Caring for healthcare professionals: improving prevention in occupational healthcare

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Chapter 5

MENTAL VITALITY @ WORK: THE EFFECTIVENESS OF A MENTAL MODULE FOR WORKERS’ HEALTH SURVEILLANCE FOR NURSES AND ALLIED HEALTH PROFESSIONALS, COMPARING TWO APPROACHES IN A CLUSTER-RANDOMISED CONTROLLED TRIAL

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ABSTRACT

**Purpose:** The aim of this study was to compare two approaches for a worker’s health surveillance (WHS) mental module on work functioning and work-related mental health.

**Methods:** Nurses and allied health professionals from one organisation were cluster-randomised at ward level to e-mental health care (EMH) (N = 579) or occupational physician care (OP) (N = 591). Both groups received screening and personalised feedback on impaired work functioning and mental health. Positively screened participants received an invitation to follow a self-help EMH intervention, or for a consultation with an OP. The primary outcome was impaired work functioning. Follow-up was performed after three and six months. Linear mixed models were applied to determine differences. Non-inferiority of the EMH-care approach was demonstrated if the mean absolute improvement on work functioning in the OP-care group was ≤10 points higher than the EMH-care group.

**Results:** Analyses were performed on the positively screened participants (almost 80%) (EMH N = 75; OP N = 108) and all participants (EMH N = 98; OP N = 142). Both groups improved over time regarding impaired work functioning. A considerable percentage of participants had improved relevantly at follow-up regarding work functioning (3 months: EMH 30%, OP 46%; 6 months: EMH 36%, OP 41%) compared to baseline. No statistically significant differences were found between the groups, and the difference did not exceed the pre-defined criterion for non-inferiority.

**Conclusion:** The OP-care approach for a WHS mental module trended towards better performance in targeting work functioning, but our findings indicate that the EMH-care approach was non-inferior. However, the high dropout rate and low compliance to EMH interventions should be taken into account.
INTRODUCTION

In nurses, mental health problems are highly prevalent.\textsuperscript{1,2} Impaired mental health can have serious adverse effects, not only on the nurses themselves but also on their patients. Letvak et al.\textsuperscript{3} found that depression in nurses was associated with presenteeism, which is associated with patient falls, medication errors and lower self-reported quality of care. Moreover, Gärtner et al.\textsuperscript{4} found that common mental disorders in nurses and allied health professionals affect several aspects of their work functioning. Consequently, it is essential to monitor and promote nurses’ and allied health professionals’ mental health and work functioning. Preventive interventions aimed at early recognition and treatment of mental health problems are called for.

The focus in the current study is on preventive workers’ health surveillance (WHS) as a means to put preventive interventions into action. WHS is an important part of occupational health services.\textsuperscript{5} It can be used to periodically monitor employees’ health and work functioning to detect impairments early and to bring timely interventions into action to prevent further impairment. In order to be able to tailor the intervention to the specific detected work functioning impairments as much as possible, a job-specific assessment for nurses and allied health professionals should be applied.\textsuperscript{6} To our knowledge, WHS targeting work functioning and mental health of nurses and allied health professionals has not been reported before.

If available, occupational health services form a natural platform for WHS. In the Netherlands, WHS is generally performed by occupational physicians. The occupational physician initiates and performs the screening and subsequently offers advice and possible interventions.\textsuperscript{7} The approach, consisting of online screening, online personalised feedback, and—in the case of impairments in work functioning and/or mental health—an invitation for a preventive consultation with an occupational physician, was successful in improving work functioning in the same population.\textsuperscript{8} In this paper, a self-help e-mental health approach for WHS is compared to this conventional approach. E-mental health interventions exist that target a wide variety of common mental disorders such as depression, anxiety, panic, phobias and various addictions. The extent of self-help varies, some being completely without guidance and some including a certain amount of guidance by a caregiver. Research has shown unguided self-help e-mental health interventions to have positive outcomes for a variety of mental health aspects (e.g. Billings et al.,\textsuperscript{9} Riper et al.,\textsuperscript{10} Warmerdam et al.\textsuperscript{11}), although to our knowledge, their effects on work functioning have not been studied in a specific working population such as nurses and allied health professionals. Self-help e-mental health interventions may offer some advantages over face-to-face healthcare, e.g., they can be followed in a self-chosen time and place and at one’s own pace. Furthermore, people might not seek help due to
concerns about being stigmatised, which e-mental health might help to avoid. E-mental health might also reach a target population who would otherwise not seek help, for instance, people who find it difficult to talk about, or who are ashamed of their problems. The aim of this cluster-randomised controlled trial, therefore, is to compare this novel e-mental health approach for WHS targeting work functioning and mental health to a more conventional approach performed by an occupational physician. As in both approaches the online screening and personalised feedback are combined with interventions which can be expected to be effective, we hypothesise that the e-mental health approach will not be inferior to the occupational physician approach in its effect on work functioning and work-related mental health outcomes.

