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# A Biobehavioral Approach to Examining Moral Distress in Critical Care Nurses

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A Biobehavioral Approach to Examining Moral Distress in Critical Care Nurses

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

by

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Abstract


A BIOBEHAVIORAL APPROACH TO EXAMINING MORAL DISTRESS IN CRITICAL CARE NURSES

By Marian Altman, Ph.D, MS, RN


A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

Virginia Commonwealth University, 2017


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Moral distress is a complex and challenging problem that may cause negative

biopsycohosical and professional outcomes for critical care nurses.  The purpose of this work

was to explore the relationship between the ethical climate of the work environment and moral

distress as experienced by critical care nurses; and to explore relationships among mediators of

stress (nurse characteristics e.g. education (BSN, nonBSN), years certified as a critical care

nurse, and tolerance of ambiguity) and their relationship with perceived stress, moral distress,

health status and salivary alpha amylase.  A descriptive correlational cross-sectional design was

used for this pilot study of 100 critical care nurses working in adult intensive care units in one

large academic medical center.  Data were analyzed using descriptive statistics to characterize

the sample and the model variables.  Regression analysis using a stepwise regression model

building technique was used to determine predictors of the study outcomes (moral distress,

health status, and salivary alpha amylase).  The findings demonstrate that the ethical

characteristics of the work environment and perceived stress were predictive of moral distress,

psychological/emotional outcomes and stress symptoms. Other variables thought to mediate

these relationships were not significant.  Future research is needed to find ways to prevent moral

distress from occurring and to support nurses dealing with moral distress.

Sigma Theta Tau Grant

A Biobehavioral Approach to Examining Moral Distress in Critical Care Nurses

**Specific Aims**

Moral distress is a complex and challenging problem that may cause negative

biobehavioral and professional outcomes for nurses and in particular critical care nurses. The

term moral distress describes the psychological, emotional, and physiological suffering that

nurse's experience when they act in a manner that is inconsistent with their ethical values,

principles or commitments (McCarthy & Gastman, 2015). Accumulating evidence indicates that

moral distress is linked to negative biobehavioral and professional outcomes that may exacerbate

elements related to the nursing shortage such as burnout, turnover and leaving the profession

(Corley, 2002; Corley, Minick, Elswick, & Jacobs, 2005; Mobley, Rady, Verheijde, Patel, &

Larson 2007; Nathanial, 2006; Pauly, Varcoe, & Storch, 2012). Moral distress negatively

influences a nurse's relationship with patients and the quality, quantity and safety of nursing care

delivered- all of which have implications for healthcare organizations, nursing and patient

satisfaction (Corley, et al., 2005; Gutierrez, 2005; Huffman & Rittenmeyer, 2012; Pauly et al.,

2012; Wiegand & Funk, 2012; Wilkinson, 1987).

Many aspects of patient and family care cause nurses working in intensive care units to

experience stress. Stress is described as the effects of psychosocial and environmental factors on

physical and /or mental wellbeing (Ganz, 2012). When a person perceives a physical or

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psychological threat, the hypothalamic-pituitary-adrenal axis and the sympathetic adreno-medullary axis are activated--resulting in sympathetic stimulation and increased salivary amylase levels (Papthanassoglou, Giannakopoulou, Mpouzika, Bozas & Karabinis 2010). Nurses experiencing moral distress report physical symptoms of stress such as diarrhea, headaches, heart palpitations, neck pain, muscle aches, and vomiting (Fry, Harvey, Hurley, & Foley 2002; Nathanial 2006; Schluter, Winch, Holzhauser, & Henderson, 2008; Wilkinson, 1987).

All nurses working in the critical care environment experience the intensity of the setting, however, it is the nurses who recognize the morally correct course of action to take, but are somehow prevented in carrying out those actions, who experience moral distress which differentiates them from the critical care nurses who do not experience moral distress (O'Connell, 2014). It is hypothesized that the experience of moral distress contributes to an activated psychophysiological stress response. While a stress response resulting from moral distress is often assumed to occur, this phenomenon has not been studied within a biobehavioral framework that can guide understanding of the link between a nurses' experience of moral distress and the physiologic stress response. Studies are needed to examine the physiologic stress effects of moral distress so that interventions to prevent or decrease the occurrence of moral distress may be evaluated. Thus, the purpose of this descriptive, cross-sectional, exploratory study is to determine the relationship between the ethical climate of the work environment and moral distress as experienced by critical care nurses.

This work is guided by a conceptual framework based upon a classic model by Elliott and Eisdorfer (1982) that was commissioned by the Institute of Medicine and has demonstrated utility in organizational research (see Figure 1). The model incorporates potential stressors, mediators of stress, psychological consequences and behavioral outcomes. The proposed

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research addresses a phenomenon that may potentially cause a stress reaction (the ethical characteristics of the unit work environment) that is mediated by individual characteristics of the nurse (total years experience as an RN, years of critical care experience, and tolerance of ambiguity), psychological consequences (perceived stress), and biobehavioral consequences such as perceived moral distress and elevated salivary amylase levels. It is also hypothesized that the ethical characteristics of the work environment may result in high intensity moral distress that activates a psychophysiological stress response resulting in altered salivary amylase levels. The specific aims for the research described in this proposal are to:

1. Determine the extent to which critical care nurses working in an adult intensive care unit experience moral distress.

2. Explore relationships among ethical characteristics of the work environment, levels of perceived stress, moral distress and salivary amylase levels.

3. Explore relationships among mediators of stress (nurse characteristics e.g. age, years of experience, years certified as a critical care nurse, and years working in the ICU) and tolerance of ambiguity and their relationship with perceived stress, moral distress and salivary amylase.

4. Analyze gender and educational (BSN vs. non-BSN) differences in perceived stress, moral distress and salivary amylase.

## Significance

Andrew Jameton, a professor of Public Health at the University of Nebraska Medical Center, first defined moral distress in 1984 as

painful feelings and/or the psychological disequilibrium that occurs when nurses are

conscious of the morally appropriate action a situation requires, but cannot carry out that

action because of institutionalized obstacles:  lack of time, lack of supervisory support,

exercise of medical power, institutional policy or legal limits (Jameton, 1984, p.6).

Moderate to high levels of moral distress are frequently associated with aggressive or futile care

at the end of life, unsafe or inadequate staffing and incompetent staff or providers (O'Connell,

2015). Nurses have reported feeling moral distress as frequently as once a week to as little as one

to two times per year (Gutierrez, 2005, Wilkinson, 1987).

The phenomenon of moral distress is well documented in the literature as a problem that

affects nurses spiritually and physically (Huffman & Rittenmeyer, 2012). Nurses' report feeling

frustration, anger, anxiety, guilt, sadness, powerlessness, and a loss of self-worth when

confronting moral distress (Elpern, Covert, & Kleinpell, 2005; Gutierrez, 2005; Kleinknecht-

Dolf, Spichiger, Mueller, Martin, & Spirig, 2015; Nathaniel, 2006; Wilkinson, 1987). As nurses

experience moral distress more frequently, they experience higher levels of emotional exhaustion

and depersonalization towards patients (Ohnishi, K. et al., 2012).  Physical symptoms reported

include diarrhea, headaches, heart palpitations, neck pain, muscle aches, and vomiting (Fry,

Harvey, Hurley, & Foley 2002; Nathanial 2006; Schluter, Winch, Holzhauser, & Henderson,

2008).

Accumulating evidence indicates that moral distress has implications for job satisfaction,

impacts retention of health care providers and is linked to higher turnover rates (Corley, Elswick,

Gorman & Clor, 2001; Corley, 2002; Ozden, Karagozoglu, & Yildirim, 2013; Pauly et al., 2012).

High levels of moral distress are linked to lower job satisfaction (DeVeer, Francke, Struijs, &

Wilhelms, 2012; Ganz, Raanan, Khalaila, et al, 2013).  Over time, the experiences of moral

distress compromise providers' core values, which may lead to desensitization or leaving the profession (Corley et al., 2005; Mobley et al., 2007; Nathanial, 2006; Ozden et al., 2013). Moral distress is higher in clinicians considering leaving their positions (Hamric, Borchers, & Epstein, 2012). Wiegand and Funk (2012), who examined 204 critical care nurses employed at a university medical center reported that 38% of nurses in the study would change their practice environment if faced with another moral distress issue. Evidence also suggests that moral distress may negatively impact a nurse's relationships with patients and the quality, quantity and safety of nursing care delivered (Corley, et al., 2005; DeVeer et al., 2012; Gutierrez, 2005; Oh & Gastmans, 2015; Wiegand & Funk, 2012). Morally distressed nurses may decrease their interactions with patients and/or families and request to not care for a patient. Some nurses describe providing a lower standard of care to patients as a result of experiencing moral distress (Wiegand & Funk, 2012).

Moral distress is a serious issue that has been frequently examined for three decades. However significant gaps in knowledge exist. First, the concept of moral distress was first defined by Jameton 29 years ago, but qualitative research demonstrates that there is no agreement on key definitional features (Hamric, 2012). Multiple definitions of moral distress have resulted in difficulty developing an adequate measure; however, recent work in this area has led to the development of a new tool for use in measuring the phenomenon (Hamric, et al., 2012). The initial testing of the Moral Distress Scale-Revised (MDS-R) shows promise as a valid and reliable measure of moral distress (Hamric et al., 2012). However, additional psychometric testing is needed as research efforts move into studying interventions (Hamric, 2012). The proposed study will utilize the revised tool and provide additional testing of the validity and reliability of the MDS-R.

A second area related to moral distress that requires further investigation is the biobehavioral effect.  While a stress response resulting from moral distress is often assumed to occur, this phenomenon has not been studied within a biobehavioral framework that can guide understanding of the linkage between a nurse's experience of moral distress and the physiologic stress response.  Studies are needed to examine the physiologic stress effects of moral distress so that interventions may be developed and tested to decrease its occurrence.

The purpose of this descriptive, exploratory study is to determine the relationships among moral distress experienced by critical care nurses, perceived stress levels and salivary amylase levels. This work is guided by a conceptual framework based upon a classic model by Elliott and Eisdorfer (1982) that demonstrates unit perceived stressors: nurse characteristics such as education, years of nursing experience as an RN and years of experience in the ICU; ethical work environment, tolerance for ambiguity and mediators of stress that cause a reaction leading to psychological and biological consequences such as perceived moral distress and elevated salivary amylase levels.  It is hypothesized that the experience of high intensity moral distress contributes to an activated psychophysiological stress response resulting in altered salivary amylase levels.

**Proposal**

**Design, sample and setting**

This study will use a descriptive correlational cross-sectional design.  The convenience sample of 80 participants will be recruited from critical care nurses working in five adult intensive care units (ICUs) at a 750 bed Level I trauma academic medical center in a large southeastern city.  Eighty participants will be needed for the pilot study based upon 15

participants per variable and oversampling for the possibility of missing data.  The potential

sample is all critical care nurses who meet the following inclusion requirements:  1) license to

practice as a registered nurse (RN), 2) working either full-or part-time in an ICU with a direct

patient care role and 3) have completed orientation and have been working in the ICU for a

minimum of six months.  RNs who are temporarily absent from their position during the data

collection period will be excluded from participation. Exclusion criteria are: 1) float pool nurses

and 2) agency nurses.

**Recruitment Strategies**

Several recruitment strategies will be utilized to ensure optimal enrollment.  The study

will be announced via email to all nurses working in each of the ICUs and will include

information about the study and data collection dates and times.  The principle investigator (PI)

will meet with nurses in each ICU at staff meetings in order to verbally explain the aim of the

study and the characteristics of the questionnaire.  Confidentiality of all participants will be

stressed. A unit champion will be recruited in each ICU to encourage participation.  In addition,

posters explaining the study will be posted in each of the ICUs.

The study will be submitted to the Virginia Commonwealth University Institutional

Review Board (IRB) for approval.  Participation in the study will be voluntary and no identifying

information will be collected.  Completion of the study questionnaires implies consent.

**Measures**

**Potential stressors.**

The Hospital Ethical Climate Survey (HECS) is a 26-item Likert-type instrument that

assesses five factors reflecting relationship of nurses with peers, patients, managers, physicians

and the hospital.  Each item elicits a response ranging from 1 (almost never true) to 5 (almost always true). Higher HECS scores indicate greater perceived support for addressing ethical problems for both unit- and organization-specific issues. Hamric (2012) reported HECS reliabilities of 0.87 to 0.90 for nurses.

**Mediators of stress.**

Tolerance of ambiguity is a mediator that may affect potential stressors and will be measured by using Budnar's (1962) Intolerance of Ambiguity Scale (TSA).  The TAS is a 16-item Likert-type scale that was designed to assess attitudes toward ambiguity through self-report measures.  Sixteen items are rated from 1 = strongly disagree to 7 = strongly agree.  Higher scores reflect increasing tolerance for ambiguity.  Internal consistency reliabilities of the scale range from 0.39 to 0.62 with a mean of 0.49 (Budner, 1962).   More recently, reliability coefficients have been reported as .73 (Tatzel, 1980).  Additional potential mediators of stress such as years of experience as an RN, years in critical care, and years on current unit will be measured using a demographic questionnaire.

**Psychological and biological outcomes.**

The Moral Distress Scale –Revised (MSD-R) is a 21-tem moral distress measurement tool. Items are scored in terms of frequency and intensity of a situation.  The frequency scale is 0 (never) to 4 (very frequently).  The intensity scale is 0 (none) to 4 (great extent). Initial testing of the MDS-R revealed promising instrument reliability and validity with a Cronbach $\alpha$ of 0.89 for nurses.  Construct validity was supported through hypothesis testing. (Hamric et al., 2012).

The Perceived Stress Scale (PSS) is a 10-item measure used to assess the stressfulness of situations, the effectiveness of stress-reducing interventions and the extent to which there are associations between psychological stress and psychiatric and physical disorders. Scores are

obtained by reversing the scores of the positive items, and then summing across all items. Scores

may range from 0 to 40 with higher scores indicating greater stress. The PSS has adequate

internal and test-retest reliability of 0.78, and is correlated in the expected manner with a range

of self-report and behavioral criteria (Cohen, Kamarck, & Mermelstein, 1983).

