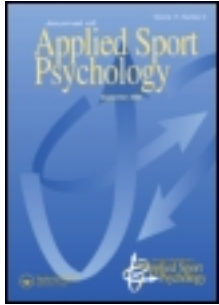


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An integrated model of response to sport injury: Psychological and sociological dynamics

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An Integrated Model of Response to Sport Injury: Psychological and Sociological Dynamics

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This paper reviews literature on the psychological and sociological dynamics of response to sport injury. An integrated model is illustrated which provides a synthesis of existing conceptual models depicting the dynamic process of psychological response to sport injury. This integrated model encompasses personal and situational moderating factors, as well as cognitive, emotional, and behavioral responses of athletes to sport injury. Empirical research on the cognitive appraisals and emotional responses associated with sport injury is reviewed and general themes are summarized. As the cultural context of sport has a major influence on these cognitive appraisals and emotional responses, sociological literature on sport injury is also highlighted. Concluding recommendations are made for future research on the psychological and sociological dimensions of sport injury.

Researchers have examined the psychology of sport injury from both preinjury and postinjury standpoints. Preinjury psychological factors

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deemed related to sport injury occurrence include personality, life stresses and coping resources (Andersen & Williams, 1988; see paper by Williams & Andersen, this issue). Once sport injury occurs, psychological consequences of sport injury encompass cognitive, emotional, and behavioral responses (Wiese-Bjornstal, Smith, & LaMott, 1995). With respect to these postinjury responses, the purposes of the present paper are as follows: to provide an integrated model of psychological response to the sport injury and rehabilitation process, to review literature on the cognitive appraisal and emotional response components of the model, and to examine the sociological literature on sport injury to gain a broader perspective on the influences of the social environment on response to sport injury.

Conceptual Models of Psychological Response

Several conceptual models provide frames of reference for understanding psychological response to sport injury. These have primarily included stress process and grief process models. The following discussion represents a brief survey of these models.

Weiss and Troxel (1986) first identified the importance of examining personal and situational factors as affecting athlete responses to injury stress. At the time of their investigation, very limited empirical evidence existed. These authors thus linked their model of psychological response to research from related areas of sport stress, such as the sport anxiety literature. Wiese and Weiss (1987) provided a simplified illustration of the basic stress process model (Selye, 1974) identified by Weiss and Troxel as a suitable model for understanding the sport injury process. This process model considers the sport injury as a stressor that prompts cognitive appraisals. These cognitive appraisals influence emotional responses, which in turn affect behavioral responses.

About this time, Pederson (1986) and Gordon (1986) discussed the possibility of athletes exhibiting a grief response subsequent to sport injury. Their work was influenced by Kubler-Ross (1969), who identified a five stage grief reaction response: denial, anger, bargaining, depression, and acceptance or reorganization. As with the stress-based models, virtually no empirical support existed to document a stage-based grief response. Gordon (1986) also, however, outlined the need to examine sport injury response from a cognitive-behavioral approach.

A conceptual model was elicited through an inductive qualitative grounded theory approach by Rose and Jevne (1993). Rose and Jevne interviewed seven competitive athletes and derived a four phase "risks model": getting injured, acknowledging the injury, dealing with the impact of injury and achieving a physical and psychosocial outcome. A fundamental process in this model was "learning the lessons" of injury that was similar to the adaptation process model identified by Gavin and Taylor (1992). This model, also derived from interviews with injured athletes, described phases of incremental and decremental adjustment to athletic injury.

Recent adaptations of the stress process and cognitive appraisal models have extended the preinjury model of Andersen and Williams (1988) into the postinjury phase. Wiese-Bjornstal and Smith (1993) and Wiese-Bjornstal et al. (1995) proposed both conceptual and operational models of postinjury psychological response derived from a deductive analysis of existing empirical research. Factors included in the operational model were elements for which empirical support existed (for a complete review see Wiese-Bjornstal et al., 1995). Grove (1993) also provided a stress-based model, which focused on personality as a factor influencing the thoughts, feelings and behaviors of athletes during rehabilitation.

Brewer's (1994) review of stage-based versus process-based models concluded that cognitive appraisal models appear to hold the greatest promise for understanding the sport injury process. Evans and Hardy (1995), however, argued that recent conceptualizations of the grief response expressed in the clinical psychology literature suggest that it is less stage-like and more dynamic than earlier versions, and thus worthy of attention from sport psychology researchers. They suggested that grief be viewed—in the context of sport injury—as “an emotional response to perceived loss, and as a process characterized by behavioral and psychological manifestations” (Evans & Hardy, 1995, p. 242).

The cognitive appraisal and grief process models are not mutually exclusive. For example, the sense of loss prevalent in sport injury (Astle, 1986; Evans & Hardy, 1992; Hardy, 1992) is a type of cognitive appraisal that leads to emotions commonly associated with grief. As such, the grief process models, as applied to sport injury, could be subsumed by a broader integrated stress process model as depicted in Figure 1. The integrated model posits that preinjury (Andersen & Williams, 1988) and postinjury (Wiese-Bjornstal et al., 1995) factors influence psychological response, that psychological response can and does change over time in a dynamic way, and that recovery—both physical and psychological—is the process outcome. The personal and situational factors listed in the model are continuously in the background of the dynamic process, and thus continue to exert their effects throughout. The bi-directional arrows at the core of the model illustrate the dynamic nature of the recovery process. Although the predominant path followed is that cognitive appraisals affect emotions, which in turn affect behaviors, certainly influences in the reverse direction are also possible. One should also envision this dynamic core as a three dimensional spiral, heading in the upward direction toward full recovery if the recovery outcomes are positive, or in the downward direction away from full recovery if the recovery outcomes are negative.

