COVID-19 related negative emotions and emotional suppression are associated with greater risk perceptions among emergency nurses: A cross-sectional study

Nathan R. Huff a, Guanyu Liu a, Hannah Chimowitz a, Kelly T. Gleason b, Linda M. Isbell a, * 

a Psychological and Brain Sciences, University of Massachusetts Amherst, 135 Hicks Way, Amherst, MA, 01003 United States
b School of Nursing, Johns Hopkins University, 525 N. Wolfe Street, Baltimore, Maryland, 21205 United States

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ABSTRACT

Background: As the COVID-19 pandemic began, frontline nurses experienced many emotions as they faced risks relevant to both patients (e.g., making errors resulting in patient harm) and themselves (e.g., becoming infected with COVID-19). Although emotions are often neglected in the patient safety literature, research in affective science suggests that emotions may significantly impact nurses’ perceptions of risk, which can have downstream consequences. Further, the use of chronic emotion regulation strategies that are known to differ in adaptability and effectiveness (i.e., emotional suppression, reappraisal) can impact risk perceptions.

Objective: To investigate the relationship between nurses’ emotional experiences in response to the pandemic and their estimates of how likely they would be to experience adverse outcomes related to both patients and themselves within the next six months. Additionally, we investigated the extent to which the use of suppression and reappraisal processes to manage emotions are associated with these risk perceptions.

Design: Cross-sectional survey.

Setting: Online survey distributed via email to emergency nurses at eight hospitals in the northeastern United States during fall 2020.

Participants: 132 emergency nurses (M_age = 37.05; 81.1% Female; 89.4% White).

Methods: Nurses reported the extent to which they experienced a variety of positive (e.g., hope, optimism) and negative (e.g., fear, sadness) emotions in response to the COVID-19 pandemic, and reported their perceptions of risk to both patients and themselves. Nurses also completed the Emotion Regulation Questionnaire, a measure of chronic tendencies to engage in emotional suppression and reappraisal. Immediately prior to providing data for this study, nurses completed an unrelated decision-making study.

Results: Nurses’ negative emotions in response to COVID-19 were associated with greater perceptions of both patient safety risks (b = 0.31, p < .001) and personal risks (b = 0.34, p < .001). The relationships between positive emotions and risk perceptions were not statistically significant (all p values > 0.66). Greater chronic tendencies to suppress emotions uniquely predicted greater perceptions of patient safety risks (b = 2.91, p = .036) and personal risks (b = 2.87, p = .040) among nurses; however, no statistically significant relationships with reappraisal emerged (all p values > 0.16).

* Corresponding author.
E-mail address: lisbell@umass.edu (L.M. Isbell).

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Conclusions: Understanding factors that influence perceptions of risk are important, given that these perceptions can motivate behaviours that may adversely impact patient safety. Such an understanding is essential to inform the development of interventions to mitigate threats to patient safety that emerge from nurses’ negative emotional experiences and their use of different emotion regulation strategies.

Tweetable abstract: Covid-related negative emotions and emotional suppression are associated with greater patient and personal risk perceptions among emergency nurses @lindamisbell @Nathan_Huff1

What is already known

- Researchers in psychology have demonstrated that negative emotions and emotional suppression are related to greater perceptions of risk in a variety of domains.
- Inflated risk perceptions have been linked to suboptimal judgements and behaviors in both non-clinical and clinical contexts.
- Despite the significant emotional toll that the COVID-19 pandemic has had on nurses, there is a considerable gap in knowledge concerning the relationship between nurses’ negative emotional experiences and perceptions of risks to both patients and themselves, as well as how suppressing these emotions may adversely impact risk perceptions.

What this paper adds

- In this cross-sectional study, we found that emergency nurses’ negative emotions in response to COVID-19 were associated with increased perceptions of both patient safety and personal risks related to COVID-19.
- Emotional suppression was also related to greater perceptions of both types of risk; however, no statistically significant relationships emerged for positive emotions and emotion reappraisal.
- Given that risk perceptions are known to relate to objective risk markers, these findings suggest that addressing nurses’ negative emotions and maladaptive coping strategies may be key intervention targets to reduce safety risks to both patients and nurses, while also increasing nurse well-being.

