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Perceived stress and professional quality of life in nursing staff: how important is psychological flexibility?

Abstract:

Objectives: Nurses are at high risk of chronic stress. Tailored, evidence-based stress-management interventions may minimise absenteeism and staff turnover, whilst at the same time promoting good quality patient care. Current literature for nurse-focused stress-management interventions is varied in quality, with little focus on data-driven intervention development. This study explores how process measures related to Acceptance and Commitment Training (ACT) are associated with perceived stress and professional quality of life in nurses, in order to guide intervention development.

Design: A cross-sectional, online psychometric survey was implemented using LimeSurvey software.

Methods: One-hundred and forty-two nurses were recruited from various specialties across four English National Health Service (NHS) Trusts. Questionnaires assessed demographic and work-related sample characteristics, ACT processes (mindfulness, acceptance, cognitive defusion, self-as-context, values and committed action), and four work-related wellbeing outcomes (perceived stress, burnout, compassion fatigue and compassion satisfaction). Correlation and regression models were used to analyse data.

Results: All six ACT processes negatively correlated with perceived stress, burnout and compassion fatigue, and positively correlated with compassion satisfaction (all $p < .05$). In regression models, these same processes explained significant variance for all outcomes (R^2 range = .36-.61), above and beyond that explained by socio-demographic and work-related factors. Acceptance (β range: -.25 to -.55), mindfulness (β range: -.25 to -.39), and values-based processes (β range: -.21 to -.36) were frequent independent contributors to work-related wellbeing.

Conclusions: This study demonstrates that the ACT framework provides a promising platform from which to develop nurse-focused stress-management interventions.

Interventions focusing on acceptance, mindfulness, and values-linked processes may be most effective.

Keywords: Nurses; stress; ACT; psychological flexibility

Introduction

Nurses form the majority of employees within global healthcare systems, and are a population at high-risk of stress (Tyler & Cushway, 1992; Mimura & Griffiths, 2003). The UK National Health Service (NHS) staff survey indicates that over 38% of staff experienced work-related stress in 2017 (NHS England, 2018). Frequent contributory factors in the experience of work-related stress include high workload (Greenglass, Burke, & Fiksenbaum, 2001) which increasing nurse shortages can exacerbate (Toh, Ang, & Devi, 2012), emotional demands of patients and their families (Isikhan, Comez, & Danis, 2004), and constant exposure to illness and death (Ekedahl & Wengström, 2007). Long-term exposure to daily workplace stress can have a negative impact on levels of professional quality of life which is defined by Stamm (2009) as including burnout, compassion fatigue and compassion satisfaction. This may be especially relevant for burnout and compassion fatigue outcomes (Monsalve-Reyes et al., 2018; Potter et al., 2010), two types of chronic stress which are of continued importance in healthcare research and policy (da Costa & Pinto, 2017). Recent research has demonstrated the deleterious effects of chronic stress on patient safety and quality of care provided in both UK (Carrieri et al., 2018) and non-UK (Hall, Johnson, Watt, Tsipa, & O'Connor, 2016; Salyers et al., 2017; Zadeh, Gamba, Hudson, & Wiener, 2012) healthcare systems.

The consequences of chronic work-related stress

Burnout consists of three elements: (i) emotional exhaustion (a chronic state of emotional depletion to deal with continuous stress), (ii) depersonalisation (a cynical, negative or detached response to patients and the caring role), and (iii) reduced personal accomplishment (the belief that one can no longer work effectively with the patient) (Maslach, 1982; Maslach & Leiter, 2017). The relationship between stress and burnout has been widely investigated (da Costa & Pinto, 2017). Barnard and colleagues (2006) reported moderate positive

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correlations between 50 nursing stressors (e.g. making job-related mistakes or lack of resources) and both emotional exhaustion and depersonalisation components. Other research has demonstrated that higher workload significantly predicts higher emotional exhaustion (Papadatou, Anagnostopoulos, & Monos, 1994).

Compassion fatigue is related to burnout, but defined more specifically as the reduction of compassion over time and an increase in hopelessness with regards to carrying out a caring role (Figley, 1995). An important risk factor in the development of compassion fatigue is characterized by staff reducing the vicarious effects of exposure to patient suffering by adopting a closed ‘experientially avoidant’ coping approach themselves (Figley, 1995). This can consequently diminish the desire to help (Showalter, 2010) and increase physical/emotional exhaustion, irritability and feelings of self-contempt over time (Sorenson, Bolick, Wright, & Hamilton, 2016). Associations between perceived stress, compassion fatigue and compassion satisfaction (i.e. “the positive feelings one has about one’s professional work—the satisfaction a person receives through his or her work when helping others who have experienced a traumatic event”; Craigie et al., 2016, p. 89) are less researched. Continued research in this field is important given the negative effects of chronic stress on absenteeism rates (van Mol, Kompanje, Benoit, Bakker, & Nijkamp, 2015), nurse turnover (Barrett & Yates, 2002) and quality of care (Salyers et al., 2017; Zadeh et al., 2012). Compassion satisfaction may have a protective or buffering effect against stress by promoting positive emotions and positive appraisals of situations, which is particularly important for addressing burnout tendencies (Craigie et al., 2016). Evidence-based interventions which promote compassion satisfaction as well as addressing negative stress outcomes are essential to equip nurses with stress-management skills to promote professional quality of life (Boorman, 2009).

