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Published in	International Journal of Rehabilitation Research
Publication Date	2002
Document Version	publishersversion
Link	<a href="https://research.tilburguniversity.edu/en/publications/23aa3ee7-d54e-48ea-82a4-402a4fbd525">https://research.tilburguniversity.edu/en/publications/23aa3ee7-d54e-48ea-82a4-402a4fbd525</a>
Citation	Blokhorst, M G B G, Lousberg, R, Vingerhoets, A J J M, Winter, F A M & Zilvold, G 2002, 'Daily hassles and stress vulnerability in patients with a whiplash-associated disorder', International Journal of Rehabilitation Research, vol. 25, no. 3, pp. 173-179.
Download Date	2026-05-11 02:32:47
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# Daily hassles and stress vulnerability in patients with a whiplash-associated disorder

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The objectives of this study were to examine the self-reported, daily problems of patients with a whiplash-associated disorder (WAD) and a healthy control group, with the hypothesis that WAD patients would report more person-dependent hassles and perceive them as more serious than the healthy control group, due to the prior experience of a whiplash injury. In addition, it was expected that the person-independent seriousness rating would be elevated, reflecting the increased vulnerability of WAD patients to common stressors. Finally, a strong relationship was expected between frequency or seriousness of daily problems on the one hand and level of distress on the other. Forty-seven WAD patients seeking treatment and 47 matched healthy control participants completed the everyday problem checklist (EPCL). The level of distress was measured by the symptom checklist (SCL-90). As expected, most EPCL-scores in the WAD group were higher than the scores of the healthy participants. Regression analysis further revealed that 61% of the variance in general distress in the WAD group could be explained by EPCL scores and educational background. Chronic WAD patients report a high stress load, which is related specifically to personal functioning after the whiplash injury. In addition, WAD patients (especially those with a low educational level) appear to be more vulnerable and react with more distress than healthy people to all kinds of stressors. Stress responses probably play an important role in the maintenance or deterioration of whiplash-associated complaints.

L'objectif de la présente étude était d'examiner les problèmes quotidiens décrits par des patients présentant un trouble associé à une entorse cervicale (TAEC, "whiplash") et des sujets témoins, l'hypothèse étant que les patients atteints de TAEC devaient décrire davantage de problèmes "subjectifs" (liés à la personnalité des individus) et les percevoir comme plus graves que les témoins en bonne santé, en raison du traumatisme associé à l'entorse cervicale. En outre, l'évaluation "objective" de la gravité des problèmes (c'est-à-dire indépendante de la personnalité des individus) devait avoir des scores plus élevés en raison de la vulnérabilité accrue des patients présentant un TAEC vis-à-vis des facteurs de stress courants. Enfin, une forte corrélation entre la fréquence et/ou la gravité des problèmes quotidiens et le niveau de détresse était attendue.

Au total, 47 patients atteints de TAEC en demande de traitement et 47 sujets témoins correspondants en bonne santé ont complété la liste de contrôle des problèmes quotidiens (EPCL, Everyday Problem Checklist). Le niveau de détresse a été mesuré par la liste de contrôle des symptômes (SCL-90, Symptom Checklist).

Comme on s'y attendait, la plupart des scores EPCL du groupe des patients atteints de TAEC étaient plus élevés que les scores des sujets en bonne santé. Une analyse de régression a révélé en outre que 61 de la variance de la détresse générale observée dans le groupe TAEC pouvaient être expliqués par les scores EPCL et le niveau d'étude.

Les patients atteints de TAEC chronique décrivent une détresse importante, spécifiquement corrélée à leur fonctionnement personnel, après le traumatisme ayant engendré le TAEC. En outre, ces patients (surtout ceux présentant un faible niveau d'étude) semblent plus vulnérables et réagissent avec plus de détresse que les sujets en bonne santé vis-à-vis de tous les facteurs de stress. Les réponses au stress semblent jouer un rôle primordial pour le maintien ou l'aggravation des plaintes corrélées au TAEC.