We have carefully documented the literature providing the basis for elements included in this model in a previous paper (see Wiese-Bjornstal et al., 1995), and several recent investigations have provided support for multiple components of this model (e.g., LaMott, 1994; Morrey, 1997; Shaffer, 1997). Our depiction and discussion of this integrated model will continue to evolve as elements are empirically tested.

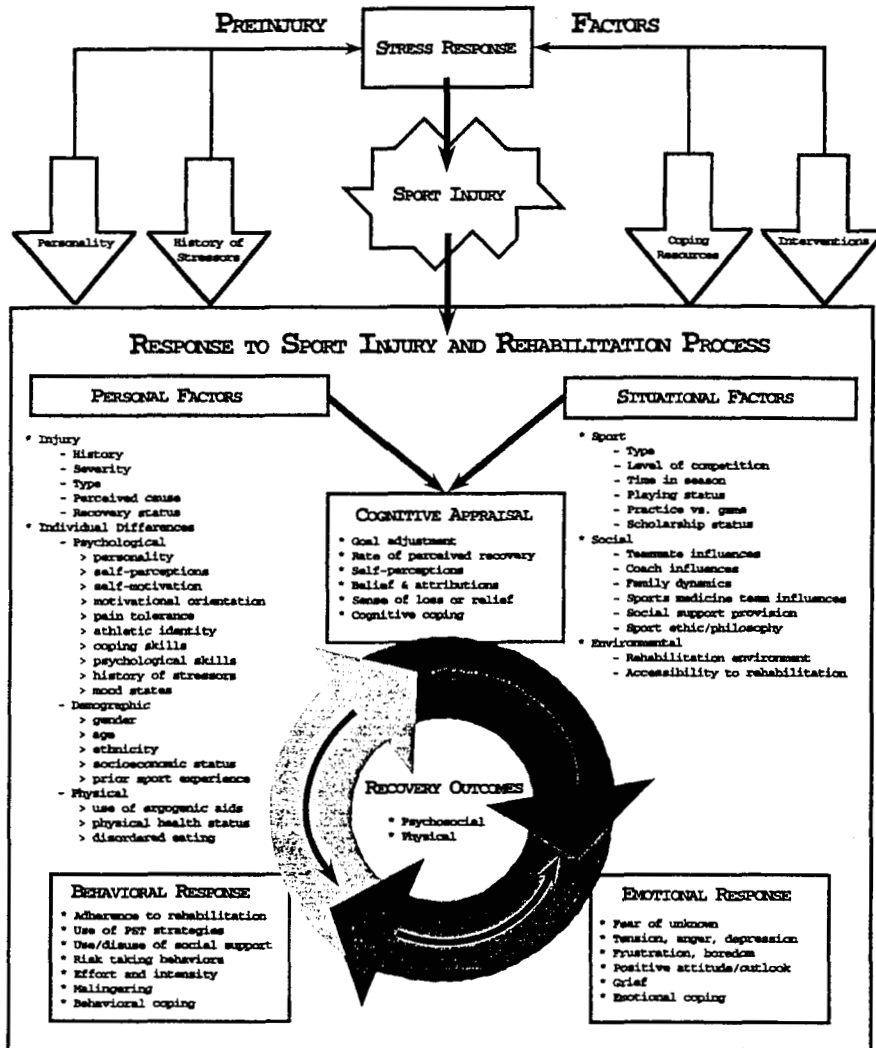


Figure 1. Integrated model of psychological response to the sport injury and rehabilitation process.

Psychological Responses

Having discussed the integrated model that depicts how the psychological consequences of sport injury relate to the overall injury experience, a review of the empirical data on psychological responses is next considered. This review is organized around two of the psychological subcomponents of the recovery process: cognitive appraisal and emotional response. The third psychological component of the recovery process,

behavioral response, is the topic of another paper in this issue (see Brewer, this issue).

Cognitive Appraisal

Athletes appraise many things postinjury. For example, several personal factors listed in Figure 1 are appraisals, such as perceptions about the cause of injury, recovery status, and availability of social support. Athletes also appraise their ability to cope with the sport injury experience. These appraisals, and their subsequent effects on the emotions and behaviors of athletes, have received limited research attention. One of the few studies to specifically examine cognitive appraisal in the context of the integrated model predictions was that of Daly, Brewer, Van Raalte, Petitpas, and Sklar (1995). These authors found that athletes' cognitive appraisals were significantly correlated with their total mood disturbance.

Perhaps most examined among the postinjury cognitions has been athlete self-perception. This category includes empirical studies on athletes' self-perceived worth, value, general abilities, and specific capabilities. Recall that the core of the integrated model—as is consistent with the psychology literature on the stress process—posits that cognitions, such as self-perceptions, are important because they in turn influence the emotional and behavioral responses of athletes to injury.

Although definitions vary, self-perception is the view one has of oneself. Both general and specific components of self-perceptions have been examined in the sport injury literature, such as global self-worth, self-confidence, and self-efficacy. Self-perceptions can be thought of both as moderators of response and as dynamic responses in and of themselves. For the purpose of clarity in discussing the empirical research in this domain, the subsequent discussion will focus primarily on the effects of injury on the athlete's self-esteem, self-worth, self-confidence, and self-efficacy.