Acceptance and Commitment Training in the context of work-related stress

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Acceptance and Commitment Training (ACT) is receiving increasing attention in the occupational health field (Flaxman, Bond, & Livheim, 2013). ACT is a third-wave cognitive-behavioral approach which uses six core processes (acceptance, mindfulness, cognitive defusion, self-as-context, values and committed action) to promote psychological flexibility: the process of noticing experiences in the present moment without judgment, and persisting in or changing behaviors to serve valued ends (Hayes, Strosahl, & Wilson, 2011). Flexibility is a well-established predictor of long-term psychological health (Biglan, Hayes, & Pistorello, 2008; Kashdan & Rottenberg, 2010).

In the psychological flexibility model, acceptance is used to indicate an alternative approach to experiential avoidance, characterised by a set of behaviors occurring when an individual is not open to experiencing thoughts, feelings, memories or sensations (Hayes et al., 2011).

Mindfulness and cognitive defusion involve an individual noticing whatever thoughts, feelings or sensations arise in the present moment, allowing one's actions to not be dictated by their internal content. Similarly, self-as-context is an awareness of one's own experiences (past and present) without attachment to them, which is often termed the 'observing self'.

Finally, values are freely chosen constructs which contribute to living a meaningful life, and committed action is the process of outlining values into goals and actions, in order to commit to value-based behaviors. Together, these processes encourage a more psychologically flexible approach to dealing with sources of distress (Hayes et al., 2011).

Various studies have illustrated the utility of ACT in the context of employee stress-reduction, for example in public health sector workers (Dahl, Wilson, & Nilsson, 2004), local government employees (Flaxman & Bond, 2010), social workers (Brinkborg, Michanek, Hesser, & Berglund, 2011), and school teachers (Jeffcoat & Hayes, 2012). Further research examining the relevance of psychological flexibility for stress in nursing populations is needed, especially within a UK context given the increasing nurse shortages which are

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prevalent in the UK NHS (Gray, Wilde, & Shutes, 2018). Elsewhere, strong positive correlations have been identified between experiential avoidance and both depersonalisation and emotional exhaustion in Spanish critical care nurses (Iglesias, de Bengoa Vallejo, & Fuentes, 2010). Similarly, in a Portuguese oncology nursing sample, psychological inflexibility demonstrated positive medium effect size correlations with burnout and compassion fatigue (Duarte and Pinto-Gouveia, 2017).

The current study

Before any psychological intervention is tested, a robust, data-driven approach to intervention design is recommended (Medical Research Council, 2006). Richardson and Rothstein's (2008) meta-analysis concluded that many published stress-management interventions include too many components which often confuse or overwhelm participants. Much of the current stress-management literature on nursing populations fails to report how interventions were tailored for these specific populations and contexts, and more importantly, how empirical data was used to inform these design decisions. The Medical Research Council (MRC; 2006) offer well-tested guidance for the development of complex interventions. Phase I studies identify intervention components which may be especially pertinent for influencing targeted outcomes. The availability of validated ACT process measures provides an opportunity to explore how each process may be associated with outcomes of interest (Levin, Hildebrandt, Lillis, & Hayes, 2012), such that stress-management interventions are designed to maximise effectiveness.

Duarte and Pinto-Gouveia's (2017) findings presented earlier provide some rationale for using ACT in nurse stress-management, though the use of the Acceptance and Action Questionnaire (AAQ-II; Bond et al., 2011) as a measure of global psychological (in)flexibility may be too insensitive for the purposes of informing intervention development.

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There is ongoing debate (e.g. Wolgast, 2014) on whether the AAQ-II is a valid measure of global psychological flexibility, or simply a measure of psychological acceptance. Given that psychological flexibility is composed of six separate processes, it would be more informative in early-stage intervention development to include measures of other ACT processes too. No published study has yet examined all components of the ACT model in this context.

The primary aim of this study is to conduct a detailed, Phase I descriptive survey of stress in nursing staff working within the UK NHS setting to identify how each ACT process relates to nurse work-related wellbeing. We use the term ‘work-related wellbeing’ to encapsulate both perceived stress and professional quality of life constructs (burnout, compassion fatigue and compassion satisfaction). This study builds on previous research (e.g. Duarte & Pinto-Gouveia, 2017) by measuring each process of the ACT model separately (rather than global psychological flexibility), in addition to outcome assessments of perceived stress and professional quality of life. We tested the following hypotheses:

- i. Perceived stress will be statistically associated with higher burnout, compassion fatigue, and lower compassion satisfaction.
- ii. ACT process variables that are indicative of a psychologically-flexible behavioral stance will be statistically associated with lower perceived stress, burnout and compassion fatigue, and higher compassion satisfaction.

Methods

Design

A cross-sectional online survey was designed and hosted using the LimeSurvey platform. Ethical approval was granted by the author’s university institution (School of Psychology Ethics Committee). UK Health Research Authority (HRA) approval was obtained, as well as research governance approval from each participating NHS site.