Ziele waren die Untersuchung der selbst berichteten täglichen Probleme von Patienten mit Schleudertraumasyndrom (whiplash associated disorder – WAD) und gesunden Kontrollen, mit der Hypothese, dass WAD-Patienten aufgrund ihres vorausgegangenen Schleudertraumas über mehr personenabhängige Probleme klagen würden und diese als

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schwerwiegender empfinden als gesunde Kontrollen. Außerdem wurde angenommen, dass die personenunabhängige Einschätzung der Schwere erhöht sei und damit die erhöhte Anfälligkeit von WAD-Patienten gegenüber den üblichen Stresseinflüssen widerspiegelt. Schließlich wurde auch ein starker Zusammenhang zwischen Häufigkeit und/oder Schwere der täglichen Probleme einerseits und dem Grad der Beeinträchtigung andererseits erwartet.

47 WAD-Patienten, die sich zwecks Behandlung vorstellten und 47 paarweise zugeordnete gesunde Kontrollen füllten die Everyday Problem Checklist (EPCL) aus. Der Grad der Beeinträchtigung wurde anhand der Symptom Check List (SCL-90) gemessen.

Erwartungsgemäß waren in der WAD-Gruppe die EPCL-Scores höher als bei den gesunden Probanden. Die Regressionsanalyse ergab außerdem, dass 61% der Varianz bei der allgemeinen Beeinträchtigung in der WAD-Gruppe mit den EPCL-Scores und dem Bildungsniveau erklärt werden konnten.

Patienten mit chronischem WAD berichten über eine hohe Stressbelastung, die spezifisch mit dem Grad der persönlichen funktionellen Beeinträchtigung nach Schleudertrauma zusammenhängt. Außerdem scheinen die WAD-Patienten (insbesondere diejenigen mit einem niedrigen Bildungsgrad) für Stresseinflüsse anfälliger zu sein und mit einer höheren Beeinträchtigung zu reagieren als gesunde Personen. Desgleichen spielen Stressreaktionen eine wichtige Rolle beim Fortbestehen oder der Verschlechterung von Beschwerden im Zusammenhang mit Schleudertraumata.

Se examinaron los problemas diarios comunicados por los pacientes con trastorno asociado a latigazo (TAL) y por controles sanos, partiendo de la hipótesis de que aquéllos informarían de una mayor confusión personal y tendrían una percepción de mayor gravedad de su propio estado que éstos, debido a su experiencia previa de una lesión por latigazo. Además, se consideraba que la puntuación de la gravedad sería elevada, debido a su mayor vulnerabilidad a problemas comunes. Finalmente, se esperaba encontrar una intensa relación entre la frecuencia y/o la gravedad de los problemas diarios, por un lado, y el nivel de malestar, por otro.

Se entregó la lista de verificación de problemas diarios (EPCL), para su cumplimentación, a 47 pacientes con TAL y 47 sanos equiparados. El nivel de malestar se midió mediante la lista de comprobación de síntomas (SCL-90).

Como era de esperar, la mayor parte de las puntuaciones EPCL en el grupo de TAL fueron más altas que las obtenidas en los sujetos sanos. Además, tras realizar un análisis de regresión se comprobó que el 61% de la varianza del malestar general en el grupo de TAL podía explicarse por las puntuaciones EPCL y el nivel de estudios.

Los pacientes con TAL crónico se quejan de gran malestar, relacionado específicamente con el funcionamiento personal después de la lesión por latigazo. Además (sobre todo si tienen un nivel de estudios bajo) parecen más vulnerables a todo tipo de problemas que los controles sanos, y reaccionan con mayores molestias que éstos. Es probable que las respuestas al estrés desempeñen un papel importante en el mantenimiento o el deterioro de la molestias asociadas al latigazo.

**Keywords:** daily hassles; stress; stressors; vulnerability; whiplash; whiplash-associated disorder

## Introduction

There is ample evidence that patients with a whiplash-associated disorder (WAD) experience a great deal of emotional distress following the onset of physical symptoms (Merksey, 1993; Radanov *et al.*, 1993, 1994, 1996; Barnsley *et al.*, 1994; Drottning *et al.*, 1995; Mayou and Radanov, 1996; Mayou, 1997; Wallis *et al.*, 1996, 1997; Smed, 1997).

