HHS Public Access

Author manuscript

J Affect Disord. Author manuscript; available in PMC 2018 August 12.

Published in final edited form as:

J Affect Disord. 2018 July ; 234: 67–73. doi:10.1016/j.jad.2018.02.090.

12-month trajectories of depressive symptoms among nurses—Contribution of personality, job characteristics, coping, and burnout

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Abstract

Background: Job related factors have been associated with higher risk for developing depression, but past studies lacked full consideration of individual factors such as personality and coping. We sought to evaluate associations of personality, coping, job characteristics, and burnout with 12-month trajectories of depressive symptoms among nursing workers.

Methods: Cohort of nursing workers (N = 281) in a private hospital system, with baseline assessments of personality, job characteristics, and coping. Burnout and depression were measured at baseline and during monthly follow-ups. Linear mixed modeling was used to examine contributions to between- and within-individual variation in monthly depressive symptoms.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.jad.2018.02.090.

Results: Personality trait of negative affectivity accounted for 36% of between-individual variation in depressive symptoms over 12 months, while job characteristics and coping explained an additional 5% and 8% of this variation, respectively. Exhaustion dimension of burnout was associated with between-individual variation in depressive symptoms (fixed effect β coefficient 2.44, $p < 0.001$), but not with within-individual variation in symptoms. Disengagement dimension of burnout was not associated with between-individual variation in depressive symptoms, but contributed to within-individual variation in depressive symptoms over time (fixed effect β coefficient 0.52, $p = 0.01$).

Limitations: Participants were nursing workers within a single hospital system. Participants who were excluded due to missing baseline data were more likely of non-white race, which may also limit the generalizability of our results. We used latent variables to represent certain job and coping characteristics, which may make our results less comparable with other studies examining the role of these factors in work-associated depression.

Conclusions: Future interventions to prevent depression in healthcare workers should consider multiple job and individual factors. Potential components include strategies to manage negative affectivity and reduce avoidant coping, such as cognitive reframing and mindfulness-based techniques, and organizational approaches to address burnout through augmentation of job resources.

1. Introduction

Depression is a major public health concern and expected to be the leading cause of global disability by 2030 (WHO | The global burden of disease, 2004). Depression is disruptive to the workplace, with increased risk for physical health problems, poor job performance, and increased attrition from the workforce (Bentley et al., 2014; McIntyre and O'Donovan, 2004). In 2010, U.S. costs associated with depression was estimated to be $210.5 billion (Greenberg et al., 2015). Job characteristics, including those often found in the healthcare sector, may contribute to increased risk for developing depression (Iacovides et al., 2003; Peterson et al., 2008; Bender and Farvolden, 2008; Yates et al., 2012; Rotenstein et al., 2016). Better understanding of factors that contribute to depression in the workplace could have important implications for public health and economic productivity.

Much of the previous research on workplace depression has focused on job stressors and associated psychosocial characteristics of the work environment. For example, high work demands combined with limited autonomy and support is thought to contribute to an overall experience of job strain (Demerouti et al., 2001; Bakker and Demerouti, 2014). Fewer studies, however, have simultaneously examined individual factors like personality and coping. Personality traits may play an important role in perceiving job characteristics as stressful, and some research indicate that individuals who are generally prone to distress are more vulnerable to workplace stress. Type D personality has been proposed to consist of two central traits of distress-prone individuals, namely predispositions toward negative affectivity and inhibited interpersonal interactions (Denollet, 2005). This combination of personality traits has been associated with higher levels of depressive symptoms and overall mental distress (Mols and Denollet, 2010). In the workplace, Type D personality traits have been associated with higher rates of sick leave and disability (Mommersteeg et al., 2012).

Additionally, individuals have different coping strategies when faced with stress. Some research suggest that individuals who are less prone to depression make greater use of social support and deal proactively with stressors, whereas individuals who are at greater risk for depression have a more avoidant approach to stressors (Shimazu and Kosugi, 2003; Snow et al., 2003; Holahan et al., 2005; Greenglass et al., 2006). Therefore, to address risk for depression among workers, it is critical to understand the contributions of both job characteristics and individual factors to the development of depressive symptoms over time.

