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Please reference this paper as:

Rees, T., & Hardy, L. (2004). Matching social support with stressors: Effects on factors underlying performance in tennis. *Psychology of Sport and Exercise, 5,* 319-337. doi:10.1016/S1469-0292(03)00018-9

Matching Social Support with Stressors: Effects on Factors Underlying Performance in Tennis

Tim Rees [a,*], Lew Hardy [b]

[a] Exercise and Sport Psychology Unit, School of Sport and Health Sciences, University of Exeter, St. Luke's Campus, Heavitree Road, Exeter EX1 2LU, UK

[b] School of Sport, Health, and Exercise Sciences, University of Wales, Bangor, George Building, Holyhead Road, Bangor, Gwynedd LL57 2DG, UK

Submitted: 2nd October, 2002

Resubmitted: 14th February, 2003

* Corresponding author. Tel: +44 1392 264722; Fax: +44 1392 264726.

E-mail address: Tim.J.Rees@exeter.ac.uk.

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Abstract

Objectives: This study: (a) examined the factor structure of a 4-dimensional measure of social support designed specifically for this study; (b) matched social support dimensions with stressors in examining the main and stress-buffering effects of social support upon factors underlying performance in tennis.

Method: 130 high-level tennis players completed measures of social support, stressors, and performance processes.

Results: Analyses of covariance structures largely provided support for the 4-dimensional structure of the social support measure. Moderated hierarchical regression analyses revealed significant main and stress-buffering effects of the social support dimensions upon performance processes.

Conclusions: The results illustrate the importance of matching specific types of sport-relevant social support with the needs elicited by the stressors under consideration. They also illustrate the need to pay close attention to the measurement instruments used in such studies. In this study, the finding of significant stress-buffering effects of social support may have been optimised through detailed attention to the measurement instruments chosen for the constructs under study. Applied implications would include developing an understanding of the beneficial role social support has to play in protecting players from the deleterious impact of stressors upon performance. Providers of support should, however, carefully match their support to the needs of the individual.

Key Words: Matching, social support, stressors, tennis performance, stress-buffering, interactions, confirmatory factor analysis

Matching Social Support with Stressors: Effects on Factors Underlying Performance in Tennis

Whilst there is increasing interest in the beneficial role social support may play in sport, there is, as is true of mainstream social psychology (Cohen, 1988; Cohen, Gottlieb, & Underwood, 2000; Thoits, 1995), need for further empirical evidence demonstrating which aspects of social support help and how. Theoretically (for reviews, see Cohen, 1988; Cohen, Underwood, & Gottlieb, 2000; B. R. Sarason, Sarason & Pierce, 1990; Veiel & Baumann, 1992), there is a consensus that social support might work in two principal ways: firstly, in a main effects model, with social support exerting generalized positive effects directly on outcomes, such as mental health, anxiety, depression, and physiological symptoms; and secondly, by moderating the effect of stress on outcomes. This latter prediction is referred to as the stress-buffering hypothesis. This hypothesis suggests that high levels of social support protect one from the harmful effects of stress, but that level of social support is relatively unimportant for those not experiencing stress. As Cohen wrote: "support 'buffers' (protects) persons from the potentially pathogenic influence of stressful events" (Cohen, p. 278). In sport, social support might influence performance in a main effect model by providing advice about tactics and game plans, or by increasing positive affect, leading to a greater likelihood of experiencing flow states (cf. Cohen, 1988; Rees, Ingledew, & Hardy, 1999). Alternatively, social support might buffer the negative impact of stress on performance.

Of course, the impact of stress on sports performance is not always negative, and the term stress is often used in place of the more specific terms anxiety, arousal, activation, and stressors (for a review, see, e.g., Woodman & Hardy, 2001). In mainstream social psychology, the notion of stress-buffering is tied to models of the stress process, appraisal and coping (e.g., Cox, 1978; Lazarus, 1966; Lazarus & Folkman, 1984), such that stress arises when an individual appraises a demand as threatening or otherwise, and does not have an appropriate coping response. The

protective (stress-buffering) influence of social support might operate via a number of different mechanisms; for example, by leading to benign appraisal of the stressful events, through a direct transfer of resources (e.g., giving financial aid), or by promoting better coping behaviours (Cohen, Gottlieb, & Underwood, 2000; Cohen & Wills, 1985; Lakey & Cohen, 2000; Wills & Shinar, 2000). The most influential viewpoint is that social support leads to better coping with stress; coping is enhanced by the supportive actions of others, or by the belief that support is available if needed (Lakey & Cohen, 2000). Understanding how the beneficial effects of social support protect people from stress is of fundamental importance to social support research. This invites the question, does social support help because there is someone available to talk to about the problem, or because there is someone to bolster one's self-esteem, or provide advice and financial aid? To address these issues, social support should be viewed as a multidimensional construct and its specific dimensions examined.

To appropriately test the stress-buffering hypothesis one must carefully match specific types of social support to specific stressors (Cutrona & Russell, 1990). Carefully matched social support-stressor combinations that produce significant interactions in regression analysis will aid understanding of which specific types of social support help to protect people from the harmful effects of specific types of stressors (Cutrona & Russell, 1990; Lakey & Cohen, 2000; Wills & Shinar, 2000); conversely, matched social support-stressor combinations that produce nonsignificant interactions will aid understanding of which types of social support do not help, or where support is not useful (cf. Dakof & Taylor, 1990; Rook, 1992).

