success and return to play.^{18,19} Findings, however, have been inconclusive, and limited attention has been focused on factors such as sex or type of sport.

Athletes involved in traditional National Collegiate Athletic Association (NCAA) sports experience unusually high levels of stress, expectations, and physical challenges within a short span of time.^{16,20} The psychological stress is exacerbated by the need to adapt quickly to the competitive environment going into the season. Existing coping resources deemed essential for optimal performance may not withstand increasing psychological and physical stressors.^{3,14,16,21,22} In the clinical setting, an athlete may also lose the ability to think clearly, resulting in irrational risk taking, noncompliance, and inadequate attention to the protocols required for successful treatment and rehabilitation, leading to further trauma or the need for extended care.^{3,20} Athletes in this environment typically have extensive national or university-governed organizational support systems in place (eg, NCAA), as well as a more coach-dominated, highly competitive training environment than observed in nontraditional sport settings.

The limited research available has provided few insights into coping mechanisms encountered in unique nontraditional environments, especially among the growing number of women participating in these sports.^{23,24} The nontraditional athlete is often not extrinsically motivated, typically prefers the solitude and escape that the sport provides, and would still participate regardless of media coverage, the presence of a crowd, or financial gain.^{11,25} These athletes frequently participate in less coach-structured, non-NCAA sports characterized by individualism, self-determination, and autonomy.^{13,15,26} Such nontraditional activities are often associated with adventurous or extreme sports such as downhill and telemark skiing, martial arts, rock climbing, rodeo, or skydiving. Further investigation is warranted to compare women involved in nontraditional sports (eg, rock climbing), who typically demonstrate intrinsic motivation, individualism, and the sheer enjoy-

ment of participation, with traditional-sport athletes, who focus on competing and dominating others.²⁴⁻²⁸

Prior research efforts have typically addressed the psychological response after injury. Given the increased stress within the sport environment and a concomitant rise in the number of severe injuries among today’s female athletes,^{12,18,21} an a priori approach would provide more meaningful insight into the psychological resolve that an athlete possesses, rather than primarily characterizing the psychological response after physical trauma of an athlete within the competitive environment. This would enhance awareness and triage procedures that reduce potential patient-related risk factors in the clinical setting and optimize recovery and return to play.^{4-6,12-14,18,19,21} Therefore, this study was conducted to quantify and compare pain-coping traits among individual-sport women athletes participating in nontraditional sports versus traditional NCAA-structured competition, with relevance to optimal treatment and rehabilitation. We hypothesized that women athletes participating in nontraditional, individual-sport activities would reveal a less pronounced pain-coping response than women participating in traditional coach-structured, individual NCAA sports.

METHODS

Participants

To ensure an adequate sample size, we recruited volunteers from a population of college-aged women athletes in a variety of individual sports with various levels of exposure to athletic trauma. Ultimately, pain-coping traits relevant to sport were evaluated in 298 women athletes (mean age = 20.3 ± 1.4 years) currently involved in individual sports at 10 university NCAA or club-sport programs.

Demographic information was obtained on individual sport, age, number of career injuries, and number of years competing in the specific sport. Although any definitions of injury and level of trauma lack universal agreement and have shortcomings, we attempted to define a career injury based on a combination of observation, treatment, and functional outcome.² A *reportable injury* was any activity or sport-related trauma that (1) caused an athlete to miss all or part of an activity or sporting event, (2) resulted in time away from competition, and (3) was reported to or treated by the athletic trainer or physician. All cranial and cervical trauma was reported.

To delineate the 2 groups, nontraditional athletes (n = 152; mean age = 20.2 ± 1.3 years) were those involved in the adventurous or extreme sports of downhill (n = 28) and telemark skiing (n = 21), martial arts (n = 18), rock climbing (n = 31), rodeo (n = 28), or skydiving (n = 26). All nontraditional programs were similar in nature: they either had an advisor or the athletes coached themselves with limited access and exposure to and influence of traditional NCAA-sponsored programs and staff. Traditional athletes (n = 146; mean age = 20.3 ± 1.4 years) were associated with the NCAA (Division I) sports of equestrian (n = 36), golf (n = 28), swimming/diving (n = 23), tennis (n = 33), or track (n = 26) and had extensive national or university-governed organizational support systems in place, as well

as a more coach-dominated, highly competitive training environment than observed in nontraditional sport settings.

Criteria for inclusion were college-aged women athletes who were presently competing in a single individual sport during the current season. This prevented the potential for crossover participation and subsequent confounding response because of multiple sport activities. The participants' skill levels ranged from national, state, or regional champions or qualifiers to general competitors who did not qualify for year-end awards or standings in their respective sport. No participants were injured at the time of data collection, yet all had experienced prior substantial but non-career-ending injuries in their sport.