Participants

One hundred and forty-two nurses (124 females and 18 males, $M_{age}=47.98$) were recruited from four NHS Trusts in England using opportunity sampling. To be eligible, participants had to be fully qualified nurses working within the participating Trusts. There was no restriction by nursing specialty, nor length of time since qualification. Sample size calculations (using G*Power version 3.1; Faul, Erdfelder, Buchner, & Lang, 2009) determined that 103 participants were needed providing sufficient power ($1-\beta = .80$) to detect medium effect size (Cohen, 1988) associations using multiple linear regression analyses with six predictors, and an alpha level of .05.

Measures

The survey comprised seven validated psychometric scales: five of these measured ACT processes (values and committed action were assessed using a single scale) and two measured our core outcome variables: perceived stress and professional quality of life (burnout, compassion fatigue and compassion satisfaction). Six demographic questions were also asked at the beginning of the survey.

Demographic information

Participants reported their sex, age, ethnicity and relationship status. They were asked to indicate in which nursing specialty they worked (table 1), and their length of experience working in that specialty, to explore contextual factors of the working environment which may be related to stress responses.

ACT processes

The *Acceptance and Action Questionnaire-II* (AAQ-II; Bond et al., 2011) is a seven-item Likert scale (1=never true to 7=always true). Although some studies use this as a global measure of psychological flexibility, we responded to recent critique (e.g. Wolgast, 2014)

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and used it instead as a measure of experiential avoidance. Total scores range from 7-49. To align with other processes in this study, this scale was reverse-scored such that higher scores indicated higher levels of psychological acceptance (i.e. lower experiential avoidance). The AAQ-II has good psychometric properties (Bond et al., 2011; Fledderus, Oude Voshaar, ten Klooster, & Bohlmeijer, 2012). The Cronbach's alpha for this sample was $\alpha=.90$.

The *Mindful Attention Awareness Scale* (MAAS; Brown & Ryan, 2003) is a 15-item Likert scale (1=almost always to 6=almost never) to measure mindfulness, focusing on the presence or absence of attention to the present moment. Scores range from 0 to 75 with higher scores indicating higher mindfulness. The MAAS is identified as a unidimensional measure of mindfulness (MacKillop & Anderson, 2007), with sound incremental and criterion validity (Brown & Ryan, 2003). The Cronbach's alpha for this sample was $\alpha=.91$.

The *Cognitive Fusion Questionnaire* (CFQ; Gillanders, Bolderston, Bond, Dempster, Flaxman et al., 2014) is a seven-item Likert scale (1=never true to 7=always true; total scores ranging from 7-49) designed to measure cognitive fusion (i.e. the extent to which participants are fused with their thoughts). Reversed scoring indicate levels of cognitive *defusion*, a subordinate process of psychological flexibility, with higher scores indicating higher levels of cognitive defusion. The CFQ has good psychometric properties (Gillanders et al., 2014). The Cronbach's alpha for this sample was $\alpha=.94$.

The *Engaged Living Scale* (ELS; Trompetter et al., 2013) is a 16-item Likert scale (1=completely disagree to 5=completely agree) used to measure both values identification and committed action. We scored the ELS so that higher total scores (ranging from 16 to 80) indicated higher levels of values-based living *and* committed action, rather than scoring as two sub-scales ('Valued living' and 'Life fulfilment'); this scoring model is permissible and is a validated scoring strategy (Trompetter et al., 2013). Preliminary psychometric properties

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in a non-clinical sample indicate this measure has good internal consistency as well as construct validity (Trompeter et al., 2013). The Cronbach's alpha for this sample was $\alpha=.94$.

The *Self-as-Context Scale* (SACS; Gird & Zettle, 2013) is an 11-item Likert scale (1=completely disagree to 7=completely agree) designed to measure self-as-context (exemplar item: "There is a basic sense I have of myself that doesn't change even though my thoughts and feelings do."). Total scores range from 7 to 77 with higher scores indicating higher self-as-context. Preliminary psychometric properties for the SACS indicate suitable internal consistency, discriminant validity and convergent validity (Gird & Zettle, 2013). The Cronbach's alpha for this sample was $\alpha=.93$.

Stress and Professional Quality of Life outcomes

The *Perceived Stress Scale* (PSS; Cohen, Kamarck, & Mermelstein, 1983) is a 14-item Likert scale (0=never to 4=very often) assessing participants' appraisals of stressful situations, including perceptions of how unpredictable, uncontrollable and overloaded their lives have been over the previous month. Total scores range from 0 to 56 with higher scores indicating greater perceived stress. The PSS-14 has been used in multiple nursing studies (e.g. Frögéli, Djordjevic, Rudman, Livheim, & Gustavsson., 2015; Lee & Kim, 2006; Purcell, Kutash, & Cobb, 2011) enabling comparability with the current study. The PSS-14 has good internal consistency and test-retest reliability (Lee, 2012). The Cronbach's alpha for this sample was $\alpha=.89$.