**METHODS**

**Study design**
The study was designed as a cluster-randomised trial with block randomisation carried out at ward level. To guarantee allocation concealment, randomisation was performed by one researcher (KN) who was not involved in the practical recruitment of employees, using the computer software program Nquery Advisor with a block size of three. The complete trial, described in Gärtner et al., included two intervention groups and one control group. The present study compared the effectiveness of the two intervention groups, in terms of non-inferiority: a) an e-mental health care group (EMH-care) and b) an occupational physician care group (OP-care). A pre-randomisation procedure with incomplete-double-consent design was applied, meaning that individuals were only informed about their own group.

Outcome measures were obtained from all participants at baseline (March 2011). Follow-up measures were obtained three and six months after baseline. The Medical Ethics Committee of the Academic Medical Center Amsterdam approved the study. All participants gave written informed consent before taking part.

The design, conduct and reporting of this study adhere to the Consolidated Standards of Reporting Trials guidelines.

**Participants**
The study population of the complete trial consisted of all nurses, including surgical nurses and anaesthetic nurses, and allied health professionals (such as physiotherapists and radiotherapists) working in one academic hospital in the Netherlands. Since it regarded a preventive study, participants were included if they were not, or were not expecting to be on sick leave for more than two weeks at baseline.
All eligible employees were invited to take part in the study, which for the complete trial added up to 1,731 employees working in 86 wards. The minimum required sample size was 718 participants for the complete trial. After randomisation at ward level, 29 wards with 579 employees were assigned to the EMH-care group and 28 wards with 591 employees to the OP-care group. The remaining wards and employees were assigned to the control group, which will not be discussed in the present paper.

Setting
The academic hospital has its own in-company occupational health service. For each division, which contains several wards, an OP is responsible for the occupational health care. Employees who are sick-listed for more than two weeks are required (in accordance with the Dutch occupational healthcare system) to visit their OP for independent judgment of sick leave and for return-to-work guidance. Furthermore, all employees of the hospital can make use of the free accessible consulting hour for questions about work and health. According to the in-company occupational health service, usage of the free accessible consultations by employees is limited.

Procedure
In March 2011, an invitation was sent by e-mail to fill out the baseline questionnaire online, which could be filled out at any time during six weeks. It was possible to discontinue the questionnaire and complete it after logging in again. Three reminders were sent, as well as an information letter to their home address. Those who had completed the baseline questionnaire were invited to fill out the follow-up questionnaires three and six months after baseline.

Interventions
Screening and personalised feedback
At baseline, participants in both groups were screened on the following aspects (for details see Gärtner et al.): impaired work functioning, distress, work-related fatigue, alcohol use, depression including suicide risk, anxiety, panic disorder and posttraumatic stress. The work relatedness of any mental health complaint was also assessed. Participants received personalised feedback on their screening results immediately after filling out the baseline questionnaire, both onscreen and in an e-mail.

E-mental health care
For participants in the EMH-care group, the personalised feedback was followed by an invitation for a tailored choice of self-help e-mental health interventions, based on an algorithm (Appendix 1). Participants were mostly offered a choice of two or three e-mental health interventions, to leave room for personal preferences. Participants who screened negative on all mental health complaints were invited to follow an e-mental health intervention aimed at enhancing and retaining their mental fitness.
The Internet-based self-help e-mental health interventions aim to reduce specific mental health complaints or enhance well-being and were developed by the Trimbos Institute (Netherlands Institute of Mental Health and Addiction) at an earlier stage. They are mainly based on the principles of cognitive behavioural therapy and combine a variety of aspects, e.g., providing information and advice, weekly assignments, the option of keeping a diary and a forum to get in contact with others with similar complaints. The e-mental health interventions used in the study were as follows:

- Psyfit: aimed at enhancing mental fitness, also offered to healthy participants.
- Strong at work (Dutch: Sterk op je Werk): aimed at gaining insight into work stress and learning skills to cope with work stress.
- Colour your life: aimed at tackling depressive symptoms.
- Don’t Panic Online: aimed at reducing panic symptoms for subclinical and mild cases of panic disorder.
- Drinking less: aimed at reducing risky drinking behaviour.

In case of positive screening on impaired work functioning (regardless of their mental health state), participants received an onscreen educational leaflet on how to improve their work functioning.

**Occupational physician care**

For participants in the OP-care group who screened positive on impaired work functioning and/or on any mental health complaints, the personalised feedback was followed by an invitation for a face-to-face preventive consultation with their own occupational physician (OP), within two weeks. They were sent a letter to their home address with an appointment for this consultation. The consultation was voluntary and supervisors were not informed about it.

