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Stressors, social support and tests of the buffering hypothesis: Effects on psychological responses of injured athletes

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Abstract

Objective

The purpose of this paper was to examine the main and stress-buffering effect relationships between social support and psychological responses to injury.

Design

The paper presents two studies, both of which matched social support types with injury stressors. Study 1 used measures of stressors, perception of social support availability, and psychological responses of injured athletes. Study 2 utilised measures of stressors, received social support, and psychological responses of injured athletes.

Methods

During physiotherapy clinic visits, injured athletes (Study 1, $N = 319$; Study 2, $N = 302$) completed measures of stressors, social support, and psychological responses to injury. Confirmatory factor analysis (CFA) and moderated hierarchical regression were used to analyse the data.

Results

In both studies, CFA suggested adequate model fit for measures of social support and psychological responses to injury. Moderated hierarchical regression analyses in Study 1 revealed significant ($p < .05$) stress-buffering effects for the perception of available esteem support in relation to restlessness, isolation, and feeling cheated, and the perception of emotional support in relation to isolation. In both studies, moderated hierarchical regression

analyses revealed significant ($p < .05$) main effects for esteem, emotional, and tangible support in relation to restlessness, isolation, and feeling cheated.

Conclusion

The findings of the current studies enhance our understanding of the stress-buffering effects of social support in relation to injury stressors and psychological responses. That is, the relationships between social support, stressors, and psychological responses to sport injury may differ with regard to received or perceived available support. The findings have important implications for the design of social support interventions with injured athletes aimed at alleviating the detrimental effects of injury stressors.

Key words: Sport injury, rehabilitation, perceived available support, received support.

Stressors, social support and the buffering hypothesis: Effects on psychological responses of injured athletes

As one of the most recognised psychosocial factors influencing physical health outcomes (Uchino, 2009), social support has the potential to alleviate psychological responses to stress that are detrimental to health and well-being (Cohen, Gottlieb, & Underwood, 2000). It is perhaps not surprising, therefore, that over recent years social support has received increased research attention in the sport injury literature, a context associated with a variety of stressors that threaten health and well-being (Rees, Mitchell, Evans, & Hardy, 2010).

Sport injury is a potentially traumatic event that can be the stimulus for a variety of physical and psychological stressors. Social support has been reported to play an important role in the way an athlete responds to and copes with the various stressors associated with injury (e.g., Bianco, 2001; Johnston & Carroll, 1998; Udry, 1996, 1997). Indeed, in Wiese-Bjornstal, Smith, Shaffer and Morrey's (1998) integrated model of the response to sport injury, social support is identified as a coping resource that may affect injury response and outcome. However, despite the recent attention afforded social support in the injury literature the pathways underlying the hypothesized effects of social support remain poorly understood (Bianco & Eklund, 2001).

An injured athlete will experience a range of stressors associated with the competitive and organisational environment (e.g., Eklund & Bianco, 2004; Podlog & Eklund, 2007). These stressors can be temporally defined across three phases of injury: onset, rehabilitation, and return to sport (Evans, Wadey, Hanton, & Mitchell, 2012). Research that has explored the temporal pattern of injured athletes' responses has suggested that stressors at injury onset include incapacitation and isolation, during rehabilitation, lack of rehabilitation progress and setbacks, and during the return to competitive sport, risk of re-injury, and loss of fitness and

pre-injury performance levels (Bianco, Mayo, & Orlick, 1999; Evans, Hardy & Fleming, 2000; Evans et al., 2012)

Injury stressors may have a number of differential physical and psychological effects that manifest themselves in a variety of ways. Two of the most frequently cited stressors, which athletes have suggested can be particularly detrimental during rehabilitation, are incapacitation and loss of confidence (Evans, et al.,, 2000; Wadey & Evans, 2011). For example, Johnston and Carroll (1998) reported that the stressor, disruption to normal functioning, exacerbated feelings of frustration and depression through an increase in daily hassles and the inability to continue with sport involvement. However, disruption to normal functioning and incapacitation can also result in other losses (e.g., athletic identify, self-esteem, self-confidence). These losses are important not least because they form the basis of self-gratification and social reinforcement (Peretz, 1970). Loss of athletic identity is important, particularly for injured professional athletes where injury may threaten their livelihood (Evans et al., 2000). With regard to loss of confidence, habitual confidence sources, either self-referenced or based on social comparison, can be threatened by injury (Magyar & Duda, 2000). Indeed, loss of confidence and efficacy beliefs have been found to contribute to both a fear of re-injury and athletes' lack of readiness to return to sport (e.g., Evans et al., 2000). Attachment theory (Bowlby, 1991) offers a means of conceptualising athlete's responses to a variety of types of loss associated within injury (Evans & Hardy, 1995), and in particular, an athletes' sense of attachment that has been developed over time from a secure attachment figure (Mikulincer & Shaver, 2009). Attachment theory conceptualizes the importance of the development of supportive attachment figures during childhood and the initiation, development, and maintenance of interpersonal relationships and the functions that they serve during adulthood (Uchino, 2009). A history of secure and

responsive attachment figures can promote the belief that people will be available if needed and as a result, feelings of security and belonging during times of stress.

A complex multi-construct, social support consists of a number of interrelated dimensions, which include support networks, support exchanges, and support appraisals (Cohen et al., 2000). Two models have been proposed to explain the way in which social support influences health – the main effect theory and buffering models (Cohen & Wills, 1985). The main effect theory proposes that an individual's social resources will be beneficial irrespective of whether they are experiencing stress (Cohen & Wills). In contrast, the buffering model suggests social support is related to heath and well-being only when a situation has been appraised as stressful (Cohen & Wills). From an empirical perspective, it is the perception of available support that has been most consistently linked to the buffering hypothesis (Cohen et al.), although theoretically, received support should also result in stress-buffering effects (Lakey & Cohen, 2000). For example, received support, as a direct transfer of support, may lead to a reduction in the impact of the stressor or alternatively, enhanced coping.

Although considered separate constructs (Dunkel-Schetter & Bennett, 1990; Wethington & Kessler, 1986), both the perception of available support and received support have been linked to the buffering hypothesis (Cohen, 2004). For example, Rees et al. (2010) examined the stress-buffering effects of perceived available support on psychological responses to sport injury in high and low performance samples. In the high- performance sample, there were significant main effects for social support on psychological responses. In the low-performance sample, detrimental relationships between stressors and psychological responses were reduced for those participants with high perceptions of social support relative to those with low perceptions of social support availability. Consistent with previous research (e.g., Cohen & Hoberman, 1983), perception of social support availability was not considered

important at low levels of stressors. In relation to received support, Johnston and Carroll (1998) interviewed 12 athletes during their rehabilitation from ACL injuries and found that participants reported being generally satisfied with received support that matched the demands created by the stressor. By making the situation more tolerable and/or controllable, received support alleviated the stress of the injury. However, there has been some inconsistency in the extent to which received support as compared to the perception of available support has been reported to buffer stress and result in positive health outcomes (Barrera, 1986). One possible explanation for this, over and above the poor relationship between the two, is that the perception of available support is more stable and linked to early interactions and family attachments whereas received support is considered situational (Uchino, 2009).