1. Introduction

1.1. Background

In the beginning of the COVID-19 pandemic, healthcare workers in the emergency department experienced many emotions while facing both known and unknown risks. Emotions were largely negative, like fear and sadness, but also positive, like hope and optimism. Risks that providers faced were relevant to their patients (e.g., making errors resulting in patient harm) as well as themselves (e.g., becoming infected with the virus) (Welsh et al., 2021). A well-established body of research in psychology has demonstrated that negative emotions increase risk perceptions in many domains, such as disease susceptibility, smoking cessation, and threats due to natural disaster and terrorism (Johnson and Tversky, 1983; Lerner and Keltner, 2001; Lerner et al., 2003). Furthermore, it has been shown that risk perceptions directly influence judgements, decisions, and behaviours (Ferrer and Klein, 2015), and a meta-analysis demonstrated that manipulating risk perceptions resulted in consistent behavior changes across a variety of domains (Sheeran et al., 2014). While largely unexamined among nurses, this possibility has implications for clinical care and patient safety, as nurses’ risk perceptions could directly inform their decision to engage with, assess, and advocate for patients.

In addition to negative emotions themselves, maladaptive emotion regulation strategies may also increase risk perceptions (Gross and John, 2003). One such strategy is suppression, which involves inhibiting emotional expression (Gross and John, 2003; Gross, 1998; Gross, 2015). A large body of research demonstrates that chronically suppressing one’s emotions is associated with adverse influences on cognitive functioning and memory (Gross and John, 2003; Richards and Gross, 2006; Johns et al., 2008; Richards and Gross, 2000), as well as reduced well-being and relationship quality (Chervonsky and Hunt, 2017). Cognitive reappraisal, which involves re-evaluating one’s original interpretation of a situation to influence what one feels, is considered a more adaptive strategy and is generally associated with positive outcomes (Hu et al., 2014).

1.2. Objectives

Despite clearly established links among emotions, regulation strategies, and consequential risk perceptions, as well as recent work highlighting the urgent need to investigate affective factors (Wyer et al., 1999; Heyhoe et al., 2016; Liu et al., 2022; Isbell et al., 2020a; Isbell et al., 2020b) that can influence clinical information processing and decision making in the emergency department (Kozlowski et al., 2017; Djulbegovic and Elqayam, 2017; Croskerry, 2015), the role of emotions is often neglected in patient safety research (Croskerry et al., 2008; Croskerry et al., 2010; Committee on Diagnostic Error in Health Care 2015). The current study focused on a key aspect of clinical information processing within an important emergency provider population: risk perceptions among nurses. Nurses...
play a critical role in emergency care, as they are often responsible for triaging patients, advocating for their care, and conveying critical information to other providers through patient handoffs. Indeed, a recent report found that emergency nurses substantially shape patient safety due to their close and sustained contact with patients, role as information communicators, and tendency to be the first medical provider to assess patients and estimate the severity of illness (Manojlovich et al., 2022). Thus, nurses’ assessments of risk are particularly consequential. We investigated the relationship between emergency nurses’ emotions in response to COVID-19 and their perceptions of both patient safety and personal risks, as well as the effect of chronic emotion regulation strategies on these risk perceptions.

2. Methods

2.1. Study participants and recruitment

Emergency nurses in the northeastern United States (US) were recruited via email during fall 2020 to complete a survey online, following an unrelated study investigating medical decision making. Study invitations were sent over email by hospital leaders at eight institutions between October and December 2020. At six hospitals, invitations were distributed by hospital representatives. At two hospitals, invitations were shared by other nurses. Eligible nurses who indicated interest were sent a personalized, one-time-use Qualtrics study link and were given two weeks to participate. Those who did not access the study were sent reminder emails, provided a new link, and offered an additional week. Nurses who did not complete the study after three weeks were again re-invited, sent another link if interested, and given one week to participate. Nurses were compensated 100 US Dollars for the hour required to complete both studies. We aimed to recruit a minimum of 132 nurses to adequately power regression analyses.

