Health and Disability

The association between gender, coping style and whiplash related symptoms in sufferers of whiplash associated disorder

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The aim of the present study was to examine specifically whether the relationship between coping style and symptoms of whiplash injury change as a function of gender. A total of 1709 sufferers of whiplash associated disorder (1349 women, 360 men) belonging to the Danish Society for Polio, Traffic and Accident Victims completed questionnaires measuring demographic and psychological factors (including coping style), and symptoms of whiplash trauma (including pain). Men and women were not found to differ significantly in their use of coping strategies, however emotion focused coping strategies were related significantly more strongly to whiplash related symptoms in men compared to women.

Women were found to display more symptoms related to whiplash injury compared to men. Possible reasons for the present findings are discussed in light of related research indicating mood as a potential moderating variable in the relationship between maladaptive coping style and degree of symptoms related to injury in men.

Key words: Coping, gender, whiplash.

INTRODUCTION

Coping style has been shown to have strong associations with response to and recovery from injury and noxious events, (Asghari & Nicholas, 2004; Delitto, Strube, Shulman & Minor, 1992; Elklit, 1997; Grossi, Soares, Ångesleva & Perski, 1999; Jensen, Turner, Romano & Karoly, 1991) and as such is an important factor in the rehabilitation and treatment of victims of whiplash trauma (Elklit, 2000). Coping is a general concept used to describe the cognitive, emotional and behavioral reaction patterns displayed in relation to challenging/distressing situations and events. The employment of varying coping strategies is an attempt to control and adapt to events in life that are potentially overwhelming. Coping styles can be broadly classified as adaptive or “maladaptive” (although the term maladaptive is used, coping styles that come under this categorization can be beneficial to the individual, though to a lesser extent than more adaptive coping strategies), or as avoidant or non-avoidant (Keogh & Herdenfeld, 2002; Riley, Robinson & Geisser, 1999; Roger, Jarvis & Najarian, 1993; Suls & Fletcher, 1985; Willebrand, Andersson, Kildal & Ekselius, 2002). Adaptive or non-avoidant strategies such as problem solving or re-focus of attention (e.g. focusing on sensory rather than affective aspects of pain), are normally associated with better health outcome in relation to maladaptive or avoidant strategies such as hoping and praying or diversion of attention away from noxious events (Jensen et al., 1991; Suls & Fletcher, 1985).

Evidence is accumulating to suggest that the effects of certain psychological factors on symptoms related to injury are dependent upon gender. For example, several studies (both clinical and experimental) have found evidence indicating that anxiety is related more strongly to pain response in men relative to women (Edwards, Auguston & Fillingim, 2000, 2003; Fillingim, Keefe, Light, Booker & Maixner, 1996; Jones, Zachariae & Arendt-Nielsen, 2003; Jones & Zachariae, 2004; McCracken & Houle, 2000; Riley, Robinson, Wade, Myers & Price, 2001). There is also evidence to suggest that men and women cope differently with events that are considered stressful. For example, Vingerhoets and Van Heck (1990) found that men were more likely to employ adaptive, problem-focused coping strategies in relation to psychosomatic symptoms, while women were more likely to employ more maladaptive, emotion-focused strategies.

Chronic pain, especially neck pain, is a common complaint associated with soft tissue injury of the cervical spine caused by a sudden hyper-flexion/hyper-extension of the neck referred to as whiplash. It is estimated that between 14 and 42% of victims of whiplash trauma go on to develop chronic pain (Barnsley, Lord & Bogduk, 1994; Radanov, Sturzenegger & Di Stefano, 1995), together with a range of other symptoms including: weakness in the arms, paraesthesia, vertigo, fatigue, nausea, tinnitus, auditory disturbances, poor bite-function, visual disturbances, memory problems, problems reading/writing and sleep disturbance (Barnsley et al., 1994; Smed, 1997; Hagstrom & Carlsson, 1996; Kessels, Aleman, Verhagen & van Luijtenaar, 2000). Despite findings...
indicating a strong association between coping style and response to and recovery from injury, and the potential for such associations to be influenced by gender (Keogh & Herdenfeldt, 2002), the role gender plays in the relationship between coping style and symptoms related to whiplash injury is unclear as few studies have attempted to focus upon this specific area.

