Modeling social comparison in the stress process: an examination of nurses

by

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Abstract

Excessive workplace stress is a costly problem for organizations and a psychophysical hazard to workers. While some sources of stress cannot be avoided or eliminated from certain occupations, they do not always result in stressful experiences for workers. Research is steadily uncovering the factors that influence experiences of workplace stress in hopes of better controlling its harmful outcomes. Accordingly, the present study focused on the potential impact of social comparison on workers' interpretations of demanding workplace events and their confidence in coping with stress. A sample of 139 healthcare workers provided personal data in relation to five types of stressors common to the field of nursing, along with relevant information about how they perceive their coworkers' responses to said stressors. Support was found for the hypothesized model through path analysis. Workers reported higher levels of stress when they were 1) frequently exposed to demanding events, and 2) when they perceived high levels of stress in their coworkers. They also felt more prepared to cope with that stress when they reported high familiarity with their coworkers' coping tactics. However, the more stressed the workers felt, the less prepared they felt to cope overall. The insights offered by these results contribute to the fusion of stress research and social comparison literature. It is hoped that the dissemination of findings like these may inform intervention efforts to help workers manage stress while simultaneously educating them about how they can harness social information to benefit themselves and others. The timing of such efforts is particularly relevant given the COVID-19 global crisis that is exacerbating the difficulties and negative outcomes already associated with medical occupations.

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Chapter 1 - Introduction

The enduring relevance of workplace stress—which the Canadian Centre for Occupational Health and Safety defines as harmful physical and emotional responses resulting from an employee's inability to meet job demands—has kept attention upon this topic for many years. Its ill-effects are costly for both employees and employers; healthcare expenditures are nearly 50% greater for workers who report high stress levels, while organizations contend with declining productivity and increasing absenteeism (Canadian Centre for Occupational Health and Safety, 2018; Williams, 2003). Unfortunately, neither employees nor employers have the power to directly reduce or eliminate sources of stress that are inherent to certain professions (e.g., healthcare fields cannot avoid sick and dying patients). However, even though some sources of stress cannot be avoided in the workplace, they do not automatically result in stressful experiences for workers. Research is steadily uncovering factors—beyond the mere exposure to potential sources of stress—that influence when and how workers become stressed. Continued examination will be critical if future interventions wish to manipulate such factors in a manner that interrupts the process(es) that lead to experiences of stress, or perhaps turn them into sources of empowerment to aid workers in adaptively and healthily coping with stress.

The present study explores how healthcare workers experience and respond to work-related sources of stress by proposing a model that integrates major tenants of social comparison literature within the framework of Lazarus' (1966) transactional theory of stress. It is posited that making comparisons between themselves and their fellow coworkers will 1) affect how workers interpret their own exposure to demanding events, and 2) influence their perceptions of their own ability to cope. Rather than conceptualizing social comparison as a coping strategy for combating existing stress, here it is presented as a cognitive mechanism that aides in directing a person's

entire experience of stress. The respective stress and social comparison literatures are both extensive, but no other studies appear to have integrated elements of social comparison into the stress process in this manner. The remainder of this introduction presents the theoretical frameworks that underlie this hypothesized connection between social comparison as an interpretative tool and the experience of stress as a multidimensional process.

Study Model

An overview of this study's conceptual model with its five variables of interest and four direct pathways can be seen in Figure 1 (immediately following the References section). This model begins with an environmental variable, *stimulus exposure*, that is expected to directly relate to the first endogenous variable, *stress appraisal*. A second variable, *perceived coworker stress*, is also expected to affect the stress appraisal variable. This stress appraisal variable then serves as a mediator between the aforementioned stimulus exposure variable and another endogenous variable, *coping preparedness*, effectively linking the left and right sides of the model. Finally, the coping preparedness variable is anticipated to be additionally affected by a second variable, *perceived coworker coping*. These paths are meant to capture some of the cognitive and behavioral processes outlined by the transactional model of stress set forward by Richard Lazarus (1966), which will be explained in the following sections, along with the added elements of social comparison.

Transactional Theory of Stress

Richard Lazarus and his colleagues have dedicated many books, articles, and years to crafting one of the most widely recognized conceptual theories of stress, often referred to as the transactional theory (or model) of stress (Lazarus, 1966; Lazarus & Folkman, 1984; Dewe, O'Driscoll, & Cooper, 2012). Unlike other theorists who conceptualize stress as either a

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stimulus, a response, or a psychophysical state, he posited a dynamic relationship between a person and their environment that changes according to two mediators: cognitive appraisal and coping (Biggs, Brough, & Drummond, 2017). Cognitive appraisal involves a person's evaluation of how their situation may compromise their well-being and, if so, what can be done to protect said well-being. Coping refers to the cognitive and behavioral efforts that a person makes to either eliminate the source of stress or regulate their responsive emotions. Both cognitive appraisal and coping influence each other reciprocally, such that a person copes with a stressful situation based upon their initial appraisal of it, but—as their coping efforts alter their relationship with the environment—a reappraisal of the situation is prompted. This may then lead them to cease, continue, or change their coping strategies. This cycle will repeat until the person no longer feels compromised by the situation. The following sections address in greater detail how cognitive appraisal, specifically its subcomponents, are incorporated into the current study's conceptual model (Paths 1 and 2, and the three boxes connected by them as seen in Figure 1).

Cognitive Appraisal

The processes that lead to an experience of stress are triggered when a person faces a demanding situation to which they must adapt (i.e., stimulus; see the "stimulus exposure" box in Figure 1). Usually, they know that if they cannot adapt to meet the demand then aversive repercussions may follow (Biggs, Brough, & Drummond, 2017). However, simply facing a demanding situation—be it a daily hassle or major life event (negative or positive)—is insufficient for the stimulus to automatically become a source of stress (i.e., stressor; see Brough, Drummond, & Biggs, 2018). Due to the highly variable conditions under which a person may be exposed to a stimulus—as well as relevant individual differences within the person themselves—their reaction to the stimulus may 1) differ in intensity, symptomology, and longevity across

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multiple instances of exposure, and 2) differ compared to the reaction of another person. The process by which an evaluation is made about a stimulus is called *cognitive appraisal*, which can be broken down into two interdependent but distinct subprocesses, the first of which is called primary appraisal.

Primary Appraisal. When faced with a stimulus that requires adaptation, a person must determine if something important to them (a goal, belief, value, possession, mental or physical well-being) is put at risk if they cannot adapt. In other words, the person will become stressed if they cannot meet the demands of their situation and something important to them a) could be damaged or lost (i.e., threatened), b) already has been damaged or lost (i.e., harmed), or c) may be pushed beyond its limits (i.e., challenged). Lazarus (1999) uses the oversimplified but useful analogy of a seesaw to illustrate the fragile balance between a person's personal resources—psychological, skill-based, and external/environmental—and the demands placed upon them by a stimulus. If the demands of the stimulus exceed the person's available resources, then the relationship between the person and the stimulus is likely to become stressful as the balance of the seesaw tips towards potential risk. As Lazarus (1999) put it, if failing to meet a stimulus's demands yields consequences that hamper "important goal commitment and situational intentions, or violates highly valued expectations," then the stimulus is a stressor for that person (p. 60). (The evaluation of whether a stimulus is a stressor is represented by the "stress appraisal" box in the study's model; see Figure 1.)

It is important to note that mere exposure to a stimulus does not automatically result in an experience of stress; a person may face the stimulus, meet its demands, and come away without feeling put at risk (i.e., the stimulus is not a stressor). However, when considered in terms of basic frequency, if Person A rarely faces the demanding stimulus, they are less likely to

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experience stress as often as a person who faces the demanding stimulus on a regular basis (Person B). Even if an experience of stress does not follow exposure to the stimulus for either Person A or Person B every single time, it is still Person B who is more likely to experience stress due to having comparatively more opportunities to feel put at risk.

Hypothesis 1: Exposure to demanding stimuli will be positively related to appraisals of stress (see Figure 1, Path 1).

Secondary Appraisal. The second subprocess of cognitive appraisal—called secondary appraisal—takes place if the stimulus is indeed interpreted as a stressor and must be handled effectively (Dewe, O'Driscoll, & Cooper, 2012). The viability of coping strategies should account for the stressful demands themselves, the person's available resources, and relevant situational factors. It is important to note that, at this point in the transactional model, appropriate strategies are only being considered (not implemented). The "coping preparedness" box in the present study's conceptual model (see Figure 1) is meant to capture one outcome of a person's secondary appraisal process, namely their perceptions about whether they have viable strategies with which to cope with the feelings of stress (or the stressor itself) at hand.

Coping refers to the multidimensional process of managing stress through cognitive and behavioral efforts that help a person adapt to the existing demand (Lazarus & Folkman, 1984). It is meant to aid them in tolerating, minimizing, or eliminating their stress, which can be achieved through problem- or emotion-focused coping strategies (Folkman & Lazarus, 1980). The first type involves enacting efforts that will alter the nature of the relationship between the person and their situation, while the second type revolves around changing the meaning behind the stressful person-situation relationship without changing its nature (Lazarus, 2001). Neither approach is meant to be elevated above the other in terms of preferability, appropriateness, or effectiveness.

A person's actions and thoughts are quite interconnected, so both types of strategies can work together to improve the relationship between a person and their situation. In fact, it is common for people to enact an array of coping strategies from both approaches simultaneously (Lim, Bogossian, & Ahern, 2010; Lo, 2002; Simoni & Paterson, 1997) or strategies that cannot be designated as solely one approach or the other (Lazarus, 2001; Pearlin & Schooler, 1978). The decision regarding what coping strategies would be the most suitable for reducing a person's stress banks heavily upon the quality of their secondary appraisal and the factors that influence it.

Lazarus (1999) already made room in his framework for social influences when he identified certain types of environmental variables that impact the secondary appraisal process through social saliency. He refers to these variables as *social constraints* because they define the boundaries of what people should *not* do based upon social conventions relevant to the situation or society at large. People simply do not have the freedom to do anything they wish without consideration of others who might be affected. It is not uncommon for there to be repercussions if social constraints are violated, which may then compound the stress that the person was already experiencing.

The restrictive nature of social constraints may interfere with how a person wishes to cope with the situation. For example, imagine a nurse who is working under the supervision of a condescending physician. The physician refuses to acknowledge the nurse's recommendations regarding a patient's care. Hence, the nurse may wish to yell at the physician and demand to be taken seriously, but doing so would seem highly unprofessional (probably drawing negative attention upon themselves). Thus, they decide that applying this coping strategy is not a good option. While this censorship prevents the nurse from assuaging their ongoing experience of

stress in their preferred manner, the alternative could result in formal (e.g., a letter of warning) or informal (e.g., tarnished reputation) backlash that may exacerbate their stress.

It is important to note that social constraints can be both external and internal in origin. Let's say a different nurse is struggling with a very taxing workload, but they are worried about losing face and/or incurring disapproval from their superiors if they voice their difficulties and ask for help (see Edmondson, 1999). While their expectation of repercussions may not be unreasonable, they may be making incorrect inferences about what would happen if they asked for help. By stopping themselves from reaching out, they may miss out on valuable resources that would otherwise be available to them. This is why it is important for a person to achieve a realistic appraisal of their situation's demands, their own resources, and any social factors that may direct the appropriateness of their coping responses.

Unfortunately, ineffective coping muddies up what should be rather straightforward relationships between appraisals of stress, enactment of coping strategies, and perception of coping effectiveness (Lazarus, 1999). Greater reporting of problem- and emotion-focused coping behaviors does not always relate to lower levels of stress or related outcomes. And yet, while ineffective coping has been associated with higher levels of stress and effective coping generally relates to lower levels of stress, it is possible that effective copers may end up in more stressful situations due to how much they extend themselves as compared to ineffective copers (Lazarus, 1999). This leaves an open-ended question regarding the relationship between a person's level of stress and their estimation of their own ability to cope. On one hand, high levels of stress may relate to feelings of being ill-equipped to cope. Alternatively, a person may find themselves under lots of stress while simultaneously believing that they are adequately prepared to cope.