According to the buffering model, social support is most effective in reducing the negative effects of stressful events when the support matches the demands created by them (Cohen & McKay, 1984; Cohen & Wills, 1985). This hypothesis, known as the specificity theory of optimal matching, suggests that stressors create deficits/losses that in turn determine the nature of the resources that are needed to cope with the loss (Cutrona & Russell, 1990). The perceived controllability of the stressor plays a central role in optimal matching. Specifically, controllable events elicit needs for support that are associated with problem-focused coping (i.e., informational and tangible support), which may enhance the ability to cope with the consequences of an event. In contrast, uncontrollable events elicit the need for support that encourages emotion-focused coping (i.e., emotional and esteem support), which may assist in the recovery from the negative emotional impact of an event (Uchino, 2004). Given that features of an injury experience may be differentially perceived as controllable and uncontrollable, careful stressor-support matching may be particularly important in an injury context. For example, injured athletes could differentially view

slowness of progress as a controllable or uncontrollable stressor, depending on their knowledge and understanding of the rehabilitation process. Viewed as a controllable stressor the athlete may seek informational support, whereas considered as uncontrollable stressor, emotional support. The latter would be consistent with emotion-focused coping, and the former problem-focused coping.

Although optimal matching between stressors and social support has been shown to be successful in achieving stress-buffering effects, we are mindful that a number of factors may complicate its application (e.g., stressors that require multiple kinds of support, needs that change over time, the meaning of the loss resulting from the stressor, and recipient-provider relationships; Rodriguez & Cohen, 1998). For example, the type or quality of supportive relationships can both facilitate and hinder the support process, depending on for example, recipient and provider characteristics. As Sarason and Sarason (2009, p. 118) point out, 'social support occurs in interpersonal transactions that include recipients and providers with distinctive cognitions, feelings, and behavioural styles'. Social support exchanges between network ties therefore, may not only hinder stress-buffering, but can also exacerbate a stressful experience (Uchino, 2004).

A further barrier to our knowledge and understanding of the stressor-support relationship in an injury context has been the variability in, and the psychometric integrity of, measures used (Brewer, 2001; Evans & Hardy, 1999). In particular, the use of non-population specific measures has precipitated calls from a number of researchers for the development and use of population specific measures that are able to capture the specific support needs and responses of the target population (Bianco & Eklund, 2001; Evans & Hardy). This suggestion is consistent with the work of Rees and colleagues who developed context-specific measures of social support to examine the main and stress-buffering effects of social

support on performance (Rees & Hardy, 2004; Rees, Hardy, & Freeman, 2007, Rees et al., 2010).

The present paper reports two studies that examine both the main and stress-buffering effects of the perception of available support (Study 1) and received support (Study 2) on injured athletes' psychological responses. Based on relevant research (e.g., Johnston & Carroll, 1998; Evans et al., 2012; Cohen & McKay, 1984; Cohen & Wills, 1985; Rees et al., 2010), for both studies we hypothesised a stress-buffering effect for specific social support types on particular psychological responses to sport injury. This process resulted in us identifying and testing the eight models presented in Table 1.

The following hypotheses were forwarded with regard to the eight models and for both studies: (a) there will be main effects for stressors - stressors will be associated with psychological responses to sport injury; (b) there will be main effects for social support - the perception of available support (Study 1) and received support (Study 2) will be associated with psychological responses to sport injury; and (c) there will be interactions between social support and stressors. Interactive effects would be explained in terms of stress-buffering and would be demonstrated in the following way: the detrimental relationships between stressors and psychological responses to sport injury would be reduced (buffered) by a high perception of available support (Study 1) and received support (Study 2) compared to those with a low perception of available support and received support. In instances of low levels of stressors, perceived availability of support and received support would be relatively unimportant.

General Method

Measures

Stressors

The term 'stress' is considered to describe a stimulus or a response to the interaction between a person and the environment (Lazarus, 1991; Fletcher, Hanton, & Mellalieu, 2006).

Unfortunately, to date there has been a lack of consistency in the use of a number of key terms in the stress literature. The relationship between the individual and environment seems to be key when conceptualising stress (Lazarus, 1991). Indeed, a transactional approach to stress reflects the dynamic relationship between the demands of the environment and an individual's resources, while also highlighting the meaning to the person of his/her relationship with the environment (Mellalieu, Hanton, & Fletcher, 2006). Based on the work of Lazarus, Fletcher et al., (2006) defined stress as 'an ongoing process that involves individuals transacting with their environments, making appraisals of the situations they find themselves in, and endeavouring to cope with any issues that may arise' (p. 329). Stressors can therefore be seen as a part of the reciprocal stress process with individual differences determining the degree of stress that is experienced (Lazarus & Folkman, 1984). As a result, stressors in the current study were defined as 'environmental demands (i.e., stimuli) encountered by an individual' (p. 329).

Two injury stressors were chosen for their relevance to the sport-injury process, 'incapacitation' and 'loss of confidence' (Eklund & Bianco, 2004; Evans et al., 2000; Gould, Udry, Bridges, & Beck, 1997a; Gould et al., 1997b). The salience of incapacitation and loss of confidence has been reported in a number of studies (e.g., Johnston & Carroll, 1998; Magyar & Duda, 2000). Indeed, the incapacitation of athletes may be a catalyst for the loss of important attachments and increased perceptions of isolation – features of the injury experience that athletes have suggested can be particularly stressful, particularly during injury onset when emotions may be heightened (Evans et al., 2012). Similarly, loss of confidence can heighten feelings of re-injury anxiety and question the readiness to return to competitive sport (Bianco et al., 1999; Podlog & Eklund, 2006). The authors who are experienced in the psychology of sport injury (N=4) examined and agreed upon the relevance and representativeness of the stressors within a sport injury context. To ensure the inter-rater

reliability for the chosen stressors the researchers agreed on 100% of stressors that were discussed. The stressors were assessed using the stem question, 'to what extent are these an issue for you as an injured athlete?' Response options ranged on a five-point Likert scale from 1 (*not at all*) to 5 (*a lot*). This procedure was consistent with that employed by other researchers in the sport injury literature (e.g., Rees et al., 2010).

Social support

Functional measures focus on the supportive functions that are perceived to be available or to have been provided (Wills & Shinar, 2000). Indeed, as functional measures tap into the different functions of social support and because they are more likely to be associated with stress-buffering effects, we adopted this measurement approach (Cohen & Wills, 1985). In both studies, the Social Support Inventory for Injured Athletes (SSIIA: Mitchell, Rees, Evans, & Hardy, 2005) was utilised to assess the availability of four support types. The SSIIA is a 16-item, self report inventory that represents the dimensions of emotional, esteem, informational, and tangible support identified by Rees and Hardy (2000) and previously used in similar injury research that has examined the main and stress-buffering properties of social support (e.g., Rees et al., 2010). In the first study, the stem question, 'to what extent do you have someone' was employed and items placed on a five-point Likert scale ranging from 1 (*not at all*) to 5 (*a lot*). In Study 2, the same 16 items that formed the measure used in Study 1 were reworded to be in the perfect tense to reflect received support; an approach that has also been adopted in similar previous research (e.g., Rees et al., 2007). For example, 'To what extent do you have someone who gives you moral support when you're feeling down' (perceived availability of social support) was changed to 'To what extent has someone given you moral support when you were feeling down' (received support). Participants once again responded to each item on a five-point Likert scale ranging from 1 (*not at all*) to 5 (*a lot*).