Another important step in understanding depression in the workplace is addressing the relationship between depression and burnout. Burnout has been defined as a syndrome of work-related exhaustion and disengagement resulting from chronic job stress (Lee and Ashforth, 1990; Demerouti et al., 2001; Bakker et al., 2014; Bianchi et al., 2015; Ruotsalainen et al., 2015). According to the Job Demands-Resources model, job stress leads to burnout when there is an ongoing imbalance between job demands and personal and/or organizational resources to meet these demands (Demerouti et al., 2001). Whereas burnout is thought to arise in the context of work, depression involves generalized symptoms across multiple life settings, including the cardinal symptoms of sadness and anhedonia, as well as guilt, concentration problems, poor sleep, and fatigue (Bianchi et al., 2015). Some studies have reported burnout to be associated with increased risk for depression (Ahola et al., 2005; Hakanen and Schaufeli, 2012, Ahola and Hakanen, 2007), but others have not found consistent relationship between depression and burnout (Iacovides et al., 1999; McKnight and Glass, 1995). These conflicting results may be due in part to inadequate consideration of both job and individual characteristics that would be important for burnout and depression, thus confounding the relationship between the two. Additionally, much of the previous research has been cross-sectional. Improved understanding of the relationship between burnout and depression, with adequate accounting of individual and job factors that may contribute to depression, would lead to better identification of at-risk individuals for both burnout and depression, and enable development of more effective interventions.

The goal of the current analyses is to examine the unique and relative contributions of both job-related and individual factors in predicting the severity of depressive symptoms over 12 months for a cohort of actively working nursing staff. This work is part of a larger observational study designed to explore how job environment and stressors faced by nursing workers impact important outcomes, such as mental health and cognitive functioning. As an occupational group, nurses are particularly vulnerable to burnout and depression (Demerouti et al., 2000; Ohler et al., 2010) due to exposure to high levels of psychological and physical job demands (Aiken et al., 2013). We hypothesized that individual factors (e.g., personality and coping) and job factors (e.g., demands at work) would be associated with severity of depressive symptoms. We also hypothesized that burnout symptoms may precede and contribute to development of depressive symptoms, after accounting for individual factors (age, sex, race, and marital status, and personality), job characteristics, and coping. Therefore, we first evaluated the contribution of demographics, personality, job characteristics, and coping to between-individual variation in depressive symptoms over 12 months, using a series of linear mixed models that sequentially accounted for each group of factors. Then, we investigated whether baseline burnout symptoms further predicted between-individual variation in depressive symptoms, after accounting for all of the above

factors. Finally, we examined whether burnout symptoms at preceding timepoints were associated with development of more depressive symptoms over time within individuals, thus lending support to burnout as a precursor and possible mediator (e.g., of job-related stress) to depression.

2. Methods

2.1. Study design and participants

Participant data were collected June 2013 through May 2016, as part of a prospective cohort study evaluating the relationships among job characteristics, burnout, depression and cognitive dysfunction among nurses and associated healthcare staff. As one of the goals of the broader project, the current study focused on the association of individual and job factors with monthly assessed depressive symptoms over one year. Email invitations were sent to nursing workers across all departments of a large academic health system in the southeast U.S. Email addresses were provided by nursing administration at the health system, but no information on participation (i.e., individual enrollment in the study or completion of any specific assessments) was shared with administrative staff or leadership. To be eligible, individuals were required to be actively working in the nursing field (i.e., no medical leave, disability, or family leave), have at least two years' experience in nursing, and be at least 25 years old. These criteria were intended to exclude individuals just starting in their profession, who may experience job stressors differently from those with more work experience. We enrolled 402 individuals, with 384 resulting from email recruitment, and 18 individuals who self-referred after seeing flyers or by word-of-mouth. Overall, participants included 372 registered nurses, 4 licensed practical nurses, and 26 other associated staff (i.e., certified nursing assistants and medical assistants). In addition to baseline assessments, participants completed monthly computer-based surveys on burnout and depressive symptoms over one year.

Self-report questionnaires were used at baseline and during followup, with trained research staff available to provide instructions; research staff were blinded to individual responses. For baseline assessments, visits occurred in a private testing room unaffiliated with any specific clinical unit or service within the hospital. We offered flexible appointment times, including evenings and Saturdays, to accommodate varying types of work schedules. Follow-up questionnaires were sent monthly via secure email link to be completed at the participant's convenience. A designated project coordinator sent all routine email communication to participants, in order to establish consistency and rapport with participants. The project coordinator also emailed reminders to participants to complete monthly questionnaires if overdue. A small incentive ($10) was provided for completion of each survey (i.e., total of $120 for all surveys over one year). Completion rates for monthly questionnaires were 87–98%, with a mean of 91%. Baseline and follow-up data were collected and confidentially maintained using Research Electronic Data Capture (REDCap) (Harris et al., 2009).