The purpose of the present study was to test the stress-buffering hypothesis in sport, using a multidimensional measure of social support, designed for this study; the dependent variables were factors underlying performance. In a previous study, Rees, Ingledew and Hardy (1999) had found main effect associations between social support and performance in tennis. The present

study heeds the proposition of Carron (1988) and Zanna and Fazio (1982) for second generation research questions to involve examination of possible moderator effects. Given the literature on stress-buffering and the extensive literature on stress and performance in sport (e.g., Gould & Krane, 1992; Jones & Hardy, 1990; Woodman & Hardy, 2001), it is reasonable to examine whether social support buffers the effect of stress upon performance factors. It is also reasonable to examine whether support exerts a direct effect on performance factors that is independent of stressors.

Stress-buffering is normally tested by means of a stress X social support interaction (Cohen & Wills, 1985). In practice, this interaction is entered in regression analysis as a cross-product term after inclusion of the main effects for stress and social support; this process is referred to as moderated hierarchical regression analysis (Biddle, Markland, Gilbourne, Chatzisarantis, & Sparkes, 2001; Jaccard, Turrisi, & Wan, 1990). Significant increments in explained variance due to this interaction, over and above the main effects of stress and social support, allow the conclusion that social support moderated the effect of stress on the dependent variable (Barron & Kenny, 1986).

For matching to be effective, one should employ well-designed, content-specific measures. One should also consider whether one wishes to assess perceived or received support. Generally, it is perceived availability of social support that has been most consistently linked with the buffering hypothesis (Cohen, 1988; Cohen, Gottlieb & Underwood, 2000; Cohen & Hoberman, 1983; Cohen & Wills, 1985; Wills & Shinar, 2000). In the present study, we required a multidimensional measure of perceived availability of social support that would be relevant to sportspeople and that could tap supportive elements that might match the specific needs elicited by the stressors under consideration (Cohen & Wills, 1985). In the Rees et al. (1999) study, the authors used the Interpersonal Support Evaluation List (ISEL) (Cohen, Mermelstein, Kamarck &

Hoberman, 1985), a measure of perceived social support with a confirmed factor structure (Brookings & Bolton, 1988), but which relates to general everyday support issues; it does not account for the support issues that might be of specific relevance to high-level sportspeople. The 8-dimensional model of social support of Richman, Rosenfeld and Hardy (1993), which was developed from a conceptualization of support in relation to burnout (Pines, Aronson, & Kafry, 1981), is generating increasing attention in sport, in particular in relation to sports injuries (e.g., see Brewer, 2001; Hardy, Burke, & Crace, 1999). Richman et al. based their measurement instrument, the Social Support Survey (SSS), on this 8-dimensional model of social support. In the present study, the SSS was not used, as some issues have been raised regarding its content and structural validity (see Rees, Hardy, Ingledew, & Evans, 2000).

In light of these issues and the proposal that social support researchers should write new items to capture specific aspects of the support needs of the target population (Wills & Shinar, 2000), a new measure of social support was constructed for this study. The measure contained four dimensions: emotional; esteem; informational; and tangible support. Stressors were measured by way of two examples drawn from the literature on sources of stress (stressors) in sport (e.g., Gould, Horn & Spreeman, 1983; Gould, Jackson & Finch, 1993; Noblet & Gifford, 2002; Scanlan, Stein & Ravizza, 1991). Chosen for their particular relevance to tennis, an individual and highly technical sport, the stressors were: competition pressure; and technical problems in training. The dependent variables were factors underlying performance, drawn from a list of performance-related factors in tennis first reported in Rees et al. (1999), and subsequently validated by Rees, Hardy, and Ingledew (2000). There were two scales: flow; and feeling flat. Flow relates to the ideal state of peak performance and peak experience (e.g., Csikszentmihalyi, 1975; Privette, 1983) that all performers strive to achieve. Feeling flat relates to a negative performing state that performers hope to avoid. The initial move of Rees et al. (1999) towards

novel measurement of performance-related variables followed suggestions from sport psychology (e.g., Hardy & Jones, 1990; Gould & Krane, 1992) for more valid and reliable measures of performance, including process measures that may reflect the task complexity of different sports (Gould, Petlichkoff, Simons, & Vevera, 1987). In the Rees et al. (1999) study, whilst no associations were found between social support and a winning versus losing outcome measure, associations were found between social support and factors underlying performance. Associations were therefore only apparent when attention was focused on those factors. This mirrors the proposition from Parfitt, Jones and Hardy (1990) that anxiety effects of statistical significance are unlikely to be detected using outcome performance measures. Nevertheless, the flow and feeling flat scales have been found to differentiate winners from losers (Rees, Hardy, & Ingledew, 2000), such that the use of these two scales could enable a greater understanding of the influence of social support and the potential processes or mechanisms underpinning performance effects.