Salivary alpha amylase (sAA) is one of the enzymes in saliva that is easily obtained and

is a sensitive biomarker for stress-related changes in the body. The release of sAA is governed

by activation of the autonomic nervous system. Thus, an increase in sAA may be expected

during psychological stress, when autonomic activation is high. A growing body of research

supports the validity and reliability of this parameter for physical and psychological stress

(Arhakas, Karagiannis, & Kalfas, 2013; Nater & Rohleder, 2009). In addition, unlike other

salivary markers of stress, sAA is not affected by variables such circadian rhythms, medications,

gender, or age.

**Data Collection Procedures**

Following IRB approval, recruitment and enrollment will be initiated. Data will be

collected utilizing a modified Dillman's Total Design methodology (Dillman, 1978). All RNs

who meet inclusion criteria will receive information regarding the study including data collection

dates and times prior to receiving the study questionnaire. The information will be provided by

the PI at staff meetings, posters displayed in the unit, and flyers placed in mailboxes. A reminder

email will be sent one week prior to each of the data collection dates. The PI will be present in

the ICU during the identified dates and times to obtain the consent, assist with electronic survey

access and collection of salivary samples. Participants will access the RedCap surveys

electronically utilizing computers on their unit. The PI will collect salivary samples from

participants after completion of the RedCap Survey by the PI who will attend a follow-up staff meeting to request participation from eligible nonparticipants.

Salivary samples will be collected using Salimetrix Saliva Collection Aid (SCA). Participants will be requested to not consume food or drink within the 20 minutes prior to sample donation. If anything has been eaten within this time window, participants will be requested to rinse their mouth with water prior to providing a specimen. Participants will be instructed to wait 10 minutes after drinking before a specimen is collected to avoid diluting it with water and artificially lowering concentration/volume (mg/dL, ng/mL, pg/mL) or activity/volume (U/mL) estimates of salivary analytes (Granger, Fortunato, Beltzer, Virag, Bright, & Out, 2012).

The passive drool method will be used to collect the saliva samples. Participants will open the individually packaged SCA and place the ribbed end of the SCA securely into a pre-labeled collection vial.  Participants will be instructed to allow saliva to pool in their mouth, then tilt their head forward and gently force saliva through the SCA into the vial to the required level. Next participants will remove and discard the SCA and attach a cap tightly to the collection vial. Samples will be collected by the PI and immediately refrigerated at 4 degrees Celsius and placed in a freezer at 20 degrees Celsius within two hours.  A gift card incentive, formal thank you letter and written documentation of their participation in the study will be provided upon completion of the electronic surveys and collection of the salivary sample.

**Data Analysis**

Questionnaires from RedCap will be uploaded into the analysis software package Statistical Program for Social Sciences (SPSS).  Salivary alpha amylase levels will be imported

and all data will be cleaned and an analysis-ready data set will be prepared. The sample will be characterized using descriptive statistics using mean (SD) for continuous variables and frequency (f) and percent (%) for categorical variables. Cronbach's alpha will be used to evaluate the reliability of the instruments used to measure the variables. Model variables will be summarized using the mean (SD) for each scale/subscale and structural equation modeling will be utilized to analyze the effects of the independent and mediator variables on perceived stress and salivary alpha amylase. Statistical significance will be set at alpha =0.05.

## Conclusion

The findings of the proposed study will add to our knowledge of biobehavioral consequences of the ethical work environment on stress and moral distress in critical care nurses. Establishing this link will allow researchers to examine and better understand the concept of moral distress so that interventions will be identified that decrease moral distress levels and intensity in critical care nurses and prevent adverse events that occur as a result of moral distress.

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**Proposed Budget**

**Personnel**

Marian Altman – PI, PhD Student

Jeanne Salyer – Advisor/Chair

Ian Hines – Lab technician

**Personnel**

| | |
|---|---|
| Lab Technician (2% effort base salary) | $423.00 |
| Research Assistant time $14.00/hour x 8 hours | $112.00 |
| Fringe Faculty and Classified | $153.00 |
| Fringe Hourly | $14.00 |

**Supplies**

Alpha amylase

| | |
|---|---|
| One plate $300.00 (36 samples or 72 duplicates) | $900.00 |
| 80 participants/180 duplicates = 3 plates | |
| Salivary Passive Drool Kits ($150/50 kits) x2 | $300.00 |
| Recruitment flyers (1000) | $ 50.00 |
| Posters (Six 18x24 glossy) | $120.00 |

**Other**

| | |
|---|---|
| Participant incentive  $10.00 store gift card x 80 participants | $800.00 |

Fees applied to VISA Cards ($1.95/card x 80 cards)                    $156.00


**Total**                                                            **$3028.00**
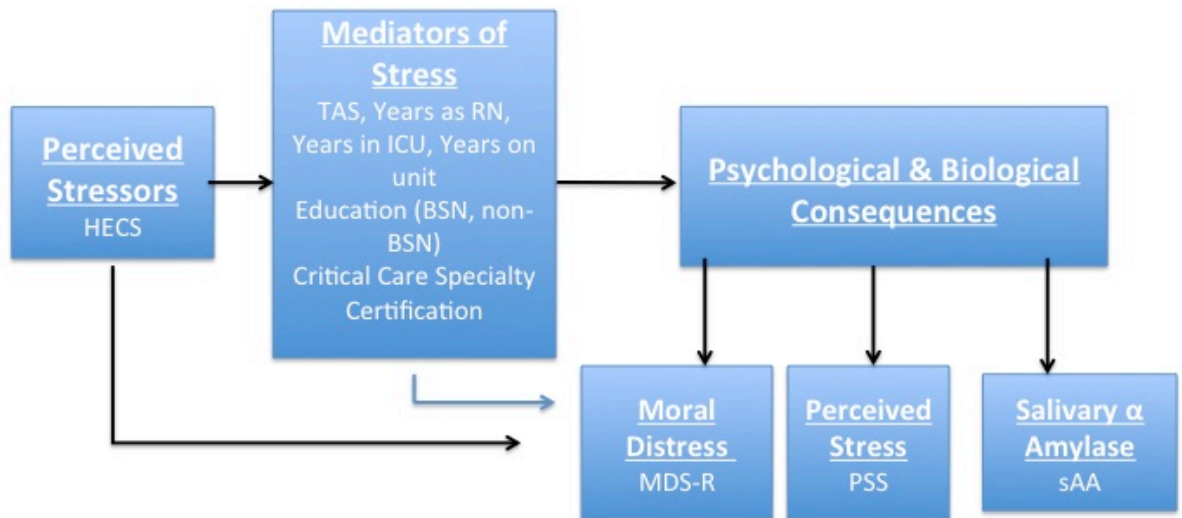
Figure 1: Conceptual Model for a theory of moral distress with a biobehavioral framework

Key: HECS – Hospital Ethical Climate Survey; TAS – Tolerance of Ambiguity Scale; ICU – Intensive care unit; MDS-R – Moral Distress Scale-Revised; PSS- Perceived Stress Scale

**Figure 1**

Conceptual Model for a Theory of Moral Distress with a Biobbehavioral Framework

Manuscript 1

Moral Distress in Critical Care Nurses: Influencing Factors and Consequences

Marian Altman MS, RN, CNS-BC, CCRN-K, Doctoral Candidate
Ann Hamric PhD, RN, FAAN,
Leroy Thacker PhD, Jamie Sturgill, PhD,
Ken Faulkner, MA, M.Div., Jeanne Salyer Ph.D, RN
Virginia Commonwealth University

**Abstract**

Moral distress is a complex and challenging problem that may cause negative biopsychosocial and professional outcomes for nurses and in particular critical care nurses. Nurses have reported a wide variety of physical, behavioral, and spiritual effects as a result of moral distress. Many of the physical and psychological symptoms felt by persons experiencing stress also occur in nurses experiencing moral distress. The stress response may be provoked by many different stimuli such as pain, fear, and emotional stress such as moral distress. While a stress response resulting from moral distress is often assumed to occur, this phenomenon has not been studied within a biobehavioral framework that can guide understanding of the linkage between a nurse's experience of moral distress and the physiologic stress response. The purpose of this paper is to propose a biobehavioral framework for studying moral distress and stress since both phenomena may occur and may result in biological and behavioral outcomes. Moral distress is a significant issue that has a negative impact on nurses. We must better understand the

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biobehavioral correlates of moral distress so that we may identify interventions that decrease moral distress intensity in nurses and prevent adverse events that occur as a result of moral distress.

## Background and significance

Moral distress is a complex and challenging problem that may cause negative biopsychosocial and professional outcomes for nurses and, in particular, critical care nurses. Andrew Jameton first defined moral distress in 1984 as

> "painful feelings and/or the psychological disequilibrium that occurs when nurses are conscious of the morally appropriate action a situation requires, but cannot carry out that action because of institutionalized obstacles: lack of time, lack of supervisory support, exercise of medical power, institutional policy or legal limits" (Jameton, 1984, p.6).

Varcoe, Pauly, Webster and Storch (2012) redefined the original definition stating that moral distress describes "the experience of being seriously compromised as a moral agent in practicing in accordance with accepted professional values and standards" (p.59). This definition of moral distress focuses less on the suffering that nurses experience as a result of a challenging situation and instead focuses on the effect of moral distress on moral integrity of the nurse and other healthcare providers.

Moral distress has been well described in the critical care nurse population (Browning, 2013; Choe, Kang & Park, 2015; Corley, 1995; Crongvist & Nystrom, 2007; DeKeyser et al., 2013; Elpern, Covert, & Kleinpell, 2005; Hamric & Blackwell, 2007; Karanikola et al., 2014; Mason, Leslie, Lyons, Walke & Griffin, 2014; McClendon & Buckner, 2007; Mobely, M. J., Rady, M. U., Verheijde, J. L., Patel, B., & Larson, J. S., 2007; St Ledger, Begley, Reid, Prior,

McAuley, & Blackwood, 2013; Whitehead, Herbertson, Hamric, Epstein & Fisher, 2014; Wiegand & Funk, 2012; Wilson, Goettemoeller, Bevan & Mc Cord, 2013). Nurses working in critical care units are repeatedly exposed to moral and ethical issues arising from an environment that is characterized by highly complex patients, challenging patient care situations requiring use of advanced technology to sustain physical life, and situations that require a nurse to overcome institutional obstacles and raise interpersonal conflicts about values. Specifically, researchers have identified that certain factors may increase the likelihood of the development of moral distress in critical care units such as of life sustaining treatments and use of advanced technology (Corley, 1995; Cronqvist & Nystrom 2007, Elpern et al.,, 2005, Hamric & Blackwell, 2007, Mobley et al., 2007), care perceived as medically futile (Corley, Elswick, Groman et al., 2001; Elpern, et al., 2005; Wiegand & Funk, 2012; Zuzelo, 2007), implementing unnecessary treatments (Silen, Tang, Wadensten, & Ahlstrom, 2011), providing end of life care (Varcoe, Pauly, Storch, Newton, & Makaroff, 2012), unsafe or inadequate staffing ( Pauly et al., 2009; Ohnishi, Ohgushi, Nakano et al., 2012) incomplete or inaccurate information about patient outcomes (Gallagher, 2011), and incompetent staff or providers (Silen et al., 2011; Varcoe et al., 2012; Zuzelo, 2007). Other themes identified include, lack of communication (Varcoe et al., 2012; Whitehead et al., 2014), witnessing unnecessary suffering of patients (Varcoe et al., 2012; Whitehead et al., 2014), and nurses' perceptions of a negative ethical climate (Corley, Minick, Elswick, & Jacobs., 2005; Hamric & Blackwell, 2007; McAndrew, Leske, & Garcia, 2011; Silen et al., 2011).

Researchers have also explored the frequency and intensity of moral distress (Oh & Gastmans, 2013), sociodemographic influences (Cavaliere et al., 2010; Corley, Elswick, Gorman & Clor, 2001; Corley et al., 2005; Dodek, et al., 2016; McAndrew et al., 2011; Ohnishi et al.,

2010; Silen et al., 2011), psychological responses to moral distress (Beumer, 2008; Meltzer & Huckabay, 2004; Ohnishi et al., 2010; Radzvin, 2011) and coping strategies for moral distress (Cavaliere, et al., 2010; Hamric & Blackhall, 2007; Radzvin, 2011; Winland-Brown, & Dobrin., 2010;). However, a significant gap in knowledge exists. While moral distress is often assumed to be a consequence of the stressors in the critical care environment this phenomenon has not been studied within a biobehavioral framework that can guide understanding of the relationship between a nurse's physiologic stress response and the experience of moral distress. Biobehavioral science examines the relationships and interactions among biological, social, behavioral and environmental factors and their effects and outcomes. Both stress and moral distress occur as a result of environmental factors such as ethical climate and individual characteristics such as tolerance for ambiguity; and may result in both biological and behavioral outcomes. Therefore, the purpose of this paper is to discuss a framework for studying the physiologic stress response and its correlation to the experience of moral distress using a biobehavioral framework.

**Conceptual Model**

A conceptual model is useful to guide exploration of the biobehavioral correlates of moral distress. Commissioned by the Institute of Medicine, Elliott & Eisdorfer evaluated evidence suggesting that stress can affect health and disease and identified research needed to gain a better understanding of such effects. The Elliott and Eisdorfer model (1982) (see Figure 1) creates a framework depicting interactions between the individual and the environment, the environmental effects on an individual and the potential stressor(s), mediators of stress, psychological reactions and consequences such as physiologic reactions to the stressors.

Everyone is subjected to stressful experiences.  However, as noted in the Elliott and Eisdorfer (1982) model, individuals react differently to activators or potential stressors based upon mediators and moderators and may experience positive or negative consequences as a result.

First, either an event or condition in the internal or external environment activates a change in the individual's present state. An activator (or the potential stressor) may be associated with negative consequences in some individuals or may result in a neutral or positive consequence in other individuals. Mediators are the filters that act to produce these individual variations and may greatly alter the significance of an activator.  Next, the individual experiences a psychological reaction. The response may or may not produce a consequence that is the sequellae to reactions. A consequence is a prolonged or cumulative effect that may be biological, psychological or sociological.

The type and magnitude of reactions to stressors depends on mediators such as genetic traits, physical condition, prior experience, current expectations, type and quality of social supports and social context (Elliott & Eisdorfer, 1982).  Modifiers such as age, sex, social networks and available coping modes may also affect consequences. This explains why some people may experience a potential stressor without having any apparent consequence while others react and have consequences.