Research Question 1: How will appraisals of stress relate to feelings of coping

preparedness (see Figure 1, Path 2)?

Social Comparison

Leon Festinger (1954) prompted a new field of research with the following claim: "There

exists, in the human organism, a drive to evaluate [their] opinions and abilities" (p. 117). He

posited that everyone, to some degree, wishes to gather information that will help them evaluate

the correctness of their thoughts, beliefs, and capabilities—evaluations that will then impact their

future behavior. Much of the research that has followed in the wake of this claim has

corroborated the idea that people universally wish to learn about themselves through comparison

with "referents" (i.e., people they choose to compare themselves to; Berscheid & Regan, 2016;

Osborne, 2016). Granted, they may be reticent with their admissions of doing so for reasons of

social desirability and an unawareness of 1) what constitutes social comparison, and 2) when

they are engaging in it (Langer, Pirson, & Delizonna, 2010; Wood, 1996). Nonetheless, there is

substantial evidence that most people do, from time to time, compare themselves with others not

only on opinions and abilities as originally posited, but also regarding accomplishments,

feelings, possessions, personal characteristics, and aspects of significant others (Gibbons &

Buunk, 1999).

Only one underlying motivation for engaging in social comparison was put forward by

Festinger (1954) and, as implied above, it is comparison for the purpose of self-evaluation. Later

expansions upon social comparison theory by other researchers, however, have led to the general

acceptance of another motivation that has garnered considerable empirical support—comparison

for the sake of self-improvement (Gibbons & Buunk, 1999; Wood, 1996). Both types of

comparison have been incorporated into the present study's conceptual model with the boxes of "perceived coworker stress" and "perceived coworker coping" (see Figure 1).

Self-Evaluation

A person needs to know if the way they think and feel (e.g., decision-making, emotionality), and the things they do (e.g., performance on relevant tasks), are acceptable (Berscheid & Regan, 2016). These evaluations may incentivize them to believe, think, and act in new ways, or simply reassure them that the way they are going about their life warrants little or no change. If objective criteria are available to establish the quality of one's opinions or performance, then a person can judge how well they meet those criteria on their own. Imagine, for example, several nurses who are required to complete at least five rounds over the course of their shift. If Nurse A fails to meet that requirement, they have a definitive indicator that their performance is lacking. They can make this evaluation in the company of Nurses B and C (who may or may not have completed all 5 rounds themselves) *or* in complete isolation (because the requirement exists objectively—it is not based on the performance of a fellow person). People seem more inclined to evaluate their opinions and abilities against an objective criterion like this if it is available (Berscheid & Regan, 2016; Festinger, 1954).

Objective criteria, however, are not always available. When real-world situations involve ambiguous performance criteria (e.g., patient improvement, obscure feedback, healthy and effective coping), a person may be compelled to examine the similarities and/or differences between themselves and other people to fill in the gap (Osborne, 2016). While social comparisons are not equivalent substitutes for objective criteria, they facilitate a useful form of information-gathering that can influence how a person interprets and reacts to their circumstances. According to Salancik and Pfeffer (1978), the immediate social environment is an

invaluable source of information that helps shape a person's understanding of what constitutes appropriate attitudes, opinions, and behaviors. People do not exist in bubbles and, according to the theory of social information processing, every interaction with another person helps both parties make sense of what is going on in their shared environment (Salancik & Pfeffer, 1978). It is of no surprise then that, beginning with the work of Schachter (1959, as cited in Berscheid & Regan, 2016) and extending over the years (e.g., Gump & Kulik, 1997; Locock & Brown, 2010), people dealing with ambiguity (in both clinical and non-clinical populations) have willfully put themselves in situations where social comparisons can be made and, by extension, social information can be gathered.

Relevance for Stress. Recall that the cognitive process of primary appraisal in Lazarus' (2001) transactional model of stress involves an evaluation of whether something important to a person has been harmed, threatened, or challenged. Since an experience of stress results from an appraisal to the affirmative, it is imperative that the appraisal be based on accurate and realistic perceptions of the situation at hand. (It is counterproductive to a person's well-being if they experience stress due to a misunderstanding of their environment.) If a demanding stimulus exhibits ambiguities that make it difficult for a person to deduce whether it harms, threatens, or challenges something valuable to them, that person may not be sure if the situation warrants high feelings of stress in response. They may not be able to deduce if they are capable of adapting to the situation's demands.

This is where the information-gathering that accompanies social comparison comes into play, as people in social environments are susceptible to the spread of other-endorsed attitudes, emotions, and even behaviors. Research on emotional contagion (i.e., the sharing or adopting of another person's emotion) indicates that people take cues from each other regarding how to feel

and behave whether they realize it or not (Hatfield, Cacioppo, & Rapson, 1993; Glomb & Liao, 2003). A unique extension of this literature focuses on "stress contagion" specifically, which emphasizes that feelings of stress can be transmitted between individuals through social interactions (even between less-than-intimate people in formal environments) and result in negative emotional and even physical effects, like increased burnout among fellow nurses (Wethington, 2000; Omdahl & O'Donnell, 1999; Carnevali et al., 2020).

It could be partly thanks to processes akin to stress contagion that healthcare workers, while engaged in primary appraisal, may determine that a workplace event warrants an acute stress response. If they cannot rely upon objective information (or personal knowledge from similar experiences) to help them determine if the situation is risky, branching out to include sources of social information (i.e., their coworkers) could be very useful. Recalling the scenario between the nurse and condescending physician, the nurse may compare their experience to that of other nurses working under the same physician in an effort to better understand whether their personal situation is uniquely harmful. If they perceive that the other nurses are similarly stressed and uncomfortable when dealing with this physician, then our target nurse may feel validated in their own appraisal of this situation—it is alright for them to feel stressed about it, because they are not alone in their frustrations. Alternatively, let us imagine a different nurse who has not personally had negative interactions with the condescending physician yet, but has observed the troubling dynamics described above. As a result, they begin to feel stressed whenever they see or run into the physician—fearing, and maybe expecting, that a negative encounter is inevitable.

In scenarios such as this, it is reasonable to speculate that the information-gathering aspect of evaluative social comparisons facilitates the process of primary appraisal. Knowing

how other people feel about a demanding stimulus may serve as a valuable cue for helping a person determine whether they are personally at risk.

      Hypothesis 2: Perceived coworker stress will positively relate to appraisals of one's own stress (see Figure 1, Path 3).

Self-Improvement

      While social comparisons can help a person evaluate the acceptability of their opinions, abilities, performance, etc., they may additionally help the person learn more about how they can improve meaningful aspects of themselves (regardless of how well the person is objectively doing, e.g., poorly, acceptably well, above average; Gibbons & Buunk, 1999; Taylor & Lobel, 1989). One person might feel dissatisfied with their current state while another person feels compelled to continuously excel, but both may have a difficult time imagining what further improvement would look like if they have never observed a model of the desired state. Therefore, they might try to observe someone whom they perceive to be doing better than they are—said referent could be seen as projection of where they themselves could be one day. They then create a plan for how to "get there" by using what they observe of the referent's behaviors, decisions, and attitudes as a blueprint for their path to achievement (Michinov & Bavent, 2001). Ashford (1986) emphasized that people engage in observation to gather information that they believe will be valuable to them, especially regarding goal achievement. They will also attempt to replicate behaviors that they have seen render valuable outcomes for salient others (Miller & Jablin, 1991). Bandura's concept of observational learning (also called vicarious learning) further supports this notion with its assertion that learning is more effective when observers already know the consequences of specific behaviors (Bandura & McClelland, 1977). There comes an expectation that behaving in an identical or similar fashion will yield similar results.

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Referent Selection. The suitability of a comparison for self-evaluation or self-improvement partly depends on whom the selected social referents are (Osborne, 2016). Some of the earliest literature indirectly related to social comparison suggests that setting a comparison point either far above or below one's actual capabilities will render an imprecise or dissatisfactory perception of actual performance (Dreyer, 1953; Hoppe, 1930). This work strongly contributed to the enduring notion that it is better to select referents similar to oneself when making self-evaluations, a notion that Festinger (1954) integrated into his framework. Similarities between a person and their referents could revolve around compatible opinions and views; comparable skills, abilities, or knowledge/education; shared or similar experiences; anything that is of relevance in the moment, all for the sake of providing a better foundation for accurate self-evaluation (Goethals & Darley, 1977, as cited in Taylor & Lobel, 1989). Therefore, people may enforce self-imposed restrictions upon their evaluations; the more two people differ on relevant aspects, the less inclined one will feel to choose the other as a referent (Festinger, 1954).

However, when a person is making social comparisons under the motivation for self-improvement, it is the differences between them and their referents that are important. They are seeking information (through observation or direct interaction) from individuals whose situations show an improvement over their own (Osborne, 2016). Naturally, the referents tend to look better than the person who is making the comparisons, which creates the potential for negative feelings for the one who looks "worse" (Brickman & Bulman, 1977, as cited in Wood, 1996). But the problem with choosing a similar referent is the possibility that the aspiring person will not gain new or useful information about why they are not doing better themselves. They are intentionally looking for a role model after whom they may pattern new behaviors and attitudes

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(Bandura & McClelland, 1977). These self-improvement comparisons are quite common according to meta-analytic findings (Gerber, Wheeler, & Suls, 2018) and are often referred to as "upward comparisons" (Taylor & Lobel, 1989).

It is important to note, however, that people do not always deliberately choose *when* they make social comparisons or *whom* they compare themselves to (Langer, Pirson, & Delizonna, 2010; Wood, 1996). The environments in which comparisons are made are not passive; sometimes they only supply referents whom a person would not choose to compare themselves to if alternatives were available. Additionally, the environment may impose comparative opportunities upon someone who was not intending to make a comparison at all. For example, workers who witness a colleague receiving a promotion or commendation for their work may find themselves spontaneously making comparisons between their own performance and that of the rewarded colleague.

Relevance for Stress. The process of secondary appraisal in Lazarus' (1966) transactional model of stress involves an evaluation of feasible coping options that address a situation's stressful demands in light of a person's available resources and relevant situational factors (e.g., social constraints). Recall that, at this stage in the model, the person is only deliberating over the most appropriate coping strategies. Coping research indicates that people simultaneously implement multiple different coping strategies when handling stressors (Lazarus, 2001), but that does not innately mean that the resulting combination of strategies will be effective. However, because the underlying purpose of coping is to reduce stress, it is reasonable to expect that a person will try to determine which strategies will be the most effective. This is where social comparison motivated by self-improvement becomes relevant, as well as the importance of referent selection.

A person who wishes to improve their current state may try to find a referent who is comparatively less stressed than they are (facilitating an upwards comparison), but they may also yearn for a point of commonality—such as shared source(s) of stress—that makes their situations comparable. A would-be-referent may be esteemed because they seem less affected by demanding stimuli or appear to be coping more effectively (Taylor & Lobel, 1989). Observing how the referent is coping with their work-related stress could serve as a guiding agent for recognizing appropriate *and* effective coping strategies (vicarious learning; Bandura, 1977). It is possible that a better-off-referent is more aware of what resources are useful for contending with the given stressor, as well as any relevant social constraints that may place restrictions upon the acceptability of certain coping strategies. Once again, social information processing theory reinforces the usefulness of attending to the norms and expectations signaled through the social environment (Salancik & Pfeffer, 1978; see Whitby, McLaws, & Ross, 2006). Returning to the example of the condescending physician, the nurse who cannot scream their grievances at the offending culprit may start to observe their similarly snubbed colleagues to figure out how they are coping with the situation. As a result, the nurse stumbles upon a lowkey venting session that recurringly happens in the breakroom. It does not eliminate the source of stress, but it is effective for releasing pent-up negative energy while simultaneously fostering supportive camaraderie between the nurses in a socially acceptable way.