Procedures

After we obtained institutional review board approval, we phoned coaches at various US universities, club-sports, and sport organizations to discuss the proposed research. Data were collected during their respective group meetings, before seasonal activity or play. All participants were fully informed of the nature of the study and provided written informed consent. The Sports Inventory for Pain (SIP)¹⁹ was administered to each participant and completed during a single meeting. Participants were encouraged to answer all questions to the best of their ability according to written directions. Completed inventories were then mailed to the principal investigators for scoring and statistical analyses.

Instrumentation

Sports Inventory for Pain. The SIP is a 25-item self-report instrument that measures 5 pain-coping traits relevant to the sport and clinical environments. Trait measures were direct coping (COP), cognitive (COG), catastrophizing (CAT), avoidance (AVD), and body awareness (BOD).¹⁹ The total coping response composite score (TCR = COP + COG – CAT) serves as an overall indicator of the ability to perform mentally while experiencing physical discomfort.

Originally based on the theory of stress inoculation and subsequent effect on performance,²⁹ the SIP is used to measure how the athlete mentally approaches stress from excessive physical exertion or injury (or both) and his or her disposition in the recovery or rehabilitative setting.¹⁹ The first 4 trait subscales (COP, COG, CAT, AVD) represent different types of coping mechanisms. The COP and COG subscales reflect the positive dimensions of an athlete's total pain-coping disposition. The COP subscale measures how much immediate attention an athlete gives to pain, discomfort, and injury during competition, treatment, or rehabilitation. High scorers on the COP scale tend to ignore pain, realize that pain is part of the sport environment, and in general, block the discomfort. A sample item is, "When hurt, I tell myself I can't let the pain stand in the way of what I want to do."^{11,13}

The COG subscale measures whether a person possesses the mental resolve to work through discomfort or pain. Individuals scoring high on the COP subscale might also score well on the COG subscale, reflecting mechanisms that the individual instinctively draws from to maintain focus on the task at hand. A sample item is, "When in pain, I replay in my mind pleasant performances from my past."

The CAT subscale detects those who tend to despair when injured. They dwell on the pain, feel that it is unbearable, and have essentially "given up." A sample item is, "When in pain, I worry all the time about whether it will end." A low score reflects an individual's ability to minimize catastrophic thinking and maintain an optimistic mindset while experiencing discomfort during athletic competition or rehabilitation.

The AVD subscale measures the extent to which a person exhibits avoidant mechanisms in dealing with pain. Thus, high scorers are thought to be less competitive when injured. A sample item is, "When in pain, I have to be careful not to make it worse." Recent data³⁰ suggest, however, that exemplary athletes may also score high on this subscale because, if injured, they tend to reserve activity for more serious challenges, ie, when it counts.

The BOD subscale was intended to measure whether a person is hyposensitive or hypersensitive to painful stimuli. As such, it was designed to serve as a possible covariant in pain studies of athletes. The subscale has emerged as a compelling predictor of pain response and subsequent physical outcome in some sport populations.^{13,19} A sample item is, "I seldom notice minor injuries." High scores on this subscale reflect an above-average sensitivity toward discomfort, whereas low scores indicate a tendency to ignore or not dwell on painful stimuli.

The items, developed according to predefined scale construct techniques,³¹ are scored using a 5-point Likert format ranging from *strongly agree* (1) to *strongly disagree* (5). For each subscale and composite score, the number of items and range of scores, respectively, are as follows: COP (8; 8 to 32), COG (5; 5 to 25), CAT (4; 4 to 16), AVD (4; 4 to 16), BOD (4; 4 to 16), and TCR (17; –3 to 53). Adequate internal consistency (Cronbach α = 0.61 to 0.88), test-retest reliability (r = 0.69 to 0.86), and low social desirability (Marlowe-Crowne r = –0.28 to –0.13) have been well established in a number of noncontact and adolescent sport populations.^{13,19,30} Based on prior studies,^{13,19,30,32} the SIP has emerged as a reliable predictor of pain-induced psychological distress and subsequent athletic performance in both the athletic and clinical environments.

