Recovery from acute whiplash: the role of coping styles

J. Buitenhuis, J. Spanjer, V. Fidler

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Abstract

**Study design:** Prospective cohort study. Victims of car accidents who initiated compensation claim procedures at a Dutch insurance company and presented themselves with neck complaints were sent a questionnaire containing neck-related questions and questions regarding the coping styles used shortly after the accident. An additional two questionnaires were administered 6 and 12 months, respectively, after the accident.

**Objectives:** To examine the association between the coping styles used and the development of late whiplash syndrome.

**Summary of background data:** Previous research has indicated that neither personality traits nor psychopathological symptoms can predict the outcome of whiplash. No studies have yet been conducted on the association between coping styles and the development of late whiplash syndrome.

**Methods:** The coping styles were determined using the Utrecht Coping List. The duration of neck complaints was measured from the time of the accident and from the time of filling in the first questionnaire. Survival analysis was used to study the association between the duration of neck complaints and the explanatory variables.

**Results:** Of the 363 eligible claimants, 278 (77%) responded to the questionnaire; 242 (67%) were included in the analysis. After 12 months, 40% of the male and 50% of the female participating claimants still had neck complaints. The duration of the neck complaints was associated with gender, palliative reaction, and the seeking social support coping style.

**Conclusions:** The coping style during the first few weeks after the accident and the gender are related to the duration of neck complaints. (Cox regression: palliative handling relative risk=0.91, p = 0.002, seeking social support relative risk=1.06, p = 0.042 and gender relative risk=1.50, p = 0.036). Thereafter the intensity of somatic complaints plays a role. Paying attention to the coping style could contribute to the prevention of the development of late whiplash syndrome.
Introduction

Neck complaints are very common in the general population of western countries and are known to have many different causes.\textsuperscript{1,2,3} Neck pain after an acceleration-deceleration movement of the head, often called whiplash, is increasingly reported in the Netherlands.\textsuperscript{4} Although the term whiplash is widely used, it is not so much a diagnosis as a description of a process of injury. The acute trauma may be categorized as a sprain of the neck. For many years, victims of car accidents have reported long-lasting complaints of the neck without evidence or structural or somatic trauma. This chronic syndrome with neck, and often with cognitive complaints also, is usually referred to as late whiplash syndrome. In up to 40\% of cases, complaints persist one year after the accident.\textsuperscript{5} During the last decade, late whiplash syndrome has become one of the major reasons for compensation claims after traffic accidents in the Netherlands.

Two factors illustrate that somatic factors alone cannot explain the development of late whiplash syndrome. First, there are major differences between western countries regarding the prevalence and prognosis of late whiplash syndrome.\textsuperscript{6-11} Second, very low accident velocities, with accelerations usually experienced in daily life, can result in severe, long-lasting, and invalidating complaints.\textsuperscript{12} Although cervical zygapophysial joints have been reported to be a common source of late whiplash syndrome, recent studies appear not to have addressed this issue properly, and they may perhaps have little to do with whiplash.\textsuperscript{7} Increasingly, a consensus is developing that social, cultural and personality factors play a major role in the development of this medical, legal, and social dilemma.\textsuperscript{3,6,7,12-17}

To facilitate prevention and treatment, the role of factors responsible for the development of late whiplash syndrome must be determined. Although some studies have reported that neither personality traits nor psychopathological symptoms can predict the outcome, these studies are known to have design and other methodological deficiencies that preclude them from effectively addressing the issue of psychological factors in a meaningful way.\textsuperscript{18-20} Furthermore, coping styles were, to our knowledge, never subject of specific research; nevertheless seem very relevant.\textsuperscript{3,21}

After an accident the victim has to cope with a stressful, potentially life-threatening event, in addition to the early physical complaints that result from the accident. The victim may also experience and have to cope with the knowledge-dependent fear that the complaints may lead to a chronic and invalidating disease.\textsuperscript{6,9} An active coping style is usually considered preferable in this regard and improving active coping strategies is advised as main treatment goal.\textsuperscript{22} A prospective study regarding the role of coping styles...
in the recovery from whiplash has not yet been published. 
In this paper, we present the results of a study of the coping styles used as a risk factor for the development of late whiplash syndrome.