Pecollson and Gerdle (2004) investigated coping in patients with whiplash associated disorder and found no differences between men and women in their use of coping strategies. Significant differences were found, however, between men and women on ratings of pain intensity of the lower back with women reporting significantly higher levels of pain compared to men. In another study by Buitenhuizen, Spanjer and Fidler (2003), this time looking at the timing of coping in recovery from acute whiplash, men were found to experience significantly shorter durations of neck complaints following injury compared to women. Also, seeking social support and low scores on palliative reaction coping style were associated with better recovery. However, neither study examined directly the relationship between coping style and whiplash related symptoms within gender groups, making it difficult to assess the gender-specific nature of the association.

Related studies (which are also few in number) offer additional clues as to the possible relationship between coping and whiplash related symptoms as a function of gender. For example, Keogh, Hatton and Ellery (2000) found that men reported less pain intensity when attending to cold pressor pain than when trying to avoid it. No such effect of coping on pain response was found for women however. Also, Keogh and Herdenfeldt (2002) found gender differences in the effect of sensory-focused coping on cold pressor pain response. Men were found to be less pain sensitive compared to women when focusing on the sensory aspect of pain. A study by Grossi, Soares and Lundberg (2000) found that use of maladaptive coping (catastrophizing) in women suffering from musculoskeletal pain was associated with high levels of distress, disability and greater medical care/health care utilization, while no such association was found in male sufferers. Jensen, Nygen, Gamberale, Goldie and Westerholm (1994), also looking at the effects of coping on musculoskeletal pain, found that women were more likely than men to employ coping strategies associated with greater disability and poorer recovery. In a community based study (Unruh, Ritchie & Merskey, 1999) women with recent pain experience were shown to use more coping strategies compared to men with recent pain experience. However, despite the greater use of coping strategies women were still found to report higher levels of pain compared to men (Unruh et al., 1999). Thus, laboratory, clinical and community based studies would seem to indicate that the function of specific coping styles on symptoms related to injury may be dependent upon gender. Men, it seems, may benefit more from the use of specific coping strategies compared to women. Women, it would seem, benefit little from the employment of coping strategies with either a neutral or a negative effect of coping on health status observed. The limited information available seems to indicate that coping, like anxiety, may be more closely associated to the response to/recuperation from injury in men compared to women.

Clearly more research is needed in an attempt to gain a better understanding of the mechanisms underlying symptoms relating to whiplash injury. The aim of the present study, therefore, was to examine for the first time whether specific coping strategies, including: rational coping, detached coping (adaptive coping strategies) and emotional coping, avoidance coping (mal-adaptive coping strategies), have a differential association with the symptoms (including pain symptoms, sensory symptoms and cognitive symptoms), related to whiplash injury in men compared to women. Based upon findings from past research the present study sought to test the following hypotheses:

(1a) Use of “maladaptive” coping strategies will be significantly higher in women compared to men.

(1b) Use of “adaptive” coping strategies will be significantly higher in men compared to women.

Due to the stronger association, found in recent studies, between adaptive coping style and pain response in men compared to women (Keogh et al., 2000; Keogh & Herdenfeldt, 2002) the following hypothesis was tested:

(2) Adaptive coping style measures will be related significantly more strongly to the number of whiplash related symptoms in men compared to women.

(3) Women will report significantly more whiplash related symptoms compared to men.

The information gained may prove useful in understanding the complex bio-psychosocial factors that influence the whiplash experience, which may in turn lead to improvements in the management of whiplash related symptoms including chronic pain.