A consultation protocol was developed which was based on interviews with the participating OPs to elicit their current practice and on the evidence-based guideline for OPs’ treatment of employees with mental health problems. It consisted of seven steps: 1) discussing expectations; 2) discussing screening results and characteristics of work functioning and mental health complaints; 3) discussing possible causes in the private, work, and health condition and consequences for work functioning; 4) identifying the problem and offering rationale; 5) giving advice on how to tackle health complaints, how to improve work functioning, how to prevent consequences of impaired work functioning, and how to communicate with the supervisor about work functioning and mental health; 6) discussing possible follow-up or referral to other care providers; and 7) summarising the consultation. All participating OPs received three-hour training in using the protocol.
Measures
All outcomes were measured at baseline and at 3- and 6-months follow-up.

Primary outcome
The primary outcome of this study was impaired work functioning, measured using the total score of the Nurses Work Functioning Questionnaire (NWFQ). In the screening phase, all seven of the original subscales were used. Participants scored green, orange or red on each subscale. A red score on one or more subscales and/or three or more orange scores led to case identification of impaired work functioning.

Only six of the seven original NWFQ subscales were used for the outcome measure, other than how it was described in the trial's design study, because the reproducibility of the impaired decision-making subscale was found to be poor. The total score on the NWFQ was calculated with the 47 items of the remaining six subscales, with a total score range of 0-100, a higher score indicating more severely impaired work functioning.

The difference between the two study groups regarding impaired work functioning was examined in two ways: as a continuous outcome and as the percentage of individuals who had improved relevantly at follow-up.

Secondary outcomes
The secondary outcomes included distress, work-related fatigue, posttraumatic stress, and work ability.

Distress was measured with the distress subscale of the Four-Dimensional Symptoms Questionnaire (4DSQ). The 16-item questionnaire uses a 5-point response scale (0 = no, 4 = very often) and has a total score range of 0-32, a higher score indicating a higher level of distress [cut-off point ≥11].

Work-related fatigue after working time was measured using the need for recovery subscale of the Dutch Questionnaire on the Experience and Evaluation of Work (QEEW). The 11-item questionnaire with dichotomous response categories (yes, no) has a total score range of 0-11 and a standardised score range of 0-100, a higher score indicating a higher level of work-related fatigue [cut-off point ≥54.5].

Posttraumatic stress was measured with the Dutch version of the Impact of Event Scale. The 15-item questionnaire uses a 4-point response scale (0 = not at all, 3 = often). Total scores range from 0 to 75, with higher scores indicating a higher level of posttraumatic stress [cut-off point ≥26].
Work ability was assessed with the first item of the Work Ability Index (WAI), concerning the evaluation of current work ability compared to their lifetime best on an 11 point scale (0 = completely unable to work, 10 = work ability at its best), a higher score indicating a higher level of work ability.

Other secondary outcomes that were mentioned in the study protocol will be presented elsewhere.

**Statistical analyses**

All participants who completed the baseline questionnaire and who screened positive on impaired work functioning and/or impaired mental health were analysed, as the work functioning and work-related mental health of these participants could be expected to change due to the interventions. However, since this was not pre-specified in the trial registration, the analyses were also performed for the total sample.

The analyses were performed at the level of the individual employee, according to the intention-to-treat principle.

**Dropout analysis**

A dropout analysis was performed to detect whether dropping out (not completing trial participation) was related to the primary outcome impaired work functioning and to identify potential predictive variables of dropout. Dropping out of the trial was defined as completing the baseline and 3-month follow-up questionnaires, but not the 6-month follow-up questionnaire; or completing the baseline questionnaire, but none of the follow-up questionnaires. Differences between non-dropouts and dropouts in impaired work functioning over time in both separate groups were explored in graphs. If different patterns of the effect were detected, a Mann-Whitney $U$ test was performed to test the significance of the differences. In the event of statistically significant differences, a multiple logistic regression analysis was performed with dropout as the dependent variable, to identify potential predictive variables for dropout. Screening positive on mental health complaints (yes/no) and age were included as the independent variables, as we expected that these two aspects might be related to dropping out of the trial. If the multiple logistic regression analysis showed one or both of these aspects to have a statistically significant effect on dropout, they were included as a covariate in the effect analyses.

**Effect analysis**

To analyse the differences over time between the groups on each outcome, Linear mixed models (LMM) were applied. If the assumption of a normal distribution of residuals was not met, a log-transformation was used for the LMM and the median and range were
used to describe the outcome. Otherwise, the mean and standard deviation were used to describe the outcome.

For each outcome, the scores at 3- and 6-months follow-up were included as dependent variables in the LMM, while the baseline score was included as a covariate. The main effects of group and time of measurement and the interaction of group x time of measurement were included as fixed effects in the model. Ward (the cluster level) and subject (the individual level) were included as random effects; however, if the cluster level did not have a statistically significant effect, it was considered negligible and was, therefore, omitted from the model. The effects of interest were the main effect of group and the interaction effect of group x time of measurement.

Furthermore, the relative change scores of individuals on impaired work functioning after three and after six months of follow-up compared to their baseline score were calculated. Individuals with a relative improvement on their NWFQ total score of 40% or more, which is the minimal important change (MIC) value of the NWFQ total scale, were defined as relevantly improved. The percentages of individuals who had improved relevantly in each group were compared using a Fisher’s exact test, for both 3- and 6-months follow-up.

