Perfectionism and coping strategies as risk factors for the development of non-specific work-related upper limb disorders (WRULD)

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Background
The incidence of non-specific work-related upper limb disorders (WRULD) is rising throughout western society. Literature and our own WRULD file (>1200 patients) revealed that both physical and psychosocial work-related factors are major causes of non-specific WRULD. It also appeared that non-specific WRULD was more likely to develop in patients with neurotic-perfectionist personalities.

Aim
To see if, alongside physical and psychosocial work-related factors, personality factors play an important role in developing non-specific WRULD.

Method
This was a case-control study with two control groups, comparing 45 computer workers with non-specific WRULD with 45 computer workers free from upper limb disorder (first control group) and 42 chronic pain patients (second control group). Main questionnaires administered were: the Utrecht Coping List (UCL), measuring coping-styles; the Multidimensional Perfectionism Scale (MPS), measuring neurotic perfectionism; and the Symptom Check List (SCL-90), measuring general psychological complaints (psychoneuroticism). The SCL-90 was added because of its known high correlation with neurotic perfectionism.

Results
Logistic regression analysis revealed significant differences in SCL-90 scores ($\chi^2 = 17.2, P < 0.0001$), thereby potentially negating the significance of the higher neurotic perfectionism in the non-specific WRULD group. A second control group of chronic pain patients, with prospective high score on the SCL-90, was added. Logistic regression showed that, after controlling for psychoneuroticism, non-specific WRULD patients had more neurotic perfectionist traits ($\chi^2 = 22.83, P < 0.0001$). There were no significant differences in mean UCL scores ($P > 0.05$).

Conclusion
Alongside physical and psychosocial work-related factors, psychoneuroticism and neurotic perfectionism appear to be important risk factors for developing non-specific WRULD.

Key words
Computer workers; coping strategies; neurotic perfectionism; non-specific work-related upper limb disorder (WRULD); personality structure.
Introduction

Repetitive strain injury (RSI) is an increasing problem for the working population of the Netherlands, particularly amongst computer workers [1] and the same is true for other highly industrialized and computerized countries, resulting in high sick pay for those unable to work [2].

A report on RSI published by the Health Council of the Netherlands in 2000 [3] gave the following description of RSI, or work-related upper limb disorder (WRULD) as it is often called in British medical literature:

RSI is a medical syndrome affecting the neck, upper back, shoulders, upper and lower arm, elbow, wrist or hand, or a combination of these areas. Its effects are restrictive or lead to participation problems. The syndrome is characterised by a disturbance in the balance between load and physical capacity, preceded by activities that involve repeated movements or prolonged periods spent with one or more of the relevant body parts in a fixed position. RSI is always caused by a combination of factors.

In other words, the committee’s definition of RSI excludes pain and other conditions that are short-lived or acute.

As a syndrome, RSI always involves a complex of complaints. To conform to this definition and to exclude specific forms of RSI such as tendinitis, the synonymous terms ‘aspecific RSI’ and ‘non-specific WRULD’ will be used [4,5]. The term ‘RSI’ is still used in the Netherlands because of its worldwide currency. This article is only concerned with non-specific WRULD [6].

Risk factors fall into three categories: physical (work-related) risk factors, such as bad posture; psychosocial (work-related) risk factors, such as lack of social support; and personal risk factors, such as an ineffective approach to stress management [3,5].

From the literature [7–9] and from our large cohort of patients with non-specific WRULD (>1200 patients), it became clear that poor posture and poor ergonomic design of equipment and tools are at least partly responsible for non-specific WRULD. However, the impression gained in clinical practice was that full postural and ergonomic adaptation of the workplace did little to reduce the number of complaints. Indeed, it is known that ergonomic interventions are more effective when psychosocial aspects of the jobs are taken into account [10]. An analysis of our non-specific WRULD cohort strongly indicated that known psychosocial and psychological factors [10–14]—and especially such personality factors as neurotic perfectionism and coping strategies—could be additional risk factors in the development and persistence of non-specific WRULD [15].

Nearly all of the new non-specific WRULD patients told us, when asked during structured history taking, that they were very precise persons, incapable of dealing with heavy workload and/or tight deadlines. As a result, over the last few years each patient’s degree of perfectionism has been assessed with the Multidimensional Perfectionism Scale (MPS), which measures neurotic perfectionism.

Moreover, these same patients told us they had high work standards and would ignore the workload and onset of non-specific WRULD symptoms, despite knowing that these symptoms could become chronic in a few months.

Apart from standard therapies such as physical therapy and occupational therapy, these patients also received rational emotive therapy (RET) [16] and advice on time management and assertiveness. RET is a type of cognitive therapy and is defined as the therapy which helps patients to replace irrational beliefs with rational assumptions.