Psychological responses

Injured athletes' psychological responses were assessed using the Psychological Responses to Sport Injury Inventory (PRSII: Evans, Hardy, Mitchell, & Rees, 2008). The PRSII is a 19-item, measure that comprises five subscales - devastation, feeling cheated, restlessness, isolation, and reorganization. Three subscales (restlessness, isolation, feeling cheated) reported to characterize athletes' responses to sport injury were chosen to match the two specific stressors (incapacitation and loss of confidence) and to test the hypotheses based on the relevant research literature. Restlessness reflects feelings of anxiety and frustration that can develop from goal-disrupted behaviour that results from injury as, for example, a result of incapacitation (e.g., Johnston & Carroll, 1998). The importance of isolation or the perception of being isolated has been widely acknowledged in an injury context and can been exacerbated by a loss of confidence that results from injury (Wadey & Evans, 2012). Finally, feeling cheated, which reflects feelings of bitterness and attempts to rationalise, can emanate from time lost from sport participation through incapacitation (e.g., Tracey, 2003). Participants were required to indicate the extent to which each of the items reflected how they felt in relation to their injury, with response options ranging on a five-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*).

Participants

Participants in both studies were injured athletes who represented a number of sports across different playing levels. Participants were required to be injured for a minimum period of one week, to have sustained their injury through sport, and received treatment from one of the physiotherapists involved in the study.

Procedure

Each study was approved by the first author's University ethics committee. Participants were recruited through 10, chartered physiotherapists at clinics throughout the

United Kingdom. Each participant completed a consent form and measures of stressors, social support, and psychological responses during clinic appointments.

Data Analysis

Prior to use in each study, the measures of social support and psychological responses were assessed using confirmatory factor analysis (CFA: Jöreskog, 1993; Jöreskog & Sörbom, 1993). Overall goodness of fit for each model was examined together with standardised residuals, completely standardised factor loadings, and modification indices for the covariances of the measurement errors. The overall goodness of fit of the models was tested using a number of indices of model fit. The chi-square likelihood ratio statistic (χ^2; Jöreskog & Sörbom, 1989), the root mean square error of approximation (RMSEA; Steiger, 1990) and its associated *p*-value (i.e., for RMSEA < .05), the standardized root mean square residual (SRMR), and the comparative fit index (CFI; Bentler, 1990). The χ^2 statistic and associated probability value (*p*) although sensitive to non-normal data and sample size, was used as a subjective index of fit where a non-significant *p* value or a χ^2/df ratio of less than 2.0 suggested a good model fit (Byrne, 1995; Jaccard & Wan, 1996). RMSEA was used to illustrate the average discrepancy between the observed and model-implied covariances for each *df*. A value greater than .05 for the RMSEA suggested a close fit, values up to .08 indicated a reasonable error of approximation, and models with values greater than .10 disregarded. The SRMR demonstrated the average discrepancy between the observed and model-implied covariances (Jaccard & Wan, 1996; Jöreskog & Sörbom, 1993), with values less than 0.05 generally indicating a good model fit. The CFI is comparative fit index that tested how much better a model fits compared with an independence model (Jöreskog & Sörbom, 1993). For the CFI values greater than .90 represented good model fit.

To examine the relationships between stressors, social support and psychological responses, moderated hierarchical regression analysis was used (Jaccard & Wan, 1996). Prior

to the formation of product terms, all variables were standardised (with a mean of 0 and standard deviation of 1) to enhance the interpretation of the interaction term (Finney, Mitchell, Cronkite, & Moos, 1984). Based on the recommendations of Biddle, Markland, Gilbourne, Chatzisarantes, and Sparkes (2001), each variable was entered into a hierarchical model that comprised three blocks. The first independent variable (i.e., the stressor) was entered in the first block and the second independent variable (i.e., the social support), hypothesized as the moderating variable, was entered into the second block. The percentage of the total variability explained by each independent variable (R^2) indicated the main effects of the respective variables. The product term was entered in the third block together with the main effect (i.e., stressor) variable and an interaction was reflected by a significant change in R^2. The form of the interaction was represented graphically by plotting the regression of the dependent variable (i.e., psychological response) on one of the independent variables (i.e., stressor) at different values of the moderator (i.e., social support).

Four predicted values which were calculated for Y (i.e., psychological response) determined the nature of the interaction: first, when a low score on the stressor was associated with a low score on the social support dimension (i.e., 1 standard deviation below its mean); second, when a high score on the stressor was associated with a high score on the social support dimension (i.e., 1 standard deviation above its mean); third, when a low score on the stressor was associated with a high score on the social support dimension; and finally, when a high score on the stressor was associated with a low score on the social support dimension (Biddle et al., 2001). As a result of these analyses, the slopes for the stressor in relation to the psychological response when a social support dimension was low and high were plotted for interpretation purposes. We followed the standard procedure for plotting interactions following significant effects in moderated hierarchical regression analysis (cf. Aitken & West, 1991). This process has also been reported in the sport literature when examining main

and stress-buffering effects of social support upon factors underlying performance (e.g., Rees & Hardy, 2004). The alpha level for all statistical tests was set at .05.

Study 1

The purpose of the first study was to examine the main effect of stressors and perceived available support and stress-buffering effect relationships between the perceived availability of social support and psychological responses to sport injury.

Method

319 injured athletes (258 males, 61 females) from 33 different sports with a mean age of 27.27 years (*SD*=9.43) completed measures of stressors, social support (SSIIA), and psychological responses (PRSII). Playing standards of participants ranged from recreational to international level and injury severity ranged in terms of time loss from participation in sport from 1 week to 336 weeks (*M*=12.24, *SD*=11.09).

Results

Means, standard deviations, and intercorrelations across all subscales used in the current study can be seen in Table 2.