For the analyses described here, we first selected 395 (98%) participants who had a minimum of 3 monthly follow-up assessments. We then excluded participants for missing the following baseline data: 15 (4%) for demographics, 52 (13%) for personality, 46 (11%)

for coping, and one person for job characteristics. Thus, our analytic models include 281 (70%) who had complete baseline data on demographics, personality, job characteristics, and coping. Compared with included participants, those missing data were similar in age (mean 42.5 years), more likely to be non-white race (18% black and 11% other race, $p = 0.02$ by χ^2-test), similar proportion married (50%), similar in health behaviors (61% exercised at least 3 days per week and 19% practiced yoga or meditation weekly), and same proportion were seeing mental health provider (12%). Of the selected participants, 250 individuals contributed 9 or more follow-up observations.

This study was approved by the Duke University Institutional Review Board.

2.2. Outcome: depressive symptoms

Depressive symptoms were assessed at baseline and monthly followup using the 9-item Patient Health Questionnaire (PHQ-9), a self-administered scale with established clinical utility for depression screening (Huang et al., 2006; Kroenke et al., 2001; Kroenke and Spitzer, 2002). Participants report frequency of depressive symptoms (e.g., anhedonia, low mood, and sleep disturbances) over the past two weeks, and responses are scored 0–3, from “Not at all” to “Nearly every day.” The PHQ-9 score is the sum of all responses, ranging from 0 to 27. Changes in PHQ-9 can be used to assess response to clinical interventions for depression, and to determine need for treatment; for example, scores 0–4 indicate minimal symptoms not requiring clinical intervention, whereas 10 and higher correspond to moderate to severe depression when treatment should be considered (Kroenke et al., 2001; Kroenke and Spitzer, 2002).

2.3. Predictors

2.3.1. Burnout—Burnout was assessed at baseline and monthly follow-up using the Oldenburg Burnout Inventory (OLBI), a validated questionnaire containing 8 items for each of two dimensions—exhaustion and disengagement (Demerouti et al., 2001, 2010; Peterson et al., 2008). OLBI exhaustion and disengagement are analogous to exhaustion and cynicism measured by the Maslach Burnout Inventory—General Survey (MBI-GS), but with additional components of exhaustion due to physical and cognitive demands, in contrast to the emotional focus of MBI-GS (Demerouti et al., 2010). Exhaustion and disengagement scales are each scored as the mean of responses to individual items (Likert scale 1–4, from “Strongly agree” to “Strongly disagree”) (Demerouti et al., 2010).

2.3.2. Demographics—We assessed baseline age in years, sex, race (white, black, or other), and marital status. All characteristics were encoded as categorical variables for statistical modeling, except for age, which was continuous and encoded as difference in years from the group mean.

2.3.3. Personality—The 14-item Type D Scale (DS14) is a self-report questionnaire designed to evaluate negative affectivity and social inhibition (Denollet, 2005). Type D personality traits have been associated with increased risk for adverse health outcomes, including mortality and major cardiovascular events (Denollet, 2005; Mols and Denollet, 2010). There are 7 items each for negative affectivity (e.g., “I am often in the dumps”) and

social inhibition (e.g., “I find it hard to start a conversation”). Scores for each scale are the sums of numerical responses (0–4, with 0 being “False” and 4 being “True”).

2.3.4. Job characteristics—Baseline job characteristics were assessed with selected items from the Copenhagen Psychosocial Questionnaire, second version (COPSOQ-II), which was developed to evaluate multiple work factors contributing to job strain and stress (Kristensen et al., 2005; Pejtersen et al., 2010). We used a subset of COPSOQ items and scales, and thus, undertook confirmatory factor analysis to fit the previously established 3 domains; however, we determined that a unitary latent factor (“work culture”) had the best fit (see Supplemental data). In our analytic models, we used work culture as a derived latent variable, and quantitative demands (scored as the mean of COPSOQ items related to demands, with 100 being the maximum) as a directly observed variable.

2.3.5. Coping—Coping was assessed at baseline using questions from the brief COPE inventory, the shortened version of a questionnaire developed by Carver et al. to measure diverse aspects of coping (Carver et al., 1989; Carver, 1997). We undertook exploratory and confirmatory factor analyses and identified 3 coping latent variables (“self-sufficient,” “social support,” and “avoidant”), consistent with past reports of the COPE inventory factor structure (see Supplemental data and (Litman, 2006)). Thus, in our analytic models, we used these derived latent coping variables, and additionally, scores for single COPE items addressing religion and humor.