**Methods**

Between March and November 1999, all victims of car accidents who had initiated compensation claim procedures at a Dutch insurance company and presented themselves with neck complaints were invited to participate in the study. Claimants younger than 18 or older than 65 years of age, victims with structural injuries, loss of consciousness or with a history of chronic pain were excluded.

In the Netherlands, the settlement of personal injury claims is based on liability insurance in which the accident victims seek compensation from the insurer of the driver at fault. The invitation letter made it clear that the study was independent of the compensation procedure. The claimants were sent a questionnaire concerning the accident and their complaints at that moment. Table 1 provides an overview of the items on the questionnaire. The claimants were also asked to fill in the Utrecht Coping List (UCL).

The UCL is a Dutch questionnaire used for measuring general coping styles. It explicitly asks people to fill in the 47 questions concerning how they deal with problematic situations in general. Its validity and reliability have been tested for several Dutch populations. The UCL measures coping as a personality characteristic. It consists of the following seven subscales: active handling, palliative reaction, avoidance, seeking social support, passive reaction pattern, expression of emotions and reassuring thoughts.

Both 6 and 12 months after the accident, the course of the complaints was monitored by means of additional questionnaires.

Methods of survival analysis (Kaplan-Meier method, log-rank test, Cox regression) were used to investigate the association between the duration of the neck complaints measured from the date of the accident and the explanatory variables. The explanatory variables were age, gender, coping styles and the answers to the questionnaire. In Cox regression, the effect of explanatory variables on time-to-an-event is described by means of hazard ratio, or relative risk. A relative risk <1 signifies a longer time-to-event.

A separate analysis was carried out of only those claimants who still had complaints at the time of completion of the UCL. The time that had elapsed between the accident and the date that the first questionnaire was returned, the “delay time”, was included in the
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analysis as a potential explanatory variable. To investigate the effect of nonresponse (and for this purpose only), we used the log-rank test to compare the time-to-claim-closure of responders and nonresponders. Time-to-claim-closure is the time between the accident and the moment the claim compensation procedure ends, and is used as an outcome in automobile insurance studies. Statistical tests were performed at the 5% significance level.

Results

The invitation and first questionnaire were sent to 614 claimants, in 72% of cases within 30 days of the accident; 341 (55%) addressees responded to the questionnaire. Of the 614 addressees, 251 turned out not to fulfill the entry criteria (16 pre-existent neck complaints, 48 no neck complaints/no car accident, 158 no damage claimed/no trauma known, 10 too old/too young, 19 accompanying trauma and various). Of the 363 eligible claimants, 278 (77%) responded to the questionnaire. Eighty-five did not return the questionnaire or indicated that they did not want to participate. Because 36 returned an incomplete questionnaire, 242 (67%) were included in the analysis.

Table 1. Overview of variables analyzed in relationship to the duration of neck complaints.