Little research has been done so far on the personality structure of the non-specific WRULD patient [11,12,15,17]. If the non-specific WRULD patient has the trait of perfectionism or is hampered by inadequate coping strategies, or both, prevention and primary intervention for non-specific WRULD should be adapted to the personality type.

The research question for this study is therefore whether perfectionism and/or inadequate coping skills are additional risk factors in developing non-specific WRULD.

Methods

This study is a case-control study with two control groups. The sample was taken from personal computer (PC) workers working at the computer with or without the use of a mouse for >20 h a week and for at least 4 h a day, and from chronic pain patients with generalized pain above and below trunk level. The latter sample included patients with fibromyalgia syndrome, distinguished by special tender points above and below the girdle and right and left side of the body.

The sample consisted of men and women aged 18–65. The case group consisted of PC workers diagnosed with non-specific WRULD at our clinic, which is a tertiary referral centre for non-specific WRULD patients.

Inclusion took place in accordance with the earlier given description of non-specific WRULD [3–5] where the symptoms lasted >6 weeks. The first control group was composed of PC workers as described above who did not have non-specific WRULD symptoms. This control group was mainly selected from colleagues of the case group and at random from the personnel of Maastricht University and a large company. Both groups were therefore homogeneous regarding workplace, pace of work and daily use of the computer.

The third group (second control group) was composed of chronic pain patients from our clinic who were not PC workers (see Table 1). This group was included because,
as chronic pain patients, they had somatopsychological problems [18] but did not suffer from non-specific WRULD and were not PC-workers.

We expected that this group would score high on the Symptom Check List (SCL)-90 [18], but had additional reasons for wanting to know how this group would behave on the Multidimensional Perfectionism Scale (MPS) (see later).

Based on the assumed differences between cases and control groups of at least 25 points on the MPS with alpha = 0.05 and a power of 80%, we needed at least 43 patients in each group. We aimed to include 50 persons in each group to allow for dropouts [19].

In the event, 45 non-specific WRULD patients (group 1), 45 people without upper limb disorder (group 2) and 42 chronic pain patients (group 3) were included. For patients who refused to be included, some demographic data and data from history taking were registered to exclude possible selection bias in the final study base.

Demographic and illness characteristics of the study and control groups were taken into account, namely age, gender, level of education, use of computer and duration of complaints. Table 1 shows a good match between the groups with respect to gender and the duration of the complaints.

The patients in the chronic pain group were significantly older than in the other two groups, had a lower standard of education (P < 0.05) and spent much less time each day at the computer than the people in groups 1 and 2.

After obtaining their informed consent, the people in all the groups were sent a set of four questionnaires, as follows.

1. A questionnaire for biographic, demographic and medical history data relevant to non-specific WRULD.

2. The MPS, Dutch version. This was originally an American scale measuring the degree of neurotic perfectionism [20]. Hamachek [21] drew a distinction between ‘normal’ perfectionists, who set high standards for themselves yet, ‘Feel free to be less precise as the situation permits’ and ‘neurotic’ perfectionists, who also set high standards but allow themselves little room for mistakes. They never feel that anything is done completely or well enough. A Dutch version of the test was made and tested for reliability and validity by our research group before use [22]. The Dutch version consists of 35 items and five subscales and is used as a multidimensional construct. The following subscales are included: concern over mistakes; personal standards; parental expectations; parental criticism; and doubt about actions. The 35 items are scored from 1 to 5. The higher the score, the greater the degree of neurotic perfectionism. The total score is a good representation of the different sub-scores. It takes ~10–15 min to fill out. MPS scores are not influenced by age or gender.

3. The Hopkins Symptom Check List (SCL)-90. This scale is in worldwide use for measuring recently experienced physical and psychological distress and for screening psychopathology, defined as psychoneuroticism [18,23] and takes ~20 min to complete. This list was used because the literature shows a high correlation between the SCL-90 and MPS scores [20]. It consists of 90 items, scored from 1 to 5, subdivided into nine subscales. The higher the score, the greater the degree of psychoneuroticism. The total score is a good representation of the different subscores. The score for a non-pathological person can be expected to lie between 100 and 120. A score of 260 points to existing depression.

4. The Utrecht Coping List (UCL) [24]. This list was used because coping styles can also be influenced by psychoneuroticism and because of the expectation from clinical practice that perfectionists would have inadequate coping strategies. This list consists of 47 items subdivided into seven subscales, measuring seven different types of coping strategy. For this reason, all subscales had to be taken into account separately. It takes ~10 min to complete.

All procedures followed the ethical standards of the Medical Ethics Committee of the University Hospital Maastricht.