To test for non-inferiority, the mean of the absolute improvement on work functioning (using the NWFQ total score) of positively screened participants was calculated for both groups, defined as the improvement between baseline and follow-up. The difference between the means of both groups was tested with an unpaired samples t test (two-sided). If the confidence interval around this difference did not exceed our non-inferiority margin that was the minimal important change value for absolute improvements of $\Delta = -10$ points, meaning that an advantage of the OP-care group over the EMH-care group was not larger than 10 points, we regarded the EMH-care group to be non-inferior to the OP-care group.

The significance level was set at $\alpha = 0.05$. All analyses were carried out using the statistical package IBM SPSS Statistics 19.

RESULTS

Participant flow and compliance
The flow of participants and their compliance to the intervention are shown in Figure 1. From March 15th until April 26th, 422 employees were enrolled in the study. A total of 369 participants (32%) were eligible for participation in the study, 178 in the EMH-care group and 191 in the OP-care group. Of the participants in the EMH-care group, 80 were lost to follow-up, compared to 49 in the OP-care group. The reasons for withdrawal from the
57 wards
1,170 individuals

29 wards in EMH-care intervention group
579 individuals approached for participation in EMH-care group

28 wards in OP-care intervention group
591 individuals approached for participation in OP-care group

212 started baseline questionnaire including screening

210 started baseline questionnaire including screening

29 did not complete baseline questionnaire
5 sicklisted > 2 weeks

16 did not complete baseline questionnaire
3 sicklisted > 2 weeks

178 completed baseline questionnaire

191 completed baseline questionnaire

139 screened positive for impaired work functioning and/or impaired mental health

39 screened negative for impaired work functioning and/or impaired mental health

151 screened positive for impaired work functioning and/or impaired mental health

40 screened negative for impaired work functioning and/or impaired mental health
Effectiveness of a mental health module for WHS, comparing two approaches

**Figure 1** Flow of participants through the trial.

- **E-mental health intervention:**
  - 28 logged into an intervention
  - 80 were lost to follow-up
  - 98 were analysed as the total sample, of which 75 were analysed as the positively screened sample

- **Preventive consultation:**
  - 51 visited OP
  - 74 cancelled/no-show
  - 26 no appointment made due to system error
  - 49 were lost to follow-up
  - 142 were analysed as the total sample, of which 108 were analysed as the positively screened sample
  - 16 did not complete baseline questionnaire
  - 3 sicklisted > 2 weeks
  - 80 were lost to follow-up
  - 40 screened negative for impaired work functioning and/or impaired mental health
  - 39 screened negative for impaired work functioning and/or impaired mental health
  - 139 screened positive for impaired work functioning and/or impaired mental health
  - 151 screened positive for impaired work functioning and/or impaired mental health
study were not assessed. Fifty-six of the participants in the EMH-care group had completed all three online questionnaires after six months, versus 99 participants in the OP-care group. Analyses for the primary and secondary outcomes were performed on participants who screened positive (EMH N = 75; OP N = 108) and on all participants (EMH N = 98; OP N = 142).

**Study population at baseline**

The baseline characteristics of the study population are shown in Table 1. The participants in both groups were fairly similar. Only age differed somewhat, participants in the EMH-care being younger than those in the OP-care group. Most of the participants were nurses, most were female and most had a permanent position in the hospital. In both groups, almost 80% screened positive on impaired work functioning and/or impaired mental health at baseline.

**Dropout analysis**

Differences between non-dropouts and dropouts in impaired work functioning over time were explored in graphs. These graphs showed that in the EMH-care group, dropouts had a worse score on impaired work functioning than non-dropouts at baseline and 3-months follow-up. A Mann-Whitney U test identified these differences to be significant in the EMH-care group (baseline p = 0.01; 3-months follow-up p = 0.04) and in the total group (baseline p = 0.01; 3-months follow-up p = 0.03). In a subsequent multiple logistic regression analysis, mental health complaints (yes/no) and age did not significantly predict dropout in the entire group (p = 0.06 and p = 0.07, respectively). Therefore, they were not included as covariates in the effect analyses.

**Intervention effects**

In Table 2, the results of the LMM analyses are shown. The random effect of ward was not statistically significant in any of the analyses, and therefore, ward as the cluster level was excluded from the model in the analyses.

**Impaired work functioning (primary outcome)**

Both the EMH-care group and the OP-care group improved over time regarding impaired work functioning, with the largest improvement between baseline and 3-months follow-up. In the LMM analysis in the positively screened sample, no significant difference in impaired work functioning between the EMH-care group and the OP-care group was identified (main effect of group p = 0.12; interaction effect group x time p = 0.45). In the total sample (thus including participants who did not screen positive on impaired work functioning and/or impaired mental health at baseline), no statistically significant difference between the two groups was found either (main effect of group p = 0.33; interaction effect group x time p = 0.13) (data not shown in table).
Table 1  Baseline characteristics of participants in the EMH-care group and the OP-care group.