2.4. Descriptive characteristics

For descriptive purposes only, we provide baseline data on health-related behaviors (i.e., smoking, exercise, and yoga or meditation) and whether participants were seeing a mental health professional (i.e., therapist, psychologist, or psychiatrist).

2.5. Statistical analyses

First, we summarized baseline characteristics and descriptive information for included participants, and assessed correlations between baseline characteristics. Then, we determined the relative contribution of between-individual differences to overall variation in depressive symptoms over 12 months by calculating the intra-class coefficient (ICC) from repeated measures analysis of variance (RM ANOVA). The ICC is also the quantification of correlation between depression scores (i.e., at multiple timepoints) for individual participants. We found that the ICC was 0.71, indicating that more than two-thirds of overall variation was due to between-individual variation (i.e, one-third of overall variation was due to within-individual variation over time).

Next, we used a series of linear mixed models to evaluate the relative additional contribution of individual and job factors to between-individual variation in depressive symptoms over 12 months. We added categories of predictors in successive blocks, beginning with a basic model that included only demographics (Model 1). We then sequentially added the following predictors—personality (Model 2); nurse (vs other worker in nursing field), quantitative demands, and work culture (Model 3); and coping (Model 4). We provide fixed effect estimates (β), standard errors (SE), and p-values for each predictor, to indicate the strength

of association between individual predictors and depressive symptoms. We also calculate the amount of between-individual variation that was explained by each model (i.e., decrease in variance of the random effects intercept, compared with RM ANOVA), as a measure of the relative contribution of each group of factors. This sequential approach also provides some indication that certain factors may have mediating effects, if the inclusion of a newer set of factors decreases the association of other factors with depressive symptoms (e.g., if adding coping reduces the association of job demands with depression scores).

Then, we investigated whether baseline burnout symptoms further contributed to between-individual variation in depressive symptoms, after accounting for all other factors. We added baseline exhaustion and disengagement scores as predictors to those factors noted above, and determined the fixed effect and amount of between-individual variation explained by this linear mixed model (Model 5).

Finally, in a sixth model, we examined whether burnout symptoms measured at preceding timepoints were associated with changes in depressive symptoms over time for individuals (i.e., within-individual variation). To do this, we used a linear mixed model with random intercepts and slopes to predict monthly depressive symptoms, and included all the above baseline factors (i.e., all variables in Model 5). Then we added the within-individual change from baseline of burnout scores at each time point (i.e., change in exhaustion and disengagement scores every month). As opposed to baseline factors (which are at the level of the individual and thus, contribute only to between-individual effects), the fixed effects of changes in burnout scores reflect the contribution of burnout to within-individual monthly variation in depressive symptoms. We evaluated whether inclusion of changes in burnout scores improved the model fit. We used restricted maximum likelihood estimation (REML) to fit all linear mixed models and provide unbiased random and fixed effects estimates. However, REML cannot be used to compare model fits, so we re-estimated models with full maximum likelihood methods and compared models using likelihood ratio tests.

All analyses were performed in R version 3.2.4.

3. Results

Baseline characteristics are summarized in Table 1. Participants were mainly middle-aged white women, approximately half were married, and most were registered nurses. Twelve percent reported seeing a mental health professional, more than half exercised, and nearly one-fifth practiced yoga or meditated at least weekly.

Correlations between baseline characteristics are presented in Table 2. The highest correlation was between coping latent factors of self-sufficient and social support (0.74). The next highest correlations were between negative affectivity and avoidant coping (0.68), burnout dimensions of exhaustion and disengagement (0.65), and depressive symptoms and avoidant coping (0.65).

In longitudinal modeling of depressive symptoms over 12 months, demographic factors did not significantly contribute to between-individual variation, but personality accounted for 36% of between-individual variation, and higher negative affectivity was significantly

associated with increased depressive symptoms (Models 1 and 2, Table 3). Job characteristics and coping each explained an additional smaller amount of between-individual variation (5% and 8%, respectively). Quantitative demands and avoidant coping were both significantly associated with more depressive symptoms, while work culture was significantly associated with less depressive symptoms (Models 3 and 4, Table 3).