Specifying stress-buffering models involves consideration of which dimension of social support would most likely moderate the impact of the stressor. The proposition of Cutrona and Russell (1990), who drew upon the coping literature, is that the controllability or uncontrollability of the stressor determines support needs. Generally, uncontrollable events would lead to a need for forms of social support that foster emotion-focused forms of coping, and controllable events would lead to a need for forms of social support that foster problem-focused coping. However, in practice Cutrona and Russell recognize that specific forms of social support do not exclusively foster either emotion- or problem-focused coping, but can foster both. Indeed, Cohen and Wills (1985) found that emotional, esteem and informational forms of support tend to be beneficial in dealing with almost all stressful situations. So, there is still no absolute certainty as to which types of social support help and in which situations, meaning that delineating hypothesized differential effects of social support on stressors is a complex process. Wills and Shinar (2000)

suggested that, alongside the use of theory, specification of hypothesized models could also involve consideration of the relative impact of the stressors under consideration, and one's previous experience with the target population. To aid our specifying hypothesized models for stress-buffering effects of social support, we therefore used a number of strategies: we drew upon the optimal matching hypothesis (Cutrona & Russell, 1990), considering the controllability or otherwise of the two stressors; we paid close attention to the content of the items on the support scales in relation to the stressors; and we used our previous knowledge of the target population.

Should competition pressure and technical problems in training be considered controllable or uncontrollable stressors? We considered competition pressure as a relatively uncontrollable environmental stressor; though one can control one's reaction to it, one cannot actually alter the nature of the pressure-laden competitive environment. For players reporting competition pressure as an issue for them, we therefore hypothesized that emotion-focused forms of coping would be appropriate. For example, emotional support, in terms of someone always being there for the player, listening and giving moral support might help. Esteem support might also help in terms of telling the player, he/she can do it, and instilling the player with the confidence to deal with the pressure. We considered technical problems in training as a relatively controllable stressor; technical problems in training can be solved. We therefore hypothesized that problem-focused forms of coping would be appropriate. For example, informational support, such as someone to talk to about the technical problems, and who gives technical advice would help. Tangible support, in terms of someone who helps planning, setting and organizing training sessions to deal with the problem, might also help. Based upon these propositions and the content of the items making up each social support scale, we made the following eight stress-buffering hypotheses. The relationship between competition pressure and flow and feeling flat would be buffered by emotional support and esteem support; and the relationship between technical problems in

training and flow and feeling flat would be buffered by informational support and tangible support.

The stress-buffering effects would be demonstrated by two basic forms (Cohen & Wills, 1985): firstly, social support might partially reduce the deleterious impact of stressors on performance; or, social support might totally ameliorate the effect of stressors on performance. In other words, for the hypothesized models, it was expected that an increase in the stressor would be associated with a maintenance or smaller decrease in scores on flow for those with high social support as opposed to those with low social support. It was also expected that an increase in the stressor would be associated with a maintenance or smaller increase in scores on feeling flat for those with high social support as opposed to those with low social support. To be consistent with the stress-buffering hypothesis, graphs of any significant interactions would be expected to take one of the two forms outlined above, with lines identifying high and low social support.

Method

Participants

Participants were 130 high-level British tennis players (100 males, 30 females), mean age 18.35 years (SD 3.94). Sampling was opportunistic, with players recruited at Lawn Tennis Association (LTA) British Tour events, national junior events and national training squads. Players ranged from those in the British top-10 (world ranked higher than 300) to those with LTA ratings not less than 3.2. As the measures in this study were dispositional, rather than state-like (situational), players were given the choice to complete the measures at the tournament site or later at their convenience.

Measures

Social Support. Social support was measured using a 39-item questionnaire, designed for this study, the items of which were derived from social support statements made by high-level

sportspeople regarding their social support experiences (Rees, & Hardy, 2000). The 39 items represented the four primary dimensions identified by Rees and Hardy: Emotional; Esteem; Informational; and Tangible support. Rees and Hardy used the definitions of Cutrona and Russell (1990) to reflect the nature of the social support found in their study. Thus, Emotional support relates to how, during times of stress, others are there for comfort and security, leading the person to feel loved and cared for. Esteem support relates to how others bolster a person's sense of competence or self-esteem, give the person positive feedback on his or her skills and abilities, or express a belief that the person is capable of coping with a stressful event. Informational support relates to how others provide the person with advice or guidance concerning possible solutions to a problem. Tangible support relates to how others provide concrete instrumental assistance, in which the person in a stressful situation is given the necessary resources (e.g., physical help with tasks) to cope with the stressful event. Emotional support contained 12 items, Esteem support contained 12 items, Informational support contained 8 items, and Tangible support contained 7 items. Not every item that could have been derived from the Rees and Hardy study was used. Instead, the 39 items were chosen for their potential to be matched with the stressors. The criteria for inclusion of items were as follows: firstly, the two stressors were chosen for their relevance to high-level tennis players and their potential influence on the performance factors identified; social support items were then selected for their potential to be matched with those stressors. For example, since it was hypothesized that the relationship between technical problems in training and flow might be buffered by tangible support, items were chosen to reflect the needs elicited by the stressor. Tangible support therefore contained items such as, who helps setting sessions in training, and who helps plan your training to deal with problems. On the other hand, despite their potential applicability to tennis players, items from tangible support concerning help with financial and transport matters were not included, because stressors relating to financial or

transport problems were not chosen for consideration in this study. With regard to the content relevance of the items chosen to measure each social support dimension, in the Rees and Hardy (2000) paper, an independent sport psychology researcher and applied practitioner had correctly assigned 98% of the quotes into the correct support dimensions. Prior to data collection in the present study, this same researcher correctly assigned 100% of the items to their social support dimensions. All the measure items in this study were also scrutinised for relevance and representativeness by one United Kingdom Lawn Tennis Association (professional grade) coach and 8 tennis players with similar rankings to the study sample. The measure asked respondents, "To what extent do you have someone…," with response options ranging on a 5-point scale from 1 (not at all) to 5 (a lot).

