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The effect of an online individualized program to prevent nurse burnout
– a mixed method study

ABSTRACT

Purpose

Preventing burnout and promoting psychological well-being in nurses is of great importance. In this study the effect of an online, stand-alone individualized preventive program for nurse burnout based on cognitive behavioral therapy is described and explained.

Methodology

A mixed method study with an explanatory sequential design was applied. Quantitative data were collected from September 2015 to March 2016 during an intervention study with a pretest-posttest wait-list control group design within a population of hospital nurses in the Dutch speaking part of Belgium. Consecutively, 13 nurses from the intervention group who fully completed the program were interviewed.

Findings

All interviewed participants experienced some sort of effect due to working with the program. Emotional exhaustion remained stable in the intervention group and increased in the control group. However, this difference was not significant. Personal accomplishment decreased significantly within the intervention group when compared to the control group. This might be explained by the self-awareness that was created through the program, which confronted participants with their weaknesses and problems.

Originality

This study adds to the understanding of online individual burnout prevention. The results suggest the feasibility of an online program to prevent nurse burnout. This could be optimized by complementing it with organizational interventions, introducing refresher courses, reminders and follow-up. Furthermore, additional attention should be devoted to preparing the implementation in order to minimize attrition rates.

KEYWORDS

Burnout, nurse, prevention, intervention, online, individual, cognitive behavioral therapy, mixed method

CLASSIFICATION

Type : Empirical research paper

Category: Research paper

INTRODUCTION

Nursing could be regarded as highly demanding work, both emotionally and physically (Bolier *et al.*, 2014). **Weak retention rates, high turnover, heavy workloads, low staffing levels and/or staffing shortages conspire to create a difficult working environment, one in which nurses may struggle to provide high-quality care (Humphries *et al.*, 2014).** Accordingly, the Fifth European Working Conditions Survey situated the healthcare sector in the category of 'mental health at risk' at an intermediate level compared to other sectors (Eurofound, 2012). Aiken *et al.* (2012) have confirmed this risk status in a large study across Europe and the USA by reporting that 10-78% of nurses regard themselves as being burned out. In Belgium, the situation is comparable with 7 - 12% of nurses having a high risk of developing burnout and an additional 2-7% scoring above the diagnostic cut-off for burnout (Geuens *et al.*, 2017, Vandebroek *et al.*, 2012).

For both society and healthcare organizations, keeping the healthcare workforce mentally fit is of crucial importance. As the population is ageing at a rapid pace, the need for healthcare workers is growing (Bolier *et al.*, 2014). However, in the Netherlands for instance, only 27% of nurses predict they will be able to work until they reach retirement age, because of high work pressure and low work engagement (Bolier *et al.*, 2014, Maurits *et al.*, 2012). This raises serious questions concerning the long term sustainability of healthcare (Bolier *et al.*, 2014, Lokkerbol and Smit, 2013). Furthermore, patient satisfaction, quality of care, adverse events and patient safety are negatively affected by nurse burnout, which includes symptoms of emotional exhaustion, depersonalization, and reduced personal accomplishment (Gravlin, 1994, Leiter *et al.*, 1998, Laschinger *et al.*, 2006, Vahey *et al.*, 2004, Van Bogaert *et al.*, 2010). The economic effect of nurse

burnout can be inferred from data on patient satisfaction, absenteeism and turnover (Jacobson *et al.*, 1996, Raiger, 2005). Stress related complaints triple the absenteeism rates and cause a substantial increase in costs for the employer (Securex, 2014).

As a consequence, preventing and reducing work related stress and burnout and promoting psychological well-being in nurses is of great importance not only with regard to the quality of life of those affected, the quality and continuity of care, but also in order to prevent the financial losses (Awa *et al.*, 2010).

Multiple authors plead for the development of preventive interventions for burnout (Awa *et al.*, 2010, Oginska-Bulik, 2006). After all, this psychological condition develops gradually but may remain unnoticed for a long time by the individual involved (Ruotsalainen *et al.*, 2015). However, once an individual becomes physically and/or psychologically unwell, it can take a long time to recover (Wright, 2014). Therefore, it is important to use this long build up to prevent burnout from developing.