It is pertinent to point out that there could be obstacles preventing someone from aligning their behaviors with those of their referents. Changing coping behaviors is not as simple as "monkey see, monkey do"; each person has spent their whole life ingraining behavioral patterns that foster preferred ways of coping (Folkman & Lazarus, 1980). These preferences do not just go away in the face of novel, recurring, or ambiguous stressors, nor do they lose all appeal even

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in light of more appropriate strategies. It is also worthwhile to clarify that social comparisons do not inherently yield constructive or objectively better information that will inherently facilitate improvement; a person's comparative efforts could lead to judgment calls that are actually worse. However, a notable amount of research has supported Festinger's (1954) assertion that social comparisons with similar but better-performing others can motivate people to aim higher and do better (e.g., Taylor & Lobel, 1989). In the context of the present study's model, it is expected that workers who are familiar with the coping strategies of their coworkers will have a greater sense of coping preparedness.

> *Hypothesis 3:* Perceived knowledge of coworker coping will positively relate to one's own feelings of coping preparedness (see Figure 1, Path 4).

Why Nurses?

Because this study explores processes related to workplace stress, it is beneficial to focus on a population of workers from a particular profession that is prone to high levels of stress. The field of nursing in particular has such a reputation, as it is complex, highly demanding, and fraught with workplace difficulties such as strenuous workloads, organizational constraints, inadequate support and resources, and role conflict (Gray-Toft & Anderson, 1981; Kath, Stichler, Ehrhart, & Sievers, 2013; Labrague, McEnroe-Petitte, Leocadio, Van Bogaert, & Cummings, 2018). For years nurses have reported high levels of stress and poor health symptoms that are physiological (e.g., illness, sleep disturbances, muscle tension) and psychological in nature (e.g., burnout, depression, lower job satisfaction, compassion fatigue; NIOSH, 2009; Zeller & Levin, 2013). Needless to say, the current global health crisis—brought about by Covid-19—has deeply exacerbated the strain experienced by most healthcare workers as their social and economic lives are upended; their workplaces made more dangerous; their work resources rapidly depleted; and

their livelihood potentially thrown under the bus by the employing institutions (some workers have been fired or reprimanded for speaking about resource shortages and other difficulties; Mock, 2020). With these factors in mind, great effort was put into gathering a sample of predominantly nurses for the present study.

Chapter 2 - Method

Participants

Participants were recruited from Amazon's Mechanical Turk (MTurk) platform, which is a practical way of obtaining high quality data (Landers & Behrend, 2015) given the present study's objectives. The title and description of this study's advertisement were written to appeal to nurses specifically, but MTurk users were allowed to accept the hit if they 1) resided within the United States, 2) had an MTurk approval rating of 95% or greater, and 3) had an MTurk profile with a 'healthcare worker' classification.

If they accepted the hit and continued past the informed consent page, participants were confronted with a warning (see the full message in Appendix A) about how this study is geared toward workers who hold (or have held) nursing jobs. Twenty people chose to opt out of the study following this warning. Another 10 respondents were dropped during data cleaning after a careful review of their job titles (provided via an open-entry question) in combination with whichever healthcare category they self-identified with suggested that they were less likely to experience the stressors of interest in this study.[1] One respondent was dropped due to careless responding—they failed two of the three directed-response and anti-bot items scattered

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[1] Participants responded to the question "Broadly speaking, which healthcare category does your current job fall under?" by selecting one of the following options: NOT a healthcare worker (1), nurse (2), physician/surgeon (3), assistant (Medical, Physician, or PT)(4), Resident (5), Technician or Technologist (6), Therapist (7), Home Health Aide (8), or Other (with a write-in textbox)(10). Most of the 10 participants dropped due to this question had selected an option other than nurse AND given a job title that indicated they worked in sales, information technology (IT), marketing, or customer service (or, in one case, they were a senior executive). Ultimately, 86% of the 139 participants in the final sample selected the nurse option; the remaining 14% selected one of the other categories but gave a job title that indicated suitable overlap with the field of nursing (e.g., patient care assistant, hospital assistant).

throughout the survey—and four more were dropped for completing less than 17% of the survey.[2] Roughly half of the participants were compensated $0.75 (USD) for completing this survey, while the other half received $2.00.[3]

The final sample consisted of 139 respondents. On average, they were 36 years old ($SD = 11.68$), female (76%), and White/Caucasian (80%).[4] Regarding education, 18% held an associate's degree; 48% held a bachelor's degree; and 23% held a master's degree or higher.[5] Only three participants became unemployed within the prior year (two directly due to COVID-19 circumstances); 88.5% of participants were still employed full-time; and 9.4% were employed part-time. The mean of employment tenure for whichever healthcare category the participant had selected was 8.64 years ($SD = 8.31$). The raw distribution of tenure data was positively skewed due to a handful of participants who have spent considerably more time working in their respective fields than the majority (e.g., 7% reported 25+ years of experience; 70% reported 10 years or fewer). Additionally, a mean average of 1372 ($SD = 5487$) healthcare workers worked at the participants' places of employment, and the participants reported working closely with a mean average of 14 ($SD = 15$) of these healthcare workers on a daily basis. It should be noted

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[2] The remaining participants responded to all (or two) of the checks correctly and completed the majority (if not all) of the survey, suggesting that careless responding and non-human responders were not a major cause for concern or detrimental to the power of the statistical analyses (see Kline, 2016).

[3] This study originally advertised $0.75 (USD) as compensation, which was later raised to $2.00 (USD) in an effort to encourage faster completion. (Interestingly, it didn't work; roughly the same number of people participated over the same length of time even after the price was raised.)

[4] 19% of participants identified as male (4.5% chose they/them pronouns or preferred not to say); 12% identified as Black/African American, while 8% either chose a different ethnicity (Native American, Asian/Pacific Islander, or Hispanic/Latino/Latina) or selected more than one.

[5] The remaining 11% had at least a high school degree or equivalent; trade/technical/vocational training; or some college experience but no degree yet.

that the data for both of these coworker variables were also severely positively skewed due to a broad range in employer size—some employers possess tiny workforces while others appear to be truly massive organizations.[6]

Measures

All model variables were measured with items using 5-point Likert scales; lower values denoted lesser frequency/endorsement and higher values denoted greater frequency/endorsement. (These items can be found in Appendix B.) Additional questions (unrelated to the model variables) gleaned personal, interpersonal, and work-related information regarding both the participants and their chosen referents (i.e., coworkers).

Stimulus Exposure & Stressor Appraisal

The present study used Gray-Toft and Anderson's (1981) Nursing Stress Scale (NSS) to acquire data for two of the conceptual model's variables: stimulus exposure and stress appraisal. The NSS is a multidimensional instrument designed to assess seven commonly reported sources of stress—each one via its own subscale—experienced by nurses in their field of work. However, for the sake of 1) a desire to focus on stressors beyond the nurses' control, and 2) parsimony, only five of the original seven stressors were incorporated into this study: death and dying (7 items), conflict with physicians (5 items), lack of support (5 items; 2 of which were added by the present researcher), workload (6 items), and uncertainty concerning treatment (5 items).[7] Each

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[6] Total number of fellow healthcare workers (*Min* = 1; *Max* = 50,000; *Mdn* = 80); healthcare workers worked closely with on a daily basis (*Min* = 0; *Max* = 100; *Mdn* = 10)

[7] Two items were added to the "lack of support" subscale in hopes of capturing further information relevant to this stressor dimension, as well as making this specific subscale more comparable in length to the other subscales. Additionally, the wording of one item in the "workload" subscale was slightly modified. All three of these items are denoted with asterisks in Appendix B.

subscale item (e.g., "Performing procedures that patients experience as painful" from the death and dying subscale) was presented once and accompanied by two separate Likert scales: one captured the frequency of the event described by the item (*Never* [1] to *Very Frequently* [5]), and the second captured the intensity of the participants' feelings of stress associated with the event (*None* [1] to *An Extreme Amount* [5]). The frequency estimates provided data for the stimulus exposure variable—as greater frequencies of events indicate greater exposure to demanding stimuli—and the intensity data embodied the stress appraisal variable—as greater intensities suggest that these events are indeed appraised as stressors.

Items were aggregated together on their respective subscales to create two stressor-specific composite scores of exposure and stress appraisal, which can be examined separately (to maintain stressor domain specificity) or further combined into higher level composites of total stressor exposure and total stress appraisal. The Cronbach's alpha values for the five exposure subscales ranged from .79 to .92, while the values for the five stress appraisal subscales ranged from .70 to .88 (see Table 1); these values meet the commonly used threshold of .70 for satisfactory internal reliability estimates (Lance, Butts, & Michels, 2006).

Coping Preparedness, Perceived Coworker Stress, & Perceived Coworker Coping

The three remaining model variables—coping preparedness, perceived coworker stress, and perceived coworker coping—were measured with items adapted from the NSS scales. All three of these variables had stressor-specific subscales (5 items each) that aligned with the five aforementioned stressors of interest: death and dying, conflict with physicians, lack of support, workload, and uncertainty concerning treatment. The coping preparedness subscales measured participants' beliefs about their own preparedness to cope with those workplace stressors; the perceived coworker stress subscales tapped into participants' evaluations of their coworkers'

stress reactions to those same workplace stressors; and the perceived coworker coping subscales assessed participants' familiarity with how their coworkers handle those workplace stressors and related feelings of stress.

Effort was made to keep the wording of the adapted items fairly consistent with the stressor events described by the original NSS items. For example, the death and dying exposure/appraisal subscale item "Performing procedures that patients experience as painful" was adjusted to "When dealing with a patient who is in pain, I can handle any distress that I myself feel" (*Does Not Describe Me* [1] to *Describes Me Extremely Well* [5]) for the death and dying coping preparedness subscale. For the death and dying perceived coworker stress subscale, it was then adjusted to "Dealing with a patient who is in pain is stressful for them" (*Does Not Describe Them* [1] to *Describes Them Extremely Well* [5]). Finally, it was changed to "When dealing with a patient who is in pain, I know how they handle any distress that they themselves might feel" (*Strongly Disagree* [1] to *Strongly Agree* [5]) for the death and dying perceived coworker coping subscale. The Cronbach's alpha values for the five coping preparedness subscales ranged from .79 to .85; the five perceived coworker stress subscales ranged from .86 to .88; and the five perceived coworker coping subscales ranged from .83 to .90 (see Table 1). Once again, these values meet the commonly used threshold of .70 for satisfactory internal reliability estimates (Lance, Butts, & Michels, 2006).

Questions about Participants & Referents

Basic demographic questions (age, gender, ethnicity, education level) were asked of the participants along with more specific work-related questions about their employment status, job title and healthcare category, field tenure, and numbers of healthcare coworkers. (Please see the *Participants* section above for these descriptive statistics and an explanation of how the job title

and healthcare category questions were used to determine eligibility for this study.) They reported how stressed they currently felt compared to both six months and one year ago, indicated possible reasons for any increases in stress, and elaborated on whether they have previously experienced a work-related stress intervention. Additionally, they were asked how much they naturally tended to compare themselves to their coworkers; the intentionality of these social comparisons; the motivations behind them; and what the comparisons were often about.

Regarding the coworkers whom they chose as social referents, participants reported how similar these coworkers' jobs were to their own job; whether they worked in the same department; whether they supervised or were supervised by these coworkers; how much experience the coworkers had in their healthcare field; and the reasons why they thought of these coworkers specifically for the purposes of this study. Furthermore, participants indicated how much healthcare field experience they have relative to each chosen coworker, and how well they generally cope with work-related stress compared to each coworker. They also reported how stressed they believe their coworkers were both six months and one year ago (if they had been working together at those past two timepoints). Finally, two directed-response items (e.g., "Please select 'Does not describe them' for this item") and one anti-bot question ("What is 33 minus 3?" presented against a patterned background) were scattered throughout the survey to identify possible careless responders and bots (Meade & Craig, 2012).

Procedure

This study was conducted as one large Qualtrics survey; participants who accepted the HIT on the MTurk platform were given the survey's link. After implying their consent by clicking past the informed consent page, all participants were confronted with the warning explaining how this study is geared toward workers who hold (or have held) nursing jobs. (See

the full message in Appendix A.) They were given the option to opt out of the study by clicking "I would like to end my participation in this study". Those who chose to proceed with the study by selecting the option "I would like to continue taking the survey" then provided work-related demographic details (e.g., current employment status, tenure).