Stressors. Two items were used as single-item measures of potential stressors. These stressors were drawn from previous research into stressors in sport (Gould et al., 1983; Gould et al., 1993; Noblet & Gifford, 2002; Scanlan et al., 1991), and chosen because of their relevance to tennis performance and the influence upon them that social support might exert in terms of stress-buffering effects. They were: competition pressure; and technical problems in training. The measure asked respondents, "Below are a list of potential stressors. Please indicate to what extent you experience these sources of stress…," with response options ranging on a 5-point scale from 1 (not at all) to 5 (a lot). Similar to the process used to assess the relevance of the social support items, the stressors were also scrutinized by one United Kingdom Lawn Tennis Association (professional grade) coach and 8 tennis players. They reported that these stressors were important issues for them.

Performance factors. The dependent variables were 2 of the 7 scales of the 28-item tennis performance measurement instrument, first reported in Rees et al. (1999). Subsequent validation by Rees, Hardy, & Ingledew, (2000) provided further evidence for the convergent and

discriminant validity of the scales, and provided evidence that the scales differentiated winners from losers. The scales used in this study were: Flow; and Feeling Flat. Relationships between social support and both of these scales had been found in the Rees et al. (1999) study. For each scale there are four items, with respondents asked, "During your matches, to what extent do you …," and response options ranging on a 4-point scale, 0 to 3, from not at all, through a little, and somewhat, to a lot. For Flow, the items are: keep a consistent standard; feel good; keep your mind on the present; and stay focused but relaxed. For Feeling Flat, the items are: feel sluggish; feel mentally tired; feel lively (reverse scored); and feel slow. Cronbach's alpha internal reliability coefficients for the scales in the present study were .75 for Flow, and .69 for Feeling Flat. In the present study, since all measures were dispositional, performance outcome was not assessed.

Analyses

Since a new measure of social support was constructed for the present study, the initial phase of analysis involved tests of the factorial validity of the measure. It would have been plausible to use exploratory factor analysis (EFA) on this measure. The process of scale construction, however, involved theoretically deriving items in terms of content and their expected pattern of item-factor loadings, based upon the Rees and Hardy (2000) study with high-level sportspeople. To test these hypotheses, the most effective method is to use confirmatory factor analysis (CFA) (Biddle et al., 2001; Jöreskog & Sörbom, 1993; Schutz & Gessaroli, 1993), as with EFA one cannot specify specific items to load on specific factors. Jöreskog and Sörbom (1993) argued that a hypothesis that has been largely derived through exploratory procedures should be confirmed using more rigorous procedures. They also argued that most studies are to an extent both exploratory and confirmatory, and CFA procedures can be used as a model-

generating tool, as opposed to being simply a strict confirmatory procedure (Jöreskog, 1993; Jöreskog & Sörbom, 1993).

In this study, the factorial validity of the measure was tested by analyses of covariance structures, using LISREL 8 (Jöreskog & Sörbom, 1993) with maximum likelihood estimation. The sequential model testing approach recommended by Jöreskog (1993) and Biddle et al. (2001) was adopted to tentatively identify indicators of fit, before testing the full four-factor model. Briefly, the sequential model testing approach involved three stages: firstly, tests of separate single-factor models corresponding to the social support scales, the purpose of which was to assess the convergent validity of the items making up each scale; secondly, each of the social support factors was paired with every other social support factor in two-factor models, the purpose of which was to identify any ambiguous items. Based upon the diagnostic information from the single-factor and the two-factor stages, items were deleted from each scale, and the single-factor and two-factor stages repeated with however many items were left in each scale. Finally, all social support factors were included in a full model. The sequential procedure also allows one to maximise relatively small data sets, such as the one in this study. Instead of testing the full model with 4 latent variables and 39 observed variables from the outset, smaller models with fewer parameters are firstly tested (e.g., 1 latent variable with 7 observed variables). Secondly, by pairing each scale with all other scales (e.g., 2 latent variables with 8 observed variables), one has initial evidence of the discriminant validity of the scales. For a more detailed explication of this process, the reader is referred to Rees, Hardy, and Ingledew (2000).

Moderated hierarchical regression analysis (Biddle et al., 2001; Jaccard et al., 1990) was used to examine the effects of stressors and social support dimensions upon performance. The authors could have tested models using LISREL. However, the sample size precluded the use of structural models, and performing analyses with observed variables on the models in this study

would have led to perfect fits, because these models would have had zero degrees of freedom. In light of this point, regression analysis was deemed the most appropriate analysis for the present study.

Results

At the outset of data analysis, all measure items were routinely checked for gender differences, but there were none. Data from males and females were therefore combined in subsequent analyses.

Social support measure

For all models, the following diagnostic information was used to aid the process of scale refinement, item deletion and further model testing: the goodness of fit of the models; the completely standardized factor loadings, to look for any low item-factor loadings; the standardized residuals; and the modification indices for the covariances of the measurement errors. For example, a large positive standardized residual between two items would suggest that these items share more in common than the model allows; a large negative standardized residual between two items would suggest that these items share less in common than the model suggests. Similar diagnostic information is provided by the modification indices for the covariances between measurement errors.