Prevention programs for burnout can either be person-directed (aimed at enhancing job competence, personal coping skills, social support or relaxation of individuals or groups), organization-directed (aimed at reducing job demands, increasing job control and participation in decision making) or a combination of both (Awa *et al.*, 2010). Awa *et al.* (2010) described in their review that burnout programs are beneficial. Person-directed programs reduced burnout in the short term (6 months or less), while a combination of both person and organization-directed programs had longer lasting positive effects (12 months and over).

Yet, Mimura and Griffiths (2003) indicated that although complex interactions in multifaceted interventions may be a necessary component, unless the interaction

is clarified further it would seem that small scale research is more likely to contribute to knowledge if it examines single component interventions or programs where the interaction of components is clearly planned and described. Therefore, this study focused on an individual prevention program for burnout in nurses.

After all, the work environment will not influence all nurses in the same way due to the role of the individual appraisal of stressors (Wright, 2014). Recent studies have shown the influence of appraisal on burnout through core-self evaluations: a combination of 1) self-esteem, 2) generalized self-efficacy, 3) neuroticism, and 4) locus of control (Bono and Judge, 2003). These core-self evaluations (CSE) are fundamental, bottom-line evaluations that individuals hold about themselves, the world, and others. As such, CSE influence people's appraisal of themselves, the world and others, on a subconscious level. Thus, condition specific appraisals – such as the evaluation of one's work or colleague's – are affected by these deeper and more fundamental self-appraisals, even though most people are not aware of the influence their CSE have on their perceptions or behavior as they occur (Bono and Judge, 2003, Judge *et al.*, 1997). Geuens *et al.* (2020) suggested that CSE belong at the initiation of the strain process or loss cycle, ultimately influencing feelings of burnout. In addition, extensive studies report the relationship between burnout and personal coping or the ability to deal with external stressors at a personal level (Ruotsalainen *et al.*, 2015, Cooper *et al.*, 2001, Schaufeli and Buunk, 2003).

It are these appraisals of and reaction to external stressors that are addressed by individual programs. Nurse resilience can be increased by building on the existing strengths and resources and supporting nurses in developing new internal models to react to future stressors (Fergus and Zimmerman, 2005).

Cognitive-behavioral therapy (CBT) can support this change as it provides new ways to feel, think and act under stressful conditions (Ruotsalainen *et al.*, 2015). In their Cochrane review, Ruotsalainen *et al.* (2015) found evidence that CBT programs in healthcare workers reduced burnout levels when compared to no intervention at six months and more. However, they state that this evidence was low-quality. Although further research is needed, CBT therapy might be promising for preventing burnout.

Application of CBT in individual or group therapy, however, is not easily accessible, expensive and has a restricted reach. Online programs using CBT show more potential because of their accessibility, lower threshold and affordability (Bolier *et al.*, 2014, Muñoz, 2010). Internet-delivered CBT is a novel development of CBT that has received increasing empirical support (Andersson, 2009, Carlbring *et al.*, 2011, Andersson and Cuijpers, 2009, Andersson *et al.*, 2014, Zetterqvist *et al.*, 2003). Nurses can use self-help interventions at their convenience, at their own pace and in the privacy of their own homes (Bolier *et al.*, 2014). Furthermore, online interventions on other topics have been proven to be effective within a nursing population in terms of participation, consistency, transfer and retention of information, time use, and accessibility (Franck and Langenkamp, 2000, Jeffries, 2001, Masys, 2002, McDaniel *et al.*, 1997, Wolford and Hughes, 2001).

In light of these findings, we have chosen to develop an online, stand-alone individualized preventive program for nurse burnout based on CBT.

METHODOLOGY

AIM

We describe and explain the effect of an individualized online program to prevent nurse burnout.

THE INTERVENTION

The intervention consisted of a stand-alone individualized online program based on CBT intervention techniques.

During the rigorous design of the program various determinants of technology acceptance were continuously evaluated. These determinants included technology readiness, perceived usefulness and perceived ease of use (Al-Fraihat *et al.*, 2020).