All participants were shown a message that acknowledged the stressful nature of the field of nursing before viewing a list of the five stressors addressed in this study—death and dying, conflict with physicians, lack of support, workload, and uncertainty concerning treatment. They were directed to select the top three stressors that they "personally deal with the most while on the job". (See the full layout of this message and selection prompt in Appendix C.) Qualtrics restricted them from choosing fewer or more than three stressors. They were then shown the original NSS subscales (measuring both exposure and appraisal) that corresponded to their three chosen stressors.

At this point, all participants were asked questions about their own current work-related stress compared to said stress six months and one year ago; possible sources of any increased stress; and their experiences with work-related stress interventions. They then viewed a second message that 1) introduced the concept of coping, and 2) informed them that their confidence in their ability to cope with work-related stress was about to be assessed (see Appendix D for the full message). This was immediately followed by the three coping preparedness subscales related to their chosen stressors.

This is when the focus of the survey broadened beyond the participants themselves to include their social referents as well. The participants were instructed to think of no more than three fellow coworkers with whom they regularly worked and had spent a lot of time observing. (See Appendix E for the full prompt, which included suggestions of what participants could

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consider when making their choices.) They indicated how many coworkers they were thinking of (either one, two, or three) and reported details about each referent individually (e.g., similarity of job, sameness of department, reasons for choosing them as a referent). Afterwards, participants were asked to report how their chosen coworkers react to the same top three stressors that the participants had previously reported upon (via the perceived coworker stress subscales). When doing so, they were instructed to think of their coworkers as a single group/unit rather than separate individuals (regardless of how many coworkers they were using as referents). (A full explanation—with a visual aid—was provided to demonstrate how to average across multiple referents; see Appendix F.) Next, all participants who confirmed that they had been working with their chosen referents six months ago, as well as one year ago, indicated whether they believed their coworkers' work-related stress was currently more pronounced than it had been at those past two timepoints. Participants then completed the three perceived coworker coping subscales that matched with their three top stressors.

Finally, the participants were prompted to directly compare themselves to their chosen referents in terms of their work experience (in their current healthcare field) and the effectiveness of their coping abilities. This was followed by self-referential questions examining the frequency, intentionality, motivations, and subject matter of the participants' workplace social comparison behaviors. The survey ended after collecting the basic demographic information (e.g., age, ethnicity) and thanking participants for their participation.[8]

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[8] The participants never saw any content related to the two stressors that they did not select as part of their "Top Three". The decision to limit participants' responses to only three out of the five stressors was made in an effort to prevent participants from feeling overwhelmed or burned out by the length and content of the survey.

Chapter 3 - Results

The present study's conceptual model is mirrored by the path model (Figure 2). Path analysis (see Lleras, 2005) was used to test the four direct pathways that were hypothesized to connect the model's five variables. However, this analysis also included tests of mediation to capture two possible indirect effects: 1) the effect of stimulus exposure on coping preparedness through stress appraisal, and 2) the effect of perceived coworker stress upon coping preparedness through stress appraisal. These mediation tests implemented a bootstrapping method, per the recommendations of Preacher and Hayes (2004). Various path modeling assumptions were examined prior to conducting this analysis. However, before addressing the path model's analysis, attention should be given to the information provided by participants about their work-related stress and social referents.

Participants' Work-Related Stress

The healthcare workers indicated that they were presently somewhat more stressed by work-related factors compared to both six months ($M = 3.99$, $SD = .90$; 5-point Likert scale) and one year ago ($M = 4.12$, $SD = 1.04$; skewnesss of -1.21, $SE = .206$; 5-point Likert scale). Roughly 85% of participants identified COVID-19 as one reason for the increase; 23% claimed seasonal factors were another reason (most of this study's data were collected from late fall through mid-winter); and 14% attributed the increase to job change as well.[9] Twenty-nine participants (21% of the sample) reported experiencing a stress intervention (e.g., workshop, lecture, training, class, program) designed to aid them with work-related stress management.

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[9] Smaller percentages of participants identified additional reasons for increased stress, such as career change (9%), entering the workforce (9%), resuming schooling for work (7%), and loss of job (3%); less than 2% of participants wrote in additional reasons (job insecurity, meeting career goals, and workplace turnover).

However, only 12 of these participants gave an interpretable timeframe for when the intervention occurred. According to these responders, the interventions happened anywhere from one week to six months prior to their participation in the present study. The intervention was facilitated by the current employer of 28 of these workers, and one worker reported putting themselves through the intervention on their own.

With regards to the top three stressors that participants chose when directed to (see Appendix C), workload was the most commonly selected domain ($n = 127$), followed by lack of support ($n = 90$), then death and dying ($n = 72$), uncertainty concerning treatment ($n = 67$), and, lastly, conflict with physicians ($n = 58$). Within each of these stressor domains, the averaged raw data for each of the five model variables were mostly normally distributed; leptokurtosis and negative skew were only seen in three cases (see the mean, standard deviation, and non-normal values in Table 1). The descriptive statistics summarized in Table 1 reveal some consistent patterns across stressor domains, namely that the healthcare workers 1) are occasionally to frequently exposed to all five types of workplace stressors, 2) find these stressors moderately to very stressful, 3) feel at least moderately (if not a bit better) prepared to cope with these stressors when they do encounter them, 4) claim to be somewhat familiar with how their coworkers cope with these same stressors, and 5) perceive these coworkers as moderately to very stressed out by these workplace stressors.

Coworker Referent Information

When given the option of selecting one, two, or three coworkers as workplace social referents (see Appendix E), 66 participants (48% of the sample) thought of only one coworker; 59 participants (42%) thought of two coworkers; and 14 participants (10%) thought of three coworkers. This yielded a total of 226 referents for whom participants reported a variety of

individual details. Concerning job similarity, 61% of referents had the same job as the participants who chose them, and 31% had a similar job. Roughly 73% of referents consistently worked (and 21% sometimes worked) in the same department as the participants. With regards to supervisory relationships, 32% of referents were the participants' supervisors, and 6% of referents were supervised by the participants.

When asked why these coworkers were chosen as referents, the most commonly reported reasons were that participants worked with these coworkers a lot (60% of referents), they shared the same department (57%), and they had the same job (49%).[10] Some less common but interesting reasons included the participants' belief that the referents had a positive influence on them (38%); they were similarly stressed by their work (34%); the participants had a positive influence on the referents (27%); and the referents made decisions well (26%) and handled work-related stress well (25%). (See Table 2 for a full list of the referent selection reasons.)

In the interest of knowing what kind of referents participants were generally selecting with regards to healthcare field experience ("How much experience does this coworker have in their current field of healthcare?"; *Very Little* [1] to *A Great Deal* [5]), weighted averages of referent ratings were calculated for each participant. In other words, when participants indicated how much field experience each referent had, these ratings were averaged together based on the number of coworkers selected as referents. (If participant A chose and reported on two coworkers, the field experience ratings of these two referents were summed and then divided by a value of two; if participant B reported on only one coworker, the rating did not change, as it

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[10] Note that these last two percentages reflect the reasoning behind why the referents were chosen, not the reality of the participant-referent connections that the previously reported percentages of job and department sameness tapped into.

was divided by a value of one.) These referent averages of field experience suggested that participants were choosing coworkers with a moderate amount to lots of experience in the healthcare field (*M* = 3.75, *SD* = .84).[11]

Finally, 84% of participants had been working with their referents six months prior to their participation in this study, and they indicated that these coworkers were reportedly somewhat more stressed at present compared to back then (*M* = 3.91, *SD* = .95). Similarly, 72% of participants had been working with these coworkers one year prior to this study, and the pattern of being somewhat more stressed now compared to the previous year held (*M* = 3.96, *SD* = 1.08; skewness of -1.04, *SE* = .24).

Social Comparison Information

In addition to the coworker referent information addressed above, participants were prompted to make social comparisons between themselves and each referent they chose regarding field experience ("How much experience in your current field of healthcare do you feel you have compared to…"; *Much Less* [1] to *Much More* [7]) and coping ability ("How well do you believe you cope with work-related stress compared to…"; *Much Worse* [1] to *Much Better* [7]). To figure out 1) how much experience participants generally felt they had compared to the referents, and 2) how efficacious they generally felt about their coping compared to the referents,

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[11] A non-significant one-way ANOVA test (that grouped participants by how many referents they chose and used field experience averages as the dependent variable) suggested that the number of referents chosen did not relate to how much field experience these coworkers had, *F*(2, 136) = 0.015, *p* = .985 (Levene's statistic was non-significant as well, *p* = .624). In other words, the average coworker chosen by participants with more than one referent did not differ in their amount of field experience from the average coworker chosen by participants who thought of only one referent.

the same process for creating weighted averages for each participant's referent comparisons (as previously described in the section above) was used to handle the responses to these two questions, respectively.[12] Descriptive statistics suggested that participants generally believed they had roughly the same amount to slightly more field experience than the referents ($M = 4.52$, $SD = 1.53$), and that their abilities to cope with work-related stress were about the same, if not slightly better, compared to the referents ($M = 4.71$, $SD = 1.22$).

When asked if they ever naturally found themselves making comparisons between themselves and their coworkers, participants reported that they occasionally did so ($M = 3.29$, $SD = 1.05$; 5-point Likert scale) and that some comparisons were intentional just as much as others were unintentional ($M = 3.31$, $SD = .97$; 5-point Likert scale). When given the opportunity to provide all the reasons why they compared themselves to their coworkers under normal circumstances, the three top reasons were 1) to learn what they could do better (endorsed by 50% of participants), 2) to avoid mistakes (50%), and 3) to figure out if they were doing something right (44%). Finally, when asked what the comparisons were about, the top five subject matters were decisions (61%), problem-solving abilities (54%), job demands (38%), experience (38%), and stress levels (36%). (For a full list of endorsed reasons and subject matters, see Table 3.)

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[12] Two more non-significant one-way ANOVAs indicated that comparisons of experience, $F(2, 136) = 0.992$, $p = .373$ (non-significant Levene's statistic, $p = .734$), and coping ability, $F(2, 136) = 0.056$, $p = .945$ (non-significant Levene's statistic, $p = .147$), did not differ depending on how many referents participants chose to compare themselves to. In other words, participants who chose more than one referent did not differ from participants who chose only one referent with regards to how much comparative experience or coping effectiveness they believed themselves to have.

Creation of Aggregated Model Variables

Due to the fact that participants selected (and only reported upon) the three workplace stressors with which they have the most experience, there is no single stressor domain that features data from all 139 participants. As mentioned above, the amount of data available for each stressor domain varied considerably (e.g., $n = 127$ for workload; $n = 58$ for conflict with physicians). To ensure that all stressors of interest were captured when testing the present study's model—and to achieve an acceptable sample size for the path analysis itself—composite scores that combined the information across all five stressor domains were created. The process for creating these variables was as follows.

Each participant's data for their own top three stressors were aggregated into five composite scores—one score for each of the five variables in the model. These scores were created by averaging the items from corresponding subscales across their three chosen stressors. For example, if participant A chose death and dying, lack of support, and uncertainty concerning treatment as their top three stressors, in order to create their composite score for the "stimulus exposure" model variable, all the stimulus exposure items across these three stressors were averaged together (7 items for death and dying, 5 items for lack of support, and 5 items for uncertainty concerning treatment; the summed total score of these items would be divided by 17).[13] Participant A's five composite scores for the five model variables were used right alongside the composite scores created from each of the other 138 participants in this study. When looking at the means and standard deviations of these composites for each of the five

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[13] Using the scale items in this manner coincides with Gray-Toft and Anderson's (1981) original recommendations for using the Nursing Stress Scale (NSS)—it can be broken down by stressor subscale or utilized as an overall frequency measure of occupational stress for nurses.

model variables (see Table 4), they closely resemble the domain-specific values reported in

Table 1 (with mostly normal distributions).