<table>
<thead>
<tr>
<th>Variable</th>
<th>range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utrecht Coping list, subscales:</td>
<td></td>
</tr>
<tr>
<td>active handling (7 items)</td>
<td>7 to 28</td>
</tr>
<tr>
<td>palliative reaction (8 items)</td>
<td>8 to 32</td>
</tr>
<tr>
<td>avoidance (8 items)</td>
<td>8 to 32</td>
</tr>
<tr>
<td>seeking social support (6 items)</td>
<td>6 to 24</td>
</tr>
<tr>
<td>passive reaction pattern (7 items)</td>
<td>7 to 28</td>
</tr>
<tr>
<td>expression of emotions (3 items)</td>
<td>3 to 12</td>
</tr>
<tr>
<td>reassuring thoughts (5 items)</td>
<td>5 to 20</td>
</tr>
<tr>
<td>Neck pain intensity</td>
<td>1 (no pain) – 10 (severe pain)</td>
</tr>
<tr>
<td>Headache intensity</td>
<td>1 (no pain) – 10 (severe pain)</td>
</tr>
<tr>
<td>Neck stiffness</td>
<td>1 (no stiffness) – 10 (severe stiffness)</td>
</tr>
<tr>
<td>Severity of restricted neck movements</td>
<td>1 (no restrictions) – 10 (severe restrictions)</td>
</tr>
<tr>
<td>Extent of neck pain</td>
<td>1 (no) – 10 (severe extent)</td>
</tr>
<tr>
<td>Severity of paresthesia in the arms</td>
<td>1 (no) – 10 (severe paresthesia)</td>
</tr>
<tr>
<td>Concentration complaints</td>
<td>1 (no) to 10 (severe complaints)</td>
</tr>
<tr>
<td>Dizziness</td>
<td>1 (no) to 10 (severe dizziness)</td>
</tr>
<tr>
<td>Use of medication since accident</td>
<td>no/yes</td>
</tr>
<tr>
<td>Sleep disturbance</td>
<td>no/yes</td>
</tr>
<tr>
<td>Daily duration of pain</td>
<td>1 (always) to 5 (less than 3 hours)</td>
</tr>
<tr>
<td>Hours after accident until onset of neck complaints (hours)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
</tr>
<tr>
<td>Gender (male:female)</td>
<td></td>
</tr>
</tbody>
</table>
In the total group of 363 eligible claimants, the median time-to-claim-closure was 429 days. The age and sex profiles of responders, partial responders and nonresponders were not significantly different. The median time-to-claim-closure in the study group (362 days) was lower than for the nonresponders (> 2 years). These differences were significant by the log-rank test (p<0.001). Figure 1 presents the Kaplan-Meier curves.

The study group of 242 claimants consisted of 100 (41%) men and 142 women. The average age was 37.3 years (SD 11.2) for men and 34.6 (SD 12.3) for women, and the age range was 18–62 years. The median time to dispatching the questionnaire to the claimant was 20 days (P25=15, P75=32), the median time to its return (measured from the date of the accident) was 35 days (P25=25, P75=47, range 14–129 days).

Table 2 summarizes the UCL data and presents the results of the Cox regression analysis. After stepwise elimination of the nonsignificant variables, only gender, palliative reaction and the seeking social support coping style remained in the model, with expression of emotions of borderline significance (P value of Wald and log-rank-tests: 0.052 and 0.048). In the final model, the relative risk of these selected variables was nearly identical to that of the full model of Table 2. Figure 2 presents the Kaplan-Meier curves for men and women.
From this analysis we conclude that male gender, a higher score for seeking social support and a lower score for the palliative reaction coping style result in a shorter duration of neck complaints.

**Table 2.** Cox model regression for relationship between duration of neck pain and all considered explanatory variables in the study group (n=242).

<table>
<thead>
<tr>
<th>Variable</th>
<th>median (range)</th>
<th>RR</th>
<th>P value</th>
<th>95 % CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender (male:female)</td>
<td>1.50</td>
<td>.036</td>
<td></td>
<td>1.03 - 2.21</td>
</tr>
<tr>
<td>age</td>
<td>34 (18-62)</td>
<td>1.01</td>
<td>.431</td>
<td>1.00 - 1.02</td>
</tr>
<tr>
<td>active handling</td>
<td>18 (8-26)</td>
<td>1.01</td>
<td>.646</td>
<td>0.95 - 1.08</td>
</tr>
<tr>
<td>palliative handling</td>
<td>17 (9-29)</td>
<td>0.91</td>
<td>.002</td>
<td>0.85 - 0.97</td>
</tr>
<tr>
<td>avoidance</td>
<td>15 (9-26)</td>
<td>1.02</td>
<td>.573</td>
<td>0.96 - 1.08</td>
</tr>
<tr>
<td>seeking social support</td>
<td>13 (6-24)</td>
<td>1.06</td>
<td>.042</td>
<td>1.00 - 1.12</td>
</tr>
<tr>
<td>passive reaction pattern</td>
<td>10 (7-24)</td>
<td>0.99</td>
<td>.706</td>
<td>0.92 - 1.06</td>
</tr>
<tr>
<td>expression of emotions</td>
<td>6 (3-11)</td>
<td>0.90</td>
<td>.072</td>
<td>0.80 - 1.01</td>
</tr>
<tr>
<td>reassuring thoughts</td>
<td>12 (6-20)</td>
<td>1.02</td>
<td>.594</td>
<td>0.94 - 1.12</td>
</tr>
</tbody>
</table>

**Figure 2.** Kaplan-Meier curve of the duration of neck complaints in females (upper curve) and males (lower curve).
Of the 242 claimants, 174 reported neck complaints at the time of the first questionnaire. However, 19 claimants stated in the second questionnaire that the neck complaints had ceased before receiving the first questionnaire and were therefore not included in further analysis. For the remaining group of 155 claimants, we investigated the effect of the information available in the questionnaire on the time-to-claim-closure and on the remaining duration of neck complaints as measured from the date that the first questionnaire was returned.