This model is adapted to study the biobehavioral responses to moral distress.  The proposed model (see Figure 2) addresses a phenomenon that may potentially cause a stress reaction (the ethical characteristics of the unit work environment) that is mediated by individual characteristics of the nurse (total years experience as an RN, years of critical care experience, years on unit, educational level, critical care specialty certification and tolerance of ambiguity), psychological consequences (perceived stress and moral distress), and biobehavioral outcomes

such as health status and elevated stress hormones such as salivary amylase levels. Thus, the model examines how both mediators and moderators influence perceptions of stress, moral distress and health status.

**Potential Activators: Work environment**

The work environment affects nurses.  Establishing and sustaining a healthy work environment is essential for nurses to make their optimal contribution in caring for patients and their families (AACN, 2005).  The American Nurses Association defines a healthy work environment as safe, empowering, satisfying and free from real and perceived threats (ANA, 2016).  One component of a healthy work environment is the ethical climate.  An ethical climate refers to the moral atmosphere of a social system that is characterized by shared perceptions of right and wrong as well as assumptions about how moral concerns should be addressed (Bell, 2003).  In an ethical climate, people are respected, valued and are able to express concern regarding an issue (Schluter et al., 2008). The ethical climate provides a reference for nursing practice.  A positive ethical climate is needed to support nursing practice (Olson, 1998).

Critical care patients' health needs are complex and usually require rapid information processing and decisions about how to care for and best meet the needs of the patient while also supporting their autonomy.  In addition, there are patient care situations that have the potential for ethical conflicts to occur such as going along with family wishes even when the nurse knows that the patient does not agree; physicians prescribing a treatment that the nurse disagrees with; physicians ordering treatments that patients do not want; and the use of life supporting technology to inappropriately extend life (Browning, 2013; deVeer, Francke, Struijis, & Willems, 2013; Whitehead et al., 2014).

Moral distress is more likely to occur in a poor work environment than a healthy work environment (American Association of Critical Care Nurses, 2008; Huffman & Rittenmeyer, 2012; Oh & Gastmans, 2015). Nurse researchers have explored the impact of an ethical climate on moral distress and found a positive correlation between moral distress and a poor ethical climate (Corley et al.,, 2005; Hamric & Blackhall, 2007; Pauly, Varcoe, Storch & Newton, 2009; Whitehead et al., 2014). Examining the relationship between work environment and moral distress examining the mediators and the physiologic response that occurs as a result has not yet been explored and it may be useful to do so.

**Mediators of stress**

Individuals react differently to activators of stress based upon mediators and moderators. Mediators act as filters and may alter the significance of an activator. A nurse's tolerance of ambiguity and their individual characteristics may alter the biological and psychological response.

**Tolerance of ambiguity**. Ambiguity occurs when an individual doesn't have enough information to clearly understand a situation (Budner, 1962). Many types of stimuli found in a critical care unit have the potential to be ambiguous such as lack of familiarity with a diagnosis or a piece of equipment, patient care complexity, and inadequate information (McLain, 1993). These stimuli and individual differences may lead to anxiety and stress (McLain, Kefallonitis & Armani, 2015). The intensity of the reaction, the degree of stress generated and the psychological and physiological consequences are dependent upon an individual's tolerance of situations characterized as novel, uncertain or insoluble.

Tolerance of ambiguity is defined as an individual's ability to respond positively to an ambiguous situation (Teoh & Foo, 1997). Budner (1962), one the earliest researchers of

ambiguity, defined intolerance of ambiguity as the tendency to perceive ambiguous situations as sources of threat and, conversely, tolerance of ambiguity as the tendency to perceive ambiguous situations as desirable. More recently tolerance of ambiguity has been described as an individual's reactions to situations systematic, stable tendency to react to perceived ambiguity with greater or lesser intensity (McLain et al., 2015). Ambiguity may be positive or negative and the reaction to it is contingent upon perception of the ambiguous stimulus. A person with low tolerance of ambiguity experiences stress, may react prematurely and avoid ambiguous stimuli. A person with high tolerance for ambiguity perceives an ambiguous situation as positive and challenging or interesting (Furham & Ribchester, 1995). Thus, ambiguity tolerance is dependent upon how individuals process, interpret and react to a stimulus (Furnham & Marks, 2013) the relationship between tolerance of ambiguity and the experience of moral distress may be useful to explore.

      **<u>Nurse characteristics.</u>** Nurse researchers have studied many individual nurse characteristics as they relate to moral distress. The literature relating the frequency and intensity of moral distress to nurse characteristics such age, years of nursing experience and education level, is conflicting (O'Connell, 2015). Some studies have shown that the frequency and intensity of moral distress occurred more often in older nurses (Mobley et al., 2007). Other studies noted that the intensity of moral distress decreased with nurses' age (Borhani, Mohammadi & Roshanzadeh, 2015; Corley et al., 2005; Ganz & Berkovitz, 2012). However, others have found no significant association between moral distress and age (Cavaliere et al., 2010; Corley et al., 2001, Dyo, Kalowes, & Devries, 2016; Elpern et al., 2005; McAndrew et al.,, 2011; Meltzer & Huckaby, 2004; Ohnishi et al, 2010; Pauly et al., 2009; Silen et al, 2011).

Some studies noted that as years of nursing experience increased, intensity and frequency of moral distress increased (Borhani, Mohammadi & Roshanzadeh, 2015; Dodek et al., 2016; Elpern et al., 2005; Mobley et al., 2007; Rice et al., 2008; Wiegand & Funk, 2012). Other studies found no significant association between moral distress and years of experience (Corley, et al., 2001; McAndrew et al., 2011; Ohnishi et al., 2010; Pauly et al., (2009). One study noted that nurses working in their position for many years experienced moral distress more frequently (Mobley et al., 2007)

Meltzer and Huckaby (2004) concluded that nurses with a bachelor's degree experience significantly higher intensity of moral distress. Papathanassoglou and colleagues (2012), in a study of European critical care nurses, found that the intensity of moral distress decreases as levels of autonomy and education increase and that autonomy increases with years of experience. Sirilla (2014) found an inverse relationship between education and moral distress. Other studies found no correlation with education (Corley 2001, Dyeo et al., 2016; McAndrew et al., 2011; Pauly et al., 2009; Shoorideh, Ashktorab, Yaghmaei, & AlaviMajid, 2015).

The critical care environment has become increasingly complex with advancements in care and technology. Some critical care nurses obtain certification in their critical care specialty to validate their knowledge and competency in the specialty. Nursing specialty certification is associated with enhancing quality of care and patient safety (Kendall-Gallagher & Blegan, 2009), increased confidence with decision making (Sayre, Wyant & Karvonen, 2010; Valente, 2010), increased empowerment (Piazza, Donahue, Dykes et al., 2006), and more frequent and effective nurse-physician collaboration (Sayre et al.,, 2010; Valente, 2010). Although nursing specialty certification is associated with positive outcomes for the nurse, the patient and the organization, only one study to date has explored nursing specialty certification and its

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relationship to moral distress.  Wilson and colleagues (2013) examined the level and frequency of moral distress in a convenience sample of forty-seven medical-surgical intensive care unit nurses and transitional care unit nurses and found no significant difference between the level of moral distress between nurses with specialty certification and those who were not certified.  This study was conducted at one site and was limited by a small sample size with participants whose characteristics may not be representative of other nurses.  Thus, the relationship between nursing specialty certification and the experience of moral distress may be useful to explore.

**Psychological Reactions:  Perceived Stress**

A work environment with high demands coupled with a lack of individual control is perceived as stressful to nurses (Berland, 2008).  Critical care nurses are repeatedly exposed to work-related stressors such as heavy workloads (Pryzby, 2005; Mrayyan, 2009), a fast work tempo (Berland, 2008) lack of clear work directives (Mrayyan, 2009), difficult and/or poor communication among team members (Berland, 2008), issues related to death and dying (Pryzby, 2005; Mrayyan, 2009) prolongation of life using supportive devices (Piers, et al., 2011), delivery of inappropriate care (Piers et al., 2011) and the need to make serious decisions quickly and correctly (Berland, 2008). Critical care nurses may feel powerless or unable to provide care according to their own belief system and therefore, may develop moral distress.

Wilkinson (1987), an early nurse researcher on the concept of moral distress found that patient care situations that were associated with moral distress include inappropriate tests and treatments on terminally ill patients.  Whitehead and colleagues (2014) descriptive, comparative study of healthcare professionals at a large level I trauma, tertiary medical center in southwest Virginia concluded that clinicians in critical care units had a higher level of moral distress than

clinicians in non critical care units. Root causes of moral distress identified in the study include

watching patient care suffer due to lack of provider continuity and poor communication. In

addition, moral distress was negatively correlated with ethical workplace climate. In addition,

many of the psychological and physical symptoms experienced by persons experiencing stress

also occur in nurses experiencing moral distress (Corley, 1995; Epstein & Hamric, 2009;

Gutierrez, 2005; Wilkinson, 1987).

Hans Selye first defined stress in 1936 as a result of the organism's failed attempt to

respond appropriately to a physical challenge. Since that time, the definition of stress has been

expanded upon to include psychological threats. In a historical view of the stress field, Mason

(1975) stated that psychological and experiential factors are among the most powerful stressors.

More recently McEwen (2000) defined stress as a real or implied threat to the body's

homeostasis.

The stress response is initiated when a person perceives a physical or psychological threat,

an event or succession of events that exceed the adaptive resources of a person and cause a

response (McEwen, 2000). The stress response may be provoked by many different stimuli such

as pain, fear, and emotional stress. The response to stress may be positive or negative, physical,

mental, emotional, short-term or long-term. Individuals manifest the effects of stress in many

different ways based upon the individual's environment, previous experiences and the type of

stress stimulus (McEwen, 2008). As noted in the conceptual model, it is theorized that the

experience of moral distress contributes to an activated psychophysiological stress response.

The body responds to the threat by activating the sympathetic-adreno-medullary (SAM)

and the hypothalmicpituitary-adrenal axes (HPA) (Papthanassoglou, Giannakopoulou, Mpouzika,

Bozas, & Karabinis, 2010). Once a stressor activates the HPA, corticotropin-releasing hormone

(CRH) is released.  CRH stimulates the anterior pituitary to release adrenocorticotrophic hormone (ACTH).  ACTH causes the adrenal gland to release glucocorticoid hormones (Mernar, 2006). As a result of the stimulation of the SAM, HPA axes and the hormones that are released there is a biobehavioral response that includes increased cardiovascular, musculoskeltal, neuroendocrine activity, immune system function as well as arousal, anxiety, aggression, and elevated blood glucose levels (Dhabar, 2009).

The impact of a stressful event is determined by one's perception of its stressfulness (Cohen, Kamarck, & Mermelstein, 1983). Stress may have negative physiological effects when the stress continues without relief. Adaptive processes are deregulated and may result in pathophysiology affecting many body systems (Arahakas, Karagiannis, & Kalfas, 2013). For example, adverse effects may include: increased glucose production for energy, decreased immune and inflammatory responses, increased protein catabolism, and increased metabolism (Dhabar, 2009). Protein catabolism causes a loss of collagen and connective tissue, direct inhibition of bone formation, reduced calcium absorption in the gut, increased polymorphonuclear leukocytes, (McEwen, 2008). Health status effects that occur as a result of stress documented in the literature include:  neck ache, back pain, muscle spams, stomach pain, nausea, diarrhea, frequent urination, palpitations, rapid pulse, increased or decreased appetite, insomnia, nightmares, disturbing dreams, frequent crying, nervous habits, constant tiredness, weakness, fatigue, weight gain or loss without diet, and increased smoking, alcohol or drug use. Many of these effects are also self-reported by nurses experiencing moral distress (Corley, 1995;; Fry et al., 2002; Gutierrez, 2005; Nathaniel, 2006; Wiegand & Funk, 2012; Wilkinson, 1987).

**Psychological Consequences:  Moral Distress**

Stress is experienced by all nurses and especially by those nurses working in critical care. Moral distress is an aspect of the stress phenomenon that is associated with the ethical aspect of nursing practice (Pauley, et al., 2009). When nurses recognize their moral responsibility in a situation, evaluate potential actions, but are constrained in their ability to practice ethically, a compromise of the nurse's core values or duties may result and moral distress may occur (Epstein & Delgado, 2010; Hamric, 2012; Weinzimmer, Zimmerman, Hooker, Isidro, & Bruce, 2014). A morally distressing situation may cause a nurse to worry about their moral integrity which may result in an elevated stress level. An elevated stress level may result in physical disorders such as headaches and insomnia and psychological symptoms such as anger or decreased self-confidence (Hardingham, 2004).

Moral distress has been shown to have significant impact on nurses such as depersonalization towards patients (Ohnishi et al., 2010), higher levels of emotional exhaustion (Meltzer & Huckabay, 2004; Ohnishi et al., 2010), and intent to leave their position (Cavaliere et al., 2010; Hamric & Blackhall, 2007; Winland-Brown et al., 2010). The moral distress literature suggests that while the experience of moral distress is known in some cases, others may experience moral distress yet fail to recognize it (Burston & Tuckett, 2012). Many qualitative studies of moral distress did not have the original intent of studying this phenomenon, however, the findings were strongly descriptive of moral distress (Hamric, 2012). This may be due to the fact that nurses are unaware of the antecedents of moral distress and how it is manifested. It may also be due to the fact that duration of career or the time spent on a unit has led to coping skills or resilience.

The phenomenon of moral distress is well documented in the literature as a problem that affects nurses both spiritually and physically. Wilkinson was one of the first nurse researchers to

study moral distress. Wilkinson (1987) interviewed 24 staff nurses working in a large metropolitan area in a direct patient-care role. Nearly all nurses in the study reported psychological or physical symptoms such as loss of self-worth, depression, behavioral manifestations such as nightmares and physical symptoms such as diarrhea and a headache. In subsequent studies, nurses self-reported psychological responses of frustration (Guiterriez, 2005; Wilkinson, 1989), anger (Guiterriez, 2005; Nathaniel, 2006; Elpern et al., 2005; Fry et al., 2002; Wilkinson, 1989), anxiety (Nathaniel, 2006; Elpern et al., 2005), depression (Nathaniel, 2006; Elpern et al., 2005),, guilt (Guiterriez, 2005, Nathaniel, 2006; Wilkinson, 1989), sadness, powerlessness (Nathaniel, 2006) , loss of appetite (Fry et al., 2002), and inability to sleep well (Gutierrez, 2005; Nathaniel, 2006; Elpern et al., 2005; Fry et al., 2002). (Elpern et al., 2005; Fry et al., 2002; Guiterriez, 2005; Kleinknecht-Dolf, Frei, & Spichiger, 2015; Nathaniel, 2006; Wilkinson, 1987). However, there is less evidence about biological responses that may occur as these physiologic correlates have not been studied. A systematic review by Huffman and Rittenmeyer (2012) indicates that nurses express moral distress through a variety of biopsychosocial responses. Many of the physical symptoms felt by persons experiencing stress also have been self-reported in nurses experiencing moral distress. For example, physical symptoms reported include diarrhea (Wilkinson, 1987), headaches (Fry et al., 2002; Gutierrez, 2005: Wilkinson, 1987), heart palpitations (Fry et al., 2002; Wilkinson, 1987) , neck pain (Gutierrez, 2005), muscle aches (Gutierrez, 2005), fatigue (Silen, Tang, P, Wadensten, B & Ahlstro, G., 2008; and vomiting (Nathaniel, 2006).