The *Professional Quality of Life Scale* (ProQoL; Stamm, 2009) is a 30-item Likert scale (1=never to 5=very often) which measures the frequency of positive and negative aspects of participants' working experiences in the helping profession over the last 30 days. This scale has three subscales: burnout, compassion fatigue, and compassion satisfaction. Total scores range from 10 to 50 for each subscale (scoring guidelines; <22 indicates 'low' levels, 23-41

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‘average’, and >42 is considered ‘high’), with higher scores reflecting higher burnout, compassion fatigue and compassion satisfaction. The ProQoL has been reported to have sound internal consistency, as well as good discriminant validity between sub-scales (Bride, Radey, & Figley, 2007). The Cronbach’s alpha for this sample was $\alpha=.82$ for burnout, $\alpha=.84$ for compassion fatigue, and $\alpha=.90$ for compassion satisfaction.

Procedure

The survey was advertised to potential participants at each NHS site via staff email and Intranet systems. Participants were provided with information regarding the content of the study and asked to complete the study in a single sitting, in a setting of their choosing. Following informed consent, participants generated unique identification codes, enabling withdrawal of data (up to one month post-study completion). Participants completed each measure in turn on a new page of the survey.

Upon completion, participants were thanked and provided with debrief information. On average, participants completed the questionnaire (inclusive of instruction reading time) in 17 minutes ($SD=5.08$; range = 8-31). Participants’ responses were exported into IBM SPSS 25, and prepared for data analysis. No participants withdrew their data from the study.

Analysis

Missing data was handled using mean imputation (missing data <10% per variable) (Tabachnick & Fidell, 2001). Totals were calculated for each scale, and listwise deletion was used during analyses. Parametric assumptions (linearity, homoscedasticity and outliers) were visually inspected followed by normality of distribution checks. Zskew scores were calculated and compared to a threshold criterion of ± 1.96 (Field, 2013). Compassion satisfaction, acceptance and self-as-context were negatively skewed and were normalised using reflected square root transformation. Subsequently, all variables met parametric

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assumptions. Pearson's correlations were performed examining statistical associations for exploratory descriptive analysis (between demographic, work-related variables and psychometric scales included), and to initially test our hypotheses. Bivariate associations between ACT processes and stress-related outcomes were checked to determine which variables to enter into multiple regression models, reducing the potential number of variables entered and increasing analytic power (Bursac, Gauss, Williams, & Hosmer, 2008).

To quantify the comparative importance of each ACT process in relation to our four outcome variables (hypothesis two), four regression models were computed. One-way ANOVAs and Pearson's correlation were used to identify potential covariates to include within regression models. Covariates investigated included categorical (gender, relationship status and nursing specialty) and continuous (age and years of experience) variables. Where statistically significant covariates were identified these variables were inputted in the first step (using the 'enter' method) of hierarchical regression models as a method of statistical control (Field, 2013). Where no such confounding variables were identified, multiple linear regression ('enter' method) was used. Normality of residuals and linearity was visually inspected as a check of parametric assumptions. Multicollinearity was also checked using correlation matrices, tolerance values and variance inflation factors (Field, 2013). All assumptions for regression analyses were adequately met.

Results

A total of 197 participants began the survey, but 55 participants were excluded due to large amounts of incomplete data (i.e. all data points missing for one or more of the psychometric scales). One hundred and forty-two participants were thus retained, representing a response rate of 4.12% of the total population (approximately 3447 nurses across the four sites). This

sample size was adequate as per our sample size calculation. We address our low response rate later in this paper.

Sample description

Participants were aged 24-63 years old ($M_{age}=47.98$, $SD=9.30$), and the sample composed 124 females and 18 males. All but one participant classed their ethnicity as White. Table 1 summarises the relationship status and nursing specialty of participants. The mean length of nursing experience in current specialties across the sample was 15 years ($SD=10.60$; range=0.5-44).

Table 1. Descriptive statistics for work-related wellbeing outcomes based on demographic and work-related variables.

Variable	Perceived stress	Burnout	Compassion fatigue	Compassion satisfaction
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
<i>Sex (n)</i>				
Male (18)	27.28 (9.26)	27.50 (5.77)	21.67 (5.42)	35.22 (6.25)
Female (124)	26.74 (8.08)	26.46 (6.01)	22.25 (5.71)	36.97 (6.07)
<i>Relationship status (n)</i>				
Single (8)	28.00 (9.39)	25.73 (5.89)	23.11 (5.03)	39.11 (5.53)
Married/Civil Partnered (92)	26.84 (7.60)	26.92 (5.87)	22.76 (5.72)	36.07 (5.91)
Divorced (14)	27.21 (9.04)	25.93 (5.97)	19.71 (3.58)	37.43 (5.73)
Separated (18)	25.88 (10.08)	26.25 (4.83)	20.75 (6.78)	40.25 (5.47)
Widowed (5)	27.80 (11.86)	29.60 (10.33)	21.40 (8.79)	29.20 (7.26)
Cohabiting (5)	21.40 (7.23)	23.00 (4.95)	18.00 (4.30)	40.80 (4.55)
<i>Nursing specialty (n)</i>				
General practice (17)	26.47 (7.22)	27.59 (5.81)	21.82 (4.94)	34.59 (5.65)