For 9 of the 155 claimants (6%), no follow-up information on the duration of neck complaints apart from that in the first questionnaire was available. Consequently, the duration of neck complaints was further analyzed for 146 claimants, 51 (35%) men and 95 women, with an average age of 35 years (SD 11.5 years).

Results of Cox regression analysis with stepwise backward elimination of variables are summarized in Table 3. This model shows that the duration of neck complaints is related to the daily duration of pain, paresthesia in the arms, the onset time of the neck pain after the accident, and delay time. After replacing the latter two variables by “headache” and “extent of neck pain,” these two variables were also significant, although the model fitted slightly less well. This behavior is explained by (significant Spearman) correlation between onset time, paresthesia in arms, extent of neck pain, and headache.

Figures 3 presents Kaplan-Meier curves for daily duration of pain.

We conclude that a delayed onset of neck pain, more extensive somatic complaints as described by a longer daily duration of pain, more severe paresthesia in the arms, neck pain and headache, and a delayed response to the first questionnaire are associated with a longer duration of neck complaints.

Table 3. Best-fitting Cox model relating neck pain duration to explanatory variables in the group with complaints at first questionnaire

<table>
<thead>
<tr>
<th>Variable</th>
<th>median (range)</th>
<th>RR</th>
<th>P-value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>delay (days)</td>
<td>35 (14-99)</td>
<td>0.97</td>
<td>.022</td>
<td>0.95 - 1.00</td>
</tr>
<tr>
<td>daily duration of pain (1=always to 5=less than 3 hours)</td>
<td>2 (1-5)</td>
<td>1.46</td>
<td>.001</td>
<td>1.17 - 1.82</td>
</tr>
<tr>
<td>onset of neck pain after the accident (hours)</td>
<td>1 (0-50)</td>
<td>0.95</td>
<td>.047</td>
<td>0.90 - 1.00</td>
</tr>
<tr>
<td>Paraesthesia in arms (1=no to 10=severe)</td>
<td>1 (1-10)</td>
<td>0.64</td>
<td>.008</td>
<td>0.45 - 0.89</td>
</tr>
</tbody>
</table>

* n=145 (1 missing daily duration of pain)
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No effect for the other variables, in particular the coping styles, was found in this group.

Discussion

After analysis of the whole study group, the palliative reaction and seeking social support coping styles were found to be significantly associated with the duration of neck complaints. Furthermore, neck complaints lasted longer in women than in men, which is in accordance with other studies.²,⁵,²⁵

Analysis of the group still with neck complaints at the time of the first questionnaire revealed no association with a coping style. This group consists of claimants with at least 2 weeks of neck complaints. In this group the severity of the somatic complaints was found to be significantly associated with the duration of neck complaints. Neck pain intensity and age, which were found to predict the outcome of whiplash in other studies, were not found to be correlated with the duration of the neck complaints in this group.¹⁴,²⁰,²⁵

These results indicate that the coping style in the first few weeks after the accident plays a role in the development of late whiplash syndrome. After this period, the intensity of somatic complaints seems to determine the duration of neck complaints.