Self-Esteem and Self-Worth. Self-esteem involves the individual's assessment of her or his own worth (Weiss & Ebbeck, 1996). To date, both global and domain specific instruments have been used to measure postinjury self-esteem and self-worth. The use of global measures has revealed somewhat mixed results. For example, when Chan and Grossman (1988) used a global measurement tool to quantify self-esteem changes in runners, self-esteem was significantly lower in injured runners (those unable to run for two weeks) than in noninjured runners. McGowan, Pierce, Williams, and Eastman (1994) showed significant decreases in global self-worth scores in 16 injured football players compared to 13 noninjured players. Conversely, a prospective study of 13 high school, Junior A hockey and National Collegiate Athletic Association (NCAA) Division I university teams in basketball, volleyball, baseball, and hockey did not demonstrate preinjury-postinjury differences in global self-esteem scores (Smith, Stuart, Wiese-Bjornstal, Milliner, O'Fallon, & Crowson, 1993). Similarly, a retrospective study by Brewer and Petrie (1995) failed

to show differences between injured and noninjured college football players using a global measure of self-esteem.

Some researchers have adopted domain-specific measures to identify the aspects of self-esteem and self-worth most affected by injury. For example, Brewer (1993) used a physical self-worth subscale with injured athletes at a sports medicine clinic, and found that it predicted postinjury depression. In a prospective, controlled investigation of NCAA Division I male university athletes from ten sports, Leddy, Lambert, and Ogles (1994) identified preinjury-postinjury differences in total and physical self-esteem. Four injury groups were defined: injured (athletes injured at postinjury and at follow-up), recovered (athletes injured at postinjury but fully recovered at follow-up), noninjured (athletes not injured at either postinjury or follow-up), and late injured (athletes not injured at postinjury but injured at follow-up). Of four defined injury groups, the injured and late injured athletes had significantly lower total and physical self-esteem scores than the noninjured and recovered athletes. Connelly (1991) also used a prospective, multifaceted approach to examine how injury affected self-perceptions, hypothesizing that physical self-efficacy and perceived physical competence would be the self-esteem aspects most affected. No significant preinjury-postinjury differences in self-esteem were detected using the global scale; however, the more specific measure of physical self-efficacy was negatively affected by injury.

Self-Confidence and Self-Efficacy. Self-confidence, a generalized belief in oneself, and self-efficacy, a belief in oneself as competent and effective in specific situations, were evaluated in an innovative study by Flint (1991). Both self-confidence and self-efficacy improved following a peer modeling intervention among female athletes who had anterior cruciate ligament (ACL) reconstruction. Ten athletes assigned to watch a video tape of peers participating in rehabilitation from ACL surgery had greater self-confidence, self-efficacy and adherence to rehabilitation than the ten matched participants who served as a control group. Another study compared various psychological responses of athletes recovering from ACL surgery across time (LaMott, 1994). Among other findings, self-confidence significantly increased in injured athletes who had reconstructive surgery compared to noninjured matched controls.

Only a few studies (e.g., Connelly, 1991; Shaffer, 1991) have examined the influence of injury on specific components of athlete self-efficacy. Since self-efficacy is a situation-specific construct, the effect of injury on perceived efficacy is dependent on the situation being assessed. Connelly (1991), for example, examined football skills efficacy preinjury and postinjury, and reported a dramatic loss of football skills efficacy as a result of injury. Shaffer (1991) found injury history related to participants' rehabilitation efficacy for a current injury. Participants with moderately severe ankle sprains who had previously completed rehabilitation had higher levels of self-efficacy for rehabilitation during the first week postinjury compared to those not injured before.

Research has demonstrated that perceptions of one's self, capabilities,

and worth may all be affected by the sport injury experience. These self-perceptions in turn influence emotional and behavioral response to sport injury. The challenge to researchers and practitioners is to examine these effects and design interventions that minimize the negative effects of injury on these important self-perceptions.

Emotional Response

The emotional response of athletes to injury has been described by a number of investigators (for a review, see Smith, 1996). Table 1 presents a summary of these individual studies. As is apparent from this table, there is tremendous variation in the populations studied, research designs employed, and measures used. Thus, although it is somewhat difficult to consolidate findings across studies, several insights gained from an overall review of these studies provide direction for future investigations on emotional response to sport injury.

Mood State Across Time. Postinjury mood state changes across time have been documented in a number of repeated measures investigations (Grove, Stewart, & Gordon, 1990; LaMott, 1994; Leddy et al., 1994; McDonald & Hardy, 1990; Morrey, 1997; Smith, Scott, O'Fallon, & Young, 1990). Cross-sectional approaches have recorded a similar finding in some cases (Morrey, 1997) but not others (Brewer, Linder, & Phelps, 1995). Perhaps repeated measures analyses in which injured athletes serve as their own control can best validate this aspect of postinjury response.

Initial studies using a repeated measures design (McDonald & Hardy, 1994; Smith et al., 1990) saw change in mood disturbance that paralleled the athlete's perceptions of recovery (a cognitive appraisal). These studies did not follow patients beyond six to 12 weeks postinjury. More recent studies by LaMott (1994) and Morrey (1997)—examining three month and six month postinjury intervals respectively—noted elevated negative mood scores of ACL injured athletes at the first interval, steady decreases during the second and third intervals, and increases in disturbance again during the fourth time period evaluations. Thus, overall mood changes across rehabilitation demonstrated curvilinear patterning. In a manner similar to the calculation of a total mood disturbance (TMD) score on the Profile of Mood States (POMS, McNair, Lorr, & Droppleman, 1971), Morrey (1996) calculated a total score from the emotions measured by the Emotional Responses of Athletes to Injury Questionnaire (ERAIQ, Smith, Scott, & Wiese, 1990). He summed negative emotion scores and then subtracted positive emotion scores to gain a total disturbance score (TERAIQ). As illustrated in Figure 2, data from the TERAQ showed changes in emotional responses across the recovery time course reflecting a "U" shaped patterning in both the LaMott and Morrey studies (raw data derived from Morrey, 1996). It is likely that the pattern of emotional response to severe injuries with long recovery durations is sinusoidal; clearly postinjury mood state is not static.