**Biological consequences: Salivary alpha amylase**

Levels of perceived stress and the subsequent activation of the HPA and SAM systems depend upon the individual. Exposure to a stressor may or may not lead to harmful physiological effects. One method to measure the physiolocial effects of the stress-health continuum is through the use of neuroendocrine biomarkers (Mernar, 2006). Biomarkers are distinctive biochemical indicators of a biological process and can be objectively measured and evaluated as an indicator of normal biological processes, pathogenic processes or pharmacologic responses to a therapeutic intervention (Biomarkers Definitions Working Group, 2001). Salivary alpha-amylase is widely considered a biomarker of psychological stress (Karibe, Aoyagi, Koda, & Kawakami, 2011). Salivary alpha amylase (sAA) levels increase with HPA and SAM activation (Papthanassoglou, et al., 2010; Duchemin, Steinberg, Marks, Vanover, & Klatt, 2015). Studies indicate a relationship between sAA secretion and the experience of a stressful condition with the level of sAA increasing with both physical and psychological stress (Arhakis, et al., 2013; Li & Gleeson, 2004; Walsh, Blannin, Clark, Cook, Robson, & Gleeson, 1999; Nater, LaMarca, Florin, Moses, Langhans, Koller, & Ehlert, 2006; Rohleder et al., 2004).

Saliva is produced when acinar cells are innervated by sympathetic and parasympathetic branches of the autonomic nervous system (Emmelin, 1987). Salivary alpha amylase (sAA) is one of the most plentiful components in saliva (Arhakis et al., 2013; Chatterton, Vogelson, Lu, Ellman, & Hudgesn, 1996; Granger, Fortunato, Beltzer, Virag, Bright, & Out, 2012; Nater, et al., 2006; Rohleder et al., 2004). Salivary alpha amylase is a digestive enzyme that breaks down starch (Bosch, Veerman, Geus, & Proctor, 2011). One advantage of using sAA as a biomarker is that saliva sampling is noninvasive and easily obtained without imposing stress.

Although sAA is widely considered a biomarker of psychological stress, sAA has not

been utilized to examine the potential link between the biological stress response and moral distress. Thus, it may be useful to explore the relationships among moral distress experienced by critical care nurses, perceived stress levels and salivary amylase levels. In this conceptual model it is hypothesized that the characteristics of the work environment may potentially cause a stress reaction that is mediated by individual characteristics of the nurse (total years experience as an RN, years of critical care experience, and tolerance of ambiguity), psychological consequences (perceived stress and moral distress), and result in biobehavioral outcomes such as an elevated stress hormones such as salivary amylase levels.

### Conclusion

Moral distress is a complex and challenging problem that may cause negative biopsychosocial and professional outcomes for nurses and in particular critical care nurses. It is doubtful that moral distress can ever be eliminated due to the nature of critical care patients and the critical care environment. However, further examination of moral distress in relation to ethical climate and stress indicators has potential health outcomes benefits for nurses and other healthcare professionals. Utilizing a biobehavioral lens to examine moral distress could provide insights into methods that could attenuate moral distress, potentially decrease its occurrence and eliminate negative health effects for the professionals who experience it. Establishing the link between physiologic stress responses and levels of moral distress will allow researchers to examine and better understand the concept of moral distress so that interventions will be identified that decrease moral distress levels and intensity in critical care nurses and prevent adverse events that occur as a result of moral distress.

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Framework for interactions between the individual and the environment
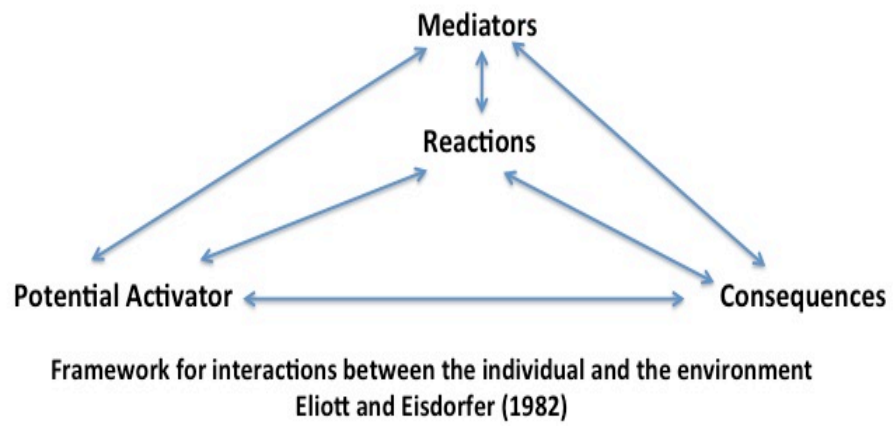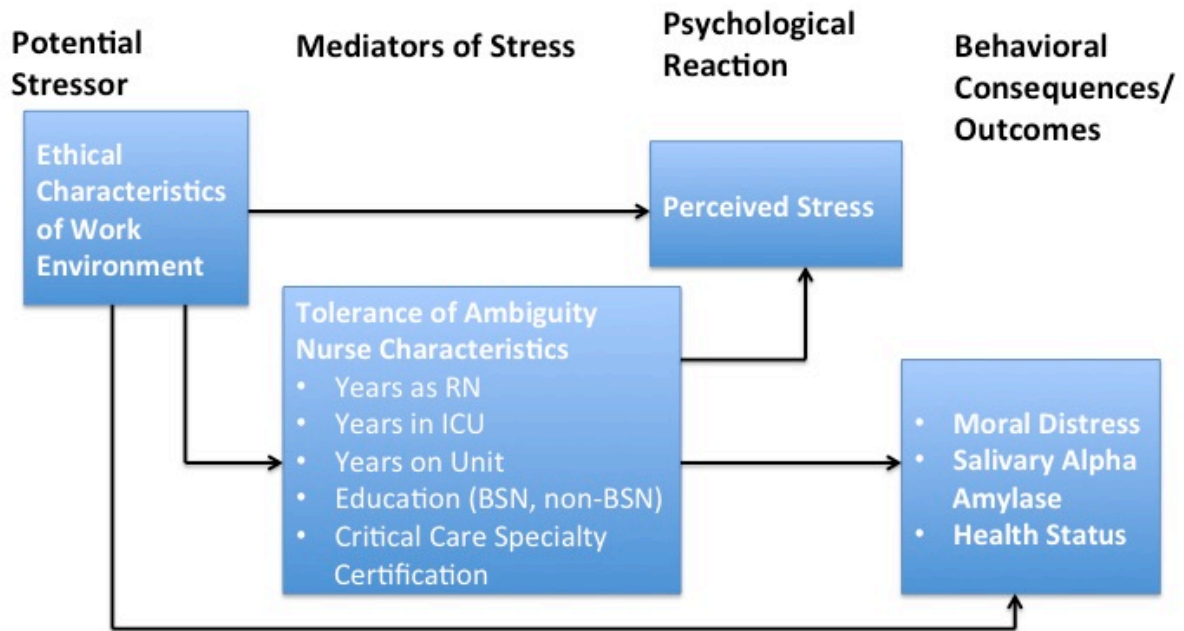Eliott and Eisdorfer (1982)

Figure 1

Framework for Interactions Between the Individual and the Environment

Conceptual model for a theory of moral distress with a biobehavioral framework

Figure 2

Conceptual Model for a Theory of Moral Distress with a Biobehavioral Framework

Manuscript 2

A biobehavioral approach to examining moral distress in critical care nurses

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Abstract

**Purpose:** Moral distress is a complex and challenging problem that may cause negative biopsychosocial and professional outcomes for critical care nurses. The purpose of this study was to explore the relationship between the ethical characteristics of the work environment and moral distress, health status and salivary alpha amylase. Mediators of stress (tolerance of ambiguity, nurse characteristics) and their relationship with perceived stress, moral distress, health status and salivary amylase were also examined.

**Design:** A descriptive correlational cross-sectional design was used for this pilot study of critical care nurses (n=100) working in adult intensive care units in one academic medical center.

**Methods:** A web-based survey of demographics and nurse characteristics, the Moral Distress Scale-Revised (MDS-R), the shortened version of Olson's Hospital Ethical Climate Scale (HEC-S), Tolerance of Ambiguity Scale (TAS), Perceived Stress Scale (PSS), SF-12 Health Survey, and the Baylor Stress Symptom Survey were used for data collection. A passive drool saliva sample for measurement of salivary alpha amylase was provided upon completion of the surveys. Data was analyzed using descriptive statistics to characterize the sample and the model variables.

Regression analysis using a stepwise regression model building technique was used to determine predictors of the outcomes (moral distress, health status, and salivary alpha amylase).

**Results:** The findings (n=100) demonstrate that the ethical characteristics of the work environment and perceived stress were predictive of moral distress, psychological/emotional outcomes and stress symptoms. Other variables thought to mediate these relationships were not significant.

**Conclusion:** The ethical characteristics of the work environment and perceived stress were predictive of moral distress, psychological/emotional outcomes and stress symptoms. The negative consequences of moral distress can be manifested both physically and psychologically and are well described in the literature. Understanding the causes of moral distress and its link to stress may lead to minimizing the negative consequences.

A biobehavioral approach to examining moral distress in critical care nurses

Moral distress is a complex and challenging problem that may cause negative biopsychosocial and professional outcomes for nurses and, in particular, critical care nurses. Jameton (1984) first defined moral distress as

> "painful feelings and/or the psychological disequilibrium that occurs when nurses are conscious of the morally appropriate action a situation requires, but cannot carry out that action because of institutionalized obstacles: lack of time, lack of supervisory support, exercise of medical power, institutional policy or legal limits" (p.6)

Moral distress is well described in the critical care nurse population (Browning, 2013; Choe, Kang & Park, 2015; Corley, 1995; Crongvist & Nystrom, 2007; Elpern, Covert, & Kleinpell, 2005; Hamric, & Blackhall, 2007; Karanikola et al., 2014; Mason, Leslie, Lyons, Walke, & Griffin, 2014; McClendon, & Buckner, 2007; Mobely, M. J., Rady, M. U., Verheijde, J. L., Patel, B., & Larson, J. S., 2007; St Ledger, Begley, Reid, Prior, McAuley, & Blackwood, 2013; Whitehead, Herbertson, Hamric, Epstein, & Fisher, 2015; Wiegand, & Funk, 2012; Wilson, Goettemoeller, Bevan, & Mc Cord, 2013). This research reflects the particular stress that nurses in critical care units face. Specifically, researchers have identified that certain factors may increase the likelihood of the development of moral distress in critical care units such as complex patients and care situations (Varcoe, Pauly, Storch, Newton, & Makroff, 2012; Wiegand, & Funk, 2012); advanced technology (Corley, Minick, Elswick, & Jacobs, 2005; Mobley, et al., 2007), interpersonal conflicts (Varcoe et al., 2012; Whitehead, et al., 2014), and institutional obstacles (Corley et al., 2005; Pauly, Varcoe, Storch, & Newton, 2009).

Researchers have also explored the frequency and intensity of moral distress and have concluded that nurses infrequently experience moral distress but nurses experience moderately high intensity of moral distress (Oh, & Gastmans, 2013). Nurse researchers studied many individual nurse characteristics as they relate to moral distress and the literature is conflicting with some studies noting an association between a sociodemographic influence and moral distress and other studies noting none (Cavaliere, Daly, Dowling, & Montgomery, 2010; Corley, Elswick, Gorman, & Clor, 2001; Corley et al., 2005; Dodek, et al., 2016; McAndrew, Leske, & Garcia, 2011; Ohnishi et al., 2010). Researchers studied the psychological responses to moral distress and concluded that depersonalization toward a patient may occur (Ohnishi et al., 2010), nurses that experience moral distress experience higher levels of emotional exhaustion (Ohnishi et al., 2010; Meltzer, and Huckaby, 2004) and nurses who experienced moral distress felt frustrated and angered (Beumer, 2008; Meltzer & Huckaby). Other researchers concluded that moral distress is higher in critical care nurses and other non-physician professionals than in physicians (Dodek, et al., 2015; Hamric & Blackhall, 2007; Whitehead, et al., 2015). The negative consequences of moral distress can be manifested both physically and psychologically and are well described in the literature. Self-reported physical symptoms include: diarrhea, headache, heart palpitations, neck pain, muscle aches, vomiting, frustration, fear, anger, anxiety, and powerlessness (Wiegand, & Funk, 2012; Wilkinson, 1987). Many of these symptoms are also self-reported by persons experiencing stress.

Both stress and moral distress occur as a result of environmental factors such as the ethical climate of the work environment. Stress may occur as a result of intolerance of ambiguity. Stress and moral distress may result in both biological and behavioral outcomes. A stress response occurring as a result of moral distress is often assumed to occur. This

phenomenon has not been studied within a biobehavioral framework that can guide an understanding of the relationship between a nurses' experience of moral distress and the physiologic stress response.  Therefore, the purpose of this study is to explore the relationship between the ethical climate of the work environment and moral distress as experienced by critical care nurses; to explore relationships among mediators of stress (nurse characteristics e.g. education (BSN, non-BSN), certified as a critical care nurse, and tolerance of ambiguity) and their relationship with perceived stress, moral distress, health status and salivary amylase.

## Conceptual Model

The model incorporates the potential stressor(s), mediators of stress, psychological reactions and consequences.  According to the model, individuals react differently to potential stressors based on mediators and moderators and may experience positive or negative reactions and consequences as a result. The model that guided the study is presented in Figure 1.