After accounting for the above individual and job factors, baseline burnout explained an additional 4% of between-individual variation in depressive symptoms, but only exhaustion was significantly associated with more depressive symptoms (Model 5, Table 3). Notably, in the model with burnout variables included, quantitative demands and work culture were no longer significantly associated with depressive symptoms. In all models, effect estimates for time (i.e., change in depressive symptoms per month) was significant ($p < 0.001$) and consistent at – 0.06, indicating that on average for all individuals, there was a small decrease in symptoms per month.

Finally, we evaluated the contribution of burnout to changes in depressive symptoms over time within individuals (i.e., within-individual variation). In a sixth model with all the above baseline predictors, change in disengagement scores was significantly associated with within-individual variation in depressive symptoms (fixed effect $\beta = 0.52$, SE= 0.21, $p = 0.01$), but change in exhaustion scores was not significantly associated (fixed effect $\beta = 0.37$, SE= 0.22, $p = 0.09$). In this model, baseline disengagement was still not associated with between-individual variation in depressive symptoms (fixed effect $\beta = -0.51$, SE= 0.51, $p = 0.32$), but baseline exhaustion remained a significant predictor of between-individual variation (fixed effect $\beta = 2.44$, SE= 0.50, $p < 0.001$). The inclusion of changes in exhaustion and disengagement scores as predictors led to improved model fit ($\chi^2 = 17.2$, df= 2, $p < 0.001$).

4. Discussion

This study examined the relative contributions of job and personal factors to monthly assessed depressive symptoms among nursing workers over one year. We found that personality, work culture, quantitative demands, coping, and burnout were significant predictors of between-individual variation in depressive symptoms, while demographic characteristics were not. In the full model evaluating between-individual variation, negative affectivity, avoidant coping, and baseline exhaustion were each associated with higher depressive symptoms. Additionally, our study showed that changes in the disengagement dimension of burnout, measured at preceding timepoints, predicted within-individual variation in depressive symptoms, such that higher disengagement contributed to more severe symptoms over time. In contrast, monthly changes in exhaustion were not associated with within-individual variation in depressive symptoms, but baseline exhaustion continued to be significantly associated with between-individual variation in depressive symptoms.

Our results suggest that exhaustion has a more person-level effect on depression, which is consistent with prior findings that the exhaustion dimension of burnout is associated with depressive symptoms (Peterson et al., 2008). Exhaustion has been shown to be more strongly associated with anxiety and poor health in a variety of healthcare workers, whereas

disengagement was not (Peterson et al., 2008). Exhaustion may represent a more sustained vulnerability to depression, while disengagement appears to contribute only to changes in depressive symptoms within individuals. It is also possible that exhaustion has more conceptual overlap with depression, as compared with disengagement—exhaustion is multidimensional and may affect individuals outside the context of work (Demerouti et al., 2010; Bianchi et al., 2014, 2015). Important questions for future work include the temporality and stability of the contributions of exhaustion and disengagement to depressive symptoms over time.

While quantitative demands and work culture were significant predictors of depressive symptoms in models with job and coping variables, these associations were no longer significant when burnout variables were added. These results indicate that burnout may mediate the main impact of job factors on the development of depressive symptoms over time. This is consistent with prior research demonstrating the role of work demands on the development of burnout, especially when job resources (part of positive work culture in our models) are insufficient (Bakker et al., 2014; Borritz et al., 2006; Demerouti et al., 2001). Thus, it will be important in future work to formally examine whether burnout mediates the impact of job factors on the development of a persistent, generalized negative mood state (i.e., depression), and additionally, if there are moderating (i.e., interaction) effects of resources on job demands, with respect to burnout and depression.

Negative affectivity has been previously associated with avoidance of stressful stimuli, which is consistent with a coping style thought to be emotion-focused and unhelpful for managing stress (Denollet, 1991; Polman et al., 2010). Although we assessed avoidant coping with a different instrument, we also found a high correlation between negative affectivity and avoidant coping. Moreover, since negative affectivity retained a significant association with depressive symptoms even after inclusion of coping variables, there may be other effects of negative affectivity independent of coping. Some of these effects may occur via overactive physiologic stress responses that have been associated with negative affectivity and may further predispose individuals to having depressive symptoms (Bender and Farvolden, 2008).