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Mental health (29)	26.28 (7.91)	26.93 (5.44)	22.21 (5.65)	36.93 (5.99)
Learning disability (8)	24.88 (6.01)	25.37 (5.88)	23.00 (5.04)	37.25 (5.44)
Community (31)	29.61 (8.80)	28.16 (7.08)	23.32 (6.60)	36.36 (6.40)
Adult (32)	27.46 (7.28)	26.31 (4.85)	22.53 (5.16)	37.13 (6.27)
Children (6)	26.33 (11.59)	25.67 (5.35)	22.50 (5.24)	35.67 (6.12)
Oncology (13)	26.92 (7.64)	25.40 (5.80)	20.85 (6.48)	38.31 (4.48)
Other (6)	15.33 (6.62)	20.67 (7.61)	16.67 (2.34)	39.00 (9.88)

Note: 'Other' in nursing specialty consists of addiction nurses (n=3) and educational nurses (n=3)

Descriptive statistics for each measure included are presented in tables one and two. Levels of perceived stress were higher than normative data from other large-scale samples (22.02 – 23.67; Cohen et al, 1983; González-Ramírez, Rodríguez-Ayán, & Hernández, 2013).

Stamm's (2009) scoring guidelines on the ProQoL state that scores less than 22 indicate 'low' levels, 23-41 'average', and those over 42 are considered 'high' on each subscale.

Within our sample, both burnout and compassion fatigue levels were in the mid-range (burnout: low=24.6%, average=74.6%, high=0.7%; compassion fatigue: low=54.2%, average=45.8%). Scores of compassion satisfaction levels were comparatively higher within our sample (low=2.1%, average=72.5%, high=25.4%).

Neither age nor years of experience working in their current nursing specialty significantly correlated with any outcome measure. Sex differences were not identified for any outcome measure. Given that 99.3% of the sample reported their ethnicity as White, it was not viable to statistically test for differences. There were significant differences in perceived stress levels between nursing specialties ($F(7, 134)=2.48, p=.02$), and in compassion satisfaction based on participants' relationship status ($F(5, 136)=3.61, p=.004$). Relationship status and nursing specialty were, therefore, controlled for in regression models for compassion satisfaction and perceived stress respectively.

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Table 2. Zero-order correlations between ACT processes and work-related wellbeing outcomes.

	Mean (SD)	1	2	3	4	5	6	7	8	9
1. Perceived stress	26.81 (8.20)	-								
2. Burnout	26.59 (5.97)	0.72**	-							
3. Compassion fatigue	22.18 (5.66)	0.57**	0.66**	-						
4. Compassion satisfaction	36.75 (6.10)	-0.46**	-0.69**	-0.37**	-					
5. Acceptance	36.15 (7.77)	-0.59**	-0.65**	-0.62**	0.39**	-				
6. Mindfulness	55.85 (13.54)	-0.55**	-0.65**	-0.55**	0.43**	0.58**	-			
7. Cognitive defusion	33.94 (8.67)	-0.54**	-0.61**	-0.56**	0.35**	0.79**	0.66**	-		
8. Values and Committed action	56.75 (9.98)	-0.60**	-0.70**	-0.40**	0.59**	0.67**	0.51**	0.64**	-	
9. Self-as-context	53.45 (11.41)	-0.57**	-0.61**	-0.40**	0.49**	0.57**	0.51**	0.56**	0.74**	-

Note: ** = $p < .001$. For additional information, we also checked subscales of the Engaged Living Scale (Valued Living and Life Fulfilment) and found moderate to strong negative correlations (all significant, $p < .001$) with perceived stress, burnout and compassion fatigue, and moderate positive correlations (both significant, $p < .001$) with compassion satisfaction.

Correlations between perceived stress and professional quality of life outcomes

Perceived stress significantly correlated with all professional quality of life outcomes (table 2). Specifically, perceived stress significantly contributed to higher levels of both burnout and compassion fatigue with considerably large effect sizes. A slightly smaller significant negative correlation was found between perceived stress and compassion satisfaction.

Statistical associations between ACT processes and work-related wellbeing outcomes

Pearson's correlation analyses revealed significant moderate-to-strong relationships between all ACT processes, perceived stress and all three sub-scales of the ProQoL (table 2). Values and committed action were strongly negatively correlated with perceived stress and burnout respectively, but along with self-as-context, had only weak negative correlations with compassion fatigue. The negative correlation between acceptance and compassion fatigue was strongest overall. There were also significant moderate-to-strong positive relationships between ACT processes and compassion satisfaction, with values and committed action correlating with the largest effect size.

Two multiple linear regression models (table 3) explored the comparative contributions of each ACT process in explaining variance in burnout (model 1) and compassion fatigue (model 2). Both models were significant, with overall variance explained being 61% for burnout ($R^2=.61$, $F(5, 136)=44.69$, $p<.001$) and 44% for compassion fatigue ($R^2=.44$, $F(5, 136)=23.52$, $p<.001$). Lower levels of acceptance, mindfulness and values and committed action were significant independent contributors of higher burnout. Lower acceptance and mindfulness were significant independent contributors of higher compassion fatigue.