The content and design of the first prototype was based on: 1) quantitative research on vulnerability factors for burnout in the nursing population (Geuens *et al.*, 2015, Geuens *et al.*, 2017, Geuens *et al.*, 2020); 2) qualitative interviews with nurses regarding burnout (Geuens *et al.*, 2019); 3) several panel meetings with experts in the fields of nursing management and HR, a design expert, registered psychologists and behavioral therapists with at least five years therapeutic experience; and 4) literature research on (online) burnout prevention and individual vulnerability factors.

This first prototype was tested within a sample of 15 hospital nurses divided into three stages. The first group of 5 nurses were given several assignments while being observed. Afterwards they were verbally questioned on the ease of use, usefulness and intention to use the program. Adjustments were made and a second group of 5 nurses repeated this process. Again adjustments were made. Finally, 5 nurses used the modified prototype for a week. In a focus group their technology readiness, experiences and suggestions to increase ease of use and

usefulness were discussed. After further modifications, the first version of the program was tested in a pilot study with 170 hospital nurses. Using a written questionnaire the nurses evaluated the impact on their behavior, the perceived usefulness, the ease of use, and the quality of the program. They were invited to formulate additional concerns or suggestions in an open ended question. Based on these results, final adjustments were made to the program. This iterative process resulted in the design of the final web based program. It consisted of a risk assessment of the stress level (Figure I), information on the development of burnout (Figure II) and a questionnaire concerning individual factors which was used to select the three most relevant modules out of a possible 10 for each participant (Figure III). The 10 module topics which were identified throughout the development of the intervention were: 'rumination', 'perfectionism', 'sleep', 'setting boundaries', 'managing conflicts', 'togetherness', 'dealing with emotionally difficult situations', 'exercise and relaxation', 'being positive and happy', and 'strengthening your self-image'. Each module consisted of an educational part (text, audio recordings of nurses, illustrations, tutorials, animations) and exercises to put theory into practice. A personal dashboard depicted their progression in the program.

Preceding the start of the program a kick-off workshop was provided to motivate and introduce them to the program.

Figure I: Screenshot of the results of the stress level risk assessment

Figure II: Screenshot of the information on the development of burnout

Figure III: Screenshot of the module Perfectionism

DESIGN AND DATA COLLECTION

This mixed method study was based on an explanatory sequential study design (Ivankova *et al.*, 2006). The study started in a first phase with a quantitative approach to measure the effect of the intervention on burnout. To explain and deepen the quantitative findings, the second qualitative phase gained insight into the subjectively experienced effect of the intervention. Finally, in a third phase the results of the quantitative and qualitative phases were integrated to further explain and interpret the findings (Ivankova *et al.*, 2006).

QUANTITATIVE DATA COLLECTION

The first quantitative phase was an intervention study with a pretest-posttest wait-list control group design with randomization at unit level. The intervention group received the intervention and the wait-list control group was assigned to care-as-usual. Both the intervention and wait-list control groups were measured prior to

the intervention (T1), 1 month after the start of the intervention (T2), and again 4-months after the start of the intervention (T3).

Data collection was performed from September 2015 to March 2016 using a written questionnaire. This questionnaire consisted of a validated self-report instrument on burnout (Utrecht Burnout Scale) supplemented with questions regarding situational factors and several demographical questions.

The Utrecht Burnout Scale (UBOS) (Schaufeli and Van Dierendonck, 2000) is the Dutch version of the Maslach Burnout Inventory, which is based on 20 items of the MBI-Human Service Survey (Van Bogaert *et al.*, 2009), and measures the frequency of the main burnout symptoms on a seven-point scale ranging from 0 (never) to 6 (always). Mean item scores were calculated for each burnout dimension by summing up the individual item scores and rescaling this score on a scale ranging from 0 to 6. Cut-off values specified for nurses label high to very high levels of emotional exhaustion (mean score >2.12) and depersonalization (mean score >1.79 or >1.59 for men or women, respectively) and low to very low levels of personal accomplishment (mean score <3.57) (Schaufeli and Van Dierendonck, 2000). High scores on Exhaustion and Depersonalization and low scores on Personal accomplishment indicate burnout. In this study, Cronbach's alpha for the burnout dimension of emotional exhaustion totaled up to 0.86, 0.90, and 0.90; for depersonalization to 0.70, 0.73, and 0.75; and for personal accomplishment to 0.77, 0.81, and 0.84 at T1, T2, and T3 respectively.