All four social support dimensions were reduced to 4-item subscales, yielding good fits. The items on the Emotional support scale were: who gives you moral support when you are feeling down; who cheers you up; who is always there for you; and who listens to your concerns. The items on the Esteem support scale were: who reinforces the positives when you have doubts about your current form; who instills in you the confidence to deal with pressures; who tells you, you can do it; and who lifts your morale when it's down. The items on the Informational support scale were: who gives you technical advice; who helps solve problems in training and

competitions; who helps you regarding technique; and whom you go and talk to regarding technical problems. The items on the Tangible support scale were: who helps setting sessions in training; who helps plan your training to deal with problems; who helps with tasks that build your confidence; and who helps organizing training and competitions.

Fit statistics for the two-factor models were generally good. The weakest model was for Tangible and Esteem support. In this case the model could have been markedly improved had the item, "who helps with tasks that build your confidence" from Tangible support been free to load on Esteem support. This makes sense substantively, as this item contains information that could be about boosting esteem. However, the item was not dropped for the following reason: The item was generated from an interview with a high-level sportsperson who related a time when he had been injured (Rees & Hardy, 2000). His father helped him with tasks (a tangible act) that helped him regain confidence whilst rehabilitating.

Like tests of the single- and two-factor models, the goodness of fit of the full four-factor model was initially tested using the chi-square likelihood ratio statistic (χ^2), Root Mean Square Error of Approximation (RMSEA: Steiger, 1990) and its associated p-value (for RMSEA < .05), Standardized Root Mean Square Residual (SRMR), and Comparative Fit Index (CFI: Bentler, 1990). This choice of fit statistics was taken from the approach to model testing of Jaccard and Wan (1996), involving measures of fit from three different classes (absolute fit, absolute fit with penalty function, incremental/comparative fit) (cf. Biddle et al., 2001; Hu & Bentler, 1999; Jöreskog, 1993; Jöreskog & Sörbom, 1993; Tanaka, 1993). Fit statistics for the full model are shown in Table 1. The χ^2 statistic was used as a subjective index of fit (Jöreskog & Sörbom, 1989); in this case, a value for χ^2 relative to degrees of freedom of less than 2 suggests a good initial indicator of fit. The recent recommendations for fit of Hu and Bentler (1999) of cut-off

values for CFI close to .95, SRMR close to .08, and RMSEA close to .06 were also used. Thus, the RMSEA was low enough (.06), with a non-significant test for close fit, the SRMR was low enough (.07), and the CFI value of .94 was also very "close to" the .95 value. Taken together, these values suggested a well-fitting model. Factor loadings for all models were fairly high, ranging from .58 to .89. Cronbach's alpha internal reliability coefficients for the four scales were: Emotional .75; Esteem .74; Informational .89; and Tangible .73. Means and standard deviations for the 4 social support subscales (and all other scales in this study) are in Table 2. The correlations between the social support dimensions (inter-subscale correlations based upon composite subscale scores using the raw data) ranged from moderate (r=.31, p<.05) to high (r=.76, p<.05) (see Table 3 for intercorrelations of all variables in this study), a phenomenon observed in other social support measures (e.g., see Heitzmann & Kaplan, 1988; Vaux, 1992), and a reason for criticism by those who question the theory behind differentiated multidimensional social support measures (e.g., see B. R. Sarason et al., 1990; B. R. Sarason, Shearin, Pierce & Sarason, 1987). In view of these results, a number of other models were tested (see Table 1). During this process, the Parsimony Goodness of Fit Index (PGFI; Mulaik, James, Van Alstine, Bennet, Lind, & Stilwell, 1989) and the Expected Cross Validation Index (ECVI; Browne & Cudeck, 1989) were also used to assess fit. The PGFI takes parsimony (degrees of freedom) into account, and is useful for comparing models with differing degrees of freedom, particularly because one can always improve the fit of models by estimating further parameters (Jöreskog & Sörbom, 1993; Stevens, 1996). Decreased values for PGFI, whilst obtaining better values for other fit statistics, implies that improvement in fit might be solely due to the addition of new parameters. The ECVI assesses the degree to which a set of parameters estimated in one sample would fit if used with a new, similar sample (Stevens, 1996). In comparing models, one would simply take the smallest value for ECVI to represent the best model. The first model tested

was a full model with a single higher order factor. This revealed a poor fit to the data. Secondly, we tested a full model with just two social support factors, combining social support dimensions that had demonstrated a high correlation. Thus Emotional and Esteem support (r=.67, p<.05) on the one hand, and Informational and Tangible support (r=.76, p<.05) on the other were combined. This revealed a reasonably good fit to the data, though fit statistics were fractionally poorer than the original four-factor model. However, whilst the ECVI revealed that the original four-factor model was the best model, the reduced value for PGFI on this model compared to the two-factor model suggests that this better fit may be solely due to the additional parameters estimated in the model. At this point, a chi-square difference test (e.g., Tabachnick & Fidell, 1996) revealed that the fit of the four-factor model was significantly better (χ^2 (5) = 12.61, p<.05) than the two-factor model. This issue is revisited in the Discussion. Finally, a two-factor higher order model revealed a very poor fit.