The proposed model addresses a phenomenon that may potentially cause a stress reaction (the ethical characteristics of the unit work environment) that is mediated by individual characteristics of the nurse (educational level, nursing specialty certification and tolerance of ambiguity), psychological consequences (perceived stress), and specific outcomes.  This includes moral distress, health status and an elevated stress hormone, a biological marker of stress, such as salivary amylase levels. Thus, the model examines how mediators influence perceptions of stress, moral distress and health status.

## Methods

**Design, Sample and Setting**

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A descriptive correlational cross-sectional design was used for this pilot study. A convenience sample of 100 participants was recruited from critical care nurses working in five adult intensive care units (ICUs) at a Magnet designated academic medical center in the southeastern United States. Inclusion criteria were: 1) license to practice as a registered nurse (RN), 2) either full-or part-time employment in an adult ICU with a direct patient care role and 3) completed orientation and has been working in the ICU for a minimum of six months. Float pool nurses, agency nurses, those nurses who were pregnant, and anyone having had a dental procedure 24 hours prior to data collection were excluded.

The sample size for this study was calculated using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007; Faul, Erdfelder, Buchner, & Lang, 2009). Using a multiple regression analysis with 8 predictor variables and assuming an alpha = 0.05 significance level, a desired 80% power and a medium effect size (f-squared = 0.15), it was calculated that we would need 98 subjects to detect a non-zero R-squared value; therefore we recruited 100 participants.

**Data collection procedures**

The Institutional Review Board (IRB) of Virginia Commonwealth University approved the study. Potential participants were identified through assistance with the unit based Clinical Nurse Specialist based upon inclusion criteria. Eligible nurses received information regarding the study including data collection dates and times via email and posters displayed in each critical care unit. The principal investigator (PI) was present in the ICU during the identified dates and times to screen for exclusion criteria, obtain informed consent, assist with electronic survey access and collection of salivary samples. Participants accessed the surveys via a Research Electronic Data Capture (REDCap) software survey using computers on their unit. De-identification methods were activated in REDCap as a means of preventing participants from

exporting sensitive data. Following completion of the questionnaires, salivary samples were collected using Salimetrics Saliva Collection Aid (SCA).  Participants did not consume food 60 minutes prior to salivary sample collection or liquids within the 20 minutes prior to sample collection to avoid diluting it and artificially lowering concentration/volume (mg/dL, ng/mL, pg/mL) or activity/volume (U/mL) estimates of salivary analytes (Granger, Fortunato, Beltzer, Virag, Bright, & Out, 2012).

The passive drool method was used to collect the saliva samples. Participants opened the individually packaged SCA and placed the ribbed end of the SCA securely into a pre-labeled collection vial.  Participants were instructed to allow saliva to pool in their mouth, then tilt their head forward and gently force saliva through the SCA into the vial to the required level. Next, participants removed and discarded the SCA and attached the cap tightly to the collection vial. Samples were collected by the PI and immediately refrigerated at 4 degrees Celsius and placed in a freezer at -20 degrees Celsius within two hours.  Each salivary sample was identified using a code assigned to the participant. Salivary samples were held in the School of Nursing Biobehavioral Lab until processed as a batch using an enzymatic assay (ELISA).  A $10.00 gift card and formal thank you letter were provided to participants after completion of the electronic surveys and collection of the salivary sample.

**Variables and Measures**

Survey data included demographics to measure nurse characteristics and tools to measure the ethical characteristics of the work environment, tolerance of ambiguity, perceived stress, and the behavioral consequences of moral distress, physical and psychological health, stress symptoms and salivary alpha amylase levels.

**Potential stressors: ethical work environment**. The Hospital Ethical Climate Survey

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(HEC-S) shortened form was used with the author's permission. The HEC-S is a 16-item Likert-type instrument that is used to measure the potential stressor of the ethical characteristics of the work environment. The HEC-S evaluates the nurse's level of perception of the ethical climate. Each item elicits a response ranging from 1 (almost never true) to 5 (almost always true) with a possible scores ranging from 16 to 80. Higher HEC-S scores indicate greater perceived support for addressing ethical problems for both unit and organization-specific issues. Hamric et al., (2012) reported HECS reliabilities of 0.87 to 0.90 for nurses. In this study the calculated Cronbach's alpha was 0.85.

**Mediators of stress.** Nurse Characteristics: Nurse characteristics were assessed using a demographic questionnaire. Years experience as an RN, years in critical care, years on current unit, education level (BSN vs. non-BSN), and critical care specialty certification were assessed.

Tolerance of ambiguity is a mediator that may affect potential stressors and biological consequences/outcomes such as moral distress and was measured using Budner's (1962) Intolerance of Ambiguity Scale (TAS). Budner defined an ambiguous situation as one that can not be adequately categorized by the individual due to insufficient cues. This may occur as a result of a completely new situation without familiar cues, a complex situation with a lot of cues, or a contradictory situation in which cues suggest different structures (Budner, 1962). Typically these situations are categorized by novelty, complexity or insolubility. The ICU environment may be perceived as complex and categorized by novelty, complexity and insolubility resulting in stress. An individual with a low tolerance for ambiguity will experience stress, react prematurely and avoid ambiguous stimuli. A person with high tolerance for ambiguity will perceive an ambiguous situation and stimuli as desirable, challenging, interesting and may not experience stress. As ambiguity increases, personal characteristics of the individual become

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more influential in determining the meaning of the situation. Budner (1962) defined tolerance for ambiguity as the tendency to perceive ambiguous situations as desirable. Intolerance of ambiguity is general tendency to perceive ambiguous situations as threatening and ambiguity tolerance implies that ambiguous situations as desirable. The TAS was used to assess individual reactions to the ambiguity in the ICU environment.

The TAS is a 16-item (8 positive and 8 negative items) Likert-type scale designed to assess attitudes toward ambiguity through self-report measures. The tool assesses novelty, complexity and insolubility. Higher scores reflect increasing intolerance for ambiguity. Internal consistency reliabilities of the scale range from 0.39 to 0.62 with a mean of 0.49 (Budner, 1962). Although this tool has a low internal reliability, various versions of the instrument are widely used (Benjamin, Riggio, & Mayes, 1996; Furnham, 1994; Kirton, 1981; Ward, 1988). In this study the calculated Cronbach's alpha was 0.28. The TAS is, however, a multidimensional scale and Cronbach's alpha may not be an appropriate reliability estimate to use.

**Psychological outcomes: Perceived stress.** Psychological outcomes were assessed using the Perceived Stress Scale (PSS) **(**Cohen, Kamarck, & Mermelstein, 1983). PSS is a measure used to assess the stressfulness of situations, the effectiveness of stress-reducing interventions and the extent to which there are associations between psychological stress and psychiatric and physical disorders. The 10-item Likert type scale ranges from 0 (never) to 4 (very often). The score on positive items are reversed and then a sum is obtained across all items. Scores may range from 0 to 40 with higher scores indicating greater stress. The PSS has adequate internal and test-retest reliability of 0.78, and is correlated in the expected direction with a range of self-report and behavioral criteria (Cohen, et al., 1983). In this study the calculated Cronbach's alpha was 0.86.

**Outcomes**. The Moral Distress Scale–Revised (MDS-R) is a 21-item tool that measures an individual's perceptions to a situation based on 1) intensity of moral distress and 2) frequency of the encountered situation. This study used the version of the tool for nurses who work with adult patients with the author's permission. Items are scored in terms of frequency and intensity of a situation using a 0-4 Likert scale (Hamric, Borchers, & Epstein, 2012). Multiplying the frequency and intensity scores for each item, and then summing across the items results in the MDS-R composite score. Each item has a range of 0-16 and the total score has a range of 0-336. Initial testing of the MDS-R revealed promising instrument reliability and validity with a Cronbach's α of 0.89 for nurses. (Hamric, et al., 2012). In this study the calculated Cronbach's alpha was 0.85.

**Stress biomarker.** Salivary alpha amylase (sAA) is one of the enzymes in saliva that is a sensitive biomarker for stress-related changes in the body. The release of sAA is governed by activation of the autonomic nervous system. Thus, an increase in sAA may be expected during psychological stress, when autonomic activation is high. Studies using physiological and psychological stressors found increasing activity of sAA due to stress (Kivlighan, & Granger, 2006; Tu, Lupien, & Walker, 2006). A growing body of research supports the validity and reliability of this biomarker as a measure of physical and psychological stress (Arhakas, Karagiannis, & Kalfas, 2013). In addition, unlike other salivary markers of stress, sAA is not affected by variables such circadian rhythms, medications, gender, or age. Another advantage of using sAA as a stress biomarker is that it may be obtained noninvasively. The range for adults is 3.1-423 U/mL (Salimetrics, 2015). While this seems like a broad range, sAA is used for a correlative measure of stress in objective situations. Salivary alpha amylase is not used in a diagnostic capacity. Therefore, there are no established ranges for the levels of amylase in saliva.

**Health Status**. Health status was assessed using two instruments: the Baylor Stress

Symptom Checklist ("Stress symptom checklist", nd) and the S-F 12 version 1 (Ware, Kosinski,

Gandek, Sundaram, Bjorner, Turner-Bowler, & Manuish, 2010). The Baylor Stress Symptom

Checklist is a list of potential physical symptoms (27 items) and psychological symptoms (25

items). The participant checked each item that describes a symptom experienced in the last

month. The total number of items checked is added. A score of 0-7 indicates low stress; 8-14

indicates moderate stress; 15-21 indicates high stress; 22+ indicate very high stress.

The S-F 12 is a measure of perceived health related quality of life that describes the general

physical health status and mental health distress. A modified version of the SF-12 (v 1) was used.

The S-F 12 is a multipurpose short form survey using twelve questions from the SF-36 Health

Survey. The survey includes questions in eight health domains: physical functioning, role-

physical, bodily pain, general health, vitality, social functioning, and role-emotional and mental

health. Scores of less than 45 indicate presence of impaired functioning or well being. Higher

scores indicate higher levels of health. Reliability of the tool ranges from .64-.86 (Ware, et al.,

2010). Test, retest reliability was .89 in the United States. (Ware, et al., 2010). It is not

appropriate to calculate Cronbach's alpha for the Physical Component Survey and Mental

Component Survey because these summary measures are linear combinations of the eight scales

included in the SF-12 (Ware et al., 2010). Reliability is estimated for these summary measures

using a method described by Nunnally and Bernstein (1994). The method takes into account the

reliability of each scale as well as the co-variances amongst the scales.


**Data Analysis**

Questionnaires from REDCap were uploaded into the analysis software package JMP, Version 13.0, SAS Institute Inc., Cary, NC.  Salivary alpha amylase levels were imported and all data was cleaned and an analysis-ready data set was prepared.  Descriptive statistics were used to describe the sample using mean and standard deviation (SD) for continuous variables and frequency (f) and percent (%) for categorical variables. Model variables were summarized using the mean and SD for each scale/subscale.  Pearson's correlation analysis was used to assess the correlation between continuous variables.  The Baron and Kinney (1986) method was utilized to analyze the effects of the independent and mediator variables on perceived stress, health outcomes, moral distress and salivary alpha amylase.  A stepwise model building approach was used to construct a predictive model to determine the effects of the independent and mediator/moderator variable on dependent variables (Baron & Kenny, 1986).  Statistical significance was set at alpha $=0.05$.

## Results

**Characteristics of the sample**

One hundred adult critical care nurses completed the survey and provided a salivary alpha amylase sample.  The majority of participants were Caucasian (n = 78), female (n =89), working full time (n=91) with an average age of 35 years (range 21-65; *SD* 10.6) and a BSN (n=72).  Years of nursing experience ranged from 6 months to greater than 20 years with 51% having 5 years or less nursing experience and 65% having 5 years or less of critical care experience.   Forty one percent of participants were certified in critical care nursing.  A summary of study demographics is provided in Table 1.

**Descriptive statistics of model variables**

Participants indicated that they did feel support for addressing ethical issues based upon a mean score of 57.64 (*SD* 9.14; range 33-80) on the Hospital Ethical Climate questionnaire. Participants had a higher intolerance for ambiguity than average with a mean 69.88 (*SD* 6.4; range 52-84). The perception of participants' stress was moderate with a mean PSS score of 22.60 (*SD* 2.96; range 14-30). Participants also reported the amount of stress symptoms they were experiencing as moderate on the Baylor Stress Symptom Checklist mean 8.99 (*SD* 7.24; range 0-34). Ninety participants scored greater than 45 on the SF-12 Physical Component Scale indicating good physical function and 10 scored less than 45 indicating impaired function (mean=53.65, *SD*=3.23; range 44-62). Fifty nine participants scored greater than 45 on the SF-12 Mental Component Scale with 41 scoring less than 45 indicating impaired well-being (mean 33.66, *SD* 8.96; 12-49). The participants' sAA mean score was 92.30 (*SD* 75.76; range of 2.16-523.09). Laboratory reference ranges are 3.1-423(U/ml). There are no established diagnostic ranges for salivary alpha amylase and its relationship with stress. While sAA is not a diagnostic marker of stress, our work and other studies show a strong correlation with measures of stress.

The frequency and intensity of moral distress in this study is consistent with that of ICU nurses in other studies using the MDS-R (mean 94.60; *SD* 39.51; range 27 to 224). Individual MDS-R items represent root causes of moral distress identified in the literature. Table 2 ranks the most distressing root causes of moral distress by study participants and Table 3 ranks the least distressing root causes. Table 4 provides a summary of the descriptive statistics for the model variables.

**Correlation analysis**

Pearson's correlation analysis was used to determine correlations among variables (See Table 5). There were multiple significant bivariate correlations between the variables in this

study.  In particular, there was a negative correlation between the ethical characteristics of the work environment, perceived stress and stress symptoms meaning that perceived stress and stress symptoms are minimized when a work environment is perceived to have positive ethical characteristics.  There was also a significant negative correlation between the ethical characteristics of the work environment and moral distress.  There was a positive correlation between ethical characteristics of the work environment and psychological/emotional function measured by the SF-12 mental component indicating that as ethical characteristics of the work environment increased, so did psychological/emotional function.  Perceived stress had a negative relationship with psychological/emotional function indicating that as the participant's perceived stress increases, general mental health decreases. Perceived stress had a positive correlation with stress symptoms.  Salivary alpha amylase had a positive relationship with moral distress and stress symptoms indicating that an increase in sAA levels occurs with increases in moral distress and stress. Salivary alpha amylase had a positive correlation with moral distress.  Moral distress correlated with all variables except tolerance of ambiguity, physical and psychological/emotional function and education.  Certification only correlated with moral distress and education (BSN, non-BSN).  Physical symptoms, measured by the SF-12 physical component scale, only correlated with psychological/emotional function.  Tolerance of ambiguity and was not significantly correlated with any variables in the study.