Data Analyses

Data were grouped for analyses with the SIP subscales and composite according to type of sport athlete (nontraditional, traditional). Multivariate analyses of variance (MANOVAs) and Wilks' λ tests were performed using the general linear model procedures of SPSS (version 19; SPSS Inc, Chicago, IL) to determine significant main effects. Data screening revealed no violations of assumptions related to sample size, bivariate linearity, multivariate normality and outliers, multicollinearity, singularity, or size of the correlations.³¹ Because of unequal numbers of observations to assess differences among variables, we conducted least squares means procedures. Univariate post hoc procedures were performed when significant main effects were observed. Statistical significance was determined a priori at the .05 level. To make the data more meaningful, we converted raw SIP scores to normalized standard scores (T-scores) with a mean of 50 and a standard deviation of 10 (Figure). The use of T-scores is a commonly accepted psychometric procedure that allows

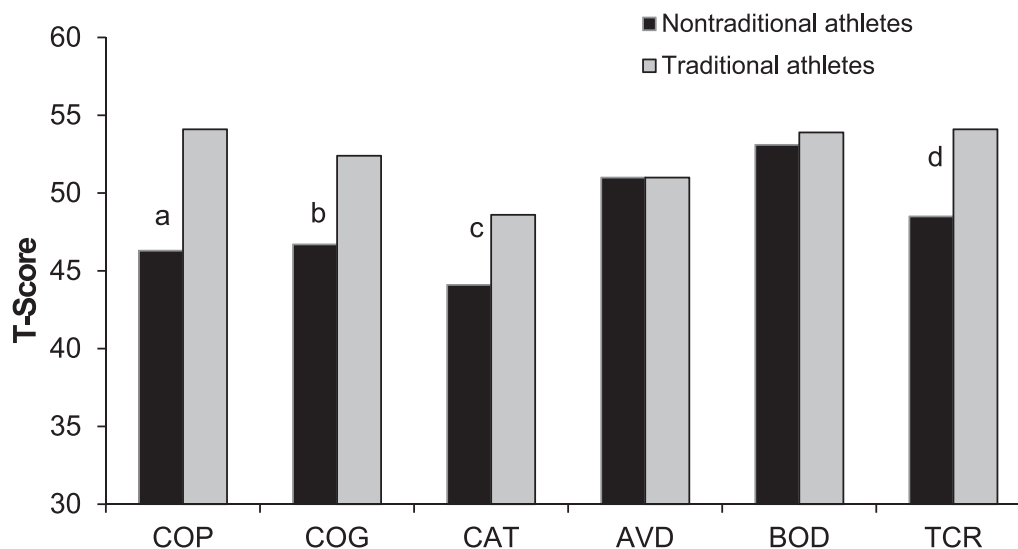


Figure. Mean Sports Inventory for Pain T-score responses of female individual-sport athletes participating in nontraditional versus traditional competition. Scales: COP, direct coping; COG, cognitive; CAT, catastrophizing; AVD, avoidance; BOD, body awareness; TCR, total coping response; T-scores (mean = 50, SD = 10); nontraditional athletes ($n = 152$), traditional athletes ($n = 146$); Wilks' λ $F_{6,291} = 12.922$; $P = .0001$; $\eta^2 = 1.000$; a, b, c, d $P = .0001$.

comparisons of scales containing different numbers of items.³¹

RESULTS

Because descriptive variables such as age, number of career injuries, and number of years of sport experience can have a profound or statistically confounding effect on subsequent psychological responses, we initially used MANOVA with Wilks' λ criterion to determine possible differences. Wilks' λ criterion indicated no significant main effect ($F_{3,294} = 0.106$; $P = .957$; $\eta^2 = 0.069$) between nontraditional and traditional individual-sport athletes, respectively, for age (20.2 ± 0.1 versus 20.2 ± 0.1 years; $P = .848$), number of career injuries (2.3 ± 0.2 versus 2.3 ± 0.2 ; $P = .644$), or number of years of sport experience (7.3 ± 0.4 versus 7.2 ± 0.4 years; $P = .861$).

Multivariate analyses of variance were then conducted to compare SIP scores of women athletes involved in both nontraditional and traditional individual sports. Wilks' λ indicated a significant main effect for type of sport competitor ($F_{6,291} = 12.922$; $P = .0001$; $\eta^2 = 1.000$; Figure). Post hoc procedures (mean \pm SE) indicated that nontraditional athletes scored lower in COP ($P = .0001$), COG ($P = .0001$), CAT ($P = .0001$), and TCR ($P = .0001$) than traditional athletes. No differences were observed in AVD ($P = .707$) or BOD ($P = .450$) responses. When we compared our findings with SIP norms (T-score mean = 50; Figure), nontraditional athletes in this study demonstrated lower scores across most subscales than athletes in traditional sports.¹⁹

DISCUSSION

Although psychometric testing has been successfully used to assess skill level, injury response, rehabilitation compliance, and stress in studies with various athletic populations,^{13,19,32} no authors, to our knowledge, have addressed coping disposition in a unique group of competitors involved in sports typically characterized by

intrinsic motivation, individualism, self-determination, and autonomy. Therefore, this study was conducted to quantify and compare pain-coping styles among individual-sport women athletes participating in nontraditional versus traditional NCAA-structured competition with relevance to optimal treatment and rehabilitation.