It is also the case that only looking at measures of total mood disturbance masks the intricacies of individual mood state changes. Individual

mood state data from both LaMott (1994) and Morrey (1997) documented that certain negative moods predominate at different points in the rehabilitation cycle. For example, in the data of Morrey (1997), one negative mood state, boredom, showed a linear decline across time, and another, frustrated, demonstrated a "U" shaped patterning. A positive mood state, optimistic, showed an "inverted-U" of positive emotion across the six month postsurgery period. Future researchers should examine specific mood state fluctuation across the injury time frame, in addition to the more global TMD measures.

Positive Profile of Most Injured Athletes. A minority, rather than a majority, of injured athletes has been reported to experience clinical levels of depression (Brewer, Petitpas et al., 1995; Leddy et al., 1994; Smith & Milliner, 1994; Smith et al., 1993). These data remind the reader that not all injured athletes will respond with depressed mood.

Smith et al. (1990) reported less mood disturbance in the two groups of injured athletes with mild and moderately serious injuries than is apparent in non-injured college norms (i.e., mood scores for male and female non-athletes of comparable ages). These athletes had more positive mood state profiles even when injured than the average college aged person. Only athletes with serious injuries (out of sport for more than two weeks) experienced significant mood disturbance. Even within the seriously injured athlete group, some athletes experienced little distress whereas others were profoundly depressed. Similarly, Leddy et al. (1994) reported that 88 percent of NCAA Division I injured athletes had normal to mild range depression scores postinjury. Brewer, Petitpas et al. (1995) reported that 81 percent of patients treated at a sports medicine clinic experienced little distress secondary to injury and Brewer, Linder, and Phelps (1995) found that 95.2 percent of injured patients had depression scores in the subclinical range.

Negative Emotions as a Facilitator. Research in the medical field has revealed some interesting findings with respect to the possible role of "negative emotions." Recognizing the dramatic differences between the sport injury situation and such life threatening illnesses as cancer, it is nonetheless worthwhile to consider the possibility that not all negative emotions are dysfunctional in the recovery process.

For example, Morrey (1997) hypothesized that competitive athletes would experience greater mood disturbance than recreational athletes and that competitive athletes would recover faster than recreational athletes. Both hypotheses were supported. Possibly the urgency to return to sport—initially contributing to frustration, depression, and anger—motivates the athlete during the long, arduous rehabilitation. Shelbourne and Foulk (1995) have reported high level athletes to be impatient and thus non-compliant with traditional protocols, but many in turn experience more rapid recoveries. Thus, there remains the possibility that the expedited recovery experienced by competitive athletes in Morrey's study may have been at least partially facilitated by negative emotions.

The key may rest in a better understanding of athlete perceptions of

Table 1
Emotional responses to sport injury research

Study	Sample size	Gender	Type of athlete	Severity index
Crossman & Jamieson (1985)	N = 43	30-Male 13-Female	International, Inter-collegiate, & Recreational athletes	Athlete self-rating of perceived severity
	N = 1	1-AT		AT rating of severity
Chan & Grossman (1988)	N = 30	16-Female 14-Male	Recreational runners	Time loss—2 weeks
Grove, Stewart, & Gordon (1990)	N = 21	Both	Recreational athletes & ACL patients	Time loss Medical care
McDonald & Hardy (1990)	N = 5	3-Female 2-Male	Collegiate athletes	Time loss Medical care
Smith, Scott, O'Fallon, & Young (1990)	N = 72	Both	Recreational athletes	Time loss Medical care
Pearson & Jones (1992)	N = 61	20-Female 41-Male	Recreational athletes	Time loss Medical care
Brewer (1993)— Study 3	N = 121	40-Female 81-Male	Athletes	Sought medical care
Brewer (1993)— Study 4	N = 90	90-Male	Collegiate athletes (Football)	Self-report
Smith, Stuart, Wiese-Bjornstal, Milliner, O'Fallon, & Crowson (1993)	N = 276	38-Female 238-Male	Competitive athletes	Time loss Medical care

Table 1
Extended

Psychological measure(s)	Design	Integration with physical	Results	Moderator(s) examined
SAI Mood scale Perceived effects of injury	Cross-sectional	Perceived severity	Athletes sig. overestimated seriousness of injuries but underestimated disruptive influence	Perspective of rater Level of participation
POMS RSE	Prospective Control group	No	SE decreased; Depression increased among injured	
LOC Optimism/Pessimism POMS Hardiness	Prospective Longitudinal	Injury described (ACLS) emotions across rehab.	Increase in depression & anger across rehab. in pessimistic athletes	Personality
POMS Qualitative interview	Longitudinal (4 weeks)	Injured ath. emotions paralleled recovery	Sig. total mood disturbance	Recovery status
ERAIQ POMS	Prospective Longitudinal	Injured ath. emotions paralleled recovery	Significant depression, tension	Recovery status Age
SFAIQ POMS-BI Qualitative interview	Prospective Longitudinal Control group	Discussed emotions; injury details from interview	Sig. mood disturbance among injured athletes	
AIMS BDI POMS PSP SARRS	Prospective	No	Athletic identity positively related to depressed mood	Athletic identity Physical self-efficacy Life events
AIMS BDI POMS PSP SARRS	Prospective Compared injured vs. non-injured	No	Leading predictor of depression interaction between athletic identity & injury status	Athletic identity
ERAIQ POMS RSE	Prospective Pre vs. Post injury Acute injuries	Severity based on time loss related to groups	Severity of injury sig. predictor of postinjury depression	Injury severity Level of participation Sport type