Our study has potential implications for the choice and timing of interventions to address risk for depression. Previous interventions to reduce burnout and promote wellbeing among healthcare workers have targeted the work environment and individual behaviors or cognitions (e.g., coping) (Panagioti et al., 2016; Ruotsalainen et al., 2015; Wasson et al., 2016). In general, the quality of evidence for such interventions is low, and depending on the exact population of healthcare workers and the type of organization being examined, institution-level interventions may be more or less effective (Panagioti et al., 2016; Ruotsalainen et al., 2015; Wasson et al., 2016). Our results could inform development or improvement of future interventions in several ways. First, there may be distinct stages or types of burnout, and this may influence responsiveness to organizational vs individual-focused interventions. For example, changes to institutional culture may impact those who exhibit greater disengagement with work, but have less impact on those who already have high exhaustion. Indeed, if high exhaustion actually overlaps with mild depression, individuals exhibiting this type of burnout may need depression-focused evaluation and

treatment. This may be particularly true for individuals who have high negative affectivity, and those who use avoidant strategies for coping with stress. Our results also suggest that avoidant coping may be a worthwhile target of future interventions to promote wellbeing among healthcare workers. Thus, our results indicate that future interventions looking to address depression in healthcare workers should consider both job-related and personal factors.

There are some limitations to our study. We used a convenience sample of nursing workers within a single hospital system, which may reduce the generalizability of our findings. A sample within a single occupation and single hospital system has the potential to be more homogenous for work culture and organization than sampling from multiple occupation groups and/or organizations. Despite this, we note that nursing is frequently studied with respect to burnout (Poncet et al., 2007). We believe that the current results are relevant to other human service professions, but this should be tested in future research. There is also potential for selection bias if mostly healthy workers with low burnout symptoms were more likely to participate, although our baseline OLBI burnout scores were comparable to those reported in a study of European nurses using a representative national sample (Innstrand et al., 2011). We also note that participants who were excluded for missing baseline data were more likely to be non-white race, and there were relatively larger numbers missing personality and coping data. Thus, selection bias could have affected our estimates of the associations between personality, coping, and depressive symptoms, as well as making our results less applicable for those of minority race. We used latent variables such as work culture and avoidant coping, which may make our results less comparable with other studies examining the role of job and coping factors in work-associated depression. However, these choices were supported by results from our factor analyses.

The strengths of the current study include longitudinal modeling of multiple job-related and individual predictors of depressive symptoms in an occupational group at higher risk for burnout and depression. We provide novel findings about differences in the contribution of exhaustion and disengagement dimensions of burnout to between and within-individual variation in depressive symptoms. Efforts to improve mental health and wellbeing for healthcare workers should consider integrating components to address multiple organizational and individual factors, such as augmenting organizational and interpersonal job resources to match quantitative demands, applying mindfulness-based techniques to manage negative affectivity, and using cognitive reframing and communication strategies to modify avoidant coping.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The authors would like to recognize members of our study team, and the participants who took part in our study.

We further confirm that this work involved human subjects and was approved by the Duke University Institutional Review Board.

Author declaration & disclosuresRole of the funding sources

This work was primarily supported by the German Federal Institute for Occupational Safety and Health (*Bundesanstalt für Arbeitsschutz und Arbeitsmedizin*, BAuA: Project F2318) to promote cross-national measurement and understanding of workplace mental and cognitive health. BAuA authors participated in the initial design and conceptualization of the larger project, and provided review of current analyses and conclusions for this specific study. Support for Daniel Hatch was provided by the National Institutes of Health (NIH Grant No. T32-AG000029). Fellowship support for Wei Duan-Porter was provided by the U.S. Department of Veteran Affairs (VA) Office of Academic Affiliations (Grant No. TPH 21-024). Support for Jane F. Pendergast was provided by the Duke University Claude D. Pepper Older Americans Independence Center (NIH Grant No. P30AG028716). NIH and VA sponsors had no role in study design, data collection, analysis and interpretation of data, writing of the report, or decision to submit article for publication.

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Table 1

Baseline characteristics of selected participants (n = 281).