Effects of stressors, social support dimensions and products on performance factors

Moderated hierarchical regression analysis involves tests for main and moderating effects. While considering whether the stressors affected performance factors, or whether social support affected performance factors regardless of the effect of stressors, it was also possible to examine whether social support moderated the effect of stressors on performance factors. This was achieved by checking whether the product of stressors and social support had an effect upon performance beyond the main effects of stressors and social support. Jaccard et al. (1990) emphasized that the independent variables should be centered prior to the formation of product terms. In this study's analyses all the independent variables were standardized (with a mean of 0 and standard deviation of 1), thereby centering them, before any product terms were computed,

and the unstandardized solution was then examined (Jaccard et al., 1990). An alpha level of .05 was used for all statistical tests.

The results from the moderated hierarchical regression analyses are shown in Table 4. The increment in explained variance (ΔR^2) is shown in the first column. The significance level of that figure is shown in the next column. The sign of the regression coefficient in the final equation (β) is taken to indicate the direction of the association between independent and dependent variable. 7 of the 8 interactions of social support dimensions and stressors added significantly to the explained variance of the performance factors. These interactions are represented graphically in Figures 1 and 2. As apparent from these graphs, the form of the interactions is consistent with the hypothesized predictions and the stress-buffering hypothesis. For example, the interaction of competition pressure (CP) and Emotional support (ES) predicting Flow (FL) can be represented by the following formula (Jaccard et al., 1990):

FL = 1.873 - .085(CP) + .125(ES) + .088(CP*ES)

Hence, when ES = -1 (one SD below its mean)

FL = 1.748 - .173(CP)

When ES = +1 (one SD above its mean)

FL = 1.998 + .003(CP)

Therefore, participants with low emotional support (i.e., with emotional support 1 SD below its mean), who reported a one-unit higher level of competition pressure had lower levels of Flow (decrease of .173 units). Participants with high emotional support (i.e., with emotional support 1 SD above its mean), who reported a one-unit higher level of competition pressure had higher levels of Flow (increase of .003 units). From this example, it is apparent that the potentially negative effect of competition pressure on Flow was “buffered” for those with high

emotional support (see Table 5 for numbers of participants with scores 1SD above and 1SD below the mean values for each social support dimension).

Discussion

Prior to testing the stress-buffering models, the structural validity of the social support measure was tested using analyses of covariance structures and the sequential model testing approach. This revealed a reasonable fit to the data, the structure largely confirmed. Moderate to high correlations between the social support dimensions, however, led us to test full models with a single higher order factor, with Tangible and Informational support combined, and Esteem and Emotional support combined, and with two higher order factors. Whilst the single higher order factor model and the two higher order factor model both produced poor fits to the data, the model with Tangible and Informational support combined, and Esteem and Emotional support combined revealed a reasonably good fit to the data, if fractionally worse than the original four-factor model. Together, these results suggest that perhaps there are only two social support dimensions. Indeed, whilst the items on these scales contained qualitatively different aspects of support, whether the social support measure should have two or four scales is unclear, suggesting that support might be broken down solely into emotional and tangible aspects (e.g., see Cutrona & Russell, 1990; House & Kahn, 1985). One might then argue that, in effect, four interactions, and not eight, were tested in the subsequent regression analyses. Cutrona and Russell have, of course, argued that these two types of support should be further distinguished by aspects of emotional and esteem support on the one hand, and tangible and informational support on the other. This of course raises an issue of scope versus parsimony of a theory and should be further addressed in future research. A significant chi-square difference test on the present data did provide some further evidence that a four-factor model fits the data better than a two-factor model. One further reason for splitting the two dimensions is the differential association that the more specific

dimensions have with specific outcomes, for example, in the present study with Tangible support, but not Informational support, buffering Flow.

The principal aim of this study was to examine in a sports performance-related context the hypothesis that social support acts as a stress-buffer. The data are consistent with a stress-buffering explanation. Whilst there were also 5 significant main effects of social support, these occurred in conjunction with interactive effects, and so should be interpreted in light of these. Graphs of the 7 interactive effects demonstrate how the protective effect of high levels of social support is apparent with higher levels of reported stressors; compared to those with high social support, those with low social support, who reported higher levels of stressors had lower scores on Flow and higher scores on Feeling Flat.

To aid explanation of how the social support might have exerted a positive influence, one needs to draw on the meaning of the social support dimensions and the content of the items making up each scale. For example, let us consider the interaction of Emotional support and competition pressure predicting Flow. The graph of this interaction demonstrates that as the level of competition pressure increased, high levels of Emotional support were associated with a maintenance of levels of Flow. Conversely, low levels of Emotional support were associated with a decrease in levels of Flow. Using the terminology of Cohen and Wills (1985), Emotional support totally ameliorated any negative association between the stressor and Flow. The implication is that players experiencing competition pressure were helped to maintain Flow by the perception that they had someone there for them, to listen, and give them moral support. The interaction of Emotional support and competition pressure predicting Feeling Flat was also significant. The graph of this interaction demonstrates that as the level of competition pressure increased, high levels of Emotional support were associated with a maintenance of levels of Feeling Flat, whereas low levels of Emotional support were associated with an increase in levels

of Feeling Flat. Similar results were found in conjunction with Esteem support, implying that players experiencing competition pressure were also helped to maintain Flow and keep Feeling Flat at low levels by the perception that they had someone to reinforce the positives, lift morale, tell them they could do it, and instill them with confidence to deal with the pressure.