Measures

SSIIA. The results of the CFA indicated an acceptable model fit for the 4-factor, 16-item measure (χ^2 (98) = 182.1, p < .01; RMSEA = .05; RMSEA (*p*) = .28; SRMR = .05; CFI = .94). Cronbach's alpha internal consistency reliability coefficients for the SSIIA were as follows: Emotional (α = .61), Esteem (α = .85), Tangible (α = .59), and Informational (α = .74). All subscales except Emotional (.61) and Tangible (.59) were satisfactory (i.e., ≥ .70; Nunnally, 1978). According to Nunnally, scale items should display a minimum inter-item correlation of *r* = .30. In both cases, average inter-item correlation was satisfactory for Emotional (*r* = .60) and Tangible (*r* = .30) indicating that the items in these scales measure the same underlying construct. In addition, utilizing standardized loading and measurement

error for each of the items, Emotional (.86) and Tangible (.83) were both above the suggested value of .70 that demonstrates good composite reliability (Shook, Ketchen, Hult, & Kacmar, 2004). Shared variance of Emotional (.60) and Tangible (.56) were both higher than .50 that indicates satisfactory content validity of the items in each subscale (Fornell & Larcker, 1981). There were a number of significant correlations between support subscales, which has been observed in other similar studies (e.g., Rees & Hardy, 2004; Rees et al., 2007; Rees et al., 2010) and social support measures (e.g., Brookings & Bolton, 1988).

PRSII. The results of the CFA were also considered to provide an adequate model fit for the 5-factor, 19-item measure ($\chi^2(142) = 357.60$, $p < .01$; RMSEA = .05; RMSEA (p) = .10; SRMR = .05; CFI = .93). Cronbach's alpha internal consistency reliability coefficients for the PRSII subscales were as follows: Isolation (α = .75), Restlessness (α = .65), Feeling Cheated (α = .71), Devastation (α = .71), and Reorganization (α = .66). Average inter-item correlations for Restlessness (.33) and Reorganization (.39) were above $r = .30$ (Nunnally, 1978). In addition, composite reliability for Restlessness (.77) and Reorganization (.81) exceeded the recommended value of .70 (Shook et al., 2004). Similarly, shared variance for both Restlessness (.51) and Reorganization (.55) was above the suggested value of .50 (Fornell & Larcker, 1981).

The relationships between stressors, social support, their product and psychological responses to sport injury.

In total, eight models were tested (see Table 1), each specifying the stressor, social support type, and the interaction of these in relation to specific psychological responses. In the absence of interactive effects, main effects of stressors and social support would indicate an impact on psychological responses directly, irrespective of the level of stress. Results from the moderated hierarchical regression analyses are shown in Table 3. Effects were in the hypothesised directions; the presence of stressors were associated with higher levels of

restlessness, isolation, and feeling cheated and higher levels of social support was associated with lower levels of restlessness, isolation, and feeling cheated.

Six interactions out of the eight models that were tested (models 2-5, and models 7-8) added significantly to the variance in psychological responses explained by the main effects of stressors and perceived available social support. Five of the six graphs (models 2-5, and model 8) of the significant interactions demonstrated consistency with the explanation of buffering (see Fig. 1); detrimental relationships between stressors and psychological responses were reduced for those with high perceived available social support compared to those with low perceived available social support, but level of perceived available social support was relatively unimportant at low levels of stressors. One significant interaction that is worthy of note and contrary to the others is that of model 7; restlessness, loss of confidence and esteem support. That is, the detrimental relationship between loss of confidence and restlessness was not reduced for all those with high levels of perceived available esteem support. This was only apparent at lower levels of confidence where the aforementioned detrimental relationship was reduced for those with high perceptions of available esteem social support. This suggests that the stressor loss of confidence was not an issue for participants in this particular situation and that perceived available social support did not act as a stress-buffer. Rather, the perception of available social support prevented a change in loss of confidence and enabled participants to tolerate and regulate feelings of restlessness.

Discussion

There has been limited research that has examined the stress-buffering effect of social support in sport generally and within a sport injury context, specifically. Therefore, the main purpose of Study 1 was to examine in a sport-injury context the hypothesis that the perception of social support availability acts as a stress-buffer. In line with the buffering hypothesis, the results revealed interactive effects for perceived availability of social support

and injury stressors on psychological responses to injury. In relation to stressors, psychological responses were at lower levels when the perception of support availability was high. However, when this support availability was perceived to be low, stressors were associated with higher levels of psychological responses.

Significant interactions provided support for the role of perceived available social support within the stress-injury process, the stressors that were used, and the importance of matching social support to these specific stressors. The findings suggested that the perception of certain available social support types when carefully matched to stressors would help reduce the impact of the stressor on the injured athlete, which may aid the recovery process (cf. Cutrona & Russell, 1990, Lakey & Cohen, 2000; Wills & Shinar, 2000). For example, athletes can experience increased levels of frustration and resentment together with decreases in self-image and self-esteem as a result of incapacitation and disruption to normal physical functioning (Evans & Hardy, 1995; Johnston & Carroll, 1998; Tracey, 2003). Indeed, participants in the current study may have experienced restlessness, isolation, and feeling cheated as a function of this. However, when participants perceived the availability of esteem and emotional support the support buffered the negative relationship between stressors and psychological responses. The perception that esteem and emotional support was available to them may have acted as important sources of reinforcement, bolstering participants' self-belief and self-worth. The perception of having someone there to listen to them in order to vent frustrations (i.e., emotional support) and to reassure them that they have the ability to deal with the injury and rehabilitation process (i.e., esteem support), may have enhanced coping by reducing their perceptions of the difficulties associated with being incapacitated and isolated (cf. Bianco, 2001; Johnston & Carroll, 1998).

A similar pattern emerged when participants experienced the stressor loss of confidence. Two significant interactions were related to the stressor loss of confidence.

Specifically, as injured athletes experienced decreased levels of confidence, high levels of perceived available esteem support maintained the levels of restlessness and isolation whereas low levels of perceived available esteem support were associated with an increase in levels of restlessness and isolation. Habitual confidence sources, either self-referenced or based on social comparison, can be disrupted by injury (Magyar & Duda, 2000) and injured athletes may experience greater levels of anxiety due to the loss of important sources of confidence and self-efficacy (Bandura, 1982). In order to maintain low levels of restlessness and isolation, athletes benefited from perceived available support that reassured them and told them they could do it, that motivated them and also lifted morale when it was down. In turn this may have enhanced levels of motivation, reducing perceptions of restlessness and isolation. This interpretation is consistent with Bandura's (1977) self-efficacy theory and the effect of efficacy beliefs on the initiation, persistence, level of expectation, and accomplishment of particular behaviours. Magyar and Duda suggested that injured athletes who had high perceptions of social support (provided by trainers, parents, and teammates) identified both environmental sources (e.g., environmental comfort, social support, and trainer's leadership) and self-persuasion sources (e.g., physical/mental preparation and mastery) as important sources of confidence restoration post-injury.

In relation to the main effects for perceived available social support, these should be considered in conjunction with the significant interactions. The proportion of variance in psychological responses explained by the main effects of perceived support availability ranged from 3% to 11%. This is comparable to the 3% to 10% range of main effects for social support on performance reported by Rees and Hardy (2004). The findings here highlight the impact that social support may have in preventing the potential impact of injury-related stressors. Indeed, those high in perceived available support were less likely to

experience stress, whereas those low in perceived available support were more likely to do so.

Study 2

The purpose of Study 2 was to examine the main effect of stressors and received support and stress-buffering effect relationships between received social support and psychological responses to sport injury. In total, the same eight models from Study 1 were tested (see Table 1), each specifying the stressor, social support type, and the relationship of these to specific psychological responses.