<table>
<thead>
<tr>
<th>Variable</th>
<th>TOTAL SAMPLE</th>
<th>POSITIVELY SCREENED SAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EMH-care (N = 178)</td>
<td>OP-care (N = 191)</td>
</tr>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>147 (83)</td>
<td>156 (82)</td>
</tr>
<tr>
<td>Age in years [mean (SD)]</td>
<td>37 (12)</td>
<td>43 (11)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurse</td>
<td>129 (73)</td>
<td>116 (61)</td>
</tr>
<tr>
<td>Nurse practitioner</td>
<td>11 (6)</td>
<td>12 (6)</td>
</tr>
<tr>
<td>Surgical nurse</td>
<td>0 (0)</td>
<td>12 (6)</td>
</tr>
<tr>
<td>Anaesthetic nurse</td>
<td>0 (0)</td>
<td>12 (6)</td>
</tr>
<tr>
<td>Allied health professional</td>
<td>38 (21)</td>
<td>39 (20)</td>
</tr>
<tr>
<td>Nursing specialization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>74 (57)</td>
<td>77 (66)</td>
</tr>
<tr>
<td>Years of experience [mean (SD)]</td>
<td>10 (10)</td>
<td>12 (11)</td>
</tr>
<tr>
<td>Working hours per week according to contract [mean (SD)]</td>
<td>31 (5)</td>
<td>29 (8)</td>
</tr>
<tr>
<td>Type of contract</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent position</td>
<td>160 (91)</td>
<td>172 (92)</td>
</tr>
<tr>
<td>Fixed-term contract</td>
<td>13 (7)</td>
<td>9 (5)</td>
</tr>
<tr>
<td>Temporary employment</td>
<td>0 (0)</td>
<td>6 (3)</td>
</tr>
<tr>
<td>Other</td>
<td>3 (2)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Impaired work functioning* (above cut-off)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work functioning impairments</td>
<td>107 (60)</td>
<td>115 (60)</td>
</tr>
<tr>
<td>Impaired mental health (above cut-off)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impaired mental health (above cut-off of one or more of the six mental health aspects)</td>
<td>109 (61)</td>
<td>112 (59)</td>
</tr>
<tr>
<td>Distress</td>
<td>41 (23)</td>
<td>50 (26)</td>
</tr>
<tr>
<td>Work-related fatigue</td>
<td>61 (34)</td>
<td>52 (27)</td>
</tr>
<tr>
<td>Posttraumatic stress</td>
<td>24 (14)</td>
<td>21 (11)</td>
</tr>
<tr>
<td>Screened positive on impaired work functioning and/or impaired mental health</td>
<td>139 (78)</td>
<td>151 (79)</td>
</tr>
</tbody>
</table>

* Impaired work functioning is presented here including the subscale impaired decision making, as it was included in the baseline screening.
Table 2 Descriptives of the positively screened sample on primary and secondary outcomes at baseline and 3- and 6-months follow-up, with p values of LMM analyses.

<table>
<thead>
<tr>
<th></th>
<th>E-mental health care (n = 75)</th>
<th>Occupational physician care (n = 108)</th>
<th>p value (LMM analyses)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Relative frequency above cut-off (%)</td>
<td>Median (range)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td><strong>Primary outcome</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impaired work functioning (NWFQ 0-100)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>91/139 (66)</td>
<td>14 (0-56)</td>
<td>88/151 (58)</td>
</tr>
<tr>
<td>3 mn</td>
<td>33/62 (53)</td>
<td>10 (0-39)</td>
<td>38/100 (38)</td>
</tr>
<tr>
<td>6 mn</td>
<td>19/52 (37)</td>
<td>8 (0-41)</td>
<td>34/86 (40)</td>
</tr>
<tr>
<td><strong>Secondary outcomes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distress (4DSQ, 0-32)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>41/139 (30)</td>
<td>7 (0-32)</td>
<td>50/151 (33)</td>
</tr>
<tr>
<td>3 mn</td>
<td>9/61 (15)</td>
<td>4 (0-29)</td>
<td>17/99 (17)</td>
</tr>
<tr>
<td>6 mn</td>
<td>10/52 (19)</td>
<td>5 (0-29)</td>
<td>14/86 (16)</td>
</tr>
<tr>
<td>Work-related fatigue (QEEW, 0-100)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>61/139 (44)</td>
<td>44 (28)</td>
<td>52/151 (34)</td>
</tr>
<tr>
<td>3 mn</td>
<td>22/61 (36)</td>
<td>36 (31)</td>
<td>30/98 (31)</td>
</tr>
<tr>
<td>6 mn</td>
<td>14/52 (27)</td>
<td>34 (30)</td>
<td>28/85 (33)</td>
</tr>
<tr>
<td>Posttraumatic stress (IES, 0-75)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>24/139 (17)</td>
<td>3 (0-71)</td>
<td>21/151 (14)</td>
</tr>
<tr>
<td>3 mn</td>
<td>10/61 (16)</td>
<td>1 (0-48)</td>
<td>7/97 (7)</td>
</tr>
<tr>
<td>6 mn</td>
<td>5/51 (10)</td>
<td>0 (0-31)</td>
<td>7/85 (8)</td>
</tr>
<tr>
<td>Work ability (WAI, 0-10)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>7 (1)</td>
<td>8 (1)</td>
<td></td>
</tr>
<tr>
<td>3 mn</td>
<td>8 (1)</td>
<td>8 (1)</td>
<td></td>
</tr>
<tr>
<td>6 mn</td>
<td>8 (2)</td>
<td>8 (2)</td>
<td></td>
</tr>
</tbody>
</table>