2.2. Measurement tools

2.2.1. Emotion regulation questionnaire

Nurses completed the Emotion Regulation Questionnaire (Gross and John, 2003), which assesses the use of emotional suppression and cognitive reappraisal strategies. The suppression subscale contains four items (e.g., “I keep my emotions to myself”); the reappraisal subscale contains six items (e.g., “When I want to feel less negative emotion, I change what I’m thinking about”). Responses were reported along a scale from strongly disagree (1) to strongly agree (7). The Emotion Regulation Questionnaire has good internal consistency, reliability, temporal stability, test-retest reliability, and good convergent and discriminant validity (Gross and John, 2003; Ioannidis and Siegling, 2015) and has previously been used with healthcare providers (Mairean, 2016; Kafetsios et al., 2016).

2.2.2. Emotions in response to COVID-19

To assess emotional experience, nurses reported the extent to which they felt 12 emotions in response to COVID-19 along unnumbered sliding scales from not at all (0) to very much (100): afraid, angry, anxious, exhausted, frustrated, hopeful, hopeless, optimistic, overwhelmed, sad, and stressed. Emotion items were generated from the Positive and Negative Affect Schedule – Expanded Form, a widely used emotion measurement tool in psychological research (Clark and Watson, 1994). Specific emotions were selected due to their relevance to the COVID-19 pandemic. Emotion items were presented in a random order.

2.2.3. Personal and patient safety risk perceptions

To assess risk perceptions, we developed an 8-item risk perception scale related to COVID-19 (Table 1). Four items informed by prior work (Ho et al., 2005) were designed to capture personal risk perceptions (e.g., nurse will become infected), and four items developed for this research were designed to assess patient safety risk perceptions (e.g., nurse will fail to adequately assess a patient). Nurses reported how likely it is these outcomes would occur in the next six months using unnumbered sliding scales from not at all (0) to very likely (100). Risk judgement items were presented in a random order. The emotion and risk judgement measurement tools were counterbalanced: half of the participants completed the emotion items before the risk judgement items, while the other half completed the risk judgement items before the emotion items.

| Patient safety and personal risk perception items. |
|---------------------------------------------------|
| In the next 6 months, how likely is it that you will ... |
| Patient Safety Risks: ...make a medical error that results in harm to a patient. ...lack the skills you need to provide care to one or more of your patients. ...fail to adequately assess a patient. ...contribute to the misdiagnosis of a patient. |
| Personal Risks: ...become infected with COVID-19. ...bring COVID-19 home and infect a family member or loved one. ...die from COVID-19. ...experience the death of a family member or loved one due to COVID-19. |
| Note. Items were presented in a random order, on the same page. Responses were provided on unnumbered sliding scales ranging from 0 (Not at all likely) to 100 (Very likely). |
2.2.4. Participant demographic questions

Finally, participants responded to demographic questions. Free response items assessed participants’ age, years of nursing experience, years of emergency medicine experience, and highest degree achieved. Multiple choice questions with a free response option were used to capture participant race, ethnicity, and gender. Multiple choice questions with a free response option were also used to capture the type of work institution (Private, Government, Other), the academic affiliation of the work institution (Academic, Nonacademic, Other), and the emergency department role (Registered Nurse, Other) in which participants worked.

2.3. Research ethics

The study was approved by our institutional review board (IRB#196: 2016–3291). Participants reviewed an informed consent document and provided their consent prior to initiating the study. At the end of the study, participants were debriefed and made aware of study purposes.

2.4. Data analysis

First, exploratory factor analyses were used to aid in the construction of positive and negative emotion subscales, as well as personal and patient safety risk perception subscales. Second, we examined bivariate correlations to assess relationships between study variables. Third, we ran a series of linear regressions to test our hypothesized relationships between COVID-19-related emotions, chronic emotion regulation strategies, and risk perceptions. In Model 1, we entered demographic control variables and questionnaire order, then added the positive and negative COVID-19 emotion subscales (Model 2), and finally added chronic emotion regulation strategy subscales (Model 3). Data were analysed using SPSS v.25.