For the description of participants' work situation at pretest, some key work-related (or situational) factors were measured through a translated and validated version of the Nursing Work Index Revised (NWI-R-vl). This instrument measures (i) the nurse-physician relationship; (ii) nurse management at the unit level; and (iii) hospital management and organizational support, using 31 items on a 4-point

Likert-type scale ranging from 1 (strongly disagree) to 4 (strongly agree) (Aiken and Patrician, 2000, Van Bogaert *et al.*, 2009). In the present study, Cronbach's alpha at T1 was 0.87, 0.82 at T2, and 0.84 at T3.

QUALITATIVE DATA COLLECTION

The qualitative study applied a descriptive research approach. Data collection was conducted through semi-structured interviews. Each interview began with an open ended and broad question about their experience with stress and burnout prevention at work. Consequently, nurses were invited to talk about their experience with the online program. Next, several questions were posed concerning the experienced effect of the intervention such as "What effect did the online program have on you?" During the interview the researchers posed probing questions in order to uncover the underlying reason for this effect or lack thereof described by the participants, such as "Why was this able to influence your behavior?", "What was missing for this to influence your behavior?" Additionally, the researchers focused on clarifying the experience by asking the participants to provide examples (Holloway and Wheeler, 2010). During the interview, the researchers carried out necessary revisions applying summarizing and repeating to recognize the participants' data.

The interviews were conducted between March and May 2016. The practical arrangements for the interviews were made via telephone. The location of the interview was chosen by the participant to make them feel comfortable; in a private place on the ward, in their home or at the office of the researcher. The interviews were audio recorded. No field notes were made. The interviews lasted

around 60 minutes, to allow sufficient time to identify the experienced effect and its underlying explanation and validate these data.

SAMPLING AND PARTICIPANTS

Quantitative sampling

Ruotsalainen *et al.* (2015) state in their review that studies with at least 120 participants are needed to evaluate the effect of burnout interventions. In addition, previous research concerning burnout interventions were able to describe significant changes for populations varying between 50 to 250 participants (Bergström *et al.*, 2010, Kravits *et al.*, 2010, Leung *et al.*, 2011). To be able to detect smaller changes due to the short follow-up period of 4 months, a sample size of 150 nurses for the intervention group and 150 nurses in the control group was aspired. As a response rate of 50% was expected due the intensity of the study, the researchers predetermined to distribute the pretest questionnaire to 300 nurses in each group.

The study sample was selected at random from 2 large general hospital groups with 8 hospitals in total in the Dutch speaking part of Belgium. All nursing units from the participating hospitals were listed. Using dice a selection of units of each nursing specialty area was made for the intervention and the control group. A total of 32 units were asked to participate in the study. No nurse managers refused to participate.

Seventy-three of the intervention group participants were measured at T1, T2 and T3. In the control group full data at T1, T2 and T3 was obtained for 163 participants. An overview of the flow of participants throughout the quantitative phase is displayed in Figure IV.

Figure IV: Flow of participants throughout the quantitative phase

Table I provides a description of the participants who completed the questionnaires at T1, T2 and T3. Since a substantial number of participants from the intervention group never logged into the program, the effect was evaluated only on the group who did use the program. However, all results are reported. As such, three groups are depicted: the control group (C), the intervention group who actually used the program (I1), and the intervention group who did not use the program (I2). At pretest, significant differences between these group were found for the division between nurse specialty area ($p < 0.001$) and their scores on hospital management and organizational support ($p = 0.006$), with participants from the control group scoring more favorable (> 2.5 , suggesting agreement with the statements) than the two intervention groups.

Table I near here

Qualitative sampling

In the quantitative questionnaire at T3 the participants of the intervention group were given the opportunity to provide the researchers with their telephone number if they agreed to be contacted for an interview. Thirteen participants who fully completed the program and agreed to the interview were contacted. This purposive sample was chosen as participants who completed the entire program were in the best position to describe and explain the effect of this program. Additionally, participants who did not complete the program or never started were interviewed to explore possible barriers. However, the latter goes beyond the scope of the current manuscript.