Assumption & Bias Checking

In preparation for running the path analysis, the composites for the five model variables

were tested for univariate and multivariate outliers, multicollinearity, and normality. None of

them exhibited more than two univariate outliers. A regression analysis was run—strictly for the

purpose of looking for multicollinearity and multivariate outliers—using participants' random

identification numbers as the criterion and all five model variables as predictors (per

recommended tactics by Tabachnick & Fidell, 2013).[14] Its results suggest that multicollinearity

was not present, and only one participant exhibited a Mahalanobis Distance value high enough to

be considered a multivariate outlier.[15] However, this participant was not dropped from further

analyses due to how close their value was to the cutoff and the fact that there was a fairly smooth

progression of other Mahalanobis Distance values leading up to it. Taken together, these findings

suggest that outliers and multicollinearity should not be causes for concern (see Kline, 2016;

Shrestha, 2020); no assumptions for running a path analysis were seriously violated.

Furthermore, there was not enough precedent for removing any participants from further

analyses on the basis of assumption violations.

Due to the fact that all the data in the present study were cross-sectional self-reported

information, common method variance (sometimes called monomethod bias) could be seen as a

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[14] All predictor VIF values were under 3.0; P-P and homoscedasticity plots looked normal; none of the condition indexes in the collinearity diagnostics exceeded a value of 30; as seen in Table 4, none of the bivariate correlations between predictors were greater than .80 (sampling a few pairs also indicated normality and homoscedasticity).

[15] It exceeded the χ^2 critical value (χ^2 [5] = 20.52, p < .001; where degrees of freedom [5] = the number of model variables) with a Distance value of 21.03.

threat to construct validity (cf. Spector, 2006). To examine whether this bias may be a measurement confound for the results, a series of five Harman's single-factor tests were conducted (see Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Each test involved items related to only one stressor domain to accommodate the different proportions of participants providing data for specific stressors. The outcomes of all five analyses converged on the same conclusion that a single latent factor fit the data very poorly ($.23 \leq$ TLI $\leq .40$; $.13 \leq$ RMSEA $\leq$ .17) and accounted for an insufficient amount of variance (21% - 28%). An examination of the scree plots and eigenvalues indicated that no less than 4 factors would be needed to explain a decent amount of variance within most of the stressor domains. Based on these results, monomethod bias should not be a major cause for concern (Podsakoff et al., 2003).

Hypothesis Testing Through Path Analysis

To test the main path model's four direct pathways and two mediation pathways (see Figure 2), a path analysis with mediation components was run via RStudio software (Preacher & Hayes, 2004; Lleras, 2005; RStudio Team, 2019; R Core Team, 2020), specifically using the "lavaan" package (Rosseel, 2012). The common model fit conventions used to evaluate this model's goodness of fit were as follows: a non-significant χ^2 value (Kline, 2016), the comparative fit index (CFI $\geq .95$; Bentler, 1990), the Tucker-Lewis index (TLI $\geq .95$; Tucker & Lewis, 1973), the root-mean-square error of approximation (RMSEA $\leq .08$; Kline, 2016), and the standardized root mean square residual (SRMR $\leq .08$; Kline, 2016). The path analysis results indicated that this model fit the data quite well ($\chi^2 = 1.85$ [1, N = 139], $p = .173$, RMSEA = .08, CFI = 1.00, TLI = .97, SRMR = .02). In order to test the three hypotheses and the research question, the coefficients of the direct pathways were examined; the results for each hypothesis are described in detail below (and summarized in both Figure 2 and Table 6).

Hypothesis 1

Hypothesis 1 predicted that exposure to demanding stimuli will be positively related to appraisals of stress. The results indicated that this hypothesis was supported (γ = .66, *SE* = .05, *p* < .001; see Figure 2, Path 1). Participants who reported greater frequencies of events related to their top three workplace stressors (indicative of greater exposure) also reported greater stress intensity associated with those same events (suggesting that the events were indeed appraised as stressors).

Research Question 1

Research question 1 left it open-ended regarding whether the relationship between appraisals of stress and feelings of coping preparedness will be positive or negative, as high stress may relate to feelings of ill-preparedness for some but not for others (e.g., ineffective vs. effective copers; Lazarus, 1999). The significant and negative coefficient of this pathway (β = -.31, *SE* = .12, *p* < .01; see Figure 2, Path 2) suggests that participants who reported greater stress intensity (related to their top three stressors) indicated feeling less prepared to cope effectively.

Hypothesis 2

Hypothesis 2 predicted that perceptions of coworkers' stress will positively relate to self-appraisals of workplace stress. The results indicated that this hypothesis was also supported (γ = .24, *SE* = .06, *p* = .001; see Figure 2, Path 3). The more stressed participants perceived/reported their coworker to be (with regards to the participants' top three stressors), the more intense the participants judged their own feelings of stress to be (towards those same three stressors).

Hypothesis 3

Hypothesis 3 predicted that possessing knowledge of coworkers' coping tactics will positively relate to personal feelings of coping preparedness. The results indicated that this hypothesis was supported as well ($\gamma = .55$, $SE = .08$, $p < .001$; see Figure 2, Path 4). The more familiar participants claimed to be with how their coworkers cope (with the participants' top three stressors), the more prepared the participants rated themselves to be (for coping with those same three stressors).

Exploratory Mediation Pathway 1

Based on the configuration of the hypothesized direct pathways that connect the path model's five variables, stress appraisal could partially mediate the relationship between stimulus exposure and coping preparedness (see Figure 2, stimulus exposure → stress appraisal → coping preparedness). In other words, how prepared workers feel to cope with events that happen frequently in their workplace could partly depend on how they appraise those events. Given the aforementioned support for the positive pathway directly connecting stimulus exposure to stress appraisal (Figure 2, Path 1) and the negative pathway linking stress appraisal to coping preparedness (Figure 2, Path 2), it is reasonable to speculate that frequent exposure to demanding workplace events could lead to more acute stress appraisals, which could then lead to a sense of being less prepared to handle that acute stress time and time again.

To test this possibility, examinations of both the indirect and direct effects of stimulus exposure on coping preparedness were built into the same path analysis that yielded the hypotheses' results reported above. The results indicated support for a significant negative indirect effect of stimulus exposure upon coping preparedness through stress appraisal (indirect coefficient = -.21, $SE = .08$, $p = .014$). Additionally, there was marginal support for a positive

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direct effect of stimulus exposure upon coping preparedness (γ = .18, *SE* = .11, *p* = .093). This

suggests that the present model's ability to explain the variance in coping preparedness relies on

consideration of both the direct and indirect effects described here (i.e., partial mediation).

Perhaps workers' confidence in their own abilities to cope with workplace stress gradually builds

the more they encounter particular types of demanding events (familiar sources of stress may not

be as unsettling as novel or rare sources), but if responsive feelings of stress intensify to the point

of becoming overwhelming, then that may metaphorically beat that confidence back down.

Exploratory Mediation Pathway 2

Another possible mediation pathway in the main path model could connect perceived

coworker stress to coping preparedness through stress appraisal (see Figure 2, perceived

coworker stress → stress appraisal → coping preparedness). Given the support found for the

direct Paths 2 and 3, as well as the first mediation pathway (stimulus exposure → stress appraisal

→ coping preparedness), it is possible that perceiving stress in fellow coworkers could signal the

need for coping in much the same way that directly experiencing a demanding event could.

However, if workers feel overwhelmed by this need, or if the stress exhibited by coworkers is

amplifying their own sense of stress (through processes like stress contagion), this may work

against the workers' capacity to feel confident about how well they can handle the situation.

To test this potential mediation, examinations of both the indirect and direct effects of

perceived coworker stress on coping preparedness were also built into the same path analysis

discussed thus far. The results indicated support for a significant negative indirect effect of

perceived coworker stress upon coping preparedness through stress appraisal (indirect coefficient

= -.06, *SE* = .03, *p* = .036), as well as marginal support for a positive direct effect of perceived

coworker stress upon coping preparedness (γ = .14, *SE* = .07, *p* = .09). Once again, this suggests

some partial mediation at play. When workers see their coworkers reacting to shared workplace stressors, perhaps that validates and increases the perceived necessity of coping. However, fostering a sense of coping preparedness may not occur if the workers' stress is intensified to a crippling degree.

Understanding this second mediation pathway further rounds out the effects that should be considered when explaining the variance in coping preparedness. Between the first mediation pathway, the second mediation pathway, and the direct effect of perceived coworker coping, the present model can explain roughly 35% ($R^2 = .35$) of the variance in the endogenous variable of coping preparedness. For the other endogenous variable of stress appraisal, the direct effects of both stimulus exposure and perceived coworker stress can account for about 63% of its variance ($R^2 = .63$).

In summary, path analysis of the main path model (Model 1) provided support for all of the hypotheses, offered clarification on the research question, and shed light on relevant indirect effects. Frequency of stimulus exposure and greater perceptions of coworker stress positively related to appraisals of stress. These stress appraisals were negatively related to participants' feelings of coping preparedness, but perceived familiarity with coworkers' coping tactics were positively related to those feelings of preparedness.

Exploratory Comparison with Alternative Model

While the fit statistics of the main path model discussed above were very good, there was still room for improvement and, more importantly, logical reasons for examining an additional pathway—namely, a direct path between perceived coworker stress and perceived coworker coping (see Figure 3, Path 5). The impetus for a path directly connecting the coworker variables mirrors the reasoning behind why a connection between workers' personal appraisals of stress

and coping preparedness was hypothesized in the first place; everyone who experiences stress needs viable strategies to cope with the stressor and/or responsive feelings of stress. If the present study's participants are 1) reporting that their coworkers are experiencing stress, and 2) claiming to be familiar with how these coworkers cope with that stress, then their shared work environment must be providing opportunities for participants to witness both the stress and the coping in action. Participants cannot become familiar with something that they never observe; their coworkers would not need to enact coping tactics in the workplace if they never felt stressed. Coworkers under great stress may have (and act upon) more opportunities to cope with their workplace stress in visible ways, which is what enables participants to gauge the extent of their coworkers' stress and become familiar with their coping tactics.

For this reason, a second path analysis (see Figure 3) was conducted testing a new exploratory model that 1) adds a fifth pathway between perceived coworker stress and perceived coworker coping, and 2) captures a third mediation pathway connecting perceived coworker stress to coping preparedness through perceived coworker coping (examining the direct and indirect effects). That third potential pathway for mediation was kept because it logically follows that if participants have more opportunities to watch their stressed coworkers cope, they may feel more confident in their own capacity to cope when they see how their coworkers succeed or fail (maybe even changing their own coping tactics as a result).

This second path model (Model 2) also displayed excellent fit ($\chi^2 = 2.06$ [2, N = 139], $p = .356$, RMSEA = .02, CFI = 1.00, TLI = .99, SRMR = .03), with most fit statistics surpassing those of the first model in acceptability. (See Table 5 for an easy visual comparison of the two models' indices.) The parameter estimates of the preexisting pathways (direct and indirect) remained largely unchanged. (Table 6 summarizes the parameter estimates of both models.) The

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additional fifth pathway was positive and marginally significant ($\gamma = .19$, $SE = .10$, $p = .094$; see Figure 3, Path 5) and marginal support was found for a positive indirect effect connecting perceived coworker stress to coping preparedness through perceived coworker coping (indirect coefficient $= .09$, $SE = .04$, $p = .055$).

Model 2 does not explain any additional variance in the two endogenous variables beyond what was already addressed in the first model (Model 1), which is understandable since the effect of perceived coworker stress on coping preparedness was already captured by the second mediation pathway of the first model. However, Model 2 does convert perceived coworker coping from an exogenous variable into an endogenous variable. Based on the R-squared value for this newly made endogenous variable, its direct connection with perceived coworker stress can account for 3.5% of its variance ($R^2 = .035$). In conclusion, this alternative Model 2 may be an improvement over Model 1, but it does not appear to make contributions above and beyond Model 1 that are substantial enough to warrant discounting the adequacy of original hypothesized model.

Chapter 4 - Discussion

This study examined whether elements of social comparison may be involved with work-related stress and coping, specifically within the field of nursing. Overall, the hypothesized model (Model 1) was thoroughly supported. The more often healthcare workers experienced demanding workplace events, the more stressed they reportedly felt (supporting Hypothesis 1). Even if a situational demand is no longer novel due to its recurrent nature (e.g., frequently tending to suffering patients in a hospital), a worker may have very little time to recover from handling/coping with one incident before needing to address the next one; perhaps their stress levels never have a chance to lessen in intensity.