3. Results

3.1. Participant demographics

Our sample included 132 emergency department nurses (Mean age = 37.05, Standard Deviation [SD] age = 9.58), who were 89.4% white (n = 118), 81.1% female (n = 107), and reported an average of 8.54 years of emergency medicine experience (SD = 7.64). Over ninety-eight percent of participants (n = 130) indicated their emergency department role was “Registered Nurse”, and 1.5% (n = 2) selected “Other”. These two participants indicated their emergency department role was “Emergency Staff Nurse” and “Primary

| Table 2 | Participant demographics. |
|---|---|
| | Years | M | SD |
| Age | 37.05 | 9.58 |
| Nursing Experience | 11.55 | 9.16 |
| Emergency Medicine Experience | 8.54 | 7.64 |
| Gender | n | % |
| Female | 107 | 81.1 |
| Male | 24 | 18.2 |
| Non-Binary | 1 | 0.8 |
| Race | 118 | 89.4 |
| White | 6 | 4.5 |
| Black/African American | 4 | 3.0 |
| Asian | 2 | 1.5 |
| White and Black/African American | 1 | 0.8 |
| White and American Indian/Alaskan Native | 1 | 0.8 |
| Race Not Provided | 1 | 0.8 |
| Ethnicity | Not Hispanic and/or Latino | 125 | 94.7 |
| Hispanic and/or Latino | 7 | 5.3 |
| Highest Degree Earned | Bachelor's Degree | 111 | 84.1 |
| Associate's Degree | 14 | 10.6 |
| Graduate Level Degree | 7 | 5.3 |
| Academic Affiliation of Work Institution | Academic | 99 | 75.0 |
| Nonacademic | 29 | 22.0 |
| Other | 4 | 3.0 |
| Type of Work Institution | Private | 92 | 69.7 |
| Government | 27 | 20.5 |
| Other | 13 | 9.8 |

*Note. Descriptive statistics presented include mean (M), standard deviation (SD), number (n) and percentage (%). Due to rounding, percentages do not always add up to 100.*
Note. Additional participant demographic information is presented in Table 2.

### 3.2. Scale creation

Because the Emotion Regulation Questionnaire is an established and widely-used measure (Gross and John, 2003) with well-documented psychometric properties (Ioannidis and Siegel, 2015), composites were created by averaging subscale items for the suppression (Cronbach’s $\alpha = 0.82$) and the reappraisal (Cronbach’s $\alpha = 0.88$) subscales.

We subjected the 12 emotion items to an exploratory factor analysis to facilitate the creation of subscales emergent from the data. An exploratory factor analysis using principal axis factor extraction and promax rotation supported a two-factor structure. Specifically, following interpretation of Eigenvalues, scree plots, parallel analysis, and minimal average partial values, exactly two factors had Eigenvalues greater than one. These two factors accounted for 55% of the total variance and are supported by theory. As such, subscales were created by averaging negative emotions (afraid, anxious, hopeless, sad, angry, frustrated, stressed, overwhelmed, exhausted; Cronbach’s $\alpha = 0.89$), and positive emotions (hopeful, optimistic, calm; Cronbach’s $\alpha = 0.81$).

A second exploratory factor analysis was conducted on the eight risk judgement items to verify that the hypothesized subscales of personal risk and patient safety risk were emergent from the data. Exploratory factor analysis using principal axis factor extraction and promax rotation supported a two-factor structure. Specifically, following interpretation of Eigenvalues, scree plots, parallel analysis, and minimal average partial values, exactly two factors had Eigenvalues greater than one. The two factors accounted for 50% of the total variance and were consistent with our hypothesized personal and patient safety risk perception subscales. As such, subscales were created by averaging personal risk (Cronbach’s $\alpha = 0.75$) and patient safety risk items (Cronbach’s $\alpha = 0.80$).

### 3.3. Bivariate correlations

Bivariate correlations among the positive and negative emotion subscales, the personal and patient safety risk judgement subscales, and the reappraisal and suppression subscales of the Emotion Regulation Questionnaire are reported in Table 3.