MATERIALS AND METHOD

Participants

Data were collected from 1349 women and 360 men (women mean age 42.6 [SD 10.36]; men mean age 44.8 [SD 9.88]; Cohen’s d = 0.21, p < 0.05) suffering from whiplash associated disorder (WAD). Participants were contacted via the Danish Society for Polio, Traffic and Accident Victims. The society works for the interests of the various patient groups by addressing the political system and by offering services to its members (such as counseling, physiotherapy, self-help groups etc.). Membership of the society occurs, in most instances, via a referral process through, for example, the Danish National Health Service and other sources. All listed members of the whiplash patient group were contacted (n = 2320). The female to male ratio of responders (response rate 74%) matches closely the ratio of the complete patient group (approx. 4:1), and represents the
findings from epidemiological studies showing women to be at a higher risk of developing and maintaining whiplash related symptoms compared to men (Cassidy, Carroll, Cote et al., 2000; Harder, Veilleux & Sissa, 1998; Spitzer, Skovron, Salmi et al., 1995). There were no differences found in the present study between responders and non-responders on gender or age. Thirty-six percent of responders were still seeking compensation; 5% of responders did not seek compensation; 3% had their application for compensation rejected, with the remaining responders claiming disability. Time since injury for all responders ranged from 1 month to 648 months. Men were not found to differ significantly from women in time since accident/injury (men, mean = 65.3; women, mean = 59.6). The mean average of time since injury for the total sample was 60.8 months (median 42 months). Time since injury was 64 months and over for the upper-quartile of the sample and 26 months and below for the lower-quartile. All participants were asked by post to fill out questionnaires assessing demographic and psychological variables – including coping style and symptoms related to the whiplash injury.

Whiplash Symptom Checklist
Participants were asked to indicate on a checklist whether they within the month prior to the study had experienced any of the following symptoms: headache; neck pain; shoulder pain; weakness in arms; paraesthesia; vertigo; fatigue; nausea; tinnitus; auditory disturbances; reduced bite-function; visual disturbances; memory problems; problems reading and writing. The symptoms were then categorized into three groups for statistical analysis as follows: (1) pain symptoms (headache, neck pain, shoulder pain); (2) sensory symptoms (weakness in arms, paraesthesia, vertigo, fatigue, nausea, tinnitus, auditory disturbances, reduced bite-function, visual disturbances, and sleep disturbance); and (3) cognitive symptoms (memory problems, problems reading and writing).

Coping style measure
The Coping Styles Questionnaire (CSQ. Elklit, 1996; Roger et al., 1993) consists of 37 items describing typical reactions to stress and is designed as a measure of general coping. The items are answered on a four-point Likert scale (Always, Often, Sometimes, Never). The CSQ is shown to be a valid measure of adaptive (RATCOP and DETCOP) and maladaptive (EMCOP and AVCOP) coping styles (Roger et al., 1993).

<table>
<thead>
<tr>
<th>Measure</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean rank</td>
<td>[n]</td>
</tr>
<tr>
<td>CSQ – RATCOP</td>
<td>747.78</td>
<td>[n = 329]</td>
</tr>
<tr>
<td>CSQ – EMCOP</td>
<td>803.31</td>
<td>[n = 341]</td>
</tr>
<tr>
<td>CSQ – AVCOP</td>
<td>792.65</td>
<td>[n = 323]</td>
</tr>
<tr>
<td>CSQ – DETCOP</td>
<td>810.47</td>
<td>[n = 322]</td>
</tr>
<tr>
<td>Pain symptoms**</td>
<td>792.02</td>
<td>[n = 360]</td>
</tr>
<tr>
<td>Sensory symptoms**</td>
<td>788.73</td>
<td>[n = 360]</td>
</tr>
<tr>
<td>Cognitive symptoms</td>
<td>877.49</td>
<td>[n = 360]</td>
</tr>
<tr>
<td>Total symptoms*</td>
<td>797.07</td>
<td>[n = 360]</td>
</tr>
</tbody>
</table>

Notes: Differences in n are due to missing cases.
* p < 0.05, two-tailed.
** p < 0.01, two-tailed.