* NWFQ total scores are calculated without the subscale impaired decision making.

b, baseline; 3 mn, follow-up after 3 months; 6 mn, follow-up after 6 months.
The mean absolute change score on impaired work functioning between baseline and 3-months follow-up was an improvement of 1.87 for the EMH-care group and an improvement of 3.82 for the OP-care group, identifying a disadvantage of the EMH-care group of -1.95 (95% CI -4.18 to 0.28, p = 0.09). Between baseline and 6-months follow-up, the EMH-care group had improved with 1.54 and the OP-care group with 2.94, a disadvantage of the EMH-care group of -1.40 (95% CI -4.20 to 1.39, p = 0.32). For each follow-up, the lower limit of the confidence interval does not exceed -10, indicating non-inferiority of the EMH-care group.

In Figure 2, the percentages of participants whose work functioning had improved relevantly after three and six months compared to their baseline score are presented. In the positively screened sample, the work functioning of 46% of the participants in the OP-care group had improved relevantly after three months. Thirty per cent of participants in the EMH-care group had improved relevantly after three months. The difference between the groups was not statistically significant (p = 0.07). After six months, 41% of participants in the OP-care group and 36% of participants in the EMH-care group had improved relevantly regarding work functioning compared to baseline (p = 0.59).

**Figure 2** Percentage of participants in the positively screened sample who had improved with at least the minimal important change on their work functioning, at 3- and 6-months follow-up.
In the total sample (data not shown in figure), the difference after three months was slightly smaller (OP-care group 42%; EMH-care group 30%; p = 0.11). After six months, in both groups, 40% of the participants had improved relevantly compared to baseline (p = 1.00).

**Secondary outcomes**

As shown in Table 2, no significant differences were found between the EMH-care group and the OP-care group on distress, work-related fatigue, posttraumatic stress and work ability in the positively screened sample (0.06 ≤ p ≤ 0.99). The patterns in both groups were very similar. Regarding distress, work-related fatigue and posttraumatic stress, both groups improved over time. In all cases, the largest improvement was between baseline and 3-months follow-up. Between 3- and 6-months follow-up, a smaller improvement was detected and in some cases even a slight deterioration. Regarding work ability, the OP-care group scored slightly better than the EMH-care group at baseline but did not improve over time, while at 3-months follow-up, the EMH-care group had improved to the level of the OP-care group and also did not improve any further.

When examining the entire sample of participants, the LMM analyses showed results similar to those in the positively screened sample, as again no significant differences between the groups were identified (0.28 ≤ p ≤ 0.86) (data not shown in table).

**DISCUSSION**

One-third of the invited employees participated in the study at baseline. Almost 80% screened positive for impaired work functioning and/or impaired mental health. Both groups improved over time regarding impaired work functioning, and a considerable percentage of participants in both groups improved relevantly regarding work functioning. Regarding distress, work-related fatigue and posttraumatic stress, both groups also improved over time. No statistically significant differences were found between the effects of the EMH approach and the OP approach for a mental module for WHS on impaired work functioning, distress, work-related fatigue and posttraumatic stress and work ability. Differences between the two approaches did not exceed the pre-defined criterion of >10 points on work functioning, indicating non-inferiority of the EMH approach compared to the OP approach. However, the OP-care group trended towards better performance.

In our study, we endeavoured to improve work functioning of nurses and allied health professionals through screening on impaired work functioning and impaired mental health, followed by personalised feedback and a tailored intervention. We consider this to be an important approach, as ultimately the goal of occupational healthcare is to keep employees functioning well, as healthy as possible.
The response rate at baseline in this study is similar to other studies in which employees were screened on mental health complaints or on general health risks. We do not have data on reasons for non-responding, but some of the reasons for not participating in this study that we heard from supervisors and eligible participants were as follows: feeling overloaded with research, because the employees of the academic hospital are asked to take part in many other research projects; fear of privacy violation, although anonymity of their enrolment was stressed; and the extensive questionnaire that took at least 30 min. to fill out.