The higher scores in COP, COG, CAT, and TCR among the traditional individual-sport group may reflect the training environment, coaching influence, sport socialization, or perceived unforeseen but controlled challenges (or a combination of these). Prior findings, however, have been limited and equivocal with regard to a woman's perception and response to discomfort. Early studies indicated that women athletes sometimes shifted to a more aggressive, achievement-oriented mentality in response to more demanding challenges,³³ whereas others have reported either a more emotion-based response among women with subsequent negativity to impending stress¹⁷ or perceived stress similar to men, albeit with different coping styles.²⁴ Women in traditional sports may be encouraged by coaches to attempt challenges beyond their physical capabilities, ultimately exposing themselves to greater potential for musculoskeletal trauma and subsequently greater stress inoculation than nontraditional women participants.^{20,28} Apart from the conjecture, most researchers have pointed to a higher pain threshold, greater tolerance of physical tasks, more cognitive pain adaptation, and greater treatment and rehabilitation responses among women athletes who have experienced a greater number and severity of physical traumas.^{19,34} Again, the significantly higher degree of coping response exhibited by the traditional-sport group may be a function of the inherent nature of the highly competitive, coach-influenced environment; clinical staff need to be cognizant of these factors to avoid encouraging or rewarding excessive efforts of traditional athletes during treatment and rehabilitation.

The nonsignificant difference in AVD between groups is not surprising. Individual-sport competitors are solely responsible and accountable, and thus, cannot avoid the

challenge in front of them or receive assistance from a teammate. Only the nature of the challenge differs, whether it is a human in tennis or an animal adversary in rodeo, or whether the competition is conducted on a standard course as in golf or is a geographic challenge as in rock climbing.

The nonsignificant difference in BOD between traditional and nontraditional athletes may reflect an analogous, instinctive understanding or sensitivity to the task at hand; that meeting the challenge primarily resides within them, a challenge that cannot be shared with or alleviated by others during competition, and a challenge that requires an internalist mentality—a mentality that win, lose, or draw, the outcome is solely dependent on them. A limited number of studies have touched upon defining locus of control among nontraditional athletes.^{25,28} Further efforts, however, are warranted to confirm this theory.

As opposed to traditional individual sports, for which extensive national or university-governed organizational support systems are in place, the unique nature of nontraditional individual sports often requires that the athlete compete under adverse climatic conditions without optimal protection, facing challenges beyond his or her control (eg, difficult terrain, dysfunctional equipment, uncooperative livestock), and encountering delayed or compromised medical and rehabilitative care.^{15,17,26,35} Although the literature suggests that these uncontrolled experiences resulted in substantial adaptation to future challenges beyond what would be considered normal, our findings indicated more positive pain-coping mechanisms among traditional women athletes. These results also contrast with those of a prior study²⁸ that demonstrated similar responses in traditional and nontraditional competitors pain coping.

FINDING A NONTRADITIONAL APPROACH

Based on the findings of this study, today's athletic trainer is in a unique position to optimize rehabilitation outcomes and return an injured player to activity by (a) approaching the nontraditional athlete from a biopsychosocial rather than a biomedical model, (b) understanding what drives the nontraditional athlete, and (c) adjusting the standard rehabilitation mentality to optimize return to activity with this unique nontraditional population.^{12,36–38}

Moving to a Biopsychosocial Model

Although the biopsychosocial model was first introduced more than 30 years ago, it is now gaining acceptance as a way of thinking that incorporates psychological, behavioral, emotional, social, and environmental indices with traditional medical and biological underpinnings.^{10,39} Despite the current support of the National Athletic Trainers' Association for competencies that now include psychosocial strategies⁴⁰ and increasing awareness by sports medicine professionals of the benefits of using psychosocial techniques in their practice,^{10,41,42} challenges will remain in successfully integrating these concepts consistently with both traditional and nontraditional athletes. The lack of specific, uniform guidelines; inadequate knowledge of the psychological factors that affect injured athletes, leading to misconceptions; and the questionable competence that some athletic trainers feel when working in the psychosocial arena have been documented in the literature.^{6,10,39,42}

However, athletes will be more receptive to sports medicine professionals who are willing to extend their concern beyond the sport environment and can relate to the personal dynamics that any athlete faces on a daily basis.^{6,10,12}

Understanding What Drives the Nontraditional Athletes

Among traditional athletes, self-worth and self-esteem are associated with participation in sport. Stressors often stem from nonparticipation due to injury or from teammates competing for their position. Nontraditional athletes exhibit similar levels of self-worth and self-esteem as traditional athletes, contributing to their continuing involvement in the activity, but teammates or a position on a team may not be major influences on their plans during rehabilitation and return to activity.