Most authors agree that the distress WAD sufferers report is a consequence of their physical injury (acute stressor) itself and its profound effects on daily life (chronic everyday stressors). Mayou (1997) argues that even a minor injury may have significant social consequences (for example, financial problems, problems at work or limitation of travel). Moreover, Drottning *et al.* (1995) concluded that the initial emotional responses to the whiplash injury are the strongest predictors of maintenance of pain symptoms

4 weeks later. Consequently the initial reaction to the whiplash injury appears to be crucial.

The extent to which the course of the WAD is influenced by pre-morbid and co-morbid stressors that are *not* related to the injury remains a matter of discussion. In a series of prospective studies, Radanov *et al.* (1991, 1993, 1994, 1996) found no relationship between the distress or physical injury-related complaints and life events present prior to or immediately after the accident. These results led the authors to conclude that distress is caused by problems that occur as a consequence of the whiplash injury itself.

There is also some evidence that psychosocial factors, unrelated to the WAD, play a significant role in the course of the whiplash syndrome (Mayou *et al.*, 1993; Smed, 1997). For example, Mayou *et al.* (1993) reported that social and emotional problems that preceded the accident predicted emotional disorders in

18% of the WAD patients. Similarly, Smed (1997) found that WAD patients who reported negative life events that occurred after the accident perceived more distress 1 and 7 months after injury than patients who reported no stressors in addition to the accident.

The discrepant results in these studies may be accounted for by several factors, including the use of different assessment methodologies (for example, interview compared with questionnaire), differences in post-injury interval at the time of assessment and the nature of the life events that were evaluated (acute compared with chronic stressors). Perhaps most importantly, however, the discrepancies may be explained by the fact that most studies considered only the number of negative life events reported. Investigators have rarely evaluated WAD patients' appraisals of the stressful life events, although numerous studies have emphasized the critical role of people's appraisals or evaluations of the meaning and importance of particular stressors in the development of emotional distress (Cohen *et al.*, 1995).

The aim of the present study was to obtain more insight into the degree of exposure to and the appraisal of whiplash-related and whiplash-independent stressors in the everyday life of WAD patients after the injury. We systematically examined the frequency of self-reported daily stressors of WAD patients, while making a distinction between person-dependent stressors (representing events and conditions probably caused by the individuals themselves, which are dependent on the functioning and mental status of a person) and person-independent stressors (representing situations beyond human control). Because WAD patients experience all kind of problems and stressors in their daily lives, we hypothesized that both their self-reported frequencies and seriousness ratings of the problems related to personal functioning would be higher compared to normal healthy individuals. In addition, we expected that the seriousness ratings, but not the frequency scores of person-independent negative hassles would also be high, reflecting a stronger impact of these stressors on these vulnerable people. Because it is unlikely that WAD patients with chronic complaints would be more frequently exposed to distressing life events that occur independently of their functioning, we anticipated no differences in person-independent problems compared to those of healthy control participants. It is assumed, however, that the anticipated higher seriousness ratings for person-independent daily stressors reflect the vulnerability of chronic WAD patients to emotional stimuli (Radanov *et al.*, 1991).

Finally, we examined the level of distress in both groups as well as the extent to which the level of

emotional distress of WAD patients is predicted by the kind and amount of stressors or seriousness ratings. Because previous studies showed a negative relationship between educational level and level of distress in a healthy population (1996) we examined this relationship in the WAD group under the assumption that patients with a low educational level exhibit more psychological complaints than patients with a high educational level.

## Methods

### *Participants*

Forty-seven WAD patients (29 (62%) of whom were women) who were referred to a rehabilitation centre for treatment because of chronic whiplash-related complaints participated in the study. The mean age of the patients was 34 years (SD=6.9) and approximately half (51%) had a high educational level while the other half had a low educational level. The injury causing the WAD occurred more than 6 months ago (mean interval=47 months, SD=24). All patients suffered a WAD following an automobile accident (45 patients had a rear-end collision and only two patients had a side collision). None of the respondents was to blame for the accident. In order to obtain a homogeneous group of patients, people who reported that they lost consciousness after the whiplash injury, those who had recent narcoses or head injury and those with a psychiatric history were excluded.