Workers who reported the highest intensities of stress reported the lowest levels of confidence in their abilities to cope with that stress (answering Research Question 1 and supporting the exploratory Mediation Pathway 1). Unfortunately, the present study's data cannot parse out whether this is due to resigned acceptance that coping tactics cannot eliminate repetitive sources of stress beyond workers' control (e.g., the constant presence of suffering patients in a hospital), or rather the implementation of coping tactics that are ineffective at reducing the workers' stress responses (e.g., trying and failing to feel unaffected by patients' suffering).

When workers reported high stress levels for themselves, they did so for their coworkers as well, whereas workers reporting low personal stress similarly described their coworkers as feeling less stressed (supporting Hypothesis 2). This could speak to the simple conclusion that healthcare work environments are filled with stressors that openly affect many workers. However, these cohesive reactions are coming from coworkers who work together closely enough to observe each other's responses. If healthcare workers independently react to shared events, then comparing each other's reactions for similarity may foster a sense of mutual validation if their stress responses are aligned. Alternatively, social comparison may be facilitating dependent reactions among these workers that could be pacifying in some instances but escalating in others. Seeing coworkers respond mildly to one workplace event may help to assuage feelings of stress for watchful workers, but coworkers reacting to a separate event with an acute stress responses may signal less stressed workers that a more extreme appraisal of the situation is warranted, thus spreading stress like a contagion (Wethington, 2000).

Workers whose responses are being reinforced or exacerbated by the reactions of close coworkers may begin to feel helpless in the face of overwhelming stress (suggested by the

support for the exploratory Mediation Pathway 2). However, the behaviors of similarly stressed coworkers may be simultaneously instrumental in fostering a sense of personal coping preparedness, as workers who indicated the greatest confidence in their own coping abilities also reported the most familiarity with coworkers' coping tactics (supporting Hypothesis 3). Workers may look to their coworkers (either consciously or unconsciously) for helpful examples on how to handle workplace stressors (or their resulting stress). If both parties are using similar coping tactics, that may reinforce the workers' beliefs that these coping methods are viable solutions. But, if the coworkers are coping using different tactics that appear to be working well for them, the watchful workers may give those alternative methods a try.

Finally, the support found for the positive connection between perceived coworkers' stress and familiarity with coworker coping in the present study's exploratory Model 2 (along with its new mediation pathway) suggests that highly stressed coworkers may provide more opportunities for external observers to watch them cope. This provides feedback for the observers on the effectiveness of these coping tactics, which may further inform how these observers view and practice their own coping (Bandura & McClelland, 1977).

Theoretical Implications

Given the aforementioned conclusions, the results of this study have many theoretical implications. With regards to the transactional model of stress, the evidence found for the empirical distinctiveness of stimulus exposure and stress appraisal aligns with Lazarus' (1966) premise that mere exposure to a potentially stressful event does not guarantee that feelings of stress will arise—there are other relevant factors involved in stress appraisal that prevent it from being identical to exposure. However, the positive connection between these two variables was the strongest pathway in the model (given the standardized coefficients), which supports the

practice of treating exposures to demanding stimuli as useful indicators of stress levels (e.g., Holm & Holroyd, 1992). Additionally, the uniqueness of the coping preparedness variable—and its negative association with high stress levels—speaks to the distinction between primary and secondary appraisal processes and their outcomes; the former determines the presence of risk and, consequently, the worthwhileness of feeling stressed, while the latter determines whether a person can viably cope (Dewe, O'Driscoll, & Cooper, 2012).

Regarding social referent selection, it is pertinent to recall that participants were directly prompted to think of coworkers whom they have previously had lots of time to observe, ideally due to holding similar or identical jobs. Thus, it cannot be claimed that the workers believed they had free reign to choose whomever they wanted (to serve as referents)—the reasons behind their selections were not completely self-driven. Therefore, it is not surprising that the majority of referents were neither supervisors to, nor subordinates of, the participants, and the most commonly endorsed reasons for referent selection related to time spent working together and the sameness of departments or jobs (elements that would facilitate the observations that the workers were instructed to consider; see Table 2).

However, one unprompted reason that was also frequently endorsed was feeling similarly stressed about work. When considered in conjunction with other findings that most participants rated themselves as being comparatively similar to their referents in both field experience and coping ability, this offers some support for Festinger's (1954) original expectations that people making self-evaluations will select referents whom they believe are similar on relevant characteristics. When asked why they naturally make work-related comparisons (outside the context of the present study), many workers endorsed self-evaluative reasons such as figuring out if they are doing something "right" or "wrong" or if they "need to change something" (see Table

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3). Therefore, the possibility that participants may have felt limited in whom they could think of for this study may not be a limitation, especially in light of Miller and Jablin's (1991) claims that observing coworkers is preferrable to observing supervisors when seeking salient information for self-evaluation.

On the other hand, there is also evidence for upward comparisons occurring within this worker pool (Osborne, 2016), as the participants were also quick to endorse their coworkers' positive influence, admirable decision-making, and commendable handling of work-related stress as reasons for selecting them. Half the participants endorsed the self-improvement desires of "learn[ing] what [they] can do better" and "avoid[ing] mistakes" when asked why they naturally make workplace comparisons (see Table 3; Gibbons & Buunk, 1999). Finally, some of the more frequently advocated topics for said comparisons reflect areas where both self-evaluation and self-improvement are applicable (decisions, problem-solving, stress levels, work ethic, coping ability; see Table 3).

Given the information about 1) whom the workers chose as referents (coworkers), 2) why they chose them (similarity and admirability), 3) why workers naturally make workplace comparisons (self-evaluation and self-improvement), and 4) what those comparisons are about (cognitions and behaviors), it is reasonable to make the following interpretations. Firstly, in support of the tenants of social information processing theory (Salancik & Pfeffer, 1978), workers may be comparing how they and their coworkers react to demanding workplace stimuli in an effort to interpret their situation as appropriately/accurately as possible. This explanation corroborates the correspondence between workers' personal stress levels and the stress they reported for their coworkers. Fellow workers may come to a unified appraisal of their work environment because they use each other as response cues. Secondly, in accordance with

vicarious learning (Bandura & McClelland, 1977), workers may be learning how to cope partly through watching how their coworkers cope and by comparing the coworkers' successes (or failures) to their own. Witnessing the coping outcomes for their coworkers bolsters their own preparatory knowledge about what is both socially acceptable and potentially effective. This explains the positive association between the workers' confidence in their own coping and their professed familiarity with their coworkers' coping tactics.

These interpretations of the hypothesized (and supported) path model suggest that coworkers' influence(s) on workplace stress processes could be further explored in relation to another model that the present study did not directly incorporate—the Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2007). This model maintains that all physical, psychological, organizational, and *social* aspects of a job can be classified as either a job demand or a job resource. While job demands accrue costs in terms of workers' efforts and skills, job resources aid workers with achieving their work goals, reducing job demands and associated costs, and facilitating personal (and relevant) improvements. On one hand, it would seem reasonable to conceptualize the observed behaviors and feelings of coworkers as job resources— valuable sources of relevant information—in light of 1) how the present study found a positive association between awareness of coworkers' coping tactics and confidence in personal coping tactics, and 2) how existing research speaks to the buffering effects that interpersonal/social job resources can have against job strain and burnout (Bakker, Demerouti, Taris, Schaufeli, & Schreurs, 2003; Schaufeli & Bakker, 2004; Yom, 2013). However, such observations could also be considered job demands themselves—requiring psychological effort and resilience to overcome—given 1) the positive relationship between participants' and referents' stress levels found in the present study (as highly stressed coworkers may augment each other's stress), and

2) how existing research indicates that witnessing the stress and fear of one's colleagues can be a major workplace stressor in and of itself (Khalid, Khalid, Qabajah, Barnard, & Qushmaq, 2016). In conclusion, it would be beneficial to empirically investigate (in accordance with the JD-R model) if information gleaned from coworkers through social comparison generally serves as more of a job resource or a job demand, or if such categorization depends on certain contextual factors. Future findings could address the merits of expanding the theoretical basis for the presently hypothesized model to incorporate elements of the Job Demand-Resources model (Bakker & Demerouti, 2007).

Practical Implications

The present study's findings have important practical implications, especially with regards to stress management interventions and recognition of stress contagion. Only a few of the present study's healthcare workers reported experiencing an intervention for their work stress, but it is encouraging that most of those who did gained the opportunity through their employer. On behalf of organizations endeavoring to lessen their employees' stress and strain, stress intervention literature should continue to examine 1) how stress processes are influenced by the greater social context of the workplace, and 2) whether social comparative processes can be strategically incorporated into stress management efforts.

Meta-analytic findings suggest that cognitive, behavioral, and mindfulness-based intervention programs (as well as programs that blend elements of all three approaches) can effectively reduce stress, anxiety, and strain in healthcare workers (Regehr, Glancy, Pitts, & LeBlanc, 2014; Dharmawardene, Givens, Wachholtz, Makowski, & Tjia, 2016). Many successful programs are conducted in group training environments (Richardson & Rothstein, 2008) and teach workers how to engage in cognitive reappraisal of both potential stressors and

their responses to said stressors (Galbraith & Brown, 2011). LaRocco, House, and French (1980) emphasized a long time ago how critical social support can be in facilitating cognitive reappraisal of stressful situations. Perhaps intervention programs could further capitalize upon these elements by also teaching workers how to recognize stress contagion—and how social comparisons may facilitate it—and offer guidance on how to halt it before it spreads too far.

As stated in the beginning of this paper, stressful experiences cannot be fully eliminated from healthcare workplaces due to the nature of the work. Workers cannot necessarily hide their experiences of stress when they do occur, because stress is often observable thanks to the behavioral indicators it can manifest—making it both easily identifiable and shareable among social beings (White & Buchanan, 2016; Carnevali et al., 2020). The coupling of both first- and second-hand stress can become especially deleterious for mental and physical health (Engert, Linz, & Grant, 2019), especially if a person is immersed in a large network of people who offer support while simultaneously exposing that person to their own stress (Riley & Eckenrode, 1986). It is already known that opportunities for emotional support among stressed people can sometimes have counterproductive effects, such as "reverse buffering" (LaRocco, House, & French, 1980). A common example of this is extensively ruminating on negative aspects of work with peers—conversations that spiral downwards and leave the discussants feeling more strained than before (Fenlason & Beehr, 1994).

If coworkers are becoming unified in their workplace stress appraisals by comparing visible stress indicators, this creates the potential for highly stressed referents (even if they are a small subset of the population) to spread their feelings to observant workers. This concerning potential is certainly not exclusive to the healthcare profession addressed by the present study, but there is certainly impetus for focusing both academic and applied efforts on better

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understanding how it may be happening within this occupation. Medical organizations were already contending with the financial costliness and inconvenience of high turnover, worker injury, treatment error, and subpar patient care and satisfaction—attributed to suboptimal performance from highly-stressed workers—*before* the globe fell into the pandemic crisis (Institute of Medicine, 2004; Kath, Stichler, Ehrhart, & Sievers, 2013; NIOSH, 2008; Vahey, Aiken, Sloane, Clarke, & Vargas, 2004; Zeller & Levin, 2013). Calls are now being made for the examination of how workers could be suffering disproportionately due to the inability of those in "system-relevant" occupations (e.g., medical fields) to work from home (Rudolph & Zacher, 2020). Due to hospitalizations related to COVID-19, healthcare workers are facing an intense dual-threat of virus exposure and indirect trauma stemming from patients' and their families' experiences. Evidence of suffering morale, heightened strain, and increased emotional exhaustion are already accumulating as these workers struggle to manage their personal resources, fears, and obligations to care for the sick (Caldas, Ostermeier, & Cooper, 2021). Reports from the present study's worker pool that they (and their coworkers) were feeling more stressed at the time of this study compared to six months and one year prior—with COVID-19 receiving most of the blame—augment these claims. At times like these (and in preparation for the future), we sorely need ways of empowering workers to cope adaptively and healthily.