### Table 1. Demographic and illness characteristics of case and control groups

<table>
<thead>
<tr>
<th></th>
<th>Non-specific WRULD (n = 45)</th>
<th>Healthy controls (n = 45)</th>
<th>Pain patients (n = 42)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>36 (7.3)</td>
<td>33 (8.3)</td>
<td>43 (9.4)*</td>
</tr>
<tr>
<td>Sex (% female)</td>
<td>69</td>
<td>71</td>
<td>57</td>
</tr>
<tr>
<td>Education level</td>
<td>5.8 (1.8)</td>
<td>5.1 (1.7)</td>
<td>3.5 (2.7)*</td>
</tr>
<tr>
<td>Hours at computer</td>
<td>6.5 (1.6)</td>
<td>6.2 (1.5)</td>
<td>1.1 (2.5)*</td>
</tr>
<tr>
<td>Duration of complaints (months)</td>
<td>35 (21)</td>
<td></td>
<td>33 (48)</td>
</tr>
</tbody>
</table>

Values are mean values (SD).

*One way ANOVA, P < 0.05.
Statistics

The demographic and illness characteristics of the study and control groups were analysed by the one-way analysis of variance (ANOVA) method \((P < 0.05)\).

First of all, the MPS-subscales and total score, the SCL-90 subscales and total score and the UCL subscales were analysed for the three groups. Then, because of the good internal consistency of the instruments as a whole, we continued with the MPS total score and the SCL-90 total score \([23]\). The UCL subscales, representing different ways of coping, were analysed separately.

The case-control groups were also compared with each other by the one-way ANOVA method \((P < 0.05; \text{Bonferroni correction was used because more than two groups were involved})\). Finally, we used logistic regression analysis to look at differences in perfectionism between patients with non-specific WRULD and both control groups while controlling for their overall SCL-90 scores.

Results

Table 2 shows that the non-specific WRULD group is significantly more neurotic perfectionist than the two control groups. It also shows that the healthy control group was significantly less psychoneurotic than the two groups with symptoms. Although the non-specific WRULD patients had the same coping styles as the healthy controls, the chronic pain group used coping strategies that were less active than the non-specific WRULD group. The chronic pain group also has a more passive coping style than the healthy control group.

In a logistic regression analysis, we first compared the patients with non-specific WRULD to the healthy control group on their level of perfectionism and did the same for their SCL-90 scores. As can be seen in Table 3, only the SCL-90 scores were significantly different between the groups. Next, we used the same approach to compare patients with non-specific WRULD to chronic pain patients (Table 4). Here, patients with non-specific WRULD appeared to be more perfectionistic, despite their lower SCL-90 scores.

Discussion

The incidence of non-specific WRULD is increasing in stressful and highly industrialized Western societies \([2,3]\). It may be no coincidence that less industrialized countries such as Greece, where the working day is also split by a long lunch break, report very few cases of WRULD \([25]\).

This study was carried out because observations from our non-specific WRULD clinic pointed to personality

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### Table 2. MPS, SCL-90 and UCL scores for case and control groups

<table>
<thead>
<tr>
<th></th>
<th>Non-specific WRULD ((n = 45))</th>
<th>Healthy controls ((n = 45))</th>
<th>Pain patients ((n = 42))</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPS total score (neurotic perfectionism)(^a)</td>
<td>70.0 (25.3)</td>
<td>56.6 (18.2)</td>
<td>54.9 (17.1)</td>
</tr>
<tr>
<td>SCL-90 total score (psychoneuroticism)(^b)</td>
<td>145.9 (41.3)</td>
<td>115.6 (27.7)</td>
<td>164.2 (49.7)</td>
</tr>
<tr>
<td>UCL (coping styles)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active coping(^c)</td>
<td>19.5 (3.6)</td>
<td>18.8 (3.9)</td>
<td>17.6 (3.0)</td>
</tr>
<tr>
<td>Palliative reaction</td>
<td>18.8 (3.6)</td>
<td>17.6 (3.2)</td>
<td>18.3 (3.2)</td>
</tr>
<tr>
<td>Avoidance</td>
<td>15.9 (3.6)</td>
<td>16.7 (4.3)</td>
<td>15.4 (3.1)</td>
</tr>
<tr>
<td>Looking for social support</td>
<td>13.9 (3.9)</td>
<td>13.8 (3.3)</td>
<td>12.8 (3.6)</td>
</tr>
<tr>
<td>Passive reaction pattern(^d)</td>
<td>11.9 (3.2)</td>
<td>11.0 (2.9)</td>
<td>13.0 (4.0)</td>
</tr>
<tr>
<td>Expression of emotions</td>
<td>5.9 (1.9)</td>
<td>6.7 (1.6)</td>
<td>6.1 (1.9)</td>
</tr>
<tr>
<td>Sedative thoughts</td>
<td>13.0 (2.8)</td>
<td>12.0 (2.4)</td>
<td>12.5 (2.3)</td>
</tr>
</tbody>
</table>

Values are mean values (SD). One-way ANOVA (Bonferroni correction).