The interactions of Tangible support and technical problems in training predicting Flow and Feeling Flat were both significant, tangible support totally ameliorating any negative association between the stressor and Flow. The implication is that players experiencing technical problems in training were helped to maintain Flow and keep Feeling Flat at low levels by the perception that they had someone to help plan, organize and set sessions in training for them.

The interaction of Informational support and technical problems in training predicted Feeling Flat, but did not predict Flow. The implication is that players experiencing technical problems in training were helped to maintain low levels of Feeling Flat by the perception that someone was available to talk to about the technical problems, who provides technical advice, and who helps solve problems in training. In conjunction with the interactions involving Tangible support, these results suggest that either the beneficial stress-buffering properties of Informational support and Tangible support differ by outcome, or that Tangible support is beneficial across a greater array of outcomes than is Informational support.

The potential for social support to act as a stress-buffer is well documented, and the results of this study attest to the beneficial properties of social support in a sports performance-related context. As Krause (1995) noted, however, findings of the stress-buffering functions of social support are equivocal. In the present study, the finding of significant stress-buffering effects for social support and stressors may have been optimized through detailed attention to the measurement instruments chosen for the constructs under study. In the present study, the two stressors were chosen for their relevance to high-level tennis players and their potential influence

on the performance factors identified, and social support items were then selected for their potential to be matched with those stressors. In this way, the measure of social support was matched in as specific a way as possible with the stressors (Cohen & Wills, 1985; Cutrona & Russell, 1990; Veiel, 1992). The measures were context-specific (i.e., of specific relevance to sportspeople), and the social support measure was multidimensional. Whilst some researchers have questioned the theory and psychometric properties of such measures, preferring instead to conceptualize social support in unidimensional terms (B. R. Sarason et al., 1990; B. R. Sarason et al., 1987), it seems unlikely that stress-buffering would have been observed with more general measures (Cohen & Wills, 1985; Cutrona & Russell, 1990; Veiel, 1992). In an earlier study by Rees, Ingledew and Hardy (1996) in sport, only main effects were found using aggregate measures of stress and social support, but no interactive effects. Detection of interactive effects may have been further enhanced by the use of performance factors, as opposed to a performance outcome measure. Additionally, whilst the influence of stress on performance has been well documented, more differentiated measures of performance would appear to give a greater insight into the possible mechanisms of influence of predictor variables, such as stress and social support (Rees et al., 1999).

The present study has important implications for sport psychologists working with high-level performers. The results suggest that social support is a good thing, in terms of its ability to combat stressors. Such results might lead important others to the conclusion that they should actively give support. Herein lies a problematic issue, in that unskilled others are often poor providers of support, basing their understanding of what the individual needs solely on intuition, and thereby providing unhelpful support or giving inappropriate advice (Lehman, Ellard, & Wortman, 1986). The findings of the present study are salient in this regard. For the one nonsignificant interaction, this result might point to a mis-match of social support and stressor, or

the concept of nonsupport (e.g., Rook, 1992). For example, the nonsignificant interaction of Informational support and technical problems in training predicting Flow suggests that players experiencing such a stressor were not helped to maintain Flow by the receipt of direct Informational support, for example, in the form of technical advice. Rather, they were helped by having Tangible support in the form of someone to plan, organize and set sessions in training to help sort out the problem. So, whilst most coaches, when approached regarding technical problems, might naturally offer Informational support, such support might not always be beneficial for alleviating this particular stressor.

A risk of the present study's use of eight multiple regression analyses was an increased likelihood of committing Type I errors. To help counter this, the authors limited the analyses to those eight models that were theoretically most plausible. Stevens (1996) comments that, if specific effects have not been predicted ahead of time, attempts by researchers to interpret scattered significant results from multiple analyses can lead to a grave Type I error risk. Heeding Stevens (1996), directional hypotheses were clearly stated in this study a priori, with graphs of high and low social support predicted to take one of two forms outlined in Cohen and Wills (1985). The 7 significant interactions, all in the predicted direction, are therefore notable; furthermore, with regard to Type I errors, there is no reason why chance interactions should always be in the hypothesized directions - such a finding defies the nature of chance. As a final check, we also later tested for interactions with models in opposition to our predicted hypotheses. These were: interactions between competition pressure and Tangible and Informational support on Flow and Feeling Flat on the one hand; and technical problems in training and Esteem and Emotional support on Flow and Feeling Flat on the other. None of these interactions reached significance.

Other potential limitations of the present research should be noted. The amount of explained variance due to the significant interactions was relatively small, ranging from 3% - 6%, and main effects of social support ranged from 3% - 10% compared with values of 12% - 21% in the Rees et al. (1999) study. The Cronbach's alpha internal reliability coefficient for the Flow scale was .69, just below the generally accepted level of .70. In terms of conducting CFA, whilst we used the sequential model testing procedure to maximise numbers of participants per variable tested, our sample of 130 participants is still relatively small, a natural function of the lack of high calibre tennis players. If one were to use a lower standard, then one could more easily increase the numbers of participants, but well-designed studies of high-level performers are relatively rare. Furthermore, for players at much lower ranking levels, where skill levels differ substantially, subtle changes in levels of social support may be less salient and play less of a role in influencing performance factors compared with skill level. A major purpose of this study was to use a context-specific measure of social support, with sport-relevant items drawn from Rees and Hardy (2000). In the Rees and Hardy study, there was, however, just one male tennis player, so the relevance of items for the present sample of tennis players could be questioned. Given these potential limitations, whilst maintaining that the results of this study are notable, we would urge readers to be cautious in appraising this study's findings.