Figure 3. Kaplan-Meier curves of duration of neck complaints by daily duration of pain: always (highest curve), not always but > 6 hours (middle curve) and < 6 hours (lowest curve).
The association found with the *palliative reaction* coping style indicates that claimants who, when confronted with a problematic situation, seek distraction, avoid thinking about their problem and try to feel better by smoking, drinking or relaxing, have a longer duration of neck complaints.\(^{23}\)

The negative association between duration of neck complaints and scores on the *seeking social support* coping scale reveals that victims who, when confronted with a problematic situation, seek social comfort and understanding and share their concerns with others, have a shorter duration of neck complaints. A higher score on this coping scale correlates with an internal locus of control that means that outcomes are thought to be under the control of one's own behavior.\(^{21,23}\)

The borderline significant association with the score on the *expression of emotions* scale indicates that victims showing annoyance or anger are associated with a longer duration of neck complaints. Both the *palliative reaction* and the *expression of emotions* coping styles correlate positively with neuroticism and feelings of fear and inadequacy.\(^{23}\)

These findings indicate that, during the first weeks of neck complaints after a car accident, claimants who seek palliative relief of their complaints, experience fear, annoyance, anger or feel inadequate but do not share their concerns or fear with others are at risk of developing late whiplash syndrome. The daily duration of pain and paresthesia in the arms seem to be indicators for the consolidation or further development of late whiplash syndrome after this period.

In contrast with what could be expected, the *active handling* coping style was not associated with the duration of neck complaints. However, because a nonpalliative coping strategy will induce more active behavior, this could explain the positive effect of active interventions described in the literature.\(^{22,26-28}\)

The importance of the *seeking social support* and *expression of emotions* coping styles are new findings. It indicates that the early emotional aspects of the whiplash injury play an important role in the development of late whiplash syndrome and should be addressed in the initial treatment.\(^3\)

Previous research showed personality factors not to be able to explain the course of recovery from acute whiplash.\(^{18,20}\) In this study we found coping styles to be related to the duration of neck complaints. Apart from methodological aspects the distinct feature of our study concerns the studied psychologic factors. Coping, which can be described as the way a person deals with a stressful event, is determined not only by personality factors but also by earlier experiences and the specific nature of the encountered event and particularly the way it is perceived.

Although the initial invited group consisted of subjects who had initiated
compensation claim procedures, we do not think that this induced a bias toward more serious complaints. \textsuperscript{3,29-31} In the Netherlands, starting such a procedure has a very low threshold. The damage report form, used for claiming the car damage, is usually filled in within a few days of the accident and contains a section to fill in the names of casualties and their complaints. We invited all claimants directly from these forms, including victims who did not seek medical help at that time or did not visit an emergency room at all.

Furthermore, although the insurer and victim can be seen as opposite parties, in the Netherlands most claims, even large ones in which serious injuries are involved, are settled out of court. None of the participating subjects were in actual litigation.

The proportion of claimants with neck complaints 12 months after the accident, 40\% for males and 50\% for females, is at the high end of the prognosis range found in the literature.\textsuperscript{5} The nonresponders group appears to have consisted of subjects with even longer lasting complaints, as may be deduced from the longer time to claim closure. This could indicate that the same factors that prevented the victims from participating in the study also prolonged the claim procedure.

As in other studies, we should not forget the fact that when people are asked about physical complaints that could also be considered mainly physiologic, there is ample room for misattribution, and hence overreporting of accident-caused complaints.\textsuperscript{6} Our results contrast with research from some other European countries and indicate that late whiplash syndrome is a major problem in the Netherlands.\textsuperscript{8-11}

Although the coping questionnaire measures coping as a personality characteristic, this does not mean that the coping style measured is static. Rather, it reveals which coping style a person would tend to use in the case of a stressful event. It can therefore be argued that the fact that the neck complaints in some of the victims had ceased by the time the UCL was filled out may have influenced the score on some of the coping scales measured.

The results of this study indicate that the coping style plays a role during the first few weeks of the development of late whiplash syndrome. The results are in accordance with the idea that nonpalliative treatment and an “act as usual” attitude help to prevent chronic complaints.\textsuperscript{26,28} We do not think that our results are in contrast with the often used treatment strategy of initial analgesia.\textsuperscript{26} In the first days after the acute trauma, adequate medication and proper information can help the patient in continuing their normal activities as much as possible, thereby facilitating favorable behavior. After a few days, this medication should be usually stopped because chronic medication can support the somatization process.

Attention to the early emotional aspects and the coping style used during the initial
treatment of neck complaints after a car accident could contribute to the prevention of the development of late whiplash syndrome.
References