The nontraditional athlete's success is primarily determined by the ability to compete on a continual basis. Factors such as adverse climatic conditions, severity of injuries, extensive travel, and delayed or compromised medical and rehabilitative care rarely seem to influence the nontraditional athlete's competitive drive.^{6,26,35,38,43–46} Romantic tradition holds that the nontraditional athlete endures such hardships with quiet dignity, a perceived supranormal tolerance to pain, and unyielding demand for perfection against ever-changing competitive conditions.^{11,13,46,47}

Yet the unique stoicism, pain perception, and consequent dissociation exhibited among this population can result in detrimental behavior and practices. After receiving emergency care, many of these athletes continue to compete through the season.^{26,35,38,46} This behavior has also been defined as a form of *positive deviance* supported by strong psychosocial constructs developed through tradition and culture.^{38,48} Others have commented on the narcotic or addictive behavior that transcends certain and continued risk after injury, thus preventing essential trauma management and optimal return to competition.^{30,47–49}

Additional contributing behavioral factors associated with injuries among nontraditional athletes typically are inexperience dealing with the traditional clinical environment and low levels of coping mechanisms, as observed in this study.^{6,50–52} Among many nontraditional athletes, inherent personality factors reflect low trait anxiety, high pain tolerance and self-reliance, and extroverted tendencies.^{3,13,35} When confronted with the realities of optimal sports medicine care, and combined with peer pressure and nontraditional social norms, rules of caution and safety are often disregarded as the nontraditional competitor pushes the bounds beyond physical capabilities.^{26,30,35,45,46,49,53} In either case, these behaviors can result in a plethora of unnecessary injuries.^{11,13,32,35,38}

Proposed theories of self-concept affecting injury potential, the dissociation of pain as a function of individual perception, cognitive approaches to performance demands, and emotional and somatic responses to rehabilitative processes have been defined in earlier investigations.^{13,19,54} Research into the psychosocial behavior of the nontraditional athlete, however, is lacking in the literature, limiting our understanding of underlying mechanisms and often minimizing the efficacy of injury prevention, treatment, and rehabilitation programs in this population. This is where the

sports medicine professional can be indispensable in educating, guiding, and shaping the nontraditional mindset during the recovery and rehabilitative journey.^{12,55,56}

Adjusting Standard Rehabilitation Mentality to Optimize Return to Activity

The main point when working with nontraditional athletes is to seek opportunities to address the similarities to traditional athletes while embracing their unique outlook and expectations. The following suggestions may be useful in creating an environment for optimal return to activity.

Keep the Athlete Connected. As opposed to the traditional athlete who wishes to avoid a sense of disconnect and remain an active participant in the sport but typically must be cleared for play by the university sports medicine staff, the nontraditional athlete's autonomy and mindset will be directed at remaining engaged with the activity.^{26,35} These athletes are very competitive but are pursuing the activity for more internal and self-directed satisfaction. Integrating standard rehabilitative modalities with nontraditional activities will both optimize coping skills and enhance the athlete's understanding of and interest in the process.¹⁰ The sport activity may be a major part of the athlete's life year round with no off-season and contributes to his or her ability to build or maintain self-confidence.

Establish a Network for Injured Nontraditional Athletes to Communicate. Using today's social media, many traditional athletes may have already established a support system of friends and athletes within their sport to assist them in adjusting to substantial levels of stress in the competitive or rehabilitative environment. We should encourage nontraditional athletes to do the same. Also, communicating with health care providers who work in regions that are conducive to nontraditional sports increases the clinician's network and knowledge base and provides the athlete opportunities to reach out to other nontraditional individuals with similar injury experiences and mindsets. The proper clinical support system makes it possible to manipulate or simulate activity-specific challenges, which may improve the athlete's coping mechanisms to more effectively handle mental and physical trauma.

Be Familiar With Sport. Optimal communication is a 2-way street. Communication skills are enhanced when the health care provider goes the extra mile in understanding the nontraditional athlete's preparatory and competitive experiences. Making the extra effort to become familiar with the activity also reflects a level of caring that may enhance patient trust and compliance, strengthening the bond between provider and patient, and ensure that the medical recommendations are appropriate for the athlete.^{10,12,55}

Understand Nontraditional Expectations. For many athletes, the goal or end result of the activity may also merit exploration. As opposed to the traditional athlete, who needs to compete to maintain or improve upon her position on the team or feels stressed when unable to help teammates succeed, the nontraditional athlete may exhibit little need or stress in these areas. Although the coping skills of nontraditional athletes may not be as robust as those of traditional athletes, it is important to avoid underestimating the resolve of this unique group. The

nontraditional athlete expects to return when he or she feels ready in any manner possible, without regard for a litany of guidelines.^{26,38,57} Many injuries are not managed by medical personnel, and injury awareness is often hampered by an individual's behavior or pain threshold (or both).^{26,35,46} The nontraditional athlete's perception and understanding of exactly what an injury encompasses, the degree of severity, and the treatment required for a successful prognosis can also impede optimal recovery in this group.^{35,51,57}