The characteristics of the participants within the qualitative sample are described in Table II. The number of participants was congruent with the assumptions of qualitative research, and data sufficiency was reached after 8 interviews, when no new topics emerged (Cleary *et al.*, 2014). An additional 5 interviews were conducted to validate this status.

Table II near here

ETHICAL CONSIDERATIONS

Ethics committee approval was obtained from both participating hospital groups (141105ACADEM). Nursing staff of all 32 units were invited to participate voluntarily, confidentiality was fully guaranteed, and informed consent were obtained at the start.

STRATEGY OF ANALYSIS

Quantitative analysis

Statistical data analyses were conducted using SPSS version 26.0 (IBM, 2019). Non-parametric tests were applied for within and between group calculations. The Wilcoxon-rank test was used for calculation of 2-tailed p-values within groups. The Wilcoxon-Mann-Whitney U test was used for calculation of 2-tailed p-values between groups. Assumptions for both tests were met (Pett, 2015). $P < 0.05$ was considered significant.

Qualitative analysis

The interviews were transcribed verbatim. Two study investigators performed a descriptive thematic analysis with themes emerging from the data during the analysis. The software program NVIVO 12 was used during data analysis. For dependability focusing on the research objective, trying to explore the same areas for all the participants and self-reflection were important points of interest.

FINDINGS

QUANTITATIVE RESULTS

Overall trends per burnout dimension

The overall trend of the outcome parameters at T1, T2, and T3 within the three groups is displayed in Figure V.

Figure V: Overall trend of the burnout dimensions at T1, T2, and T3 for the intervention group who used the program (I1), the intervention group who did not use the program (I2) and the control group (C)

Comparison of burnout dimensions per group (I1, I2, C) at posttest 1 month and at posttest 4 months

Within group comparisons are portrayed in Table III. For the emotional exhaustion score from T1 to T3 a significant increase was found for the intervention group who did not use the program ($p=0.045$) and the control group ($p=0.001$), while the intervention group who used the program remained stable ($p=0.839$). The score for personal accomplishment decreased significantly in the intervention group who used the program ($p=0.036$), indicating a reduced feeling of personal accomplishment at T3. It also decreased in the intervention group who did not use the program, but not significantly ($p=0.684$), and increased not significantly in the

control group ($p=0.216$). Depersonalization showed no significant change from T1 to T3 within each of the three groups.

Table III near here

Comparison of burnout dimensions between groups (I1-C and I2-C) at posttest 1 month and at posttest 4 months

Between group comparisons are displayed in Table IV. The mean differences in emotional exhaustion scores from T1 to T3 proved not to be significant between the intervention group who used the program and the intervention group who did not use the program ($p=0.156$) nor between the intervention group who used the program and the control group ($p=0.340$). Only the scores for personal accomplishment differed significantly from T1 to T3 between the group who used the program and the control group ($p=0.015$). The mean differences in depersonalization scores were significant from T1 to T2 between the intervention group who used the program and the control group ($p=0.023$). From T1 to T3 this difference was no longer significant ($p=0.411$).

Table IV near here

QUALITATIVE RESULTS

All participants stated that they recognized (parts of) themselves in the content of the online program.

"I was really happy that people offered me this program. Because you are not consciously dealing with those things, but because of the program it is

pointed out that you should be more conscious. And I recognized a lot in there.” (Interviewee 1)

On one hand, the fact that participants recognized themselves in the content of the program, made them feel supported and reassured them that it was not ‘just them’. On the other hand it contributed to creating self-awareness. They stated that it made them stop and think about themselves and the way they think, feel and react in certain situations. It helped them to get to know themselves and clarify their own thoughts or heighten their attention again to pitfalls they already knew they had to be cautious for.

“I think it is good it made you stop and think about yourself: ‘what have you done to reduce or to increase this?’. Because you do it all on autopilot.” (Interviewee 2)

“I am glad that I used the program because I got to know myself. [...] I really discovered myself” (Interviewee 3)

Although they assessed this newfound self-awareness as a positive development, they also described this experience as confronting. They stated that the program forced them to face the weaknesses in their functioning and made them actively deal with their problems.