\(^aP < 0.05\) between non-specific WRULD and other groups.

\(^bP < 0.05\) between healthy control and other groups.

\(^cP < 0.05\) between non-specific WRULD and pain group.

\(^dP < 0.05\) between healthy control and pain group.

### Table 3. Logistic regression for non-specific WRULD and healthy control groups\(^a\)

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCL-90 sumscore</td>
<td>–0.0270</td>
<td>0.0098</td>
<td>0.0006</td>
</tr>
<tr>
<td>MPS sumscore</td>
<td>–0.0052</td>
<td>0.0137</td>
<td>0.7018</td>
</tr>
</tbody>
</table>

\(^a\chi^2 = 17.17, df = 2, P < 0.0001.\)

### Table 4. Logistic regression for non-specific WRULD and chronic pain patients\(^a\)

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>SE</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCL-90 sumscore</td>
<td>0.0226</td>
<td>0.0075</td>
<td>0.003</td>
</tr>
<tr>
<td>MPS sumscore</td>
<td>–0.0544</td>
<td>0.0145</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

\(^a\chi^2 = 22.83, df = 2, P < 0.0001.\)
traits—particularly neurotic perfectionism—as additional risk factors for developing non-specific WRULD [20].

We therefore hypothesized that patients suffering from non-specific WRULD would have inadequate movement strategies [6], that such inadequate strategies develop preferentially amongst people under high task stress who ignore breaks and high work pace [6] and that people with this behaviour would tend to show neurotic perfectionism.

The results indeed show that PC workers from our sample are significantly more neurotic perfectionist than PC workers without non-specific WRULD.

Logistic regression analysis, however, showed that these significant differences in neurotic perfectionism were potentially negated by the differences in SCL-90 scores. In other words, PC workers with non-specific WRULD were, above all, more psychoneurotic than PC workers without non-specific WRULD. This means that they suffered primarily from psychological and physical complaints. Because the variable tested was the MPS, measuring neurotic perfectionism, we conclude that our hypothesis is accepted. To further confirm our hypothesis, we used a second control group consisting of chronic pain patients, who would be expected to score high on the SCL-90 [18]. By logistic regression analysis we could show that patients with non-specific WRULD are significantly more neurotic perfectionist than chronic pain patients, despite not having the higher SCL-90 scores we would expect from the literature [20].

There were, against expectation, no significant differences in coping mechanisms between non-specific WRULD patients and the healthy controls.

On the other hand, the pain patients used coping strategies that were significantly less active than the non-specific WRULD patients and had a more passive coping style than the healthy control group.

The MPS originally consisted of six subscales. The subscale ‘Organization’ of the MPS had to be removed because of psychometric inconsistencies; that is, it reduced the internal consistency of the MPS. Despite this, the internal consistency of the subscales and the questionnaire was, on the whole, good [22].

Although there was a high correlation between the subscales ‘Parental expectations’ and ‘Parental criticism’, these two subscales were left separate as in the original version, leaving five subscales. The fact that there were three missing values in the healthy control group for each subscale of the UCL was of little consequence for the project, as the UCL list was not the main variable.

To put the results of this study into practice, every new patient diagnosed as having non-specific WRULD would be encouraged to fill in the SCL-90 and MPS questionnaires. A patient with non-specific WRULD who scored $>260$ on the SCL-90 should be referred for psychiatric screening [20].

In our daily practice, patients with non-specific WRULD and a total score $>120$ on the MPS are sent to a psychologist or psychotherapist to learn how to deal with their neurotic perfectionism.

**Conclusion**

This study shows that while neurotic perfectionism may be an additional risk factor for developing non-specific WRULD, the correlation could be accounted for by psychoneuroticism experienced as general physical and psychological complaints.

Although unlikely, the study does not rule out the possibility that the presence of psychoneuroticism and neurotic perfectionism was caused by non-specific WRULD.

To exclude confounding by psychoneuroticism, a prospective study is needed on the causal relationship between non-specific WRULD and psychoneuroticism/neurotic perfectionism after allowing for the physical and psychosocial work-related factors.

Nevertheless, there is good reason to direct prevention and primary intervention of non-specific WRULD primarily at those PC workers with psychoneurotic and neurotic perfectionist personalities.

**Acknowledgement**

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**References**


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