Data analysis
Equal intervals could not be assumed between scores on the Whiplash Symptom Checklist, therefore non-parametric tests were used to analyze data. Mann-Whitney U tests were used to test for differences between gender on measures of coping style and whiplash related symptoms. Correlation of coping style scores with symptoms of whiplash injury were performed within gender groups using Spearman’s Rank Order correlation (r<sub>ho</sub>). Tests of differences between gender groups in correlation coefficient magnitude were performed by transforming r<sub>ho</sub> into a z-score using Fisher’s z-transformation method.

RESULTS
Gender differences
Table 1 shows the mean ranks of all measures for men and women separately. The following symptoms were significantly more prevalent in women compared to men: Women reported significantly higher levels of pain symptoms (U = 220148.0, p < 0.01, z = 4.058) and significantly higher levels of sensory symptoms (U = 218961.5, p < 0.01, z = 2.889) compared to men. Women were also found to display significantly more symptoms in total (U = 221964.5, p < 0.05, z = 2.519) compared to men. Men and women were not found to differ significantly on measures of coping.

Correlation analysis
Correlations between coping style and whiplash related symptoms for men and women are presented in Table 2,

Table 1. Means (rank) for coping style measures and symptoms of whiplash for men and women separately

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The present study was unable to support findings from earlier studies showing that women adopt more maladaptive coping strategies compared to men (Jensen et al., 1994; Vingerhoets & Van Heck, 1990), as men and women were not found to differ significantly in their use of coping strategies. This finding is in accordance with a previous study by Peolsson and Gerdle (2004) who also found no differences between men and women in their use of coping strategies in relation to whiplash.

Although there were many similarities in the correlation between adaptive coping styles and whiplash related symptoms in men and women, measures of maladaptive coping styles – emotional coping and avoidant coping, were both found to be more strongly related to symptoms following whiplash in men; with significant differences found in the magnitude of correlation between emotional coping and both sensory and cognitive symptoms and (trend difference) between avoidance coping and sensory symptoms (see Table 2). Thus, findings from previous research showing that maladaptive coping is related to poorer health outcome to a greater degree in women compared to men (Grossi et al., 1999; Jensen et al., 1994) could not be supported in the present study. Rather, in line with studies investigating the relationship between anxiety, gender and pain (Edwards et al., 2000, 2003; Fillingim et al., 1996; Jones et al., 2003; Jones & Zachariae, 2004; McCracken & Houle, 2000; Riley et al., 2001) the present study found that increases in the use of maladaptive coping strategies (specifically emotion focused coping) were more strongly related to poorer health (higher number of symptoms) in men compared to women.

In the present study, women were found to exhibit significantly more symptoms related to whiplash injury compared to men, despite using relatively similar coping strategies. This finding together with the stronger association found between specific coping styles and symptoms in men may indicate that coping is relatively less important in relation to recovery from whiplash injury in women. Support for a gender-specific effect of coping on symptom appraisal can be found in related studies. For example, despite a greater use of coping strategies, a higher degree of somatic problems (including pain, vertigo, diarrhoea, nausea, bruising and swelling) were observed in women compared to men (Unruh et al., 1999). Also, differential effects in the use of specific coping strategies on pain appraisal were found in men compared to women, with pain appraisal in men related more strongly to coping style (Keogh et al., 2000; Keogh & Herdenfeldt, 2002).