Following the Quebec Task Force's clinical-anatomic axis (Spitzer *et al.*, 1995) that corresponds to severity of the whiplash injury, only patients with chronic complaints classified in levels 1 and 2 (the lowest of the four levels of neck complaints of pain, stiffness or tenderness accompanied by musculoskeletal signs and without fractures or significant neurological signs) were included. The control group consisted of 47 healthy participants, matched for sex (62% women), age (mean=33.7, SD=7.3) and educational level (51% had a high educational level).

### *Measures*

#### *The everyday problem checklist*

The everyday problem checklist (EPCL) (Vingerhoets and van Tilburg, 1994) is a 114-item self-report questionnaire that assesses both the frequency and perceived seriousness of chronic everyday problems during the preceding 2 months. This questionnaire includes items from several domains including: (1) family life, (2) living conditions, (3) working conditions, (4) physical appearance and general

performance, (5) transactions, (6) social developments and (7) confrontations (as witness or as victim). Respondents were asked to check the items describing events and situations that they had experienced in the past 2 months. Three scores can be calculated from this questionnaire: (1) the total number of items checked (frequency score); (2) the mean intensity score or seriousness rating; and (3) the product of these two scores (total score). This score reflects the amount of self-perceived stress load.

In the original instrumental development study of the EPCL, a panel of judges determined that 28 of the items were person dependent (for example, 'you could not realize your ambitions' or 'you had problems with friends') and 22 were person independent (for example, 'things you wanted to buy were suddenly more expensive' or 'someone in the family was the victim of a crime'). The remainder of the items may or may not be caused by the behaviour or mental status of the individual.

The EPCL has a good test-retest reliability for the three scores: frequency = 0.87; intensity = 0.85; and total score = 0.85. A previous study has shown that the relationship between the EPCL factors and distress is moderately positive in a general population (Vingerhoets and van Tilburg, 1994). Furthermore, results have indicated that self-reported everyday problems are of direct influence on subjective health complaints (Vingerhoets and van Tilburg, 1994). There is also evidence that the EPCL scores are related to immune activity, cardiovascular functioning and stress-hormone release, indicating the validity of the test. The EPCL has previously been used with patients with rheumatic arthritis and patients with systemic lupus erythematosus (SLE) and results revealed that the EPCL scores are positively related to pain, anxiety and depression (Vingerhoets and van Tilburg, 1994).

### *The symptom checklist*

In order to investigate the level of distress in our population, the Dutch version of the symptom checklist SCL-90 was administered (Arrindel and Ettema, 1986). The SCL-90 is a self-reporting, multi-dimensional symptom checklist composed of 90 items, each describing a physical or psychological symptom (Derogatis, 1983; Arrindel and Ettema, 1986). The instructions require patients to respond on a five-point scale (ranging from 'not at all' to 'extremely') to indicate how much an item has bothered them over the past week. In addition, eight subscales have been derived: anxiety (anx), phobic anxiety (pho), depression (dep), somatic complaints (som), insufficiency

(insuf), interpersonal sensitivity (sen), hostility (hos) and sleeping problems (sle). The global severity index (GSI) is a measure of general distress that is obtained from the subscale scores plus other items of the questionnaire not included in these scores.

The SCL-90 has proven to be a useful device for describing the distress of chronic pain patients in general, including the psychological and physical symptoms after a whiplash injury (Bernstein *et al.*, 1994; Wallis *et al.*, 1996). Wallis *et al.* (1996) found a homogeneous pattern of responses that described a profile of whiplash patients characterized by high somatic complaints and obsessive-compulsive and depression scores. The profile of pain patients does not describe any diagnostic personality disorder or neurotic disorder and there is evidence that the psychological distress exhibited by WAD patients is secondary to chronic pain.