**Regression analyses**

A stepwise model building approach was used to construct a predictive model to determine the effects of the independent and mediator/moderator variable on dependent variables and determine whether or not the effects of the dependent variable ethical climate of the work environment was mediated by tolerance of ambiguity, nurse characteristics and perceived stress

on the outcome variables of moral distress, sAA, and health status. A four-step approach was used in which several regression analyses were conducted and significance of the coefficients was examined at each step (See Figure 2). In step 1 the causal variable is correlated with the outcome to establish if there is an effect that can be mediated. If one or more of the relationships are not significant, then mediation is not possible and no further steps are completed. If there is a significant relationship then in step 2 the causal variable is correlated with the mediator. In step 3 the mediator is correlated with the outcome. In step 4 the causal variable and the significant mediator(s) are correlated with the outcome. The first three steps established that zero-order relationships among the variables exist. Relationships that were not significant were eliminated. In step four variables with significance were analyzed to determine mediation. If all 4 steps are met, then the mediator completely mediates the causal variable-outcome variable relationship. If the first 3 steps are met, but not step 4, then partial mediation is indicated (Baron, & Kenny, 1986).

The final model demonstrates that ethical characteristics of the work environment and perceived stress were significant predictors of moral distress, psychological/emotional functioning and stress symptoms. Perceived stress was a mediator of the ethical work environment and the outcome variables moral distress, psychological/emotional functioning and stress related symptoms (See Figures 3, 4 and 5; Tables 6 and 7). Individuals who reported higher levels of ethical work environment experienced lower levels of perceived stress and reported lower levels of moral distress suggesting the work environment had an effect. Physical symptoms were not significant in step 1 and tolerance of ambiguity and nurse characteristics were not significant in step 2 therefore, these variables were eliminated from the final model.

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**Discussion**

The purpose of this study was to explore the relationship between the ethical climate of the work environment and moral distress, health status, and salivary alpha amylase in critical care nurses. Mediators of stress (tolerance of ambiguity, nurse characteristics) and their relationship with perceived stress, moral distress, health status and salivary alpha amylase were also examined. The findings suggest that there is a relationship between the ethical climate of the work environment, moral distress, perceived stress, psychological/emotional functioning and health status.

**Characteristics of the sample**

The participants in this study were similar to the 110,254 members of the American Association of Critical Care Nurses as of June 2017 (Monica Simmerman, personal communication, June, 2017). The majority of study participants were female (89%) and Caucasian (78%) and AACN's membership is comprised of eighty five percent female members and sixty eight percent Caucasian. More participants in this survey had a BSN (72%) than AACN members (60%). This may be attributed to the fact that the organization was recently re-designated by the American Nurses Credentialing Center as a Magnet hospital and the organization is focusing on the national initiative of 80% BSN staff by 2020. Forty one percent of participants in this survey were certified. This is similar to AACN's membership figures; 48% of AACN members are certified. Studies of Magnet hospitals showed that they are more likely to have nurses that are specialty-certified and to have employed more nurses with a BSN than non-Magnet hospitals.

**Descriptive statistics of model variables**

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**Potential stressor: ethical work environment**. The nurses in this study rated their

perception of support to address ethical issues as good with a mean score of 57.64 (*SD* 9.14;

range 33-80). This finding may be attributed to the resources that the participants are able to

access. The organization has an ethics committee that accepts consults from any member of the

organization, patients and/or family members and a palliative care unit and palliative consult

service. The organization has a chaplain service that regularly interacts with staff and is

available for consultation as needed. Additionally, the organization offers ethics education in the

New Graduate Residency program and other educational events and end of life education such as

End of Life Nursing Education Consortium. Falco-Pegueroles and colleagues (2016) found in

their study of 203 critical care nurses from ten ICUs at two tertiary hospitals that nurses

experienced less exposure to ethical conflict when they perceived themselves as being in an

environment that was favorable for addressing the ethical problem. Casterle and colleagues

(2015) concluded that institutional ethics policies and a value-supportive care environment that

allows nurses to share their opinions, experiences and concerns can support nurses in their

challenges to make ethically sound decisions.

**Mediators of stress: tolerance of ambiguity.** Participants had a higher than average

intolerance for ambiguity suggesting that participants perceived ambiguous situations as a threat

and not desirable. This finding is not surprising since many types of stimuli found in a critical

care unit are novel, complex and at times insoluble such as lack of familiarity with a patient

diagnosis, new equipment used for patient care, patient care complexity, and inadequate

information (McLain, 1993). Stimuli and individual differences in processing the stimuli may

lead to anxiety and stress (McLain, Kefallonitis & Armani, 2015). The intensity of the reaction,

the degree of stress generated and the psychological and physiological consequences are

dependent upon an individual's tolerance of situations characterized as novel, uncertain or insoluble. The tolerance of ambiguity tool has 3 subscales measuring novelty, complexity and insolubility that may be computed to reveal the major source of intolerance of ambiguity. Participant's mean score of 15.2 (*SD* 3.51) on the TAS subscale of novelty indicate that novelty may contribute to participant's intolerance for ambiguity.

**Psychological reaction.** Participants in this study rated their stress level as moderate. It is widely recognized that stress is experienced by all nurses (Applebaum, Fowler, Fiedler, Osinubi, & Robson, 2010) and particularly critical care nurses (Rao, 2004; Feits, & Romeo, 2004). A study by Zainiyah (2011) concluded that 33% of nurses reported having moderate to severe stress. Fujimaru and colleagues (2011) in a study of 68 neonatal intensive care nurses found that nurses working in the ICU experienced higher stress levels than those working on a general ward.

Occupational stress is caused by work environments or situations that place demands on workers and can lead to health implications for nurses (Nowrouzi, Lightfoot, Lariviere, Carter, Ruckholm, Schinke, & Belanger-Gardner, 2015). The critical care environment may be particularly stressful as it is characterized by high demands coupled with a lack of individual control that may perceive as stressful (Berland, Natvig, & Gundersen, 2008). Critical care nurses are repeatedly exposed to work-related stressors such as heavy workloads (Mrayyan, 2009), a fast work tempo (Berland, et, al., 2008), lack of clear work directives (Mrayyan, 2009), difficult and/or poor communication among team members (Berland, et al., 2008), issues related to death and dying (Mrayyan, 2009) prolongation of life using supportive devices (Piers, et al., 2011), delivery of inappropriate care (Piers et al., 2011) and the need to make serious decisions quickly and correctly (Berland, et al., 2008). Berland and colleagues (2008) in a study of twenty-three ICU nurses at two regional hospitals showed that the ICU is a demanding work environment that

is perceived by nurses to be stressful and concluded that a supportive environment is important to allow nurses to tolerate work stress.

Linquist and colleagues (2003) noted that stress may have psychological and physiologic effects on nurses caring for the critically ill. In this study, psychologic effects were more prevalent than physical effects. The effect of unmanaged stress may have a negative impact on nurses both personally (Barnett, Namasivayam, & Narudin, 2010) and professionally (Tahir, Santhna, & Nizam, 2007). Stress may lead to burnout (Balevre, Cassells, & Buzaianu, 2012), turnover (Bartram, Joiner, & Stanton, 2004), decreased job satisfaction (Bourbonnais, Brisson, Malenfant, & Vezina, 2005), absenteeism and illness (Bartram et al., 2004). Stress may also lead to difficulties recruiting and retaining workers (Bartram et al., 2004).

Due to the nature of the critical care environment it is impossible to remove all potential stressors from a critical care nurse's work environment. Organizations need to focus on creating a healthy work environment. Healthy work environments are linked to retention, reduced turnover and a lower degree of job stress and burnout in nurses (Hall, 2005; American Hospital Association, 2002). A healthy work environment is one that has skilled communication, true collaboration, authentic leadership, effective decision-making, appropriate staffing and meaningful recognition (AACN, 2016). Organizations should implement stress reduction programs and provide a work environment that focuses on team member collaboration and skillful communication (Ganz, 2012). In addition, organizations should provide employee assistance programs to assist them to deal with stress.

**Outcomes**.

*Moral distress*. The moral distress level of nurses in this study (mean 94.60; *SD* 39.51; range 27 to 224) is consistent with those of ICU nurses in other studies that used the MDS-R. As noted

in the literature, ICU nurses typically have a higher mean moral distress score than non-ICU nurses (Dodek, et al., 2016; Wilson et al., 2015).  For example, Whitehead and colleagues (2015) noted a mean moral distress score of 89.0 (*SD* 51.3; range 2-272) in 489 ICU nurses working at a level I trauma, tertiary medical center.  Non-ICU nurses had a mean moral distress score of 70.5 (*SD* 47.9; range of 0-290). Similar to this study's findings, Whitehead and colleagues (2015) noted some nurses experiencing no moral distress and others reporting high levels and also found no relationship between moral distress and years in the profession or in the current unit.

The two most frequently ranked root causes of moral distress in this study (see Table 2) were related to futile care such as continuing to care for patients when not indicated and following families' wishes when not in the best interest of the patient.  These root causes are consistent with other studies of intensive care nurses (Browning, 2013; Cavaliere et al., 2010; Dodek et al., 2016; Dyo, Kalowes, & Devries, 2016; Elpern et al., 2005; Hamric & Blackhall, 2007; McLeod, 2014; Mobley et al., 2007; O'Connell, 2014; Rice, Rady, Hamrick, Verhijde, & Pendergast, 2008; Weinzimmer, Miller, Zimmerman, Hooker, Isidro, & Bruce, 2014; Whitehead et al., 2015; Wilson et.al., 2013; Zuzelo, 2007). Futile care occurs when a patient is provided life sustaining interventions and treatments that have no medical benefit for the patient (Meltzer & Huckaby, 2004).  Futile care occurring in an ICU is likely due to the nature of the unit. This finding is not surprising since ethical conflict is usually an antecedent to moral distress.  Also, ethical conflicts are prevalent in nursing and especially critical care nursing due to the complex, high intensity patient care environment, and use of many technological advancements (McAndrew, 2016). Nurses are patient advocates; therefore, in their role as professionals upholding the code of ethics of the profession, a nurse may experience moral distress as a result of advocating for their patient. Thus, based upon these research findings it is important for units

and healthcare organizations to develop a positive ethical climate and provide resources for nurses to use in response to ethical challenges. Further investigation is needed regarding which organizational resources may be most effective.

Situations surrounding potential ethical issues (e.g., take no action about an observed ethical issue because the involved staff member or someone in a position of authority requested that I do nothing or witness medical student perform painful procedure on patients solely to increase their skill) had low mean scores. This finding is congruent with the study of participants' perception that there is support to address ethical issues.

***Health Status.*** Ninety participants scored greater than 45 on the SF-12 Physical Scale (mean 53.65, *SD* 3.23; range 45-62) indicating good physical function and 10 participants scored less than 45 indicating impaired function such as limitations in self-care, physical, social, and role activities; bodily pain; frequent tiredness; and health rated as poor. Fifty nine participants scored greater than 45 on the SF-12 Mental Scale (mean 33.6, SD 8.96; range 12-49) with 41 participants scoring less than 45 indicating impaired well-being such as psychological distress, substantial social and role disability due to emotional problems and health in general rated as poor. This finding indicates that participants were more psychologically stressed than physically stressed. The finding that 41 participants scored below 45 suggesting impaired well-being is not surprising given that psychological and experiential factors such as novelty are more powerful stressors than physical stressors (Mason, 1975) and intolerance of ambiguity scores of participants were high.

Repeated stress may take its toll psychologically. Stress has been associated with feelings of anxiety, depression, fatigue and reduced self-esteem (Mealer, Burnham, Goode, Rothbaum, & Moss 2009). All of these symptoms have been shown to influence the ability to

perform work related tasks (Kincey, Eddleston, Grout, Alexander, Morley, & Lomax, 2005).

One step that nurses may take to address health status effects of stress is to develop resiliency

skills in an effort to minimize repeated stress effects (McEwen, 2002; Mealer, et al., 2009).

Skills to enhance resilience can be learned and allow a person to thrive in the face of adversity

and could be evaluated in future research.

Participants rated their stress symptoms as moderate utilizing the Baylor Stress Sympton

Scale, mean 8.99 (*SD* 7.24; range 0-34). The association between stress and health outcomes is

well documented (Applebaum, et al, 2010; Mealer, Shelton, Berg, Rothbaum, & Moss, 2007).

Participants most frequently experienced headaches (n=54%), backaches (n-=53%), neck and

shoulder pain (n=50%), tight muscles (n=47%), insomnia (n=41%), and lack of energy (n=41%).

The study findings are consistent with other studies that concluded health status effects that

occur as a result of stress include: neck ache, back pain, muscle spasms, stomach pain, nausea,

diarrhea, frequent urination, palpitations, rapid pulse, increased or decreased appetite, insomnia,

nightmares, disturbing dreams, frequent crying, nervous habits, constant tiredness, weakness,

fatigue, weight gain or loss without diet, and increased smoking, and alcohol or drug use (Glazer,

& Gyurak, 2008; Folkman, Lazarus, Gruen, & DeLongis, 1986). Some of the ways nurses may

reduce stress and its consequences by taking part in a stress prevention program, accessing an

employee assistance program and utilizing relaxation techniques such as meditation.

### *Stress biomarker.*

The participants' sAA mean score was 92.30 (*SD* 75.76; range of 2.16-523.09).

Laboratory reference ranges are 3.1-423(U/ml). There are no established diagnostic ranges for

sAA and its relationship with stress. In U.S. Army research, concentrations >600 units/mL are

considered high stress and 400-600 units/mL are considered moderate stress (Morrison, Haas,

Shaffner, Garrett, & Fackler, 2003). Prior studies utilizing sAA in studies of skydivers and exercise subjects values ranged from 150-900 U/ml (Chatterton, Vogelson, Lu, 1996; Chattlerton, Vogelsong, Lu, & Hudgens, 1997). The participants mean sAA score of 92.30 is consistent with a study by Morrison and colleagues (2003) whose small pilot study of eighteen nurses working in a pediatric intensive care unit at an academic medical center found participants sAA levels ranging from 0-888u/mL with a mean of 121u/mL.