When taken together, the findings from the present study and related studies seem to indicate that specific coping strategies are related more strongly to the degree of sensory and cognitive problems in men. Why, as found in the present study, emotion focused coping strategies are more strongly associated with the prevalence of whiplash related symptoms in men is unclear. Reasons given for the present findings are purely speculative at this time. It is likely that the differential patterns of association observed can be attributed to a third

### Table 2. Correlation analyses between coping style and whiplash related symptoms for men and women and significance of differences between magnitude of correlation

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
<th>Z-score</th>
<th>p = (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RATCOP (n = 329)</td>
<td></td>
<td>(n = 1203)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>−0.052</td>
<td>0.021</td>
<td>0.5</td>
<td>0.61</td>
</tr>
<tr>
<td>Sensory</td>
<td>0.060</td>
<td>0.070*</td>
<td>0.16</td>
<td>0.87</td>
</tr>
<tr>
<td>Cognitive</td>
<td>−0.010</td>
<td>0.054</td>
<td>0.71</td>
<td>0.47</td>
</tr>
<tr>
<td>Symptom total</td>
<td>0.038</td>
<td>0.073*</td>
<td>0.56</td>
<td>0.57</td>
</tr>
<tr>
<td>EMCOP (n = 341)</td>
<td></td>
<td>(n = 1248)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>0.194**</td>
<td>0.109**</td>
<td>1.42</td>
<td>0.15</td>
</tr>
<tr>
<td>Sensory</td>
<td>0.348**</td>
<td>0.214**</td>
<td>2.38</td>
<td>0.01</td>
</tr>
<tr>
<td>Cognitive</td>
<td>0.359**</td>
<td>0.247**</td>
<td>2.01</td>
<td>0.04</td>
</tr>
<tr>
<td>Symptom total</td>
<td>0.382**</td>
<td>0.241**</td>
<td>2.55</td>
<td>0.01</td>
</tr>
<tr>
<td>AVCOP (n = 323)</td>
<td></td>
<td>(n = 1229)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>0.068</td>
<td>0.027</td>
<td>0.65</td>
<td>0.51</td>
</tr>
<tr>
<td>Sensory</td>
<td>0.201**</td>
<td>0.086**</td>
<td>1.87</td>
<td>0.06</td>
</tr>
<tr>
<td>Cognitive</td>
<td>0.130*</td>
<td>0.122**</td>
<td>0.13</td>
<td>0.89</td>
</tr>
<tr>
<td>Symptom total</td>
<td>0.190**</td>
<td>0.101**</td>
<td>1.45</td>
<td>0.14</td>
</tr>
<tr>
<td>DETCOP (n = 322)</td>
<td></td>
<td>(n = 1215)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>−0.031</td>
<td>−0.031</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Sensory</td>
<td>0.061</td>
<td>0.015</td>
<td>0.73</td>
<td>0.46</td>
</tr>
<tr>
<td>Cognitive</td>
<td>0.002</td>
<td>0.018</td>
<td>0.25</td>
<td>0.40</td>
</tr>
<tr>
<td>Symptom total</td>
<td>0.050</td>
<td>0.015</td>
<td>0.56</td>
<td>0.57</td>
</tr>
</tbody>
</table>

Notes: Differences in n are due to missing cases.
* p < 0.05, two-tailed.
** p < 0.01, two-tailed.

including tests of differences between gender groups in correlation coefficient magnitude.

Tests of differences between gender groups in correlation coefficient magnitude revealed that the magnitude of correlation differed significantly when comparing emotional coping with sensory symptoms, cognitive symptoms and total number of symptoms (all p values < 0.05). For men, use of emotional coping was related significantly more to the above symptoms compared to women (see Table 2).

Gender differences in correlation coefficient magnitude were also found when comparing avoidance coping with sensory symptoms, with use of avoidance coping related more strongly (approaching significance p = 0.06) to sensory symptoms in men compared to women (see Table 2).

No significant gender differences in correlation coefficient magnitude were found when comparing rational coping and detached coping with symptoms of whiplash (see Table 2).