Compounding the challenge is that, in many instances, the injury may have occurred at a significant distance from a trauma center, thereby delaying qualified medical care and reinforcing self-treatment and subsequent noncompliance, especially when the injury does not limit ambulation.^{26,35,38} In addition, the level of knowledge about self-medication after injury among many nontraditional athletes has been questioned.^{38,58} Most studies have indicated that this sport population has not been educated adequately in the efficacy and appropriate use of nonsteroidal anti-inflammatory drugs or other drugs used to assist with optimal return to competition, an area that warrants attention.

In summary, our findings suggest that the nontraditional athlete's drive to return to her routine and the coping mechanisms necessary to successfully manage injuries should be identified. Furthermore, the nontraditional athlete's goals and expectations, perception of quality of life, degree of self-determination, conformity to traditional standards of care, opportunity for open communication, and support system should be addressed before and during treatment. The nontraditional athlete's rehabilitation outcome may still exceed clinical expectations but may not conform to traditional modalities or expected time frames. Understanding the behavior of these unique patients may be integral to successful injury management.¹²

Limitations

Although differences did exist between traditional and nontraditional athletes, our study was not without its limitations, as a number of factors may influence the pain-coping style of an individual after actual athletic trauma. Potentiating factors such as locus of control, athletic identity, hardiness, and nonsport-related life stressors are thoroughly described elsewhere^{18,21,22} and beyond the scope of this article. In addition, the influence of prior environment, history of injury, hormonal patterns, location of injury, nutrition, and degree of social and cultural exposure to other sports must be acknowledged.^{34,37} These factors may have influenced the responses of both groups and therefore not have affected the results.

Lastly, the dependence on self-reported data, as is often the case with psychological studies, remains a concern.² In retrospect, our experience is that interested athletes typically provide more effort than uninterested competitors, which optimizes the validity of any study. A key strength of our study was the prospective cohort multivariate design, which allowed for greater insight into both significant and subtle differences between traditional-sport athletes and nontraditional, individual-sport athletes; the latter group has not been studied extensively.

Clinical Implications

The attenuated pain-coping mechanism of our nontraditional, individual-sport athletes ultimately is ephemerally driven by values not seen among traditional competitors. The groups perceive physical challenges and trauma in different paradigms. The paradigm of the nontraditional athlete nurtures cooperative participation, self-achievement, and self-understanding, thereby side stepping the traditional sport model, which reflects an environment of continual human confrontation, supremacy, and aggression.³⁶ Nontraditional athletes may be simply more carefree and less concerned with injury than traditional collegiate athletes.³⁵ Ultimately, within the clinical setting, the less pronounced pain-coping mechanism may indicate that the athlete will not respond optimally to the usual methods of coaches and clinicians during her treatment and rehabilitation. Her mindset may affect how she defines and approaches both competition and success. This group is often not influenced by traditional training, coaching, locker room, or team influences and has developed its coping disposition primarily from unstructured human versus environmental challenges rather than structured human-versus-human competition.^{26,35}

However, we do not know if nontraditional, individual-sport activities develop this unique mindset or if individuals with this mindset gravitate toward nontraditional individual sports, where this mindset is accepted and nurtured. To achieve clinical success with this nontraditional population, an athletic trainer may need to alter his or her usual clinical expectations and the time frame to full recovery. This may involve different tactics or a different approach and an acceptance of how these athletes perceive themselves, their success, and their progress. Again, limited and fragmented focus on the nontraditional mindset prevents extensive discussion and yet provides fertile opportunity for additional conversation in a burgeoning area of sport participation and media exposure.

CONCLUSIONS

The successful treatment and rehabilitation of athletes is contingent upon many factors. In this study, we investigated the pain-coping styles of nontraditional women athletes in a variety of individual-sport activities and demonstrated differences between nontraditional and traditional athletes. The attenuated pain-coping style in this population has not been reported elsewhere, to our knowledge. The findings also support our hypothesis that women participating in nontraditional sport activities would reveal less pronounced pain-coping styles than women participating in more traditional coach-structured sports. We hope these results will be used to stimulate continued research into the pain-coping responses of nontraditional populations during treatment and rehabilitation.