Lower sAA levels may be related to the participants not experiencing a stressful situation at the time of the single specimen collection since salivary alpha amylase rises fairly rapidly in response to stress. Also, the rate of saliva secretion can significantly influence levels of salivary analytes (Granger, et al., 2012). Several participants had difficulty producing the required amount of saliva and attributed this difficulty to their lack of fluid intake during the shift prior to providing the salivary sample. Collecting salivary biomarkers is an attractive alternative that is less burdensome and less invasive to participants than collecting blood to measure stress levels. Suggestions for future research include obtaining salivary samples throughout the day to examine the effect of the intensive care environment on sAA, and obtaining a sAA sample in conjunction with an activity or situation identified as stressful by the intensive care nurse.

**Correlation analysis**

There were multiple significant bivariate correlations between the variables in this study. In particular, there was a negative correlation between the ethical characteristics of the work environment, and all of the stress variables; and a highly significant correlation between ethical characteristics of the work environment and moral distress and psychological/emotional function as measured by the SF-12. These significant correlations were an expected finding since the participants in this study perceived the ethical characteristics of their work environment as

positive which would result in decreased stress and moral distress. This also supports the findings of other studies in the literature (Corley et al., 2005; Hamric, & Blackhall, 2007; Falco-Peueroles et al., 2016; Pauly, et al., 2009; Sauerland, Marotta, Peinemann, Berndt, & Robichaux, 2014; Whitehead et al., 2015) and supports the concept of organizations focusing on creating a healthy work environment to minimize adverse effects on healthcare professionals.

Salivary alpha amylase was positively correlated with stress symptoms and moral distress, however, it did not correlate with perceived stress, the ethical characteristics of the work environment, physical or psychological health status as measured by the SF-12, or nurse characteristics. This finding may be a result of sAA levels typically rising immediately in association with a stressor. Therefore, the relationship was not captured in this single point study. The relationship between sAA and moral distress and perceived stress and moral distress were a strongly significant. This finding supports further study of the relationship between sAA, moral distress and other stress variables across a time frame and utilizing collection of a sAA sample at the time of a morally distressing situation.

Certification was negatively correlated with moral distress and education. This finding supports the positive patient outcomes noted in the literature when a patient is cared for by a certified nurse and the initiative to have nurses obtain their BSN by 2020. Therefore, organizations should support staff pursuing nursing specialty certification and/or furthering their education.

**Regression analysis**

      **Ethical climate of work environment.**

Ethical climate of the work environment was the most significant predictor of moral distress and explained 30% of the variance in the model. The hospital ethical climate had a

negative effect on moral distress indicating that a positive ethical climate is associated with less moral distress. This finding is consistent with other studies reporting that the more positive an ethical climate was perceived to be, the less moral distress occurred (Atabay, Cangarli, & Penbek 2015; Hamric, & Blackhall, 2007; Hamric et al., 2012; Pauly et al., 2009; Silen, Svantesson, Kjelstromm, Sidenvali, & Christensson, 2011; Whitehead et al., 2015). Although this variable explained a significant amount of the variance in moral distress, other factors that influence moral distress need to be examined in future studies.

The ethical characteristics of the work environment were also a predictor of psychological/emotional function predicting 18% of the variance in the model indicating that individuals with a better perception of ethical climate have better psychological/emotional function. However, a significant amount of the variance in psychological/emotional function remains unexplained in the model. Thus this variable should be further examined in future studies.

**Mediators of stress.**

None of the nurse characteristics specified in the model were predictive of moral distress. Many studies examined the relationship between nurse characteristics and moral distress and reported inconsistent findings (Cavaliere et al., 2010; Dyo et al., 2016; McAndrew et al., 2011; Meltzer & Huckaby, 2004; Ohnishi et al., 2010; Pauly et al., 2009; Silen et al., 2011). The lack of association between nurse characteristics and moral distress may be due to the unit and/or hospital culture and setting. This study also found no predictive relationship with education and moral distress, which is consistent with other studies (Dyo et al., 2016; McAndrew et al., 2011; Pauly et al., 2009; Shoorideh, Ashktorab, Yaghmaei, & AlaviMajid, 2015) and no association with critical care specialty certification. Wilson and colleagues (2013) examined the level and

frequency of moral distress in a convenience sample of forty-seven medical-surgical intensive care unit nurses and transitional care unit nurses and found no significant difference between the level of moral distress between nurses with specialty certification and those who were not certified.

This study found no association between tolerance of ambiguity or nurse characteristics and outcomes. Also, the ethical characteristics of work environment, perceived stress and moral distress were not associated with physical function or salivary alpha amylase with regression analysis.

**Psychological reactions.**

Perceived stress was positively associated with moral distress and explained 30% of the variance indicating higher perceptions of stress are associated with higher levels of moral distress scores. There may be other psychological reactions that impact moral distress in these nurses. This suggests a fruitful area for further investigation.

Perceived stress was negatively associated with the overall mean of psychological/emotional function, explaining 18% of the variance. This demonstrates that a lower perception of stress is associated with higher psychological/emotional function indicating better well-being. Perceived stress was also a significant predictor of stress symptoms and predicted 15% of the variance in the model. The effect was positive indicating that higher perceived stress was correlated with more stress symptoms. However, a significant amount of the variance in psychological/emotional function and stress symptoms remains unexplained in the model. Thus, there may be other reactions that are impacting this relationship that should be explored in future studies.

In summary, the final model confirms that the ethical characteristics of the work environment and perceived stress are associated with moral distress, stress symptoms and psychological/emotional functioning of critical care nurses. Variables specified as mediators in the model were not significant. However, perceived stress was a mediator of the outcomes variables moral distress, psychological/emotional function and stress symptoms.

## Limitations

There are several limitations to the study. First, this was a cross-sectional study therefore it is not possible to infer causality. Second, data was obtained from one site with a sample size of 100. However, the study sample was reflective of the national sample of the American Association of Critical Care Nurses member demographics. Future studies should include samples from multiple hospitals to increase generalizability of results. Third, no other information about participants' potential sources of stress or competing demands such as marital status and responsibilities outside of the workplace was obtained since it was out of the scope of this research. Future research should aim to develop and test a more comprehensive framework that incorporates the impact of more comprehensive demographics. Another limitation is that this was a single point correlated study, therefore, only one salivary amylase sample was obtained. The data established a relationship with mediators in the model and were compelling enough to suggest future studies obtain baseline salivary alpha amylase samples as well as sAA samples across a time frame should be obtained to examine the relationship over time. In addition, it may be helpful to obtain sAA samples during a morally stressful event or situation. Lastly, other variables thought to mediate the outcome variables such as personality and

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professional characteristics were not significant. Additional methodology strategies such as utilizing a tool to assess stress personality hardiness might refine outcomes of future studies.

## Summary and Conclusion

This descriptive correlational cross sectional study examined the relationship between the ethical climate of the work environment and moral distress and health status as experienced by critical care nurses; explored relationships among mediators of stress (nurse characteristics e.g. education, years certified as a critical care nurse and tolerance of ambiguity) and their relationship with perceived stress, moral distress, health status and salivary alpha amylase. The results of this study confirm the presence of moral distress in participants and the correlation of the ethical characteristics of the work environment, moral distress, stress symptoms and psychological/emotional outcomes. The findings of this study provide evidence of the link between moral distress and the ethical characteristics of the work environment and are useful to develop ways to identify and reduce root causes of moral distress. This study also adds to the knowledge of the consequences of the ethical work environment and its effect on nurses' levels of moral distress in critical care nurses. This study contributes to the understanding regarding experiences that nurses find morally distressing. Some root causes are harder than others to address clinically. However, establishing this link will allow researchers to examine and better understand the concept of moral distress so that interventions may be identified that decrease moral distress levels and intensity in critical care nurses and prevent the adverse effects that occur as a result of moral distress.

## Acknowledgements

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List of References (Manuscript 2)

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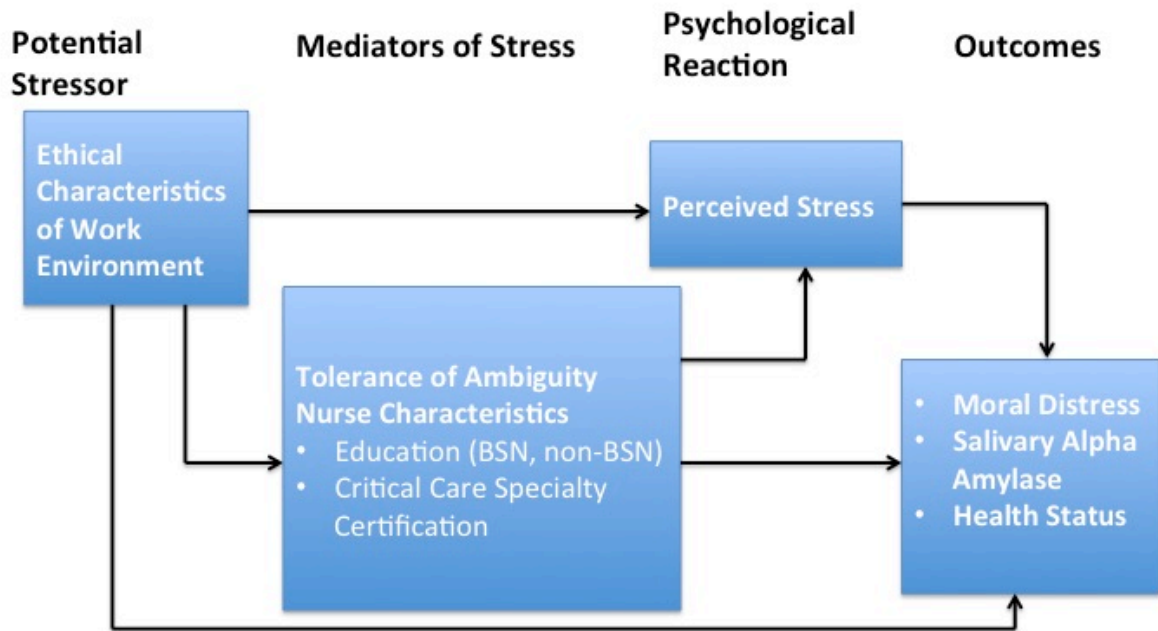
*Figure 1.* Conceptual Model for a Theory of Moral Distress with a Biobehavioral Framework

Perceived stress

m

*a*

*b*

Hospital ethical environment

Outcomes

x

y

c (total effect)          c' (direct effect)

Step 1 x ————► y
Step 2 x ————► m
Step 3 m ————► y
Step 4 x + m ————► y
If  x and m are both significant, there is partial mediation.
If x is no longer significant when m is controlled, there is
full mediation.
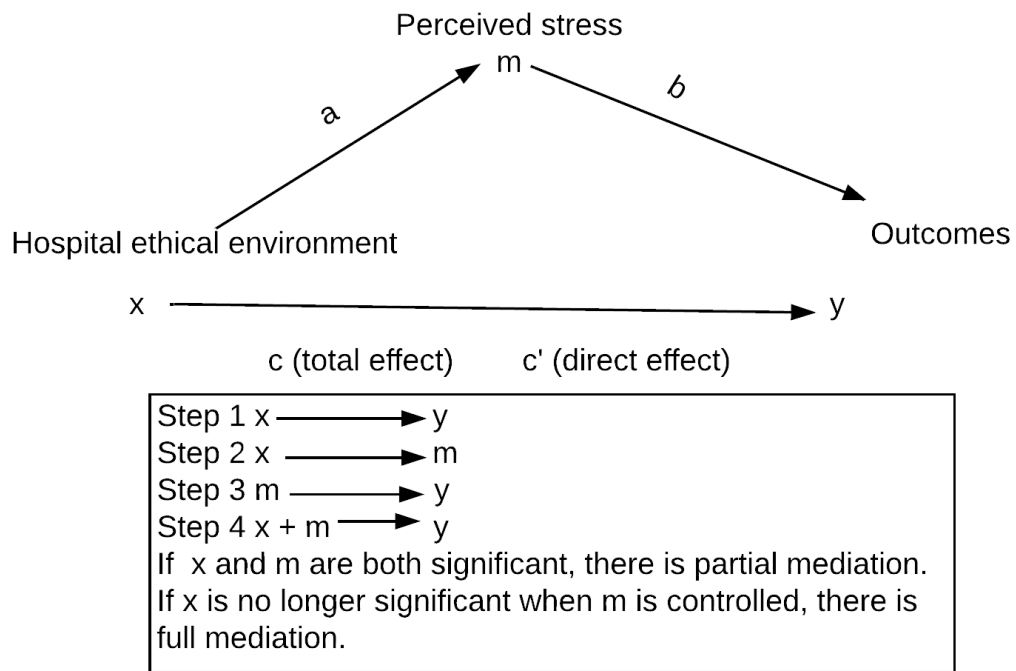
*Figure 2*.  Model for Identification of Mediation Effects adapted from Baron and Kenny (1986)
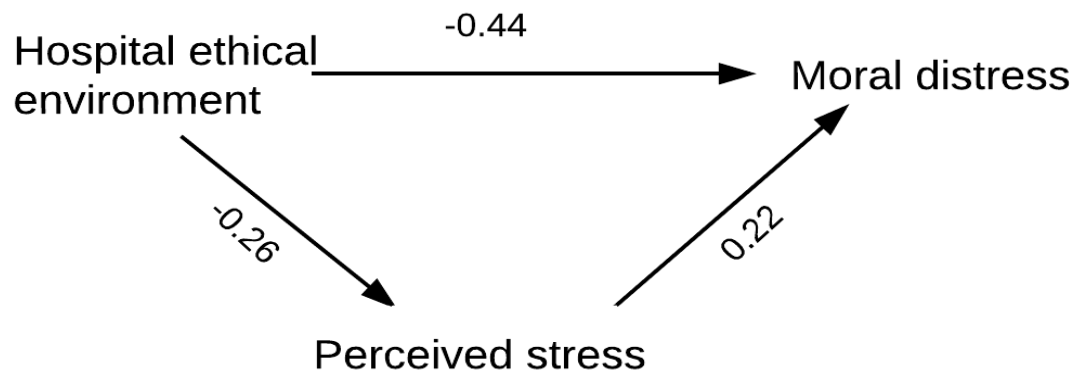Methodology