Table 1
Continued

Study	Sample size	Gender	Type of athlete	Severity index
LaMott (1994)	N = 40	20-Female 20-Male	Recreational athletes ACL patients	Time loss Medical care
Leddy, Lambert, & Ogles (1994)	N = 343	343-Male	Collegiate athletes (10 sports)	Time loss Medical care
Quackenbush & Crossman (1994)	N = 25	9-Female 16-Male	Competitive and Recreational athletes (3 levels)	Self-rated Time loss Medical care
Brewer, Linder, & Phelps (1995)	N = 121	81-Male 40-Female	Patients at Sports Med. clinic	Physician rating
Brewer, Pettipas, VanRaalte, Sklar, & Ditmar (1995)	N = 200	86-Female 114-Male	Patients at Sports Med. clinic	Sought medical care
Crossman, Gluck & Jamieson (1995)	N = 30	30-Male	High school, Club, & Semi-pro athletes	Time loss Medical care Moderate severity injuries
Daly, Brewer, Van Raalte, Pettipas, & Sklar (1995)	N = 31	12-Female 19-Male	Competitive & Recreational athletes Knee surgery	Time loss Medical care

Table 1
Extended

Psychological measure(s)	Design	Integration with physical	Results	Moderator(s) examined
ERAIQ SIP STAI SCAT	Prospective Longitudinal Matched control group	Integrated emotional responses to ROM	Greater ROM diff. between inj. & noninj. knee the greater anger, pain, fear, frustra- tion, & pessi- mism; Inverted-U of emotions	Recovery status Gender
BDI STAI TSCS	Prospective Pre vs. Post in- jury Noninjured as controls	Listed types of injuries	Increased depres- sion, anxiety & reduced SE post- injury; 12% de- nied depression	
Questionnaire	Retrospective 4 time periods	Self-recalled recovery status at 4 time peri- ods	Negative emotions decreased & posi- tive increased across recovery time	Recovery status Level of partici- pation Gender
PQ AIMS BDI POMS	Cross-sectional	Physician rat- ed injury status	Social support sig. correlated w/ post- injury depression; Most had positive mental health pro- file	Performance im- pairment Age Gender Recovery % Pain Social support Athletic identity
BSI Demo- graphic PT/ATC rat- ed distress behaviors	Cross-sectional	Patient esti- mated % recovery PT/ATC % re- covery	19% of patients had clinical level of psych. distress No relationship be- tween patient re- ported distress & PT/ATC rating	Recovery status
Questionnaire	Longitudinal	Four assess- ment times linked to recovery status	As recovery pro- gressed, negative emotions dimin- ished & positive emotions in- creased	Recovery status
Cognitive ap- praisal item POMS Adher- ence	Correlational	Knee injury requiring surgery	Cognitive appraisal sig. correlated w/ total mood distur- bance; TMD neg. related to rehab. attendance	Level of partici- pation Cognitive ap- praisal as re- lated to emo- tional response

Table 1
Continued

Study	Sample size	Gender	Type of athlete	Severity index
Udry (1997)	N = 25	15-Male 10-Female	Sport and physical activity participants	ACL surgery
Morrey (1997)	N = 64	Both	Competitive & Recreational athletes ACL surgery	Time loss Medical care
Udry, Gould, Bridges, & Beck (1997)	N = 21	11-Male 10-Female	US Ski team alpine & freestyle	Season-ending injuries

the emotions experienced. When negative affect—such as anger, which is often interpreted by athletes as “ready to fight”—is appropriately controlled and focused it might indeed exhibit itself as a fighting spirit, which in turn may have a positive effect on coping with a rehabilitative program. This, of course, remains to be seen. For now, researchers should at least avoid the untested assumption that all negative emotion is necessarily detrimental to recovery.

Extreme Responses. As discussed earlier, the majority of injured athletes cope well with injury and require minimal clinical psychological intervention. Several studies, however, have also pointed out that a substantial number (approximately 10 to 20 percent) of injured athletes experiences extreme responses, particularly depression, which surpass levels usually recommended for clinical referral (Brewer, Linder, & Phelps, 1995; Brewer, Petitpas et al., 1995; Leddy et al., 1994).