Perhaps taking a candid approach with workers about how to be "spreaders" of 1) healthy coping methods, and 2) honest-but-not-overly-negative affect and information, could foster workplace environments where social comparisons enable unthreatening appraisals of demanding stimuli and effective coping tactics. Stress management programs that adopt this approach could be incorporated into employee onboarding procedures to help establish an organizational culture of care, along with an expectation that both stress and coping are not

issues that workers will be expected to handle alone (Caldwell & Peters, 2018). Existing employees could be offered opportunities to retake stress management programs if they periodically need a refresher. If such programs can only be offered sporadically, then maybe workers who have experienced the program could be paired with workers who have not in a mentorship capacity. Workplace mentoring provides both instrumental and psychosocial support to protégés, which meta-analyses have associated with healthy attitude change, greater helping behaviors, positive interpersonal relationships, and less strain (Eby, Allen, Evans, Ng, & DuBois, 2008; Eby et al., 2013). Perhaps the successful transfer of skills learned in stress management programs to everyday routines could be reinforced when mentors feel compelled to set a good example (i.e., be a good referent for comparison), and when protégés are given experienced referents to emulate. All of these implementations could capitalize on Bandura's assertion that, "Under most circumstances, a good example is therefore a much better teacher than the consequences of unguided actions" (Bandura & McClelland, p. 5).

Limitations & Future Directions

Although no evidence of common method bias was found while assumption-checking, it is still possible that the single-source nature of the data had some undetected consequences. This is aggravated by the fact that the measures for coping preparedness, perceived coworker stress, and perceived coworker coping have not yet undergone the validation process that typically accompanies scale construction (see Hinkin, 1998). While the data for all five stressor domains passed the Harman's single-factor test (Podsakoff et al., 2003), the eigenvalues and scree plots did not indicate that five distinct factors (indicative of the five separate model variables) would be absolutely necessary for all the different stressor domains. This may be cause for concern, as it could speak to participants' conflation of two or more model variables.

However, it bears mentioning that factor analyses are best suited for evaluating reflective scales (where latent variables are the presumed causes of indicator items). Close examination of the scale items for the present study's model variables, however, reveals that these measures may be better specified as formative scales (where indicator items are viewed as causing the latent variables, which are composites of the items; Roy, Tarafdar, Ragu-Nathan, & Erica, 2012). Indeed, the argument has been made that stress can/should be viewed as a formative construct (Bollen & Lennox, 1991). Because Harman's single-factor tests and the follow-up CFAs treated the scales as reflective, any less-than-ideal results should be interpreted with a grain of salt. Therefore, in answer to the concern of possible monomethod bias, it is much more reassuring that evidence for multicollinearity was not found when a regression analysis was run.

With regards to testing the hypothesized model, path analyses generally require large sample sizes in order to achieve sufficient power (Kline, 2016). Ideally, this study would have run five separate path analyses testing the model within each of the five stressor domains (death and dying, conflict with physicians, lack of support, workload, and uncertainty concerning treatment), respectively. Unfortunately, the final samples of data within each domain were rather small—consequently shrinking the ratio of observations to estimated model parameters—which would call the trustworthiness of the parameters' values into question if the tests were run (Jackson, 2003; Kline, 2016). Therefore, path analyses were run only after collapsing the data across the five domains, which prevented a detailed look at any evidence for social comparison processes in relation to each stressor uniquely.

Future expansions on the present study should aim for collecting larger samples of data within each stressor domain of interest, because having the wiggle room to confidently explore hypothesized (and exploratory) models within specific domains would be not only exciting, but

also very informative. Stress generally manifests in visible symptoms (White & Buchanan, 2016), but these symptoms and subsequent coping strategies may be more observable—to both researchers and fellow healthcare workers—in relation to some stressors more than others, depending partly on *when* and *how* healthcare workers handle the stressful situations. For example, coworkers may operate together within the workplace when confronted with malfunctioning equipment or when commiserating over critical colleagues; in this case, social comparisons may be easily made in the moment based on overt expressions of feelings and/or attempts at resolving the source of stress. By contrast, workers may respond to the death of a patient by masking their private feelings until they leave the workplace—perhaps seeking distraction and/or comfort in family, friends, or external activities—which may thwart any social comparisons between coworkers. Due to the inability to test the hypothesized model within each stressor domain uniquely, the present study cannot tell if different stressors exhibit different patterns of evidence for social comparison prevalence—hence why future studies should explore this.

On a related note, the present study only assessed healthcare workers' confidence in their abilities to cope with different sources of workplace stress; the actual coping tactics used by workers to combat the stressors and manage their personal feelings were not examined. Recall that Lazarus and Folkman (1980) differentiated between problem- and emotion-focused coping methods, and emphasized that neither type is inherently superior over the other. That being said, the supported path model cannot speak to whether workers felt more confident in using problem-focused tactics over emotion-focused ones (or vice versa), nor can it tell whether one type lends itself to resolving certain stressors better than others. Future work investigating the broader nomological network of workplace stress should examine what coping tactics are enacted (both

inside and outside the workplace) to handle specific workplace stressors. It would be constructive to see which factors impact workers' chosen coping methods, such as the different natures of workplace stressors, the coping methods they believe their coworkers are using, and individual differences of the workers themselves (e.g., gender and culture; see Koinis et al., 2015).

Furthermore, expanding the nomological network to incorporate organization-level antecedents and outcomes of workplace stress would be wise, as the scope of the present study focused entirely on individuals and their interpersonal connections with close coworkers. Existing research that has examined how healthcare systems respond to pandemic situations (which is the circumstance under which the present study was conducted) speaks very strongly to the influence of both the organization's climate and leadership. Frontline workers report that one of their greatest stress reducers is witnessing how their colleagues work together and exhibit positive attitudes, while one of their bigger stressors is seeing these same coworkers stressed or scared (Khalid, Khalid, Qabajah, Barnard, & Qushmaq, 2016; Windarwati et al., 2021). They themselves try to combat their stress by also adopting a positive attitude, and an important motivator for them is acknowledgement from management and supervisors for their work. Indeed, they appreciate when leaders visit them and offer reassurance—even if these leaders cannot provide fast and concrete solutions to problems—because it reinforces the principle that they are heard and allowed to ask for help (Shanafelt, Ripp, & Trockel, 2020). Situations in which workers feel unsupported by their administration and/or are highly stressed by their work have been linked to numerous well-documented and costly organizational outcomes, such as turnover intentions and rates, worker injury, treatment error, subpar patient care, burnout, and compassion fatigue (Institute of Medicine, 2004; Kath, Stichler, Ehrhart, & Sievers, 2013; Mock,

2020; NIOSH, 2008; Vahey, Aiken, Sloane, Clarke, & Vargas, 2004; Zeller & Levin, 2013).

Gathering quantitative data on the prevalence of these outcomes in relation to stress reduction methods—which may be spreading around healthcare work environments via social comparison—could be invaluable for developing catered support systems for these workers, rather than just relying on generic ones that do not account for sources of stress and social influences (Shanafelt, Ripp, & Trockel, 2020; Shechter et al., 2020). Such systems would ideally enhance the overall organizational climate of support/safety and the effectiveness of leadership—two important antecedents of stress that future studies should consider.

With regards to the topic of comparison behaviors, theory and data converge to suggest that sometimes comparisons take place with little deliberative thought (Langer, Pirson, & Delizonna, 2010). Therefore, when asked to report about these behaviors and their outcomes, people may struggle to provide accurate representations of themselves and their referents. Fortunately, Hemphill and Lehman (1991) found that people do not seem hesitant to report on their self-evaluative and self-improving comparison behaviors. If participants of the present study were fully aware of their past engagement in comparison behaviors, there is reason to believe that they reported them honestly. An interesting question to ask that stems from this is whether workers' perceptions of their coworkers' stress and coping effectiveness are truly accurate. If, objectively-speaking, the coworkers are really good at hiding their feelings of stress or, conversely, behave in a manner that suggests they feel much more stressed than they actually are, future studies might explore what this means for the workers who are using them as referents. Are their appraisals of demanding workplace events aligned (or divergent) in reality or just in the observer's mind? This may have implications for the observer's ability to respond appropriately to the situation and accurately recognize the referent's coping when it happens.

A future study might investigate the alignment between dyads of coworkers regarding 1) their personal perceptions of workplace stress and coping effectiveness, 2) their perceptions of each other on those same variables, and 3) relevant outcomes of the full stress process (like burnout). Additionally, inquiring what types of coping tactics both dyad members regularly use may also be fruitful to explore for correspondence. It certainly may be appreciated, given the multiple comments that participants left for the present researcher, either recommending that their coping methods be inquired after or volunteering such information openly (e.g., binge-watching *Grey's Anatomy* and *House M.D.* with their coworkers while on break).

Lastly, there is strong and consistent evidence indicating that highly stressed people may try to reduce their stress by comparing themselves to someone who is in a worse situation than they are—an act of "downward comparison" for "self-enhancement" (Hakmiller, 1966; Thornton & Arrowood, 1966; Wills, 1981; Wood, 1996). The workplace provides ample opportunities for downward comparisons that workers have been repeatedly shown to affectively benefit from (see Brown, Ferris, Heller, & Keeping, 2007). The present study did not attempt to thoroughly capture this dimension of social comparison due to the difficulty of distinguishing it from emotion-focused coping *and* gathering honest data about it (e.g., Hemphill & Lehman, 1991; Taylor & Lobel, 1989). The only elements that could have vaguely tapped into it were 1) the opportunity for participants to agree that they naturally make comparisons in the workplace to feel better about a "situation" or "themselves" (but these reasons were endorsed the least by participants), and 2) rate their referents considerably lower than them on field experience or coping ability (which did not happen). Unfortunately, this means that an important piece of the puzzle may have been left out. Future studies should try to come up with a clever way to covertly assess this type of comparison if it is deemed relevant.

Conclusion

The present study conceptualized social comparison as a cognitive mechanism that aides with directing a person's experience of stress—an underused approach to merging the two important fields of stress research and social comparison literature. Its focus on healthcare workers is especially timely given the global crisis that is exacerbating the difficulties and negative outcomes already associated with medical occupations. The support found for the hypothesized model that links demanding stimuli and perceived coworker stress to personal stress, which then works alongside perceived coworker coping to inform personal coping preparedness, offers unique insights that could contribute to future stress research and intervention design. It is hoped that, ultimately, the dissemination of research findings like these—and others that may follow along this stream of research—may lead to practical recommendations for workers' stress management in high-stress professions.