*Figure 3.* Final Regression Model: Effects of Ethical Characteristics of the Work Environment on Moral Distress
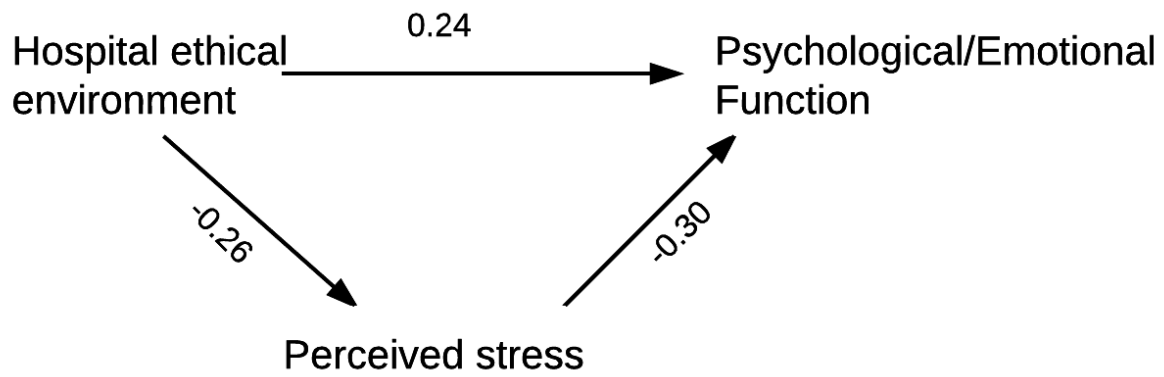
*Figure 4.* Final Regression Model: Effects of Ethical Characteristics of the Work Environment on Psychological/Emotional Function
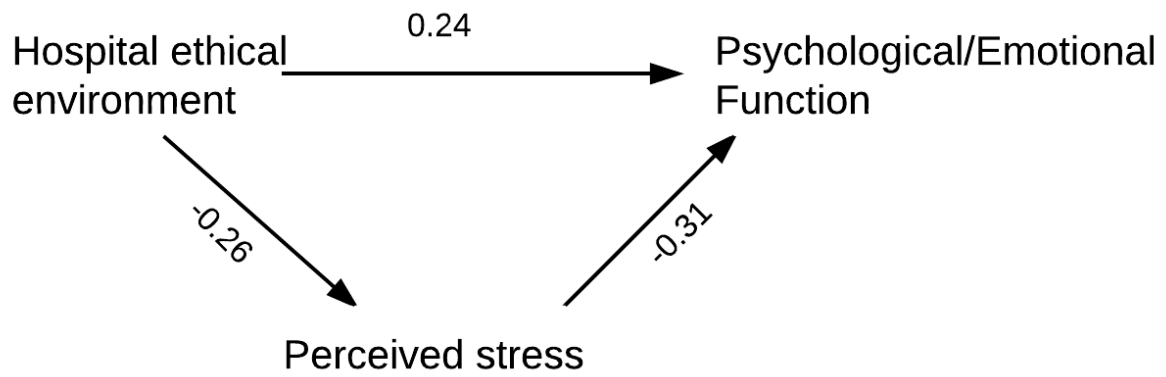
*Figure 5*. Final Regression Model: Effects of Ethical Characteristics of the Work Environment on Stress symptoms

Table 1

Sample Demographics

| Characteristics | N (%) | Mean (*SD*) | Range |
|---|---|---|---|
| Gender | | | |
| • Female | 89 (89%) | | |
| • Male | 10 (10%) | | |
| • Declined to answer | 1 (1%) | | |
| Race | | | |
| • African American | 4 (4%) | | |
| • American Indian or Alaska Native | 2 (2%) | | |
| • Asian | 12 (13%) | | |
| • Hispanic or Latino | 3 (3%) | | |
| • Native Hawaiian or Other Pacific Islander | 0 | | |
| • White | 78 (78%) | | |
| Age | | 34.76 (10.60) | 22-63 |
| Highest Level of Education | | | |
| • Diploma | 3 (3%) | | |
| • Associates Degree | 5 (5%) | | |
| • BSN | 72 (72%) | | |
| • MSN | 19 (19%) | | |
| • PhD | 1 (1%) | | |
| • DNP | 0 | | |
| Years of Nursing Experience | | | |
| • 6 months-1 year | 6 (6%) | | |
| • 1-2 years | 15 (15%) | | |
| • 3-5 years | 31 (31%) | | |
| • 6-7 years | 11 (11%) | | |
| • 8-10 years | 5 (5%) | | |
| • 11-15 years | 10 (10%) | | |
| • 16-20 years | 5 (5%) | | |
| • 21-30 years | 11 (11%) | | |
| • 30+ years | 5 (5%) | | |
| • Declined to answer | 1 (1%) | | |
| Years of Critical Care Experience | | | |
| • 6 months-1 year | 9 (9%) | | |
| • 1-2 years | 32 (32%) | | |
| • 3-5 years | 24 (24%) | | |
| • 6-7 years | 4 (4%) | | |
| • 8-10 years | 6 (6%) | | |
| • 11-15 years | 8 (8%) | | |
| • 16-20 years | 4 (4%) | | |

| | |
|---|---|
| • 21-30 years | 9 (9%) |
| • 30+ years | 4 (4%) |
| • Declined to answer | 0 |
| Years on Current Unit | |
| • 6 months-1 year | 13 (13%) |
| • 1-2 years | 33 (33%) |
| • 3-5 years | 27 (27%) |
| • 6-7 years | 3 (3%) |
| • 8-10 years | 3 (3%) |
| • 11-15 years | 6 (6%) |
| • 16-20 years | 3 (3%) |
| • 21-30 years | 9 (9%) |
| • 30+ years | 2 (2%) |
| • Declined to answer | 1 (1%) |
| Current Position Status | |
| • Full time | 91 (91%) |
| • Part time | 9 (9%) |
| Nursing Specialty Certified | |
| • Yes | 41 (41%) |
| • No | 59 (59%) |
| Types | |
| • CCRN | 36 |
| • CNRN | 3 |
| • PCCN | 2 |

Table 2

Most Distressing Root Causes of Moral Distress

| Rank | Item | MDS-R Mean | SD |
|------|------|------------|-----|
| 1 | Follow the family's wishes to continue life support even though I believe it is not in the best interest of the patient | 10.42 | 4.25 |
| 2 | Continue to participate in care for a hopelessly ill person who is being sustained on a ventilator, when no one will make a decision to withdraw support | 9.84 | 4.39 |
| 3 | Initiate extensive life-saving actions when I think they only prolong death | 9.51 | 4.36 |
| 4 | Witness healthcare providers give "false hope" to a patient or family | 6.89 | 4.36 |
| 5 | Carry out the physician's orders for what I consider to be unnecessary tests and treatments | 5.78 | 4.17 |

Table 3

Least Distressing Root Causes of Moral Distress

| Rank | Item | MDS-R Mean | SD |
|------|------|------------|-----|
| 17 | Be required to care for patients I don't feel qualified to care for | 1.86 | 2.61 |
| 18 | Follow the physician's request not to discuss the patient's prognosis with the patient or family | 1.69 | 2.64 |
| 19 | Increase the dose of sedatives/opiates for an unconscious patient that I believe could hasten the patient's death | 1.47 | 2,56 |
| 20 | Take no action about an observed ethical issue because the involved staff member or someone in a position of authority requested that I do nothing | 1.31 | 2.41 |
| 21 | Avoid taking action when I learn that a physician or nurse colleague has made a medical error and does not report it | 1.24 | 1.87 |

Table 4

Summary Statistics for Model Variables

| Variable | Mean | *SD* | Range |
|---|---|---|---|
| Hospital ethical climate | 57.64 | 9.14 | 33-80 |
| Tolerance of ambiguity | 69.88 | 6.41 | 52-84 |
| • Complexity | 36.35 | 3.86 | 27.46 |
| • Insolubility | 12.85 | 2.65 | 7-19 |
| • Novelty | 15.20 | 3.51 | 5-25 |
| Perceived stress | 22.60 | 2.96 | 14-30 |
| Moral distress | 94.60 | 39.51 | 27-224 |
| • Frequency | 1.1 | 1.09 | 0-4 |
| • Intensity | 2.06 | 1.44 | 0-4 |
| Salivary alpha amylase | 92.30 | 75.76 | 2.16-523.09 |
| Stress symptoms | 8.99 | 7.24 | 0-34 |
| Physical functioning | 53.65 | 3.23 | 45-62 |
| Mental/emotional functioning | 33.66 | 8.96 | 12-49 |

Table 5

Correlation of Variables Potential Stressor, Mediators of Stress, Psychological reaction and Behavioral Consequences/Outcomes

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| | sAA | MD | EWE | TA | PS | PHY | PSY | SS | ED | CE |
| 1. sAA | 1.0 | | | | | | | | | |
| 2. MD | 0.321<br>0.0012 | 1.0 | | | | | | | | |
| 3. EWE | -0.148<br>NS | -0.502<br><0.0001 | 1.0 | | | | | | | |
| 4. TA | -0.077<br>NS | -0.134<br>NS | -0.016<br>NS | 1.0 | | | | | | |
| 5. PS | 0.128<br>NS | 0.338<br>0.0006 | -0.257<br>0.0105 | -0.144<br>NS | 1.0 | | | | | |
| 6. PHY | 0.073<br>NS | -0.059<br>NS | 0.008<br>NS | 0.080<br>NS | 0.118<br>NS | 1.0 | | | | |
| 7. PSY | -0.177<br>NS | -0.217<br>NS | 0.340<br>0.0062 | 0.148<br>NS | -0.379<br>0.0015 | -0.270<br>0.0166 | 1.0 | | | |
| 8. SS | 0.230<br>0.0241 | 0.231<br>0.0235 | -0.248<br>0.0148 | -0.179<br>NS | 0.364<br>0.0003 | 0.033<br>NS | -0.621<br><0.0001 | 1.0 | | |
| 9. ED | -0.060<br>NS | 0.082<br>NS | -0.022<br>NS | -0.075<br>NS | 0.016<br>NS | -0.075<br>NS | 0.041<br>NS | 0.006<br>NS | 1.0 | |
| 10. CER | -0.080<br>NS | -0.242<br>0.0150 | -0.042<br>NS | -0.060<br>NS | -0.021<br>NS | 0.052<br>NS | 0.008<br>NS | 0.073<br>NS | -0.257<br>0.0098 | 1.0 |

*Note.* sAA – salivary alpha amylase; MD – moral distress; EWE – ethical work environment; TA – tolerance of ambiguity; PS – perceived stress; PHY- physical function; PSY – psychological/emotional function; SS – stress symptoms; ED- education (BSN, non-BSN); CER- certification; NS- not significant

Table 6

Univariate Regression Model

| Variable | Beta | *SE* | *F* | $R^2$ | p-value |
|---|---|---|---|---|---|
| Step 1 Effects of Ethical Characteristics of the Work Environment on Outcomes | | | | | |
| Moral distress | -0.50 | 0.38 | 32.73 | 0.250 | <0.0001* |
| Salivary alpha amylase | -0.15 | 0.83 | 2.13 | 0.021 | 0.1479 |
| Physical function | 0.01 | 0.04 | 0.01 | 0.000 | 0.9440 |
| Mental/emotional function | 0.31 | 0.11 | 7.93 | 0.096 | 0.0062* |
| Stress symptoms | -0.24 | 0.08 | 6.16 | 0.059 | 0.0148* |
| Step 2 Ethical Characteristics of the Work Environment on Tolerance of Ambiguity, Nurse Characteristics, and Perceived Stress | | | | | |
| Tolerance of ambiguity | -0.02 | 0.00 | 1.03 | 0.000 | 0.1875 |
| Education (BSN, non-BSN) | -0.10 | 0.00 | 1.03 | 0.010 | 0.3132 |
| Specialty certification | -0.04 | 0.01 | 0.17 | 0.002 | 0.6839 |
| Perceived Stress | -0.26 | 0.32 | 12.44 | 0.065 | 0.0105* |
| Step 3 Perceived Stress on Outcomes | | | | | |
| Moral distress | 0.34 | 1.27 | 12.44 | 0.113 | 0.0006* |
| Mental/emotional function | -0.36 | 0.34 | 10.85 | 0.126 | 0.0015* |
| Stress symptoms | 0.36 | 0.23 | 14.42 | 0.128 | 0.0003* |

Table 7
Final Regression Model.

| Dependent Variables | Moral Distress | Psychological/emotional function | Stress Symptoms |
|---|---|---|---|
| **Independent Variables** | | | |
| | Beta *(SE)* | Beta *(SE)* | Beta *(SE)* |
| Ethical characteristics of the work environment | -0.44 (0.09) | 0.24 (0.11) | -0.16 (0.09) |
| Perceived Stress | 0.22 (0.09) | -0.30 (0.11) | 0.32 (0.09) |
| *F, $R^2$*, p value | 20.47, 0.297, <.0001 | 8.25, 0.182, 0.0006 | 8.76, 0.153, 0.0003 |

**Vita**

Marian Altman was born on February 25, 1961 in Ephrata Pennsylvania and is an American citizen currently living in Richmond, Virginia with her husband.  She graduated from John F. Kennedy High School in Richmond, Virginia in 1979.  She received her Bachelor of Nursing Degree from Virginia Commonwealth University School of Nursing (VCU SON) in Richmond, Virginia in 1983 and a Master's of Science in Nursing from Virginia Commonwealth University School of Nursing in Richmond, Virginia in 1990.  Her 34-year professional nursing career included employment as a critical care nurse, a clinical nurse specialist, adult nurse practitioner, and adjunct faculty at the VCU SON.  She is currently employed as a Clinical Practice Specialist for the American Association of Critical Care Nurses (AACN).  She serves on the editorial review board for Nursing Management Journal.  Marian has published in multiple journals including:  Journal of the American College of Surgeons, Advanced Critical Care, Critical Care Nurse and Nursing Management. She received the Circle of Excellence Award from the American Association of Critical Care nurses in 2012 for her work with nursing specialty certification; and she was awarded Leader of the Year, Mentor of the Year and CCRN of the Year by the local AACN chapter.  She lectures nationally on a wide variety of nursing clinical and leadership topics.  She maintains membership in Sigma Theta Tau, International Honor Society of Nursing; the American Organization of Nurse Executives; the Virginia Organization of Nurse Executives; and the American Association of Critical Care Nurses where she has served on the board of directors.