### *Statistical procedure*

The statistical package for social sciences (SPSS) was applied for all data analyses (Norusis, 1992). Frequency distribution, mean and SD were calculated for the EPCL and the SCL90 variables. Next, non-parametric tests (Mann-Whitney *U* tests) were performed to test the differences between the WAD group and the healthy control group. Regression analysis was performed in order to investigate the relationship between the EPCL and the SCL-90. All reported *P*-values are two tailed.

### **Results**

Frequency analyses showed that the EPCL scales as well as the SCL-90 scales were not normally distributed (they all showed very skewed distributions). Because attempts to transform these variables into normality failed, non-parametric tests were performed (Hair *et al.*, 1998).

Mann-Whitney *U* tests were performed to compare the EPCL scores of WAD patients and healthy control participants. The results indicated that the person-dependent frequency, the seriousness ratings and the total scores of the WAD group were all significantly higher than those of the control-group (see Table 1).

There was, however, no significant group difference in the person-independent frequency score, whereas the seriousness rating was statistically significant ( $P < 0.001$ ).

To summarize, WAD patients seemed to experience more person-dependent but not person-independent

**Table 1.** Means and standard deviations of the everyday problem checklist scales for the patients with whiplash-associated disorder and the control group

	WAD group (mean (SD))	Control group (mean (SD))	P-value*
Person-dependent frequency	8.5 (4.7)	5.2 (3.4)	<0.001
Person-dependent intensity	1.6 (0.6)	0.9 (0.7)	<0.001
Person-dependent total	14.9 (10.7)	5.6 (5.4)	<0.001
Person-independent frequency	5.4 (3.5)	4.3 (2.7)	NS
Person-independent intensity	1.4 (0.7)	1.1 (0.6)	<0.001
Person-independent total	8.3 (7.4)	5.1 (4.4)	<0.005
EPCL total	51.2 (36.2)	22.4 (17.0)	<0.001

WAD, whiplash-associated disorder; EPCL, everyday problems checklist. \*Two-tailed significance.

**Table 2.** Means and standard deviations of the symptom checklist scales for the patients with whiplash-associated disorder and the control group

	WAD group (mean (SD)) n=47	Control group (mean (SD)) n=47	P-value*
Anxiety	17 (5.5)	11 (1.6)	<0.001
Phobic anxiety	10.2 (3.8)	7.2 (0.4)	<0.001
Depression	31.1 (11.8)	18.9 (3.8)	<0.001
Somatic complaints	28.3 (8.0)	14.7 (3.1)	<0.001
Insufficiency	25.9 (8.4)	11.2 (2.8)	<0.001
Sensitivity	28.9 (10.7)	21.1 (4.3)	<0.001
Hostility	10.7 (5.1)	7.0 (2.0)	<0.001
Sleeping problems	7.5 (3.3)	3.9 (1.5)	<0.001
Global severity index	172.6 (50.0)	105.0 (17.2)	<0.001

WAD, whiplash-associated disorder. \*Two-tailed significance.

stressors, but they perceived both kinds of stressors as more serious than control participants did.

The scores on the SCL-90 subscales and the GSI scale were significantly higher in the WAD group than in the control group, indicating more distress in the patient group (see Table 2).

In order to investigate to what extent the EPCL scores predict the level of distress in WAD patients, regression analysis was performed within the WAD group. After a logarithmic transformation was performed on the GSI scale, normality was achieved for this scale in the WAD group. EPCL variables were entered in a linear regression analysis as independent variables combined with sex, age, educational level and pain interval; the log transformed GSI scale was the dependent variable. A stepwise procedure was performed. Results revealed a model in which the GSI scores were predicted by the person-dependent frequency variable, together with the person-independent seriousness rating and educational level. This model explained 61% of the variance of GSI scale (see Table 3).

## Discussion

The first aim of the present study was to obtain greater insight into how WAD patients experience

daily stressors. We assessed frequency and seriousness of two types of self-reported everyday stressors of WAD patients who are in the chronic phase.

As expected, the results of this study revealed a clear difference between the exposure to person-dependent compared with person-independent stressors, indicating that chronic WAD patients appear more often to be confronted with stressors that may be related to their personal functioning or mental status. In contrast, stressors not related to their personal functioning were not elevated compared to a healthy control group. These results are consistent with those reported by Radanov *et al.* (1996), who argued that many of the problems and stressors encountered by WAD patients are a consequence of the whiplash injury.