Demographics	
Age, y, mean (SD), range 25–67	41.4 (11.4)
Male, *n* (%)	22 (7.8)
Race, *n* (%):	
White	231 (82.2)
Black	33 (11.7)
Other	17 (6.0)
Married, *n* (%)	152 (54.1)
Personality[a]	
Social inhibition, mean (SD), range 0–28	9.4 (5.9)
Negative affectivity, mean (SD), range 0–28	9.1 (5.9)
Health behaviors[b], *n (%)*	
Smoking cigarettes	12 (4.3)
Exercising at least 3 days per week	167 (59.4)
Practicing yoga or meditation at least weekly	52 (18.5)
Occupation and job characteristics	
Nurse[c], *n* (%)	267 (95.0)
Quantitative demands[d], mean (SD), range 0–100	47.1 (14.7)
Work culture[d], mean (SD)	0.05 (0.83)
Coping[e], *mean (SD)*	
Self-sufficient	0.0 (0.9)
Social support	0.0 (1.0)
Avoidant	0.1 (0.9)
Humor, range 1–4	2.3 (1.0)
Religion, range 1–4	2.3 (1.2)
Mental health	
Seeing mental health provider, *n* (%)	33 (11.7)
Burnout[f]:	
Exhaustion, mean (SD), range 1–4	2.6 (0.5)
Disengagement, mean (SD), range 1–4	2.4 (0.5)
Depression[g]:	
Score, mean (SD), range 0–27	5.7 (5.0)
Categories (score range), *n* (%) —	
Minimal symptoms (0–4)	130 (46.3)
Mild depression (5–9)	82 (29.2)
Moderate depression (10–14)	37 (13.2)
Moderately severe depression (15–19)	15 (5.3)
Severe depression (20–27)	5 (1.8)

SD = standard deviation.

[a]Assessed with Type D Scale-14.

[b]All health behaviors and seeing mental health provider were self-reported.

[c]Nurses were all registered nurses; non-nurses were certified nursing assistants (n = 13) and medical assistants (n = 1).

[d]Assessed with the Copenhagen Psychosocial Questionnaire; work culture is a latent variable, standardized to mean of 0, with ± 1 standard deviation.

[e]Assessed with the brief COPE inventory; self-sufficient, social support, and avoidant are latent variables, standardized to mean of 0, with ± 1 standard deviation.

[f]Assessed with Oldenburg Burnout Inventory.

[g]Measured with 9-item Patient Health Questionnaire; 12 participants missing baseline score.

Table 2

Correlations between Baseline Characteristics ($n = 281$) [a].

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age																
2. Male	−0.01															
3. Race	−0.03	0.11														
4. Married	0.15	0.11	−0.27													
5. Social inhibition[b]	−0.01	0.05	−0.15	0.00												
6. Negative affectivity[b]	−0.09	−0.09	−0.31	−0.07	0.46											
7. Nurse[c]	0.12	−0.32	−0.53	0.39	0.19	0.03										
8. Quantitative demands[d]	0.06	0.14	−0.02	−0.01	0.07	0.18	0.02									
9. Work culture[d]	0.05	0.16	0.06	0.18	−0.20	−0.33	0.21	−0.20								
10. Self-sufficient[e]	−0.11	−0.08	−0.02	−0.14	0.07	0.26	−0.01	0.21	−0.22							
11. Social support[e]	−0.27	−0.15	−0.07	−0.09	−0.04	0.18	0.03	0.07	−0.10	0.74						
12. Avoidant[e]	−0.09	−0.08	−0.18	−0.08	0.34	0.68	−0.01	0.22	−0.36	0.56	0.43					
13. Humor[e]	−0.17	0.04	−0.14	0.04	0.00	0.14	0.57	0.08	−0.06	0.40	0.37	0.25				
14. Religion[e]	0.07	−0.11	0.24	0.14	−0.17	−0.14	−0.13	0.05	0.03	0.31	0.25	−0.04	0.02			
15. Exhaustion[f]	−0.09	−0.30	−0.17	−0.12	0.22	0.44	0.14	0.45	−0.44	0.29	0.21	0.45	0.15	−0.05		
16. Disengagement[f]	−0.18	−0.01	−0.15	−0.10	0.20	0.43	−0.13	0.31	−0.51	0.30	0.23	0.47	0.13	−0.06	0.65	
17. Depression[g]	−0.03	−0.16	−0.15	−0.12	0.31	0.60	−0.10	0.20	−0.35	0.31	0.20	0.65	0.15	−0.15	0.56	0.43

[a] Pearson correlation coefficients for 2 continuous variables, polyserial correlations for continuous and categorical variables, and polychoric correlations between 2 categorical variables.

[b] Assessed with Type D Scale-14.

[c] Dichotomous categorical variable distinguishing between nurses and non-nurses (i.e., certified nursing assistants and medical assistants).