Our hypothesis stated that an EMH approach would be non-inferior to an OP approach in its effect on work functioning and several mental health outcomes. We did indeed find no significant differences in their effects on impaired work functioning, distress, work-related fatigue, posttraumatic stress and work ability over time between the EMH-care group and the OP-care group, and further analysis suggested non-inferiority. Since the OP approach was successful in improving work functioning compared to a control group, these findings are promising for the EMH approach.

When looking closer at trends regarding impaired work functioning, the following can be detected. Both groups improved over time on impaired work functioning, and we found no significant difference between the groups. In the OP-care group, a larger percentage of participants improved relevantly regarding work functioning than in the EMH-care group (non-significant). Thus, the OP-care group trended towards a better performance than the EMH-care group regarding the improvement of work functioning.

Both approaches for a mental module for WHS consisted of two parts: 1) online screening on impaired work functioning and mental health, followed by personalised feedback; and 2) either a preventive consultation with an OP or a tailored choice of self-help e-mental health interventions. All positively screened participants received part one of the intervention, but not everyone complied to part two of the intervention. Compliance to the offered e-mental health interventions was low, as only nine positively screened participants in the EMH-care group started an e-mental health intervention at least to some extent. The number of elements followed by those who did start on an e-mental health intervention varied, but no one completed all elements. Compliance in the OP-care group was considerably higher (34%), offering a possible explanation for its better performance. In most of the consultations, all steps of the protocol were followed. In 61% of consultations, an advice was given to the employee, and ten employees were referred to other healthcare providers. Since results on work functioning and work-related mental health were promising in both groups, screening plus personalised feedback without further interventions might already bring about a positive effect.
The process evaluation also gave us some insight into the possible reasons for non-use of the second, approach-specific part of the intervention. In the OP-care group, the most mentioned reason for not going to the preventive consultation was that they did not find it necessary. Most of those who did go found the advice that was given by the OP useful, and nine out of 15 participants indicated that following the OPs advice helped improve their mental health and/or work functioning. Very few participants in the EMH group graded the EMH intervention they followed, and the grades they gave varied greatly. These few participants further indicated that following the EMH intervention(s) did not help to improve their mental health or work functioning.

Unfortunately, participants in the EMH-care group, when asked, offered no explanation why they did not follow an e-mental health intervention. Self-help EMH interventions often have low compliance rates. However, we think that several reasons could underlie the low compliance to these interventions. First of all, our study regarded a preventive setting, and the perceived need of the participants may have been insufficient to motivate them to log into and follow an e-mental health intervention. Other studies have shown that being identified as having mental health complaints does not automatically mean that you experience a problem yourself or that you perceive a need of mental healthcare.

Secondly, some of the participants reported problems with logging into the interventions, due to technical problems and/or inadequate computer skills, which might have posed a problem for more participants. Lastly, e-mental health interventions may be too impersonal for nurses and allied health professionals, since they have chosen a people-oriented and face-to-face occupation themselves.

To gain more insight into whether screening and feedback only was effective in its own regard, we performed a post hoc analysis by calculating an effect size (Cohen’s $d$) for the screening and feedback only group and the group who followed up on the additional intervention. This was only possible for the OP-care group, since so few people (partly) followed an EMH intervention. We found that when looking at the first follow-up after three months, going to the preventive consultation resulted in a larger effect ($d = 0.50$, medium sized effect) than screening and feedback alone ($d = 0.34$, small effect). When examining the second follow-up after six months, the effect sizes of screening and feedback alone, and additionally going to a preventive consultation were similar ($d = 0.35$ and $d = 0.24$, respectively, small effects). Possibly, the effect of one preventive consultation is short-lived and needs to be enhanced by offering more advice or follow-up. However, it should be kept in mind that the group of participants who came to the preventive consultation is based on self-selection. They might differ from the screening and feedback only group in some way, complicating the comparison between these two groups.
An important strength of this study was the cluster-randomisation design that was carried out at ward level. This made it possible to prevent contamination between the study groups as much as possible. Furthermore, a pre-randomisation procedure with incomplete-double-consent principle was applied, meaning that individuals were only informed about their own group. This further minimized the possibility of contamination.

Another asset of our study was our relevant choice of margin to determine non-inferiority. The smallest value that would be a clinically important effect is often chosen as margin. We applied the minimal important change (MIC) for absolute improvement on work functioning which was recently determined for the instrument that we used, the Nurses Work Functioning Questionnaire. We used the MIC for a high baseline group in our sample who screened positive on impaired work functioning and/or impaired mental health.

One limitation of our study was that we did not meet our required sample size for sufficient power, which was set at 189 participants in each group who completed participation. This increases the chance of finding non-significant p values despite trends for differences.

Secondly, we did not perform per-protocol analyses that are more robust in case of testing for non-inferiority, because the sample size of participants who complied to the complete offered intervention was too low. We can, therefore, not clearly distinguish between the unspecific effect of screening and feedback and the specific effect that is attributable to either the OP approach or the EMH approach.