The results further revealed significant differences in patients' appraisals of severity of their daily problems, indicating that stressors, in general, have a greater impact on WAD patients than on healthy people. This finding further supports the notion that WAD patients who are in the chronic phase become easily aroused by all kinds of stressors.

Corroborating previous results, the results of this study demonstrate that the level of distress is significantly higher in WAD patients than in healthy people (Merksey, 1993; Radanov *et al.*, 1993, 1994, 1996; Barnsley *et al.*, 1994; Drottning *et al.*, 1995;

**Table 3.** Regression analysis for the patients with whiplash-associated disorder (prediction of global severity index out of the everyday problems checklist;  $n=47$ )

Variable	B	SEB	$\beta$	P-value
Step 1*				
Person-dependent frequency	-0.0146	0.003	0.59	0.000
Step 2*				
Person-dependent frequency	-0.0138	0.003	0.55	0.000
Educational level	-0.0871	0.026	-0.37	0.001
Step 3*				
Person-dependent frequency	-0.0113	0.003	0.45	0.000
Educational level	-0.0861	0.023	-0.37	0.000
Person-independent seriousness rating	-0.0632	0.017	0.37	0.001

WAD, whiplash-associated disorder; EPCL, everyday problems checklist. \* $R^2=0.35$  for step 1 ( $P<0.001$ ),  $R^2$ change=0.14 for step 2 ( $P<0.001$ ); and  $R^2$ change=0.12 for step 3 ( $P<0.001$ ).

Mayou and Radanov, 1996; Wallis *et al.*, 1996, 1997; Mayou, 1997). The results of the regression analysis suggest that this distress in WAD patients is strongly related to the number of daily hassles related to personal functioning and to appraisal of stressors independent of personal functioning.

Furthermore, the results indicate that WAD patients with a low educational level have more general distress than patients with a high educational level, which seems to imply that the low educational group is more vulnerable.

To what extent pre-existing dispositions are of influence on the reported distress and appraisals of daily problems remains to be established. In other words, it is possible that the injury is only a mediating variable, which triggers pre-existing stress sensitivity. Future studies focusing on pre-morbid characteristics of the patients may yield results answering this question.

One limitation of this study is that a selection bias might have occurred, because the participants in the present study were all patients who have been referred to a rehabilitation centre for a treatment, which prevents generalizing the present findings to the WAD population at large. Despite this limitation, the results of this and previous studies suggest that it is important in the early stages following a WAD to assess both the frequency of problems or daily stressors as well as patients' appraisals. Treatment must focus on the reduction of the daily stressors associated with personal functioning (active, problem-oriented coping strategies) combined with emotional coping strategies aiming at changing the perceived seriousness of daily problems. Adequate, early interventions may prevent excessive emotional distress in many of these patients.

## Conclusions

In conclusion, WAD patients report high degrees of daily stressors that are related to their personal functioning. These problems are likely to be a consequence of the whiplash injury. What appears to be important is not only the amount of self-perceived daily problems but also how WAD patients appraise their daily problems and life events. Our results revealed that both the amount of person-dependent problems as well as WAD patients' excessively negative interpretations of stressors contribute to psychological distress, which may lead to the exacerbation and maintenance of their physical symptoms. To what extent the stress responses of WAD patients after the whiplash injury are caused by pre-existing disposition factors is a question for future research. Patients with a low educational level seem to be particularly vulnerable and tend to react with more distress compared to patients with a high educational background.

It is reasonable to assume that coping and psychological stress responses play an important role in the maintenance or worsening of whiplash-associated complaints. In order to gain more insight into the observed vulnerability, future studies should focus on the effects of educational level, personality factors, coping abilities and stressors on the course of whiplash-related symptoms (Cohen *et al.*, 1995).

## Acknowledgements

The authors wish to thank D. Turk (PhD) for his comments on earlier versions of this manuscript. This study was made possible by a grant from the Nardy Roeloffzen Foundation.

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