Table 3. Multiple linear regression models: ACT processes as contributors to the variance explained in burnout and compassion fatigue

Model	Variable	B	β	t	p
1. Burnout					
<i>(R² = .61; p>.001)</i>	<i>Constant</i>	53.98	-	28.03	<.001
	Acceptance	-.20	-.26	-2.76	<.05
	Mindfulness	-.17	-.39	-5.33	<.05
	Cognitive defusion	.06	.10	.92	ns
	Values and committed action	-.21	-.36	-4.18	<.05
	Self-as-context	-.02	-.04	-.46	ns
2. Compassion fatigue					
<i>(R² = .44; p>.001)</i>	<i>Constant</i>	40.20	-	18.48	<.001
	Acceptance	-.40	-.55	-4.94	<.001
	Mindfulness	-.13	-.32	-3.75	<.001

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Cognitive defusion	.02	.03	.25	ns
Values and committed action	.08	.14	1.40	ns
Self-as-context	-.03	-.05	-.56	ns

Note: ns = non-significant. Subscales of the Engaged Living Scale entered into separate regression models presented the following results: Valued Living (*Burnout*; $\beta=.06, p>.05$. *Compassion fatigue*; $\beta=-.23, p<.05$) and Life Fulfilment (*Burnout*; $\beta=-.37, p<.001$. *Compassion fatigue*; $\beta=-.13, p>.05$).

To control for the potentially confounding effects of relationship status and nursing specialty, hierarchical linear regression models (table 4) were calculated for perceived stress (model 3) and compassion satisfaction (model 4). Both models were significant with overall variance explained estimated at 46% for perceived stress ($R^2=.46, F(6, 135)=20.83, p<.001$) and 36% for compassion satisfaction ($R^2=.36, F(6, 135)=14.45, p<.001$). Neither relationship status or nursing specialty significantly accounted for variance explained in these two outcomes. Lower acceptance, mindfulness, values and committed action, and self-as-context were significant independent contributors of higher perceived stress, whereas greater mindfulness and values and committed action emerged as significant contributors to compassion satisfaction. It is worth noting that cognitive defusion did not emerge as a significant independent contributor of any outcome in these four regression models.

Table 4. Hierarchical linear regression models for perceived stress and compassion satisfaction.

Model	Variable	<i>B</i>	β	<i>t</i>	<i>p</i>
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1. Perceived stress

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Step 1 ($R^2 = .01; p > .05$)	<i>Constant</i>	28.19	-	18.28	<.001
	Nursing specialty	-.35	-.08	-1.00	ns
Step 2 ($\Delta R^2 = .47; p < .001$)	<i>Constant</i>	60.81	-	18.65	<.001
	Acceptance	-.26	-.25	-2.24	<.05
	Mindfulness	-.15	-.25	-3.02	<.05
	Cognitive defusion	.05	.05	.44	ns
	Values and committed action	-.17	-.21	-2.07	<.05
	Self-as-context	-.13	-.18	-1.98	<.05

2. Compassion satisfaction

Step 1 ($R^2 = .03; p > .05$)	<i>Constant</i>	35.52	-	43.72	<.001
	Relationship status	.62	.16	1.95	ns
Step 2 ($\Delta R^2 = .37; p < .001$)	<i>Constant</i>	13.70	-	5.33	<.001
	Acceptance	.02	.03	.22	ns
	Mindfulness	.10	.22	2.47	<.05
	Cognitive defusion	-.11	-.16	-1.29	ns

Values and committed action	.33	.55	5.01	<.001
Self-as-context	.01	.01	.11	ns

Note: ns = non-significant. Subscales of the Engaged Living Scale entered into separate regression models presented the following results: Valued Living (*Perceived stress*; $\beta=.11, p>.05$. *Compassion satisfaction*; $\beta=.35, p<.05$) and Life Fulfilment (*Perceived stress*; $\beta=-.42, p<.001$. *Compassion satisfaction*; $\beta=.23, p>.05$).

Discussion

This cross-sectional study explored the statistical relationships between ACT processes, perceived stress and professional quality of life outcomes (burnout, compassion fatigue and compassion satisfaction) in a sample of UK NHS nurses. Modelling work may enable more effective tailoring of stress-management interventions, and is essential in helping NHS staff (such as nurses) to develop effective coping mechanisms to endure stress.

How is perceived stress associated with professional quality of life?

Our results indicate that perceived stress was significantly associated with all three quality of life outcomes: moderate-to-strong positive correlations were found for burnout and compassion fatigue, and a moderate negative correlation was found for compassion satisfaction. These data support our first hypothesis and are consonant with previous research into the link between stress and burnout (e.g. Barnard, Street, & Love, 2006; Papadatou et al., 1994). Previously, there was a dearth of research on the associations between perceived stress and compassion fatigue/satisfaction in nurses, and so our findings offer novel contributions to the literature.