Method

A different sample of 302 injured athletes (194 males, 108 females) from 23 different sports with a mean age of 29.47 years (*SD*=10.57) completed the measures of stressors, social support and psychological responses. Playing standards ranged from recreational to international level. Injury severity ranged in terms of time loss from participation in sport from 1 week to 92 weeks (*M*=13.54, *SD*=12.03).

Results

Means, standard deviations, and intercorrelations across all subscales in the current study can be seen in Table 4.

Measures

Social support. The results of the CFA used to test the four-factor model with the 302 participants suggested an adequate model fit ($\chi^2(98) = 177.4$, $p < .01$; RMSEA = .04; RMSEA (*p*) = .44; SRMR = .05; CFI = .94). Cronbach's alpha internal consistency reliability coefficients were as follows: Emotional (α = .76), Esteem (α = .88), Tangible (α = .73), and Informational (α = .79). Moderate to high correlations were again found between social support dimensions (i.e., .50 - .77, p <.05).

PRSII. The results of the CFA although perhaps marginal, were considered to provide an adequate model fit for the 5-factor, 19-item measure ($\chi^2(142) = 356.86$, $p < .01$; RMSEA = .06; RMSEA (p) = .20; SRMR = .05; CFI = .92). Cronbach's alpha internal consistency reliability coefficients for the PRSII subscales were as follows: Isolation (α = .78), Restlessness (α = .67), Feeling Cheated (α = .75), Devastation (α = .80), and Reorganization (α = .70). Average inter-item correlations for Restlessness (.40) was above $r = .30$ (Nunnally, 1978) and composite reliability (.81) was above Shook et al's recommended value of .70. Shared variance for Restlessness (.62) was above the suggested value of .50 (Fornell & Larcker, 1981).

The relationships between stressors, social support, their product and psychological responses to sport injury.

The results of the moderated hierarchical regression analyses are shown in Table 5. Main effects of stressors and social support indicated that they had an impact on psychological responses directly, irrespective of the level of stress. There were significant main effects for stressors in each of the eight models that were tested. Over and above the variance accounted for by stressors, there were significant main effects for emotional support (models 1 and 3), esteem support (models 2, 4, 5, 7, and 8), and tangible support (model 6). There were no significant interactions so the findings only provided support for the hypothesis of main effects for stressors and social support.

Discussion

The results of the moderated hierarchical regression suggest that social support had a positive influence on psychological responses to sport injury, but in contrast to Study 1 it operated as a main effect and not as a stress-buffer. The finding of main effects in the absence of interactions suggests that received social support had a significant effect on psychological responses but irrespective of injury stressors.

The proportion of variance in psychological responses explained by the main effects of social support was larger than in Study 1 and ranged from 9% to 21%, depicting medium to large effect sizes (cf. Cohen, 1992). The variance reported in similar social support studies has ranged from 10% to 24% for received support (Rees et al., 2007). Given the paucity of quantitative-based studies that have examined the main and stress-buffering effects of received social support in a sport injury context, these results provide a level of practical significance and highlight the importance of received social support regardless of the presence of injury stressors.

The main effect findings of received support highlight potential mechanisms through which received social support may influence psychological responses to injury. It is likely that the participants in the current study were integrated within networks that promoted adaptive responses regardless of injury and related stressors (Cohen et al., 2000). For example, by receiving specific support types (i.e., emotional, esteem, and tangible support), participants were able to reduce the impact of certain stressors (i.e., incapacitation and loss of confidence) upon psychological responses (i.e., restlessness, isolation, and feeling cheated). Specifically, support that the participants received may have served as a source of positive affect; emotional support that was received by participants would have increased feelings of security and being cared for, whereas esteem support would have increased perceptions of competence and the belief that they could cope. In turn, participants with a sense of purpose, recognition of self-worth and self-esteem would have felt less despondent and more motivated to care for themselves. Similarly, tangible support received from others in the form of instrumental assistance and care would reduce participants' exposure to risk factors associated with certain stressors.

The failure to detect stress-buffering effects, which is not uncommon in the area of social support, has also been attributed to research design, specifically to issues of power

(Wills & Shinar, 2000). That is, small sample sizes can result in an inability to detect stress-buffering effects. However, the sample size in the current study was larger than in comparable studies that have reported stress-buffering effects in injured athletes (Rees et al., 2010). In addition, although not specifically addressed, a number of aspects of the support process may have contributed to the non-detection of stress-buffering effects in the current study. For example, it is possible that the support that was provided to the participants, although well intentioned, was unhelpful. In fact, stress-buffering models have been reported to inadequately capture the essence of support, in particular with regard to whether the recipient is receptive to the support that is offered and whether it enhances coping (Goldsmith, 2004). Although the current study did not examine the exact nature of support relationships the injury literature suggests that a number of people can act as support sources for the injured athlete (Evans et al., 2006) and can provide more than one type of support if needed (Bianco, 2001). With this in mind, it is conceivable that the relationship between recipient and provider and the context of support interactions had a moderating effect on the support interaction. Indeed, Reis and Collins (2000) suggested that difference in support interactions relate to functional differences between support recipient and providers, which may include perceived partner responsiveness, the degree and type of casual influence each partner has on the other, sentiment, and social and environmental aspects.

Summary and Concluding Discussion

The current research provides further support for the role of social support in the injury-response process. In particular, it provides some support for the efficacy of optimal matching when athletes are faced with certain injury stressors. Consistent with previous sport research (e.g., Rees & Hardy, 2004; Rees et al., 2007; Freeman & Rees, 2008; Rees et al., 2010) results partially support the notion that when optimally matched to stressors, perceived available social support is more consistently linked to positive outcomes than received

support. Unlike the perception of available support that buffered injured athletes from the negative effects of injury stressors, received support appeared to function in a more preventative manner.

Although the matching hypothesis offers a plausible explanation for the stress-buffering effects of the perception of available social support (study 1), it fails to do so for received support (study 2). One possible explanation for why received support does not show stress-buffering effects is that it involves an exchange of resources (i.e., a behavioural component) as opposed to the perception of support that is available (i.e., a perceptual component). To elaborate, there is greater likelihood that the actual exchanges of support will fail to meet the recipient's needs because of possible mismatches in provider and recipient characteristics, the timing of the support, and the appropriateness of the support relative to the recipient's needs (Barrera, 1986; Rook & Underwood, 2000). An alternative explanation could be that if the person is not perceived to be threatened by stressful events, or is perceived to be coping and performing well in the face of adversity, then the person may not elicit socially supportive behavior (Cutrona & Russell, 1990).