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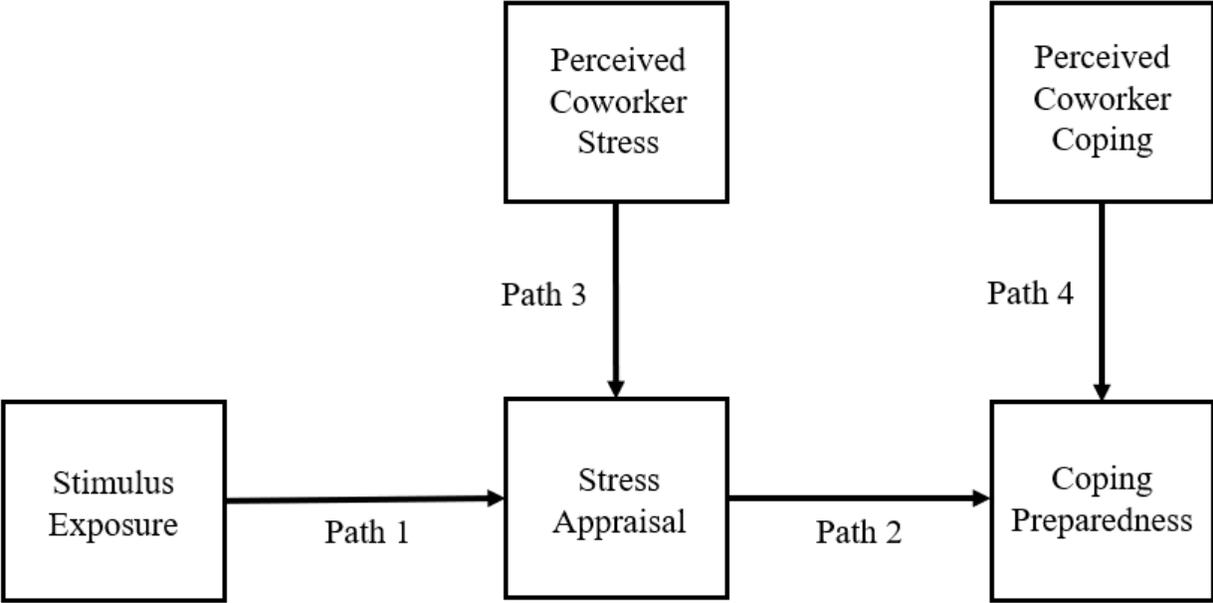
Figure 1. Conceptual Model

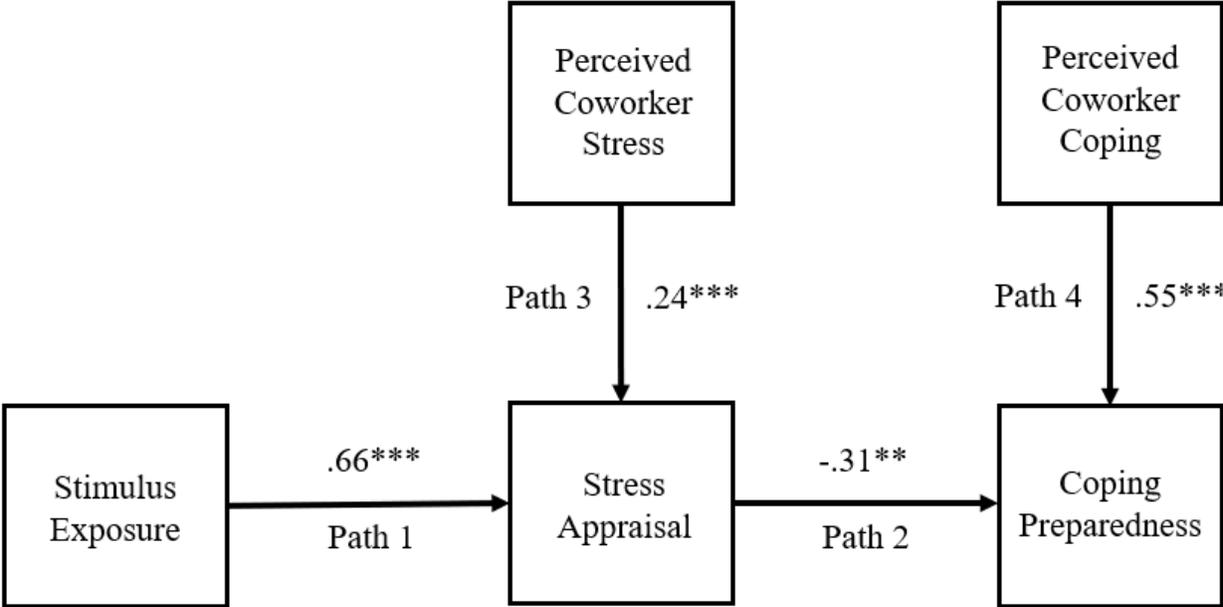**Figure 2. Main Path Model Results (Table 6, Model 1)**

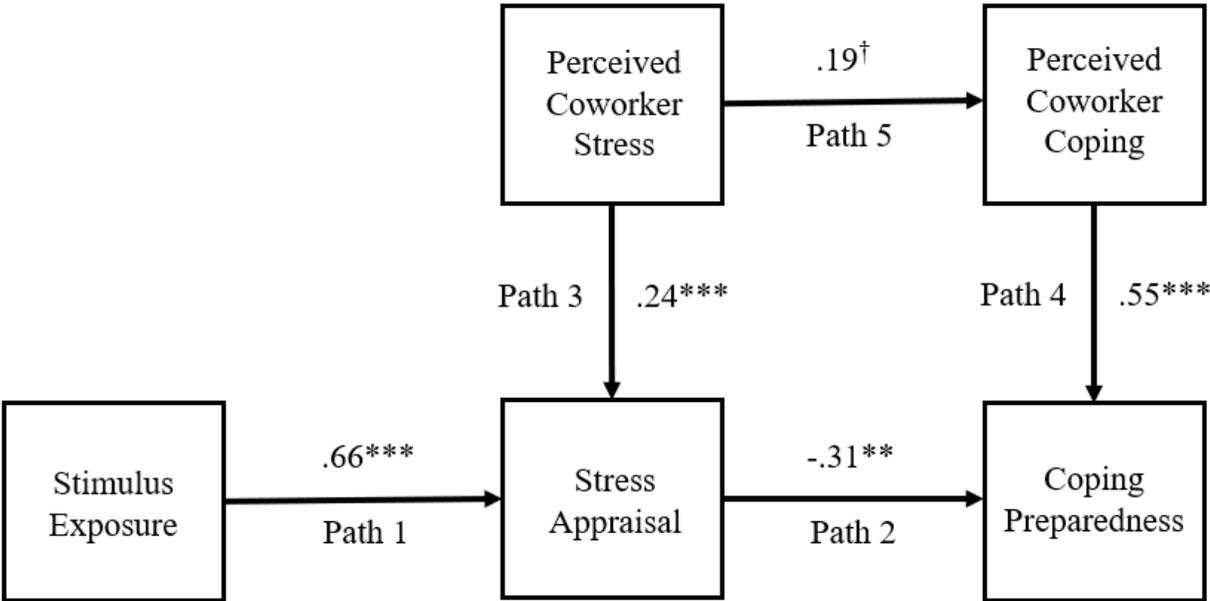**Figure 3. Exploratory Path Model Results (Table 6, Model 2)**

Table 1. Model Variable Descriptives Across Specific Stressors.

Means, Standard Deviations, and Cronbach Alpha Values for Model Variables Across Specific Stressors

	Death and Dying (*n* = 72)			Conflict with Physicians (*n* = 58)			Lack of Support (*n* = 90)			Workload (*n* = 127)			Uncertainty Concerning Treatment (*n* = 67)		
	M	*SD*	α	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*	α
Stimulus Exposure	3.39	.71	.82	3.38	.81	.79	3.32	.81	.82	3.44	.86	.86	2.96	1.01	.92
Stress Appraisal	3.56	.73	.81	3.41	.73	.70	3.23	.82	.76	3.43	.85	.83	3.13	1.04	.88
Coping Preparedness	3.41	.85	.85	3.63	.79	.79	3.35	.72	.82	3.40	.81	.81	3.66	.76	.84
Coworker Stress	3.34	.95	.88	3.29	.99	.87	3.18	.92	.86	3.31	.98	.87	3.21	.98	.88
Coworker Coping	3.70	.82	.84	3.83	.77	.83	3.55	.89	.89	3.80	.83	.85	3.98	.81	.90

Note. All Likert response scales ranged from 1 to 5. The following variables were leptokurtotic: Stress Appraisal under Death & Dying (1.42, *SE* = .56), and Coworker Coping under both Conflict with Physicians (2.04, *SE* = .61) and Uncertainty Concerning Treatment (1.73, *SE* = .58). Only Coworker Coping under Uncertainty Concerning Treatment was negatively skewed (-1.03, *SE* = .29).

Table 2. Full List of Reasons Behind Coworker Referent Selection.

Percentages of Referents Chosen for the Following Reasons

Reason	Percentage
I work with them a lot	60%
We work in the same department	57%
We have the same job	49%
I think they have a positive influence on me	38%
We're similarly stressed out by our work	34%
I think I have a positive influence on them	27%
I like how they make decisions	26%
I think they handle work-related stress well	25%
I think they're less stressed about work than me	19%
I think they have a strong influence on me	17%
I think I have a strong influence on them	14%
I view them as a mentor	12%
They're my supervisor	9%
I think they are more stressed about work than me	8%
I'm their supervisor	7%
I think I play a mentoring role for them	6%

Table 3. Full List of Reasons for and Content of Workplace Coworker Comparisons.

Comparison Reasons and Content (% of Endorsing Participants)

	Percentage
Reasons for Making Workplace Comparisons	
To learn what I can do better	50%
To avoid mistakes	50%
To figure out if I'm doing something right	44%
To figure out if I need to change something	40%
To figure out if I'm doing something wrong	38%
To feel better about a situation	30%
To feel better about myself	25%
Subject Matter of Workplace Comparisons	
Decisions	61%
Problem-Solving Ability	54%
Job Demands	38%
Experience	38%
Stress Levels	36%
Work Ethic	35%
Coping Ability	34%
Reputation	17%
Opportunities	15%
Recognition	9%
Popularity	9%

Note. One participant "wrote in" that they make comparisons "to highlight incompetent peers" and that they make comparisons about "competence".

Table 4. Model Variable Descriptives and Correlations (Aggregated).

Summary of the Means, Standard Deviations, and Correlations for the Model Variables

	M	*SD*	1	2	3	4	5
1. Stimulus Exposure	3.34	0.72	-				
2. Stress Appraisal	3.37	0.70	.76***	-			
3. Coping Preparedness	3.47	0.71	.07	.004	-		
4. Coworker Stress	3.27	0.86	.41***	.51***	.16	-	
5. Coworker Coping	3.76	0.77	.11	.19*	.54***	.19*	-

*Note. *p < .05, ***p < .001*

Table 5. Summary of Fit Indices for Path Models.

Summary of Path Models and Fit Indices.

Model	χ^2 (df, N)	p	CFI	TLI	RMSEA	SRMR
Model 1	1.85 (1, N = 139)	.173	1.00	.97	.08	.02
Model 2	2.06 (2, N = 139)	.356	1.00	.99	.02	.03

Note. CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, RMSEA = Root Mean Squared Error of Approximation, SRMR = Standardized Root Mean Square Residual

Table 6. Parameter Estimates for Path Models.

Summary of Parameter Estimates for Path Models

Pathway	Estimate	*SE*
Model 1		
Stimulus Exposure → Stress Appraisal (**Path 1**)	.66***	.05
Stress Appraisal → Coping Preparedness (**Path 2**)	-.31**	.12
Coworker Stress → Stress Appraisal (**Path 3**)	.24***	.06
Coworker Coping → Coping Preparedness (**Path 4**)	.55***	.08
Stimulus Exposure → Coping Preparedness	.18†	.11
Coworker Stress → Coping Preparedness	.14†	.07
(Stimulus Exposure → Stress Appraisal) × (Stress Appraisal → Coping Preparedness)	-.21*	.08
(Coworker Stress → Stress Appraisal) × (Stress Appraisal → Coping Preparedness)	-.06*	.03
Model 2		
Stimulus Exposure → Stress Appraisal (**Path1**)	.66***	.05
Stress Appraisal → Coping Preparedness (**Path 2**)	-.31**	.12
Coworker Stress → Stress Appraisal (**Path 3**)	.24***	.06
Coworker Coping → Coping Preparedness (**Path 4**)	.55***	.09
Stimulus Exposure → Coping Preparedness	.18†	.10
Coworker Stress → Coping Preparedness	.14†	.07
(Stimulus Exposure → Stress Appraisal) × (Stress Appraisal → Coping Preparedness)	-.21*	.08
(Coworker Stress → Stress Appraisal) × (Stress Appraisal → Coping Preparedness)	-.06*	.03

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Coworker Stress → Coworker Coping **(Path 5)**	.19†	.10
(Coworker Stress → Coworker Coping) × (Coworker Coping → Coping Preparedness)	.09†	.04

Note. †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$. Parameters of direct pathways represent standardized estimates; parameters of indirect pathways represent unstandardized estimates.

Appendix A - Warning About Nursing-Specific Content

This survey has been designed specifically for participants who hold jobs as nurses currently or in the recent past. If you have NEVER held a nursing job, you might want to consider discontinuing your participation in this study. If you decide to continue participating, please follow the upcoming instructions carefully and answer the