REFERENCES

1. Meyers MC, Sterling JC, Marley RR. Efficacy of stairclimber versus cycle ergometry in postoperative anterior cruciate ligament rehabilitation. *Clin J Sport Med*. 2002;12(2):85–94.
2. Meyers MC. Incidence, mechanisms, and severity of game-related college football injuries on FieldTurf versus natural grass: a 3-year prospective study. *Am J Sports Med*. 2010;38(4):687–697.
3. Van Mechelen W, Twisk J, Molendijk A, Blom B, Snel J, Kemper HC. Subject-related risk factors for sports injuries: a 1-year prospective study in young adults. *Med Sci Sports Exerc*. 1996;28(9):1171–1179.
4. Engel GL. The need for a new medical model: a challenge for biomedicine. *Science*. 1977;196(4286):129–136.
5. Evans RG, Stoddart GL. Producing health, consuming health care. *Soc Sci Med*. 1990;31(12):1347–1363.
6. Wiese-Bjornstal DM. Psychology and socioculture affect injury risk, response, and recovery in high-intensity athletes: a consensus statement. *Scand J Med Sci Sports*. 2010;20(suppl 2):103–111.
7. Bonanno GA. Loss, trauma, and human resilience: have we underestimated the human capacity to thrive after extremely aversive events? *Am Psychol*. 2004;59(1):20–28.
8. Ray O. How the mind hurts and heals the body. *Am Psychol*. 2004;59(1):29–40.
9. Taylor SE, Kemeny ME, Reed GM, Bower JE, Gruenewald TL. Psychological resources, positive illusions, and health. *Am Psychol*. 2000;55(1):99–109.
10. Clement D, Granquist MD, Arvinen-Barrow MM. Psychosocial aspects of athletic injuries as perceived by athletic trainers. *J Athl Train*. 2013;48(4):512–521.
11. Encarnacion ML, Meyers MC, Ryan ND, Pease DG. Pain coping styles of ballet performers. *J Sport Behav*. 2000;23(1):20–32.
12. Johnson SB. Increasing psychology's role in health research and health care. *Am Psychol*. 2013;68(5):311–321.
13. Meyers MC, Bourgeois AE, LeUnes A. Pain coping response of collegiate athletes involved in high contact, high injury-potential sport. *Int J Sport Psychol*. 2001;32(1):29–42.
14. Tracey J. The emotional response to the injury and rehabilitation process. *J Appl Sport Psychol*. 2003;15(4):279–293.
15. Meyers MC, LeUnes AD, Elledge JR, Sterling JC, Tolson H. Injury incidence and psychological mood state patterns in collegiate rodeo athletes. *J Sport Behav*. 1992;15(4):297–306.
16. Pensgaard AM, Ursin H. Stress, control, and coping in elite athletes. *Scand J Med Sci Sports*. 1998;8(3):183–189.
17. Johnson U. Coping strategies among long-term injured competitive athletes: a study of 81 men and women in team and individual sports. *Scand J Med Sci Sports*. 1997;7(6):367–372.
18. Junge A. The influence of psychological factors on sports injuries: review of the literature. *Am J Sports Med*. 2000;28(suppl 5):S10–S15.
19. Meyers MC, Bourgeois AE, Stewart S, LeUnes A. Predicting pain response in athletes: development and assessment of the Sports Inventory for Pain. *J Sport Exerc Psychol*. 1992;14(3):249–261.
20. Meyers MC, Brown BR, Bloom JA. Fast pitch softball injuries. *Sports Med*. 2001;31(1):61–73.
21. Green SL, Weinberg RS. Relationships among athletic identity, coping skills, social support, and the psychological impact of injury in recreational participants. *J Appl Sport Psychol*. 2001;13(1):40–59.
22. Hanson SJ, McCullagh P, Tonymon P. The relationship of personality characteristics, life stress, and coping resources to athletic injury. *J Sport Exerc Psychol*. 1992;14(3):262–272.
23. Crocker PR, Graham TR. Coping by competitive athletes with performance stress: gender differences and relationships with affect. *Sport Psychol*. 1995;9(3):325–338.
24. Hammermeister J, Burton D. Gender differences in coping with endurance sport stress: are men from Mars and women from Venus? *J Sport Behav*. 2004;27(2):148–164.
25. Feher P, Meyers MC, Skelly WA. Psychological profile of rock climbers: state and trait attributes. *J Sport Behav*. 1998;21(2):167–180.
26. Haas JC, Meyers MC. Rock climbing injuries. *Sports Med*. 1995;20(3):199–205.