[d] Assessed with the Copenhagen Psychosocial Questionnaire; work culture is a latent variable, standardized to mean of 0, with ± 1 standard deviation.

[e] Assessed with the brief COPE inventory; self-sufficient, social support, and avoidant are latent variables, standardized to mean of 0, with ± 1 standard deviation.

[f] Assessed with Oldenburg Burnout Inventory.

[g] Measured with 9-item Patient Health Questionnaire; 12 participants missing baseline score.

Table 3

Fixed Effects and Contribution to Between-Individual Variation in Depressive Symptoms over 12 months.[a].

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate (SE)	***p*-value**	**Estimate (SE)**	***p*-value**	**Estimate (SE)**	***p*-value**	**Estimate (SE)**	***p*-value**	**Estimate (SE)**	***p*-value**
Age[b]	0.01 (0.02)	0.72	0.02 (0.02)	0.17	0.02 (0.02)	0.22	0.03 (0.02)	0.10	0.03 (0.02)	0.07
Male	−0.53 (0.86)	0.54	−0.34 (0.70)	0.62	−0.41 (0.68)	0.55	−0.46 (0.64)	0.47	0.20 (0.63)	0.75
Black race[c]	−0.58 (0.73)	0.43	0.45 (0.60)	0.45	0.22 (0.63)	0.73	0.14 (0.61)	0.82	0.27 (0.59)	0.64
Other race[c]	−2.00 (0.98)	0.04	−0.29 (0.80)	0.71	−0.36 (0.77)	0.64	−0.22 (0.73)	0.76	−0.28 (0.70)	0.69
Married	−0.64 (0.47)	0.18	−0.32 (0.38)	0.41	−0.12 (0.37)	0.74	−0.09 (0.36)	0.80	−0.05 (0.35)	0.88
Social inhibition[d]	—	—	0.07 (0.04)	0.05	0.07 (0.03)	0.05	0.05 (0.03)	0.10	0.05 (0.03)	0.12
Negative affectivity[d]	—	—	0.36 (0.04)	< 0.001	0.31 (0.04)	< 0.001	0.14 (0.04)	< 0.001	0.12 (0.04)	0.004
Nurse[e]	—	—	—	—	−0.44 (0.94)	0.64	−0.66 (0.91)	0.46	−1.07 (0.88)	0.22
Quantitative demands[f]	—	—	—	—	0.04 (0.01)	0.002	0.03 (0.01)	0.009	0.009 (0.02)	0.48
Work culture[f]	—	—	—	—	−0.80 (0.23)	< 0.001	−0.55 (0.22)	0.01	−0.36 (0.23)	0.12
Self-sufficient[g]	—	—	—	—	—	—	−0.12 (0.33)	0.71	−0.09 (0.31)	0.78
Social support[g]	—	—	—	—	—	—	−0.08 (0.28)	0.77	−0.15 (0.27)	0.59
Avoidant[g]	—	—	—	—	—	—	1.9 (0.32)	< 0.001	1.78 (0.31)	< 0.001
Humor[g]	—	—	—	—	—	—	0.10 (0.19)	0.59	0.11 (0.18)	0.56
Religion[g]	—	—	—	—	—	—	−0.13 (0.16)	0.43	−0.12 (0.16)	0.43
Exhaustion[h]	—	—	—	—	—	—	—	—	2.49 (0.52)	< 0.001
Disengagement[h]	—	—	—	—	—	—	—	—	−0.88 (0.52)	0.10
% Between-Individual Variation Explained	**0.9%**		**36.4%**		**41.5%**		**49.5%**		**53.5%**	

SE = standard error.

[a]Estimates for fixed effects of predictors and percent of between-individual variation explained from linear mixed models. Outcomes for all models are monthly depression scores as assessed by the 9-item Patient Health Questionnaire; score is the sum of all items (0–3 possible for each item).

[b]Age has been standardized to the group mean.

[c] Race is a categorical variable with the reference being white.

[d] Social inhibition and negative affectivity were assessed with Type D Scale-14 (scored as the sum of responses).

[e] Nurses or non-nurses (i.e., certified nursing assistants and medical assistants).

[f] Assessed with the Copenhagen Psychosocial Questionnaire; work culture is a latent variable, standardized to mean of 0, with ± 1 standard deviation.

[g] Assessed with the brief COPE inventory; self-sufficient, social support, and avoidant are latent variables, standardized to mean of 0, with ± 1 standard deviation.

[h] Assessed with Oldenburg Burnout Inventory.