The consistent experience of stress on a daily basis (e.g. high caseload demands coupled with nurse shortages) is a central risk for developing burnout (Maslach, 1982). The frequent

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exposure to patient trauma and illness, the task of meeting patient and family demands/expectations, and all whilst maintaining a high standard of care, is likely to increase nurses' risk for compassion fatigue (Sinclair, Raffin-Bouchal, Venturato, Mijovic-Kondejewski, & Smith-MacDonald, 2017). The negative impact of perceived stress on compassion satisfaction is also important. It is these positive aspects (e.g. connecting with the patient, providing compassionate care, working as a team) of carrying out a caring role which many nurses value most in their job (Altun, 2002). Perceived stress negatively correlating with compassion satisfaction in the current study may be a factor in partially explaining prevalent shortages in the nursing workforce (Ho, Chang, Shih, & Liang, 2009; Khamisa, Peltzer, Ilic, & Oldenburg, 2016).

These findings support the rationale that effective stress-management interventions are needed for nursing professionals, and that intervening on stress perceptions may indirectly reduce the risk of burnout and compassion fatigue, and encourage greater satisfaction.

ACT processes and their relation to stress and professional quality of life

The second aim of this study explored (i) whether ACT may provide a suitable intervention framework for this population, and (ii) whether tailoring to focus differentially on the six core processes of the ACT framework was necessary. Promisingly, all six ACT processes negatively correlated with perceived stress, burnout and compassion fatigue, with moderate-to-strong effects. This concurs with Cheng, Meng and Jin (2015) who reported that higher scores on professional values were associated with lower burnout, and Iglesias et al. (2010) reported positive correlations between experiential avoidance and burnout. The inclusion of compassion fatigue as an outcome variable in the current study is advantageous as this has not yet been explored extensively in ACT-based occupational health research. All six ACT processes positively correlated with compassion satisfaction (with moderate-to-strong effect

sizes), with values and committed action demonstrating the strongest associations. This also concurs with Cheng et al.'s (2015) finding that professional values positively impact on personal accomplishment in their nursing sample. Craigie et al. (2016) suggest that compassion satisfaction may provide a protective mechanism against the development of negative stress outcomes such as burnout and compassion fatigue. In this context, our findings are important as they tentatively point to the applicability of ACT as a relevant intervention framework.

We also conducted multivariate analyses to identify the comparative importance of each ACT process in explaining variance in each outcome variable. This was a crucial next step, providing valuable information for tailored intervention content. In these analyses the ACT processes together explained a large proportion of the variance for each outcome (R^2 ranging from .36 to .61), representing large effect sizes (Cohen's d : 1.5 to 2.49) (Cohen, 1988). This is concurrent with Duarte & Pinto-Gouveia (2017) who also reported that psychological flexibility explained significant proportions of variance (small to medium effects) in two of these same outcomes. It is important to note, however, that (a) effect sizes were stronger in our study, and (b) Duarte & Pinto-Gouveia (2017) used only the AAQ-II as a 'predictor' variable (rather than separate sub-processes within the ACT model) and so it is debatable whether their findings really do pertain to overall psychological flexibility or to experiential avoidance/acceptance only. Our approach of using separate measures for each ACT processes offers a more in-depth, sensitive, and theoretically-robust exploration of ACT in this context. To that end, we propose that our data offer a novel and more robust theory test of the ACT model to the field of occupational health psychology.

Tailoring ACT-based interventions for this population and context

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Acceptance, mindfulness, and values and committed action were particularly reliable variables across each of the four regression models. Based on these findings we would encourage tailoring of stress-management interventions for nurses to focus especially on these ACT processes. Before attempting to conceptually explain these findings, it is important to note that high variance was explained by these ACT processes beyond any variance explained by work-related (e.g. nursing specialty) and demographic (e.g. relationship status) confounding variables. These large effects highlight the importance of mindfulness and ACT-consistent behaviors in managing stress, above and beyond previously-known factors such as the importance of having a partner (Cutrona, 1996), or having more years of experience in a given nursing specialty (Berger, Polivka, Smoot, & Owens, 2015; Dasan, Gohil, Cornelius, & Taylor, 2014).

Higher scores in ACT processes contributed to lower scores in perceived stress, burnout and compassion fatigue, and higher levels of compassion satisfaction. These findings make conceptual sense: within a healthcare context, patient checks can become routine, reducing a sense of personal accomplishment which is a known risk factor for burnout (Maslach, 1982). Mindfulness training may promote more attentive listening behaviors, which in turn allow healthcare workers to address the unique needs of each patient in the present moment (Raab, 2014), thus promoting a sense of achievement within this caring role. The finding that mindfulness significantly contributed to improved compassion satisfaction is, therefore, not surprising. Training in psychological acceptance and an openness to experience (rather than avoid) external and internal causes of suffering may develop a capacity to engage in effective care and communication, even in the presence of nurses' own and patients' distress (Gomes, Santos, & Carolino, 2013). This is crucial given that a risk factor for compassion fatigue can be conceptualised as the avoidance of psychological suffering in others to reduce vicarious effects (Figley, 1995). The inherent value of connecting with patients is important to nurses

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to promote the perception that their work is meaningful, further reducing risks of burnout (Cheng et al., 2015). It is, therefore, not surprising that values and committed action contributed to improved compassion satisfaction within this sample; if the workplace environment can be configured such that nursing staff can gain a greater sense of personal achievement from their work, they are likely to value that aspect of their job to a greater extent, consequently buffering against the negative effects of workplace stressors such as lack of workload control (Craigie et al., 2016).