### DISCUSSION

The present study produced the following results: (1) Men and women were not found to differ significantly in their use of coping strategies. (2) Emotion focused coping strategies were positively related to whiplash related symptoms significantly more strongly in men compared to women. (3) Women were found to display more symptoms related to whiplash injury compared to men.
variable. Support for this comes from a recent study by Keeffe et al. (2004), who examined the relationship between gender, pain, coping and mood in a sample of patients with osteoarthritis in the knee. Results from the study indicated a differential relationship between mood and coping style in men compared to women. Men, it was discovered, were more likely compared to women to use emotion-focused coping when their mood was negative, suggesting, according to Keeffe et al., that maladaptive coping is triggered by negative mood in men only (Keeffe et al., 2004). The finding by Keeffe et al., together with findings from related studies indicating that anxiety is related more strongly to pain response and level of disability in men relative to women (Edwards et al., 2000, 2003; Fillingim et al., 1996; Jones et al., 2003; Jones & Zachariae, 2004; McCracken & Houle, 2000; Riley et al., 2001) suggests that mood/negative affect may be an important factor in understanding the differential relationship between coping style and symptoms related to injury as a function of gender. The exact relationship between negative affect, coping style and symptoms related to injury in men and women is not clear at this time. Caution should, however, be exercised when interpreting the Keeffe et al. (2004) findings, as the relationship between maladaptive coping and negative mood observed in the Keeffe et al. study may merely be a product of type of methodology used. There is evidence to suggest that items measuring coping (specifically items measuring emotional coping) overlap with items measuring emotional distress and psychopathology (Stanton, Danoff-Burg, Cameron & Ellis, 1994). Potential overlap in these supposedly distinct measures may lead to emotional coping being erroneously associated to negative affect (Stanton et al., 1994). Where possible, future studies investigating the relationship between negative affect, coping style and symptoms related to whiplash injury should use measures of coping style shown to be un-confounded with measures of distress or psychopathology in order to avoid the potential for spurious associations between measures.

Limitations of the study

The following limitations should be taken into consideration when interpreting the present findings: The present study examined symptoms following whiplash trauma with the inherent methodological problems associated with retrospective evaluations such as recall bias, rationalization and repression. As a result of the retrospective methodology only the degree of association between variables can be estimated, nothing can be said about the causal relationship between coping style and symptoms of whiplash injury from this type of investigation. Also, due to the cross-sectional nature of the design, understanding of the association between coping style and symptoms related to injury is limited. For example, use of a specific coping style may change as levels of symptoms change. Caution should be exercised in interpreting the results, as despite the significantly higher associations between coping style and whiplash related symptoms in men compared to women, the correlations for men (although statistically significant) were relatively small. The highest correlation was rho = 0.382 only explaining a small proportion of the variance. Thus, further research is needed to test the validity of the conclusions made in the present study. Studies have shown poor mental health to be associated with poor outcome in whiplash sufferers and sufferers of neck pain (Gargan, Bannister, Main & Hollis, 1997; Gozzard, Bannister, Langkamer, Khan, Gargan & Foy, 2001; Van der Donk, Schouten, Passchier et al., 1991). The impact of mental health status (pre- and post-trauma) on whiplash symptoms was not assessed in the present study. Future studies on whiplash and coping may wish to control for mental health status in order to assess any possible effect. Also, the present study would have benefited from the use of a more standardized measure of whiplash symptoms. In addition to the psychometric benefits, use of a standardized measure would have allowed for easier comparison of data across studies.

Clinical implications of the study

To the best of our knowledge this is the first documented study investigating gender differences in the magnitude of association between coping styles and whiplash related symptoms. The clinical implications are as yet unclear and are contingent upon replication and elucidation of the present findings. Programs of therapeutic intervention in the management of symptoms related to whiplash injury may be tailored with gender in mind to maximize the efficacy of interventions which focus on coping style. The relationship between coping style, gender and symptoms of whiplash injury is complex and requires further study.

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