“I think it is good that you are forced to face the facts and that you see what you have to work on to reduce that stress for yourself.” (Interviewee 4)

This confrontation with themselves and self-awareness inspired them to take action. This varied from just applying a few aspects of the program to their work up to applying multiple aspects both at work and at home.

“Especially situations on which you usually don’t reflect. Certain situations such as ‘saying no’, or conflicts or other things about your self-esteem. You

normally just let them pass or you just do your thing while now you consciously think about how you are going to approach this. It has done that for me. That actually helped me.” (Interviewee 5)

Participants stated that the program provided them with practical tools or tips and tricks to deal with thoughts, problems or situations that they struggled with. As such, all participants experienced some sort of effect due to working with the program. This effect could be divided into several categories. First of all, various effects were related directly to the content of the individually recommended modules. Participants described – among other things – improvements in brooding, taking time for themselves and relaxing, dealing with conflicts, quality of sleep, setting boundaries, and perfectionism.

“Something I had to work on was saying ‘no’ without having to justify why and having the courage to say ‘no’. Because most of the time I felt guilty when I said ‘no’. I felt really, really guilty and I always apologized. And now I just think: ‘No. Not this time’.” (Interviewee 6)

Second of all, a broader effect of the program was identified as participants described that they were more capable of putting things into perspective, distancing themselves from certain situations, nuancing, accepting and letting go. For some this effect was more outspoken as they developed a more cynical attitude. Participants found strength in this attitude and indicated to be more relaxed, less agitated, and less bad tempered.

“Yesterday I had just arrived and a whole load was dumped on top of me. But I remembered and thought: ‘Okay this patient is getting bent out of shape and she’s taking it out on me. But where is this coming from?’ And then I was able to distance myself from the situation and the remarks she

gave. And that is something I really learned from the program.”
(Interviewee 7)

“I don’t think I bottle things up. I think I can handle them better. I’m more in a mindset now of: ‘I will just do my work, my thing, and I don’t care about the rest.’ I am not getting worked up about that anymore.” (Interviewee 8)

Third, the effect of the program on stress levels was perceived differently amongst the participants. Half of the participants indicated a positive effect on their stress levels. This effect was greatest when they were actively working with the program, but they noticed that it weakened over time.

“I did experience less stress when I was using the program. [...] Certainly because you were actively and consciously working on it. [...] Probably it fades a bit because you are not actively working on it, but it still lingers around somewhere.” (Interviewee 9)

On the other hand, multiple participants thought that the effect of the program would have been greater if they had more time to internalize what they had learned. Therefore, they described that room for improvement still remained.

Several participants stated that although the program made them more self-aware, it did not affect their stress level as it was no match for the stress they experienced due to situational factors. They identified stressors such as work and personal circumstances, manager support and teamwork. Especially high workload and persistent organizational changes were prominent.

“At the end of the study it was just too busy around here and I had to work too much and I didn’t have any spare time and I also go to school in the evening and my boyfriend lives far away. [...] It was completely unrelated

to the online program that I was just as stressed as before.” (Interviewee 10)

Because of the experienced influence of these situational factors, several participants claimed that the program was an efficient first step to reducing stress, but additional organizational changes and support might increase its effectiveness.

Besides these direct effects, working with the program had further implications for the individual as well as the team. On the individual level the increased self-awareness and successful changes, made them proud of themselves, triggered their curiosity, and stimulated them to continue discovering and developing themselves.

"In September a colleague and I are going to attend a workshop 'feeling good'. I want to try that. It seems like I have become more curious to discover myself. And that at 50 years of age!" (Interviewee 3)

Several participants indicated that the presence of the program was tangible on team level. It lowered the threshold to talk about sensitive subjects. Participants shared experiences, gave advice to each other, and recommended the program to others.

"It created space to speak about those things with more ease. Or to express your concerns to colleagues and stuff like that. So you could also hear a different opinion." (Interviewee 11)

INTEGRATION OF QUANTITATIVE AND QUALITATIVE FINDINGS

Participants described that the program created self-awareness or focused their attention again on pitfalls they already knew they had. This was experienced as confronting as it forced them to face their weaknesses and problems. Although the program offered practical tools to deal with these weaknesses and problems it also

triggered their curiosity for further self-discovery and development (*effect on feelings of personal accomplishment*).