The perception of social support availability, and the stress-buffering effects observed in Study 1, could be viewed as the adult consequence of the attachment experience (Mikulincer & Shaver, 2009). Attachment theory conceptualizes the importance of the development of supportive attachment figures during childhood and the initiation, development, and maintenance of interpersonal relationships and the functions that they serve during adulthood (Uchino, 2009). A history of secure and responsive attachment figures can promote the belief that people will be available if needed and as a result, feelings of security and belonging during times of stress. Previous attachment experiences can also influence the effectiveness of interpersonal interactions, interpretations of what can transpire during these interactions, increase feelings of personal effectiveness and self-efficacy, and the ability to

cope (Collins, Guichard, Ford, & Feeney, 2006). During threatening situations or in response to anxiety such perceptions have been associated with a more task-focused approach to coping. However, another consequence of interrelationship effectiveness may also be increased network size and the perception that one can mobilise it, which may in turn, increase the perception of support availability (Uchino, 2004). Taken together although a little speculative, attachment theory may offer a plausible explanation for the stress-buffering effects reported in Study 1.

The present study addressed a number of limitations of previous research. We used theoretically derived multidimensional measures of received support and the perception of available support to account for the different types and functional and perceptual dimensions of social support. Similarly we used a population-specific measure of injured athletes' psychological responses. In addition, single-item measures of injury stressors, drawn from the injury literature, were relevant to the injury and rehabilitation context.

The study was not, however, without limitations. In relation to the measures of social support, the results of the fit statistics suggested adequately fitting models. We are confident that the current models are consistent with the data although aware that further work in relation to re-specification is required. For example, in Study 1, two of the four SSIIA subscales (.59 and .61) and two of the five PRSII subscales (.65 and .66) have alpha reliabilities below Nunnally's (1978) standard of .70. In Study 2, one subscale from the PRSII (.67) is below the .70 standard. However, as Schmitt (1996) pointed out, even with alpha reliabilities far lower than those we report, so long as a measure has other desirable properties, such as meaningful content coverage of the domain in question, along with reasonable unidimensionality, all of which we demonstrate in our work, low reliability need not be a major impediment to its use. As estimates of the relationships between variables will likely be attenuated with low reliability, interpretation of the regression models and paths

should therefore be viewed cautiously. In addition, we are cognisant of the potential influence of common method variance in the current research, particularly in light of self-report measures that have been utilised throughout each study. This may be particularly salient in the bias (i.e., elevation) of correlations across the social support variables, and in the main effects obtained. However, it is difficult to see how common method variance can easily account for significant interaction (moderator) effects. Although the use of structural equation modelling would have addressed common method variance (Jöreskog & Sörbom, 1996) a sample size far greater than the present one is required to test a full structural model of relevant variables (cf. Marsh, Hau, Balla, & Grayson, 1998). Finally, although it is acknowledged that the testing of eight models may have increased the chance of a Type 1 error (cf. Rees & Hardy, 2004), a strong theoretical rationale for each of the models should counteract this concern. Indeed, we believe that the main and stress-buffering effects that have been reported in the current study are in part, due to the fact that both the measures used and hypotheses tested were theoretically underpinned by the relevant research literature.

The results of the present set of studies support the contention that the perception of available social support buffers psychological responses when athletes face specific injury stressors. The findings highlight the protective qualities of support types when matched to the stressors the athlete may be experiencing, findings that have important implications for sport and health-care providers. For example, the nature of injury stressors that an individual may experience and the importance of available social support in reducing certain psychological responses that may hinder rehabilitation. It is essential that network members and support providers become educated in social support, particularly the quantity and appropriateness of the support that they make available to the injured athlete.

Based on the present findings research should consider the processes by which stress-buffering occurs. For example, if previous attachment processes (e.g., carer-taker interactions

and previous support experiences) play a role in the development of perceived availability of support of injured athletes, then this aspect merits further consideration. Indeed, the developmental aspects of perceived support have been acknowledged in mainstream psychology literature in relation to the need to adopt a life-span approach in order to capture change in support over time and its antecedents (Uchino, 2009). The examination of the factors and processes that impact upon the success of support exchanges, particularly in relation to both support provider and recipient characteristics is important for future research. These challenges have the potential to illuminate the processes underlying social support, particularly with regard to the needs of the injured athlete elicited by stressors, the timing of the support, and those who provide it. Importantly, this information could inform the design and implementation of social support interventions to help expedite athletes' recovery from sport injury.

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Table 1

Hypotheses with corresponding interactions

	Stressor	Support type	Response	Effect
1	Incapacitation	Emotional support	Restlessness	Interaction
2	Incapacitation	Esteem support	Restlessness	Interaction
3	Incapacitation	Emotional support	Isolated	Interaction
4	Incapacitation	Esteem support	Isolated	Interaction
5	Incapacitation	Esteem support	Feeling cheated	Interaction
6	Incapacitation	Tangible support	Isolated	Interaction
7	Loss of confidence	Esteem support	Restlessness	Interaction
8	Loss of confidence	Esteem support	Isolated	Interaction

Table 2

Means, standard deviations and intercorrelations for all subscales

Subscale	M	SD	1	2	3	4	5	6	7	8	9	10
1. Devastation	8.97	3.27										
2. Feeling Cheated	8.15	3.20	.72**									
3. Restlessness	10.71	4.21	.38**	.35**								
4. Isolation	7.73	3.14	.64**	.56**	.33**							
5. Reorganization	8.47	3.36	.06	.03	.02	.14						
6. Emotional	15.93	4.12	-.11*	-.15**	-.09	-.18**	.03					
7. Esteem	14.82	3.61	-.14*	-.16**	-.10	-.27**	.08	.66**				
8. Tangible	14.29	3.50	-.04	-.05	.00	-.11*	.11*	.43**	.55**			
9. Informational	14.10	3.45	-.17**	-.14*	-.12*	-.26**	.04	.62**	.80**	.66**		
10. Incapacitation	3.31	1.20	.19**	.21**	.18**	.18*	.02	.08	.04	.01	.05	
11. Loss of confidence	2.84	1.22	.40**	.43**	.23**	.35**	-.02	.00	-.07	-.03	-.06	.25**

N=319. Note: * Denotes correlation significant at .05 level (2-tailed). **Denotes correlation significant at .01 level (2-tailed).

Table 3

Hierarchical regression analyses: Effects of stressors, social support factors and products on psychological responses.

Model	Dependent variable	Independent variable	ΔR^{2a}	$P(F)^b$	b^c	$p(t)^d$
1	Restlessness	Incapacitation	.02	.01	.55	.00
		Emotional	.03	.00	-.64	.00
		Product	.01	.10	-.25	.10
2	Restlessness	Incapacitation	.02	.01	.50	.01
		Esteem	.02	.01	-.49	.01
		Product	.01	.04	-.32	.04
3	Isolation	Incapacitation	.03	.00	.16	.00
		Emotional	.06	.00	-.22	.00
		Product	.02	.01	-.09	.01
4	Isolation	Incapacitation	.03	.00	.15	.00
		Esteem	.08	.00	-.22	.00
		Product	.02	.01	-.10	.01
5	Feeling Cheated	Incapacitation	.05	.00	.70	.00
		Esteem	.02	.01	-.49	.01
		Product	.04	.00	-.58	.00
6	Isolation	Incapacitation	.03	.00	.14	.00
		Tangible	.01	.04	-.09	.04
		Product	.00	.74	.01	.74
7	Restlessness	Loss of confidence	.13	.00	1.13	.00
		Esteem	.01	.02	-.40	.02
		Product	.01	.04	-.35	.04
8	Isolation	Loss of confidence	.12	.00	.26	.00
		Esteem	.06	.00	-.20	.00
		Product	.02	.00	-.12	.00

n = 319. All variables standardised except for product. Product formed from the two preceding standardised variables.