27. Hallin RG. Pain more painful in women. Gender perspective neglected in research on the biological mechanisms of pain. *Lakartidningen*. 2003;100(46):3738–3741.
28. Trafton T, Meyers MC, Skelly WA. Psychological characteristics of the telemark skier. *J Sport Behav*. 1997;20(4):465–476.
29. Epstein S. Toward a unified theory of anxiety. In: Maher B, ed. *Progress in Experimental Personality Research*. New York, NY: Academic Press; 1967.
30. Griffith JD, Hart CL, Goodling M, Kessler J, Whitmire A. Responses to the Sports Inventory for Pain among BASE jumpers. *J Sport Behav*. 2006;29(3):242–254.
31. Anastasi A. *Psychological Testing*. 6th ed. New York, NY: Macmillan; 1988.
32. Levy AR, Polman RC, Clough PJ, Marchant DC, Earle K. Mental toughness as a determinant of beliefs, pain, and adherence in sport injury rehabilitation. *J Sport Rehabil*. 2006;15(3):245–253.
33. Stein A, Bailey M. The socialization of achievement orientation in females. *Psychol Bull*. 1973;80(5):345–366.
34. Berkley KJ. Sex differences in pain. *Behav Brain Sci*. 1997;20(3):371–380.
35. Aleman KB, Meyers MC. Mountain biking injuries in children and adolescents. *Sports Med*. 2010;40(1):77–90.
36. Sage GH. *Power and Ideology in American Sport: A Critical Perspective*. Champaign, IL: Human Kinetics; 1990.
37. Fillingim RB. Sex, gender, and pain: women and men really are different. *Curr Rev Pain*. 2000;4(1):24–30.
38. Meyers MC, Laurent CM. The rodeo athlete: injuries—part II. *Sports Med*. 2010;40(10):817–839.
39. Stiller-Ostrowski JL, Hamson-Utley JJ. Athletic trainers' educational satisfaction and technique use within the psychosocial intervention and referral content area. *Athl Train Educ J*. 2010;5(1):4–11.
40. National Athletic Trainers' Association. *Athletic Training Educational Competencies*. 5th ed. Dallas, TX: National Athletic Trainers' Association; 2011.
41. Ford IW, Gordon S. Perspectives of sport trainers and athletic therapists on the psychological content of their practice and training. *J Sport Rehabil*. 1998;7(2):79–94.
42. Larson, GA, Starkey C, Zaichkowsky LD. Psychological aspects of athletic injuries as perceived by athletic trainers. *Sport Psychol*. 1996;10(1):37–47.
43. Evans JP, Freeman TR. Rodeo injuries. *Sports Med Update*. 1996;10(4):4–11.
44. Kotarba JA. Conceptualizing sports medicine as occupational health care: illustrations from professional rodeo and wrestling. *Qual Health Res*. 2001;11(6):766–779.
45. Fountain J, Meyers MC. Skateboarding injuries. *Sports Med*. 1996;22(6):360–366.
46. Meyers MC, Sterling JC, Souryal TO. Radiographic findings of the upper extremity in collegiate rodeo athletes. *Med Sci Sports Exerc*. 2003;35(4):543–547.
47. Pearson DW, Haney CA. The rodeo cowboy as an American icon: the perceived social and cultural significance. *J Am Culture*. 1999;22(4):17–21.
48. Hughes R, Coakley J. Positive deviance among athletes: the implications of overconformity to the sport ethic. *Sociol Sport J*. 1991;8(4):307–325.
49. Vanderford L, Meyers MC. Injuries and bungee jumping. *Sports Med*. 1995;20(6):369–374.
50. Schmitt H, Gerner HJ. Paralysis from sport and diving accidents. *Clin J Sport Med*. 2001;11(1):17–22.
51. Smith RE, Smoll FL, Ptacek JT. Conjunctive moderator variables in vulnerability and resiliency research: life stress, social support and coping skills, and adolescent sport injuries. *J Pers Soc Psychol*. 1990;58(2):360–370.
52. Watson AW. Sports injuries: incidence, causes, prevention. *Phys Ther Rev*. 1997;2(3):135–151.
53. Parkkari J, Kujala UM, Kannus P. Is it possible to prevent sports injuries? Review of controlled clinical trials and recommendations for future work. *Sports Med*. 2001;31(14):985–995.
54. Lamb M. Self-concept and injury frequency among female college field hockey players. *J Athl Train*. 1986;21(3):220–224.
55. Wiese DM, Weiss MR. Psychological rehabilitation and physical injury: implications for the sports medicine team. *Sport Psychol*. 1987;1(4):318–330.
56. Pearson L, Jones G. Emotional effects of sports injuries: implications for physiotherapists. *Physiotherapy*. 1992;78(10):762–770.
57. Thor J. Realities of rodeo. *Lancet*. 2003;362(suppl):S52–S53.
58. Lanier AB. Use of nonsteroidal anti-inflammatory drugs following exercise-induced muscle injury. *Sports Med*. 2003;33(3):177–185.

Address correspondence to Michael C. Meyers, PhD, FACSM, Department of Sport Science and Physical Education, Idaho State University, 921 South 8th Avenue, Stop 8105, Pocatello, ID 83209-8105. Address e-mail to meyersgroupinc@gmail.com.