Among the many areas of concern for athletes exhibiting these extreme responses is that of suicidal tendencies. Of the several injured athletes in our clinical experience who attempted suicide postinjury (Smith & Milliner, 1995), all had: (1) POMS depression scores above 40 (on a scale ranging from 0 to 60), (2) undergone a surgical procedure, (3) been successful in sport prior to their injury, and (4) failed to recover to their preinjury levels of participation despite working hard in rehabilitation. Those most at risk have been young, seriously injured, competitive athletes highly invested in sport who meet the above criteria. Sports medicine practitioners working with injured athletes must be vigilant to the subtle

**Table 1
Extended**

Psychological measure(s)	Design	Integration with physical	Results	Moderator(s) examined
Demographic CHIP POMS SSI Adherence	Longitudinal	Rehab. attendance	Instrumental coping most used coping strategy; sig. predictor of adherence	
ERAIQ POMS-ISP SIP	Longitudinal	Psychological changes integrated with physical progress measure		Level of participation
Interviews	Retrospective	Off skis minimum 3 months	90.5% noted emotional upheaval; 81% noted positive outlook	

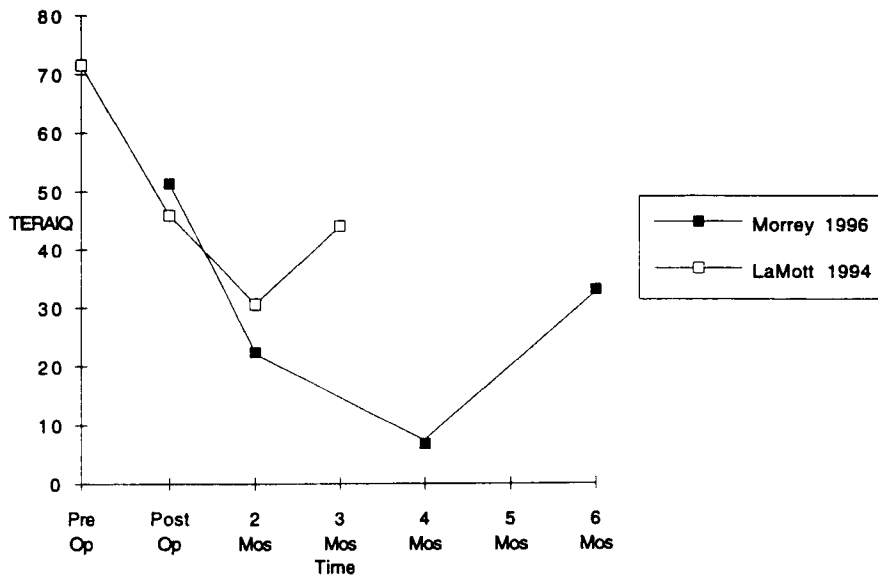


Figure 2. Anterior cruciate ligament (ACL) reconstructive surgery and rehabilitation emotional "U" evidenced in studies by LaMott (1994) and Morrey (1997).

clinical signs of depression and low self-esteem that can accompany sport injury, and seek appropriate referrals.

Although research has not yet documented this finding, an increasing clinical concern is the use of injury as an excuse to escape a sport situation. When pressed to explain this reaction to injury, some will confess they feel relieved of externally imposed pressures from parents, coaches, and teammates, and from internally imposed pressures for perfectionism and commitment. One recent clinical example occurred when an adolescent female star basketball player initially expressed disappointment that her second major knee injury in two years was not diagnosed as an ACL tear. When a subsequent diagnosis revealed it was a torn ACL and would require surgery, she expressed relief—a “positive” emotion. She was tired of being the star player, strung out, and saw injury as her way out of an unbearable situation. Observations such as these merit the consideration of both clinicians and researchers to alleviate this enormous pressure, particularly on young athletes, to perform at all costs.

Perceptions of Sports Medicine Practitioners. Several studies have examined the perspective of sports medicine practitioners such as physical therapists (Gordon, Milios, & Grove, 1991), athletic trainers (Crossman & Jamieson, 1985; Fisher, Mullins, & Frye, 1993; Kahanov & Fairchild, 1994; Wiese, Weiss, & Yukelson, 1991) and physicians (Brewer, Linder, & Phelps, 1995; Brewer, Van Raalte, & Linder, 1991) about the psychological responses of athletes to injury. Two studies have compared the perceptions of athletes, coaches, and medical professionals (Brown, 1995; Crossman, Jamieson, & Hume, 1990).

Although medical professional assessment of athlete postinjury responses is helpful, erroneous assumptions of another person's subjective experience can occur. On the other hand, the unwillingness of many athletes to admit to weakness suggests that in some cases the medical practitioner's assessment may be more honest and accurate. The limited relationship between psychological distress ratings of physical therapists, athletic trainers and their patients (Brewer, Petitpas et al., 1995), the limited relationship between physicians' ratings of injury severity and athletes' postinjury depression (Brewer, Linder, & Phelps, 1995), the discrepancies between athletes', physicians' and coaches' ratings of the causes, seriousness, and disruptiveness of injury (Brown, 1995; Crossman et al., 1990) and the discrepancies in perceptions held by injured athletes and athletic trainers during the initial injury evaluation (Kahanov & Fairchild, 1994) support the need for caution in completely accepting the perceptions of either athletes or medical professionals. Clearly steps should be taken to enhance insight and the clarity of communication between the injured athlete and all members of the sports medicine team to provide a complete picture of athlete emotional states.

Nature of the Injury. It was apparent from our review that studies reporting the psychological consequences of injury have generally not been consistent in their definition of sport injury, nor have they typically provided details about the nature of the injuries. This is not entirely sur-

prising, as the definition of what constitutes a sport injury is unclear and varies across sports. Acute, overuse, and chronic injuries have often been included within the same cross sectional design, yet one might expect somewhat different psychological responses depending on differences in the type of injury.