[a] Stepwise change in R^2.
[b] Probability of F for ΔR^2.
[c] Unstandardised regression coefficient in final equation.
[d] Probability of t for b.

Table 4

Means, standard deviations and intercorrelations for all subscales

Subscale	M	SD	1	2	3	4	5	6	7	8	9	10
1. Devastation	10.38	3.88										
2. Feeling Cheated	9.51	3.79	.70**									
3. Restlessness	10.75	2.93	.63**	.49**								
4. Isolation	8.67	3.52	.62**	.66**	.52**							
5. Reorganization	7.60	2.56	-.21**	-.20**	-.05	-.05						
6. Emotional	14.32	3.10	.19**	.15*	-.01	-.01	-.01					
7. Esteem	13.77	3.09	.24**	.20**	-.05	-.05	.03	.79**				
8. Tangible	10.81	3.20	.07	-.04	.15**	.07	.33**	.26**	.31**			
9. Informational	10.87	3.33	.02	-.06	-.06	-.01	.48**	.19**	.34**	.65**		
10. Incapacitation	2.87	1.17	.42**	.31**	.39**	.36**	-.17**	.10	.07	-12*	-.12	
11. Loss of confidence	2.85	1.23	.43**	.52**	.29**	.50**	-.07	.12*	.11	.01	.01	.28**

N=302. Note: * Denotes correlation significant at .05 level (2-tailed). **Denotes correlation significant at .01 level (2-tail)

Table 5

Hierarchical regression analyses: Effects of stressors, social support factors and products on psychological responses.

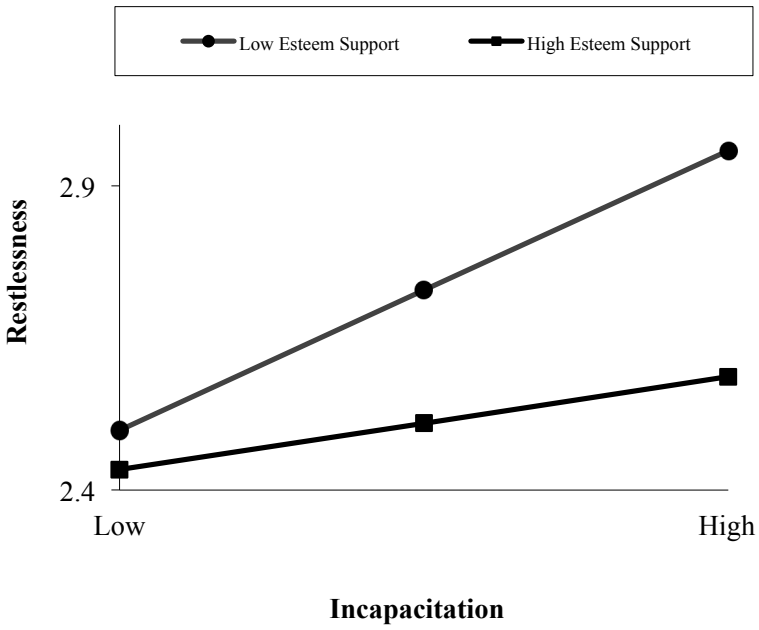
Model	*Dependent variable*	*Independent variable*	$\Delta R^{2\,a}$	$P(F)^{b}$	b^{c}	$p(t)^{d}$
1	Restlessness	Incapacitation	.14	.00	.98	.00
		Emotional	.16	.00	-1.35	.00
		Product	.04	.30	.35	.30
2	Restlessness	Incapacitation	.15	.00	1.06	.00
		Esteem	.17	.00	-1.05	.00
		Product	.03	.75	.35	.76
3	Isolation	Incapacitation	.07	.01	.89	.00
		Emotional	.19	.00	-1.26	.00
		Product	.02	.24	.29	.24
4	Isolation	Incapacitation	.03	.01	.12	.00
		Esteem	.08	.00	-.29	.00
		Product	.00	.70	.10	.71
5	Feeling Cheated	Incapacitation	.14	.00	.95	.00
		Esteem	.13	.00	-1.33	.00
		Product	.03	.29	.03	.29
6	Isolation	Incapacitation	.08	.04	.24	.01
		Tangible	.06	.03	-1.09	.05
		Product	.00	.85	.20	.85
7	Restlessness	Loss of confidence	.06	.03	.19	.01
		Esteem	.08	.01	-.28	.00
		Product	.00	.50	.20	.49
8	Isolation	Loss of confidence	.27	.00	.55	.00
		Esteem	.08	.03	-.11	.02
		Product	.02	.60	.11	.06

n = 302. All variables standardised except for product. Product formed from the two preceding standardised variables.

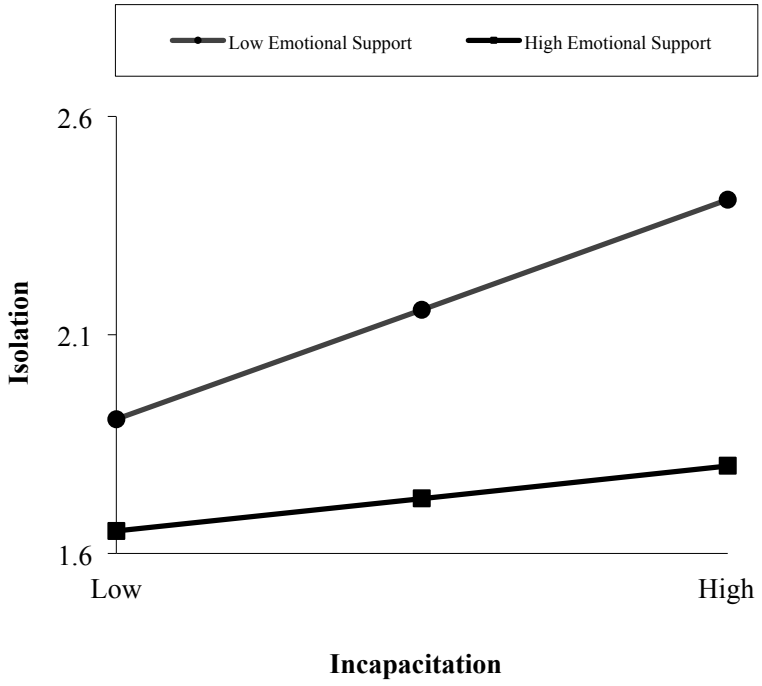
[a] Stepwise change in R^2.

[b] Probability of *F* for ΔR^2.