### 3.4. Regression models predicting patient safety and personal risk perceptions

Regression weights from all models predicting both patient safety risk perceptions and personal safety risk perceptions appear in Table 4. Negative emotions predicted increased perceptions of both patient safety risk ($b = 0.31, SE = 0.11, p < .001$) and personal risk ($b = 0.34, SE = 0.11, p < .001$) when controlling for positive emotions, suppression, reappraisal, the order in which emotions and risk were assessed, and participants’ gender, race, and age (Models 3; Table 4). Also, nurses higher in chronic tendency to suppress emotions reported greater perceptions of patient safety risk ($b = 2.91, SE = 1.37, p = .036$) and personal risk ($b = 2.87, SE = 1.39, p = .040$) controlling for all predictors. No other effects were statistically significant, all $p$ values > 0.16.

We also examined whether emotion regulation strategies moderated the relationship between negative emotions and risk judgements. We found no statistically significant evidence of moderation, all $p$ values > 0.19 (see supplemental material Table S1).

Finally, although factor analysis revealed a negative and positive emotion factor structure best fit our data, researchers have specifically linked fear to pessimistic risk judgements (Lerner and Keltner, 2001; Ferrer et al., 2015). Thus, we created a fear composite (afraid, anxious; Cronbach’s $\alpha = 0.70$) and re-ran all analyses with fear in place of negative emotions. Results were analogous to those reported.

### 4. Discussion

Emergency nurses’ negative emotions related to COVID-19 and nurses’ use of emotional suppression, a maladaptive emotion regulation strategy, both predicted increased perceptions of patient safety and personal risks. These associations held when controlling for the effect of the other, as well as when controlling for positive emotions, tendencies to engage in emotion reappraisal, and several demographic variables. This finding suggests that not just negative emotions themselves, but also tendencies to suppress emotions are

### Table 3

| Variable 1                        | 1     | 2     | 3     | 4     | 5     | 6     |
|-----------------------------------|-------|-------|-------|-------|-------|-------|
| Positive Emotions Toward COVID-19 | —     | -0.58* | -0.19* | -0.21* | 0.21* | -0.03 |
| Negative Emotions Toward COVID-19 | —     | —     | 0.34** | 0.34** | -0.11 | -0.00 |
| Personal Risk Judgements          | —     | —     | -0.37** | -0.09 | —     | -0.14 |
| Patient Safety Risk Judgements    | —     | —     | —     | -0.14 | —     | 0.19* |
| Use of Emotional Reappraisal Strategies | —     | —     | —     | —     | —     | —     |
| Use of Emotional Suppression Strategies | —     | —     | —     | —     | —     | —     |

**Note.**
* $p < .05$.
** $p < .01$. Positive Emotions Toward COVID-19 (3 items; Cronbach’s $\alpha = 0.81$). Negative Emotions Toward COVID-19 (9 items; Cronbach’s $\alpha = 0.89$). Personal Risk Judgements (4 items; Cronbach’s $\alpha = 0.75$). Patient Safety Risk Judgements (4 items; Cronbach’s $\alpha = 0.80$). Use of Emotional Reappraisal Strategies (6 items; Cronbach’s $\alpha = 0.88$). Use of Emotional Suppression Strategies (4 items; Cronbach’s $\alpha = 0.82$).
5. Limitations

Our study has several limitations. First, we captured risk perceptions, not objective risk markers. Objective risk markers, such as exposure to COVID-19 (i.e., personal risk) and the making of medical errors (i.e., patient safety risk) would be difficult if not impossible to determine amongst frontline healthcare providers during the early stages of the pandemic. Nonetheless, research demonstrates that risk perceptions influence behavior in a wide range of domains (Ferrer and Klein, 2015; Sheeran et al., 2014) and thus are likely to similarly influence clinical decision making and behavior. For example, emergency physicians who estimated greater risk of adverse outcomes for chest pain patients were more likely to admit these patients, even when actual risk was low (Schriger et al., 2018). Even