A third limitation was the fairly high dropout rate of participants, especially in the EMH-care group. This loss to follow-up was selective, as dropouts in the EMH-care group had higher scores on impaired work functioning at baseline and 3-months follow-up than the participants who did not drop out of the trial. This may have introduced bias, although in which direction is unclear.

As impaired work functioning and impaired mental health were highly prevalent in the population that was studied, it seems wise to focus on preventive actions. The WHS mental module was well received by the nurses and allied health professionals who did participate in the study. Insight is needed into which type of employees take part in WHS and comply to the offered interventions, and who do not.

Possibly the strategy of online screening, online personalised feedback and a subsequent intervention did not appeal to the employees who did not participate and the participants who dropped out of the study. However, the extensive questionnaires due to it being a research project might have played a part in this. Additionally, the e-mental health
interventions were started and partly followed by very few participants. A strategy for a mental module for workers’ health surveillance should be sought that fits with the target population’s preferences. To improve compliance to the e-mental health interventions, it could be useful to apply elements of persuasive design, i.e., to increase motivation and ability to follow an e-mental health intervention and to incorporate triggers to encourage participation and compliance. Furthermore, it might be effective to combine e-mental health interventions with face-to-face contact with a healthcare provider (blended care), as in the OP-care group, a larger percentage of participants complied to the intervention and improved on work functioning.
REFERENCES


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APPENDIX 1

Algorithm for determining the specific choice of e-mental health interventions.

a. Decision rules

• If the participant screens positive on anxiety, he or she is screened on panic disorder.
• If the participant screens positive on suicide risk, the participant is advised to seek contact with their general physician. They can also indicate that they prefer to receive an invitation for an appointment with their occupational physician. A link to the national online suicide prevention platform (113 Online) is provided, where they can seek help anonymously. No advice on how to improve their work functioning (if applicable) is given and no e-mental health interventions are offered, as we regard it most important to seek help for the suicidal thoughts.
• The offered choice of e-mental health interventions is as specific as possible for the (combination of) mental health complaint(s).
• Freedom of choice of the participant is an important aspect. Therefore, if possible, different options are given so that the participant can choose. When necessary, a priority is given by means of recommended or optional.
• As we do not dispose of a specific e-mental health intervention directed towards anxiety (other than panic), if the participant screens positive on only anxiety and no panic the advice is given to seek contact with the occupational physician if the complaints persist.
• The e-mental health intervention Strong at Work is not offered as an option if the mental health complaints are not related to work.
• If the participant screens positive on distress and/or work-related fatigue and ‘more severe’ mental health problems, the offered choice is only directed towards the ‘more severe’ mental health problems.
• If the participant screens positive on two or more mental health complaints (more severe than distress and/or work-related fatigue), the e-mental health intervention Psyfit is no longer given as an option because we prefer someone to follow a ‘stronger’ intervention.
• If the participant screens positive on two or more mental health complaints (more severe than distress and/or work-related fatigue) for which we can offer a specific e-mental health intervention (i.e. depression, panic and risky drinking behaviour), the advice is given to prioritise according to their own suffering (i.e. what do they feel they suffer from the most?).
• If the participant screens positive on three or more mental health complaints (more severe than distress and/or work-related fatigue), the advice is given to also seek contact with the occupational physician.
b. Schematic representation of the algorithm

**Questionnaire → screening:**
* problems in work functioning (WF)
* mental health problems (MH)
* work relatedness of mental health complaints (WR): participant has WF problems and/or his or her MH problems are caused by work

**Intervention**

1. Suicide risk? YES → Advice GP/OP + link to national online suicide prevention platform
2. WF? YES → Advice on how to improve work functioning
3. MH? NO → E-mental health intervention: Psyfit
4. Check specific (combination of) complaint(s)
5. WR? YES → Tailored offer of intervention(s)

NO →
1. Suicide risk? NO →
2. WF? YES → Advice on how to improve work functioning
3. MH? NO →
4. Check specific (combination of) complaint(s)
5. WR? YES → Tailored offer of intervention(s)

NO →
1. Suicide risk? NO →
2. WF? YES → Advice on how to improve work functioning
3. MH? NO →
4. Check specific (combination of) complaint(s)
5. WR? YES → Tailored offer of intervention(s)

NO →
1. Suicide risk? NO →
2. WF? YES → Advice on how to improve work functioning
3. MH? NO →
4. Check specific (combination of) complaint(s)
5. WR? YES → Tailored offer of intervention(s)

NO →
1. Suicide risk? NO →
2. WF? YES → Advice on how to improve work functioning
3. MH? NO →
4. Check specific (combination of) complaint(s)
5. WR? YES → Tailored offer of intervention(s)
c. Example of specific algorithm for participants who screen positive for depression

Choose 1 based on preference:
- Colour your life (recommended)
- Strong at Work (optional)
- Psyfit (optional)

Choose 1 based on preference:
- Colour your life (recommended)
- Psyfit (optional)