For example, one component of the nature of injury is injury severity. Two prospective studies have shown injury severity, based on time loss, to be a key moderator of postinjury psychological response (Smith et al., 1990; Smith et al., 1993). Others have not found injury severity to play an integral role in postinjury mood disturbance (Brewer, Linder, & Phelps, 1995; Brewer, Petitpas, Van Raalte, Sklar, & Ditmar, 1995). Careful consideration needs to be given to research design in future investigations (see paper by Flint, this issue). For example, to ensure that results of future investigations are comparable at different levels of participation, an injury has been defined in a sport specific and similar manner in our studies of ice hockey participants (Stuart & Smith, 1995; Smith, Stuart, Wiese-Bjornstal, & Gunnson, 1997). Screening physicals are conducted prior to the season to determine injury status at the start of each study. Hours of exposure for games and practices are recorded. A sports medicine physician diagnoses each injury and records the location, type, mechanism, and severity of each injury on a specific form. Coaches complete reverse attendance forms (Rice, 1989) and provide information on time lost from sport. Injury rates are calculated per 1000 hours of exposure time for practices and games. Comparisons are then possible across studies that can lead to better documentation of injury trends. This, in turn, can lead to the design of meaningful physical, behavioral, and psychological interventions.

In sum, a review of the literature about cognitive and emotional responses to sport injury suggests many areas requiring further examination. A significant subset of injured athletes does express serious cognitive and emotional disruptions; however, the majority seem to handle the sport injury experience relatively well. Next, a review of sociological writings establishes the social and cultural context that influences athlete responses to injury.

Sociological Dynamics

Although mentioned in some of the early writings on the psychology of sport injury (e.g., Rotella and Heyman's [1986] identification of predisposing attitudes to sport injury) research in the psychology of sport injury has to a large extent failed to adopt a social psychological view of the sport injury process and corresponding consequences. Consideration of the "sport ethic" (Hughes & Coakley, 1991) as a factor affecting psychological response to injury is essential. The emphasis on sociological influences is to encourage sport psychology researchers to consider these factors when examining the psychological consequences of sport injury.

Athletes are socialized in a culture that values achievement of the sport

dream. Although injuries have the potential to shatter that dream, many players are unwilling to quit regardless of the pain experienced. Frey (1991) discussed the "culture of risk" in sport that prompts athletes to believe that accepting physical risks is their only legitimate choice. This cultural belief system reflects values such as monetary inducements to play with pain and injuries, cultural values linking pain tolerance with character, and rationalizations of pain and injuries as "part of the game" (Frey, 1991).

Through his interviews with former male athletes, Messner (1992) identified external pressures and threats to masculine identity as primary reasons to risk injury. Values of the sports world are such that coaches, teammates, and fans negatively judge the athlete who refuses to play hurt. This external pressure is also prevalent in the media where an athlete's willingness to endure pain and injury is celebrated (Ewald & Jobu, 1985; Hughes & Coakley, 1991; Nixon, 1991). For example, a *St. Paul Pioneer Press* headline read, "Pain? NFL [National Football League] players Strug it off!" (Cagle, 1996, p. 1D), in reference to the injured Kerri Strug's legendary gymnastics vault in the 1996 Olympic Games. Ignoring pain and injury becomes the sport norm when the culture praises stoicism in the face of injury (Messner, 1992).

The internal structure of masculine identity results in males becoming alienated from their feelings and thus prone to using their bodies instrumentally—as weapons to harm and be harmed (Young, White, & McTeer, 1994)—especially in the competitive and insecure world of sport careers (Messner, 1992). Sports such as boxing, football, and wrestling are essentially rule-bound combat, likely to produce high rates of injury (Messner, 1990). Played almost exclusively by males, these sports perform an important role in shaping a masculine identity (Messner, 1990; Sabo, 1989). To question the decision to "give up" their bodies would be to question the entire system of rules through which they had successfully formed relationships and a sense of identity. Considered too threatening, athletes instead are more likely to rationalize their own injuries as "part of the game" and to claim that the pain contributed to "character" development, thereby gaining them the respect of others (Messner, 1992). These internalized ideas about masculinity—when combined with external pressures—influence athletes to "choose" to play hurt (Nixon, 1993). This phenomenon of sacrificing one's body for sport achievement was empirically supported by Shaffer (1996), who found that adolescent wrestlers ignored their body's warning signal of pain and continued to compete despite experiencing physical discomfort and hampered ability.

Curry's (1992) case study of a wrestler's competitive career clearly illustrates this socialization process as an athlete learns to deal with pain and injury (as summarized by Coakley, 1996). The athlete's early observations of other wrestlers taught him to define pain and injury as routine parts of the sport. Progressing to higher levels of competition demonstrated that endurance of injury was commonplace. To be successful a wrestler had to adopt the following beliefs, attitudes, and actions:

(1) to "shake off" minor injuries; (2) to see special treatment for minor injuries as a form of coddling; (3) to express desire and motivation by playing while injured or in pain; (4) to avoid using injury or pain as excuses for not practicing or competing; (5) to use physicians and trainers as experts whose roles were to keep him competing when not healthy; (6) to see pain-killing anti-inflammatory drugs as necessary performance-enhancing aids; (7) to commit himself to the idea that all athletes must pay a price as they strive for excellence, and; (8) to define any athlete (including himself) unwilling to pay the price or to strive for excellence as morally deficient (Coakley, 1996, p. 358).

Finally, through a combination of injuries to his spine, knees, and ears, he became a role model for younger wrestlers (Coakley, 1996; Curry, 1992).

The socialization experiences of this young wrestler's career illustrate the "sport ethic" (Hughes & Coakley, 1991) in which athletes learn to define sacrifice, risk, pain, and injury as the price one must pay to be a true athlete in competitive sports. Voluntary acceptance of the possibility of injury signifies courage and dedication (Williams & Donnelly, 1985) and when accepted unconditionally, athlete conformity to the sport ethic jeopardizes the health and physical well-being of themselves and others (Coakley, 1996). As increasing numbers of girls and women enter the competitive sport arena they too are socialized into accepting this ethic of sport (e.g., Young & White, 1995).