All participants were effected to some degree from working with the program. Besides effects related directly to the content of the modules, being more capable of nuancing, accepting and letting go, were described as a more general effect. For some participants this coping mechanism tipped over into adopting a more cynical attitude (*effect on depersonalization*).

Due to this new attitude, participants described to be more relaxed, less agitated, and less bad tempered (*effect on emotional exhaustion*).

DISCUSSION AND CONCLUSION

This study aimed to describe and explain the effect of an individualized online program to prevent nurse burnout. The results might suggest a preventive effect of the online program on nurse burnout. The qualitative study indicated that all participants experienced some sort of effect due to working with the program.

Emotional exhaustion remained stable in the intervention group who used the program, but increased significantly in the intervention group who did not use the program and the control group. As such, this lack of increase in emotional exhaustion, over the course of the three time waves, in the intervention group who used the program, suggests a preventive character of the program. The qualitative study supported this finding as participants described a reduction in symptoms of emotional exhaustion. However, the differences were not statistically significant in the between-group comparison.

For depersonalization, only the score of the intervention group who used the program, increased statistically significant from T1 to T2. However on T3 this rise

was no longer significant. Qualitative results might explain this trend as participants described that they improved their capability to nuance, accept and let go or even adopted a cynical attitude. This coping mechanism shows overlap with the burnout dimension of depersonalization, which is described as a cold, cynical, distant and impersonal attitude towards the patients and co-workers (Schaufeli and Van Dierendonck, 2000).

Finally, the feeling of personal accomplishment decreased significantly from T1 to T3 within the intervention group who used the program, indicating that participants experienced more feelings of incompetence and lack of personal achievement in the job at T3. This also proved to be significantly different from the evolution in the control group. The qualitative study could explain this as participants stated that in the process of the program affecting their behavior, it also made them more aware and confronted them with their pitfalls, weaknesses and problems.

Interview participants reported varying effects on stress levels due to the strong influence of situational stressors. The similar trends of all three burnout dimensions for both intervention groups reflects this influence of situational stressors. After all, participants for these groups were recruited from the same nursing units, thus were exposed to similar situational stressors.

In addition, Table I indicates that the control group also differed significantly from the intervention groups at T1. The control group scored significantly more favorable on perception of hospital management and organizational support, a factor that was identified in the interviews and previous research as an important situational stressor (Van Bogaert *et al.*, 2013). Additionally, the intervention group who used the program consisted in a large part of nurses from ER-OR-ICU and medical-surgical units, while in the control group nurses from technical and psychiatric units were represented more. This difference occurred due to high

drop-out and self-selection within the intervention group. Previous research from Geuens *et al.* (2015) indicated that burnout risk is higher in ER-OR-ICU units (10%) and medical-surgical units (15%) and lower in technical (8%) and psychiatric units (3%). This might explain the initial differences between the groups at T1 for the various outcome parameters.

When comparing the findings of the study at hand to the literature on the effect of burnout prevention, we found that Awa *et al.* (2010) described varying results on 17 person-directed burnout interventions in their review. They summarized that in 14 of the studies, a reduction in burnout or some core component(s) was registered, in 2 studies there were no positive changes in burnout and an unexpected significant increase in burnout was registered in 1 person-directed intervention study. However, although the intervention content of the studies included in this review varied greatly, no comparable studies concerning a stand-alone online program were included (Awa *et al.*, 2010). The study of Bolier *et al.* (2014) used a more similar intervention yet considered a different outcome. They found that a preventive workers' health surveillance program consisting of online screening, personalized feedback and a personalized offer of online self-help interventions was capable of enhancing positive mental health, and in particular psychological well-being, at three and six month follow-up (Bolier *et al.*, 2014).

Although, Mimura and Griffiths (2003) indicated that small scale research is more likely to contribute to knowledge if it examines single component interventions, the results of our study indicate that the effect on stress and burnout might be optimized by matching organizational interventions to the individual online program. This is confirmed by Quitanilla-Madero (2020) who states that intervention plans should pay close attention tot the organizational context and the personal needs of the individual employee. As such, every organization can

develop its own intervention model according to its specific needs (Quintanilla-Madero, 2020, Wieneke *et al.*, 2019).