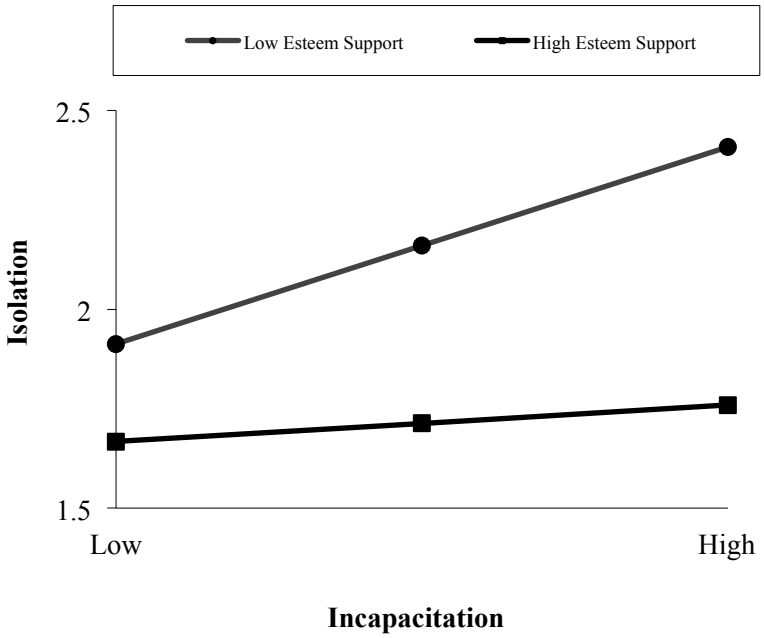
[c] Unstandardised regression coefficient in final equation. [d] Probability of *t* for *b*.


Low Esteem Support
High Esteem Support
Restlessness
2.9
2.4
Low
High
Incapacitation

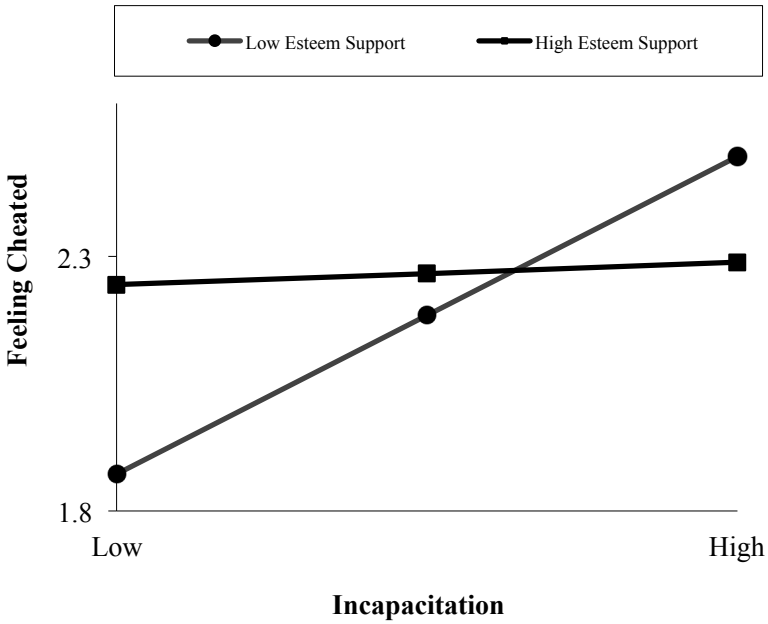
1
2
3


Low Emotional Support
High Emotional Support
Isolation
2.6
2.1
1.6
Low
High
Incapacitation

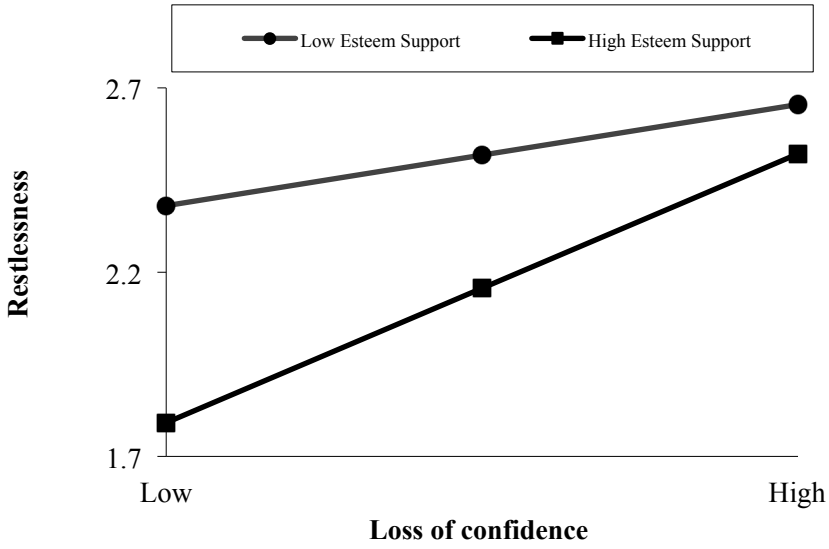
4
5
6
7


Low Esteem Support
High Esteem Support
2.5
2
1.5
Isolation
Low
High
Incapacitation

1
2
3


Low Esteem Support
High Esteem Support
2.3
1.8
Feeling Cheated
Low
High
Incapacitation

4
5
6



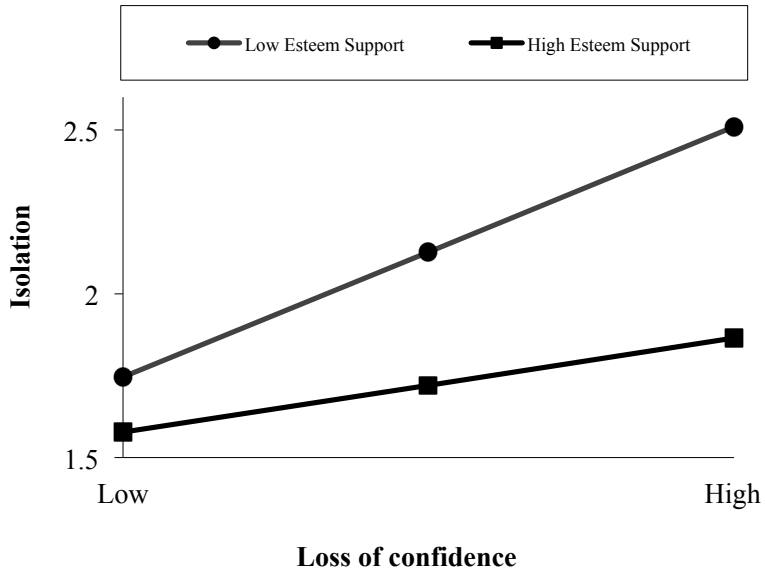


Fig. 1. The significant interactions of stressors and social support in relation to restlessness, feeling cheated and isolation. The x-axis represents values of low (1 SD below the mean), mid (the mean), and high (1 SD above the mean) levels of stressors. The lines represent values of low (1 SD below the mean) and high (1 SD above the mean) social support.