Cognitive defusion did not significantly contribute to any of our study outcomes, and self-as-context only contributed to perceived stress. This may be due to the lack of well-validated tools to measure these specific ACT processes; the measures used for both cognitive defusion and self-as-context are both relatively new contributions to the literature and require robust psychometric validation. An alternative explanation might also be found in our cross-sectional design, in that cognitive defusion and self-as-context may be processes that develop longitudinally.

Study limitations

The derivation of data via self-report measures in this study is potentially subject to socially desirable answers (Paulhus, 1984; Van de Mortel, 2008). Participants may have been less inclined to indicate that they were stressed or 'burnt out' given that their employers advertised the study to them, despite reassurances that employers would not have access to individual participant data. Whilst the cross-sectional nature of this study limits capacity to infer causality between the ACT components and work-related wellbeing outcomes (Bowen & Wiersema, 1999), it provides a good rationale for the testing of ACT interventions using experimental study designs which could more effectively elucidate causal mechanisms. The nature of the sample also potentially limits generalisability of findings, due to a

predominantly white, female sample. Although likely representative of the North-West of England (one of our recruitment sites), this may not be representative of the ethnic diversity in the East/West Midlands of England where participants were also recruited from. The ratio of female-to-male nurses in our sample is concurrent with previous nurse studies cross-nationally (Heinen, van Achterberg, Schwendimann, Zander, Matthews et al., 2013) and thus the gynocentric bias in our sample was representative of the current UK nursing workforce (NHS Digital, 2019). Data was not collected on the grade of nursing staff (e.g. ward manager, senior staff nurse, staff nurse etc.). These roles have different stressors and reward systems that may impact work-related wellbeing differently (Butterworth, Carson, Jeacock, White, & Clements, 1999). Future research should consider collecting data related to this specific demographic in order to account for these contextual factors.

The response rate in this study was low, which might impact generalisability of findings. However, our calculated response rate assumes that every nurse possible will have been provided with the opportunity to complete the survey; it is highly likely though that large proportions of the nursing population at participating Trusts may not have seen the survey invitation due to the unsolicited, impersonal method of recruitment (primarily via the staff Intranet system rather than direct email) (Wright, 2005). Despite this low response, however, our study exceeded sample size requirements to fully power analyses. Furthermore, not only was mean perceived stress and professional quality of life reported by our sample similar to previous research (e.g. Craigie et al., 2016; Duarte & Pinto-Gouveia, 2017; Frögéli et al., 2015; Kashani et al., 2010), the current sample was reflective of the UK NHS workforce in which nurses working in adult, community and mental health settings are the three largest sub-specialties across the UK (NHS Digital, 2019). This implies that although self-selected, our sample was representative of the wider nursing population. Although Cronbach's alphas were high (ranging from .90 to .94) for all of the ACT process measures in this study, it is

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worth considering that some ACT process measures have received better validation than others. For instance, validation of measurement tools for cognitive defusion and self-as-context are less developed. This might partially explain the lack of significant findings regarding cognitive defusion and self-as-context.

Implications

Given the negative impact of perceived stress on professional quality of life, absenteeism and staff turnover, this study further supports current UK policy (e.g. Boorman, 2009) that evidence-based stress-management interventions are needed in the UK healthcare setting. We acknowledge that comprehensively addressing issues of work-related wellbeing in nursing may require system-level change as well as individual-level intervention. At the individual level, our data suggest that ACT is a promising intervention framework from which to provide this support and skills training, particularly interventions which focus on acceptance, mindfulness and values-based processes. With regards to broader implications, two processes (cognitive defusion and self-as-context) did not emerge as significant contributors to study outcomes. This may be due to the quality of measurement tools which has implications for broader ACT research too. In line with the MRC (2006) framework, Phase I longitudinal and experimental research (e.g. single-case experimental designs; Ledford & Gast, 2018) examining changes in these ACT processes and how these relate to outcomes of interest is now needed to build on these Phase I cross-sectional findings. This would address recommendations for more research on intervention moderators/mediators (Stanton, Luecken, MacKinnon, & Thompson, 2013; Hulbert-Williams, Beatty, & Dhillon, 2018) and processes (Hayes & Hofmann, 2017; Oakley, Strange, Bonell, Allen, & Stephenson, 2006). This is necessary before moving to high-cost Phase II studies (e.g. a multi-site feasibility trial) in order to ensure tailored interventions are having desired effects on work-related wellbeing outcomes (Medical Research Council, 2006). Although this sample is limited to nursing staff,

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we believe that our findings can be generalised to other healthcare professionals, given the role overlap between different groups in the allied healthcare professions (Williams & Sibbald, 1999; White et al., 2008).

Conclusions

The present study sought to provide empirical justification for the use of ACT for nurse stress-management. Our findings indicate that mindfulness, acceptance and values-based processes are pertinent influences on stress and professional quality of life, and should feature as key components in ACT-based stress-management interventions for this population. Although our sample was limited to nursing staff in the UK, our findings have broader implications and would likely be replicated in other geographic settings, and in other health and social care professional groups.

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