The fact that positive effects can be enhanced by refresher courses (Awa *et al.*, 2010) was also confirmed in the current qualitative study where participants stated that the perceived positive effect weakened over time.

STUDY LIMITATIONS

A substantial drop-out was observed in the intervention group with only 24% of participants completing the three questionnaires. This might have caused a selection bias in addition to causing a relatively small sample size of 73 nurses. Additionally, not all nurses in the intervention group used the program, which resulted in an even smaller sample size as the intervention group had to be subdivided into nurses who used the program (49) and nurses who were supposed to use the program, but chose not to (24). Various reasons for this attrition might be speculated upon. First of all, the nurse managers played a pivotal role. When they were perceived to be less motivated to participate, a higher drop-out was observed in addition to fewer nurses using the program. Romppanen & Häggman-Laitila (2017) described that the degree to which interventions affect well-being at work is linked to leadership competences and styles and the organization's maturity for changes. Additionally, Chen and Chen (2018) showed that support offered by supervisors and their competent leadership skills can help nurses cope with job stressors and burnout. Therefore, encouraging leaders' supportive attitudes can be an effective strategy in reduce nurse burnout. In future research extensive attention should be payed to preparing the nurse manager and creating substantial organizational support before implementing and evaluating any

intervention, even if they are aimed at the individual nurse. Building on the findings of Horan *et al.* (2018) efforts to increase support for stress management interventions should especially be aimed at supervisors with medium levels of support. These researchers found that a quadratic function with a U-shape best explained the variance in process variables for the relationship between supervisor support for stress management and intervention ratings. Nurses with medium supervisor support for stress management tended to perceive the intervention least favorably (Horan *et al.*, 2018).

Besides support of the nurse manager, some practical problems may have attributed to the attrition rates. During the interviews some participants mentioned obstacles for using the program such as finding it difficult to make time to work on the program or not having a computer or other electronic device (smartphone, tablet) at their disposal at work or at home. The availability of an electronic device at the work place had already been identified as an important condition during prototyping. Therefore, the researchers arranged with the nurse managers that nurses would be able to use the program on a computer in the nursing station. However, this proved insufficient as these computers were also being used for completing patient files and checking laboratory results. Thus, they were often occupied. This implied that a group of nurse, although very small, who did not dispose of a personal computer, smartphone or tablet, were unable to use the program. Donkin *et al.* (2011) have described similar factors. Further research is needed to identify other reasons for participants dropping out of the intervention group or not participating at all from the beginning.

In addition, the concise application of a technology acceptance model during the design process such as TAM or one of its versions (TAM2, TAM3 or UTAUT or UTAUT2) could have increased the acceptance and use of the program. Several

elements of this model, such as technology readiness, perceived usefulness and perceived ease of use, were integrated in the different stages of prototyping and the pilot study. However, applying the more thorough and validated TAM instruments and measurement scales could have undoubtedly improved the design of the program (Al-Fraihat *et al.*, 2020).

IMPLICATIONS FOR PRACTICE

When implementing this kind of interventions it might be important to provide ample time and pay extensive attention to preparing the nursing team as well as the nurse manager and create organizational support.

Furthermore, nurses should be supported to work with the online program and all logistical or practical obstacles that can be foreseen should be addressed.

Additionally, the effect of the individual online program might be optimized by complementing it with organizational interventions to reduce stress and burnout and increase resilience (Awa *et al.*, 2010). The complete intervention should be embedded in the organization and regular refresher courses, reminders and follow-up might attribute to anchoring it within the organization (Awa *et al.*, 2010). The qualitative results confirm that once self-awareness has been raised, individuals are stimulated to continue discovering and developing themselves. When no follow-up is provided by the organization, this might stunt the individual's personal growth and induce further frustration.

In conclusion, burnout prevention using an individualized CBT-based online program is feasible, though it should be complemented with organizational interventions, refresher courses, and follow-up to effectively prevent nurse burnout.

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