Unless athletes exercise power on their own behalf to protect themselves from influences promoting a culture of risk, they will be vulnerable to considerable direct and indirect pressure to take excessive risks with their bodies and health (cf. Flint & Weiss, 1992). If injured athletes turn only to those in their sports network for advice or support, and if the sport ethic binds this network together, it is not surprising that athletes ultimately decide to play with pain and injuries (Nixon & Frey, 1996). Unfortunately, for many athletes the perceived benefits of working through an injury to maintain salary, scholarship, team position and/or social affiliation may outweigh those of ceasing participation to allow recovery.

In order to fully understand the cognitive appraisals and emotional responses associated with sport injury, it is essential to also consider this sociological culture of sport that encourages ignoring injury in pursuit of victory. An attempt to counter this prevailing ethic places additional demands on the psychological complexity of managing sport injury. Table 2 provides a survey of some of the key sport sociological literature to consider when evaluating the role of the sport ethic as a moderator of the psychological and physical consequences of sport injury.

Implications For Future Research

Although there is a lack of rigorously controlled empirical investigation on psychological responses to sport injury, the available literature has established a foundation to advance research to the next level. A number

Table 2
Sociological influences on sport injury response writings

Author(s)	Year	Nature of Paper
Lord & Kozar	1989	Pain tolerance in the presence of others
Sabo	1989	Pain as part of men's sports
Thornton	1990	Playing sport with pain
Frey	1991	Culture of physical risk in sport
Hughes & Coakley	1991	Sport ethic of accepting injury risks and playing through pain
Curry	1992	Case study of wrestler socialized to endure pain and injury
Flint & Weiss	1992	Dilemma of when to return injured athletes to competition
Messner	1992	External pressure and threats to masculine identity as reasons to risk sport injury
Nixon	1992	Social network analysis explaining acceptance of injury risks
Nixon	1993	Sociocultural influences on playing hurt
Curry & Strauss	1994	Photo-essay on normalization of sport injuries
Nixon	1994a	Coaches' view of the risk-pain-injury paradox
Nixon	1994b	Role of significant others in affecting pain and injury behavior
Young, White, & McTeer	1994	Framing of serious sport injury as a masculinizing experience
Young & White	1995	Women's tolerance of potential for injury in sport
Shaffer	1996	Motivation of adolescent wrestlers to compete when injured
Krane, Greenleaf, & Snow	1997	Elite gymnast participating through injury

of research recommendations appeared in this regard throughout the paper; this final section will summarize five major recommendations.

First, with respect to research design, whenever possible it would be most accurate to survey injured athletes with repeated measures designs, from preinjury throughout the recovery process and well into their return to sport. In this manner the entire stress process—both preinjury and postinjury—can be evaluated and the associated risks described for each phase. Acknowledging that this task will be difficult because of the large initial sample size required, it is worth the effort. Furthermore, the use of control groups whenever possible can help separate influential moderator factors specific to injury occurrence from those that also affect healthy participants from the same teams, sports, levels of participation, etc. This means that researchers must continue to track both injured and noninjured athletes simultaneously across time.

Second, researchers should address a number of concerns in the measurement area in future investigations. Methodologically, some research questions might be best answered through quantitative techniques, while others are best suited to qualitative methods and analysis. Decisions whether to employ global measures, specific measures, or both, should be grounded in the specific study hypotheses. In the evaluation of mood state, for example, when researchers only analyze total mood disturbance data without looking at individual emotional responses the intricacies of mood state changes across time are masked. Relative to the examination of emotional changes, reliance on the POMS has revealed confusion with some mood states. For example, many athletes interpret "anxious" on the POMS—considered a negative mood state—as "ready to go," a positive motivational state. Recent research has also noted that the physical and mental properties of "fatigue" on the POMS are indistinguishable (Smith et al., 1997). If the ultimate goal is to help athletes deal more effectively with injury rehabilitation, it is necessary to better identify the dimensions of response variables such as fatigue.

Third, more consistent definitions of sport injury should be provided by researchers (see the paper by Flint in this issue for a discussion). Researchers must consider, for example, whether their interest lies in the psychological responses of athletes who sustain injury (regardless of whether the injury cause is related to their sport or not) or psychological response to sport injury (which implies that the injury occurred in a sport context). Stronger study designs will also examine both physical and psychological recovery variables in a concurrent fashion.

Fourth, the directionality of the relationship between psychological response and physical recovery should be examined. Is it greater speed of physical recovery that leads to improved self-perceptions and mood states, or is it the reverse? This is an important question not only from a research standpoint but from a counseling standpoint, as the most efficacious interventions for injured athletes would depend on establishing directionality.

Fifth, an examination of the sociological literature on sport injury provides a broader view of athlete responses to injury. Future research in sport psychology should examine the ingrained "ethic of sport" as it affects the self-perceptions, mood states, and behaviors of injured athletes. Pressure to conform to this ethic is yet another moderating stressor with which the athlete must deal when managing the sport injury situation.

In conclusion, the dynamic model of psychological response to the sport injury and rehabilitation process presented in this paper integrates prediction of injury components (Andersen & Williams, 1988) with response to injury components identified through a survey of empirical studies (Wiese-Bjornstal et al., 1995). Therefore, it is hoped that the model of psychological response will serve as a blueprint for future researchers who seek to understand the injured athlete experience from a physical, psychological and social perspective.

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