### Table 4

| Variable                                 | Patient Safety Risk | Personal Safety Risk |
|------------------------------------------|---------------------|----------------------|
|                                           | Model 1 | Model 2 | Model 3 | Model 1 | Model 2 | Model 3 |
| Nurse Gender                             | -0.70 (5.03) | -5.22 (4.89) | -1.93 (5.03) | 4.23 (4.99) | 0.39 (4.91) | 3.60 (5.10) |
| Nurse Race                               | -4.97 (6.41) | -5.90 (6.19) | -5.98 (6.31) | 2.50 (6.36) | 2.68 (6.22) | 3.81 (6.39) |
| Nurse Age                                | -0.05 (0.20) | 0.07 (0.20) | 0.08 (0.20) | -0.16 (0.20) | -0.08 (0.20) | -0.09 (0.20) |
| Order of Emotion and Risk Judgement Questionnaires | 0.17 (3.88) | 2.61 (3.72) | 1.50 (3.68) | -4.40 (3.85) | -2.34 (3.74) | -3.39 (3.73) |
| Positive Emotions Toward COVID-19         | -0.06 (0.10) | -0.03 (0.10) | 0.02 (0.10) | 0.04 (0.10) |
| Negative Emotions Toward COVID-19         | 0.33 (0.11)** | 0.31 (0.11)** | 0.35 (0.11)** | 0.34 (0.11)** |
| Emotion Regulation Strategy - Suppression | 2.91 (1.37)*  | 2.87 (1.39)*  |
| Emotion Regulation Strategy - Reappraisal | -2.48 (1.74) | -0.97 (1.77) |

Note. Sample Size (N) = 132.

*p < .05.

**p < .01. Uniformly standardized regression weights are presented with standard error in parenthesis. Nurse Gender: 0 = male, 1 = female. Nurse Race: 0 = non-white, 1 = white. Order of Emotion and Risk Judgement Questionnaires: 0 = Emotion items first, 1 = Risk judgement items first. Positive Emotions Toward COVID-19 (3 items; Cronbach’s α = 0.81). Negative Emotions Toward COVID-19 (9 items; Cronbach’s α = 0.89). Emotion Suppression (4 items; Cronbach’s α = 0.82). Emotional Reappraisal (6 items; Cronbach’s α = 0.88). Patient Safety Risk (4 items; Cronbach’s α = 0.80). Personal Safety Risk (4 items; Cronbach’s α = 0.75). Nursing experience was substituted for nurse age in Model 1, and results were identical in interpretation; as such, age was used in subsequent models.
so, more research is needed to link specific risk assessments to clinical behaviors.

Second, we found similar results regardless of whether we used negative affect or fear alone to predict risk perceptions, even though research suggests that fear uniquely predicts risk perceptions (Johnson and Tversky, 1983; Lerner and Keltner, 2001; Lerner et al., 2003; Ferrer et al., 2015). While our emotion items were selected from the Positive and Negative Affect Schedule – Expanded Form, which is a well-established tool (Clark and Watson, 1994), this finding may reflect the inability of our COVID-19 emotion measure to detect meaningfully distinct emotion categories. However, it may also reflect the possibility that nurses themselves did not distinguish between fear and anger, for example, with respect to COVID-19 during the start of the pandemic, and instead experienced many overlapping negative emotions.

Third, the extent to which our results would generalize to emergency nurses outside the northeastern US is unknown, as our sample is limited to a specific geographic region. Finally, our sample was largely female, reflecting the demographics of this profession in the US and was also disproportionately white. The extent to which our findings would generalize to more diverse participant samples is unknown.

6. Conclusions

Actual, objective risk indicators are shaped by how nurses perceive the likelihood of these risks unfolding, and we demonstrated that such perceptions were influenced by nurses’ negative emotions. In this sense, emotions serve as a nexus from which threats to patient safety and medical errors likely emerge. Addressing nurses’ emotions and coping is crucial to explore, as emergency nurses serve a vital role in preserving continuity of care, and negative emotions may be particularly susceptible to targeted interventions that improve clinical care and reasoning.

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Declaration of Competing Interest

None.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ijnsa.2022.100111.

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