Finally, this study involved cross-sectional data, with dispositional measurement of all variables. It is therefore important to note that no causal link can be inferred from this study. As such, instead of explaining regression analyses in terms of social support buffering stress and effecting a maintenance of levels of performance factors, performance factors might have caused social support, or a third factor might have caused changes in social support and performance factors. Indeed, since all measures were self-report, as well as dispositional in nature, it is possible that this study may have been prone to negative affectivity bias (Watson & Pennebaker,

1989). Cohen and Wills (1985) have suggested that prospective studies would allow one a greater insight into the causal structure of stress-buffering effects. Future research might therefore include prospective/longitudinal designs. One should note, however, that prospective studies would involve changes in outcome variables over time in relation to social support that has remained stable across the same time-span. But social support may fluctuate over time (Cohen & Wills, 1985), and in the case of tennis, playing in tournaments away from home may lead to a depletion of normal social support function.

In conclusion, this study has provided an initial insight into the potential of social support to act as a stress-buffer. To further develop understanding, and to assess the effectiveness of the matching process, there is a need to extend this study in different contexts, with different outcome variables, and across specific time-frames.

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Table 1
Fit measures for two-factor models and full model

Scale	χ^2	d.f.	p(χ^2)	RMSEA	p value (for RMSEA <0.05)	SRMR	CFI	PGFI	ECVI
Full model	152.37	98	.00	0.06	.21	0.07	.94	.63	1.786
Higher order factor model	220.17	101	.00	0.09	.00	0.12	.86	.60	2.225
2-factor model	164.98	103	.00	0.07	.12	0.08	.93	.65	1.822
2-higher order factor model	614.13	103	.00	0.13	.00	0.19	.82	.61	2.128

Note. N = 124. RMSEA = Root Mean Square Error of Approximation. GFI = Goodness of Fit Index.
SRMR = Standardized Root Mean Square Residual. CFI = Comparative Fit Index.

Table 2

Means and SDs for all subscales

Scale	N	Mean	SD
Emotional	130	3.83	.75
Esteem	130	3.54	.73
Informational	130	3.74	.97
Tangible	130	3.46	.82
Competition pressure	129	3.37	1.05
Technical problems in training	129	2.88	1.00
Flow	129	1.89	.54
Feeling Flat	129	1.12	.53

Table 3

Intercorrelations of social support dimensions, stressors, and performance factors

	Emotional	Esteem	Informational	Tangible	Competition pressure	Technical problems in training	Flow
Emotional							
Esteem	.67*						
Informational	.31*	.41*					
Tangible	.34*	.43*	.76*				
Competition pressure	.09	.15	.17	.06			
Technical problems in training	.05	.06	.04	-.04	.23*		
Flow	.25*	.27*	.15	.30*	-.13	.03	
Feeling flat	-.15	-.11	-.13	-.22*	.24*	.13	-.44*

Note. * denotes correlation significant at .05 level (2-tailed)

Table 4

Hierarchical Regression Analyses: Effects of Stressors, Social Support Factors and Products on Performance

Dependent Variable	Independent Variable	ΔR^{2a}	$p(F)^{b}$	b^{c}	$p(t)^{d}$
Flow	Competition pressure	.02	.13	-.09	.05
	Esteem Support	.09	.00	.12	.01
	Product	.04	.02	.10	.02
Feeling Flat	Competition pressure	.06	.01	.13	.00
	Esteem Support	.02	.09	-.05	.31
	Product	.04	.02	-.09	.02
Flow	Competition pressure	.02	.13	-.08	.06
	Emotional support	.07	.00	.13	.01
	Product	.03	.04	.09	.04
Feeling Flat	Competition pressure	.06	.01	.13	.00
	Emotional support	.03	.05	-.08	.09
	Product	.03	.05	-.08	.05
Flow	Technical problems in training	.00	.73	.04	.33
	Tangible support	.10	.00	.17	.00
	Product	.04	.02	.09	.02
Feeling Flat	Technical problems in training	.02	.16	.04	.44
	Tangible support	.05	.01	-.12	.01
	Product	.06	.01	-.11	.01
Flow	Technical problems in training	.00	.73	.03	.50
	Informational support	.02	.10	.09	.07
	Product	.02	.10	.07	.10
Feeling Flat	Technical problems in training	.02	.16	.04	.41
	Informational support	.02	.15	-.08	.08
	Product	.06	.01	-.11	.01

Note. N = 126. All variables standardized except for Product. Product formed from the two preceding (standardized) variables.

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

Table 5

Participants 1SD above and 1SD below the mean values for each social support dimension

Social support dimension	1SD above mean	1SD below mean
Emotional	16	23
Esteem	16	22
Informational	30	24
Tangible	17	20

Figure Captions

Figure 1. Interaction of Esteem support and Competition Pressure predicting Flow. Interaction of Esteem support and Competition Pressure predicting Feeling Flat. Interaction of Emotional support and Competition Pressure predicting Flow. Interaction of Emotional support and Competition Pressure predicting Feeling Flat.

Figure 2. Interaction of Tangible support and Technical Problems in Training predicting Flow. Interaction of Tangible support and Technical Problems in Training predicting Feeling Flat. Interaction of Informational support and Technical Problems in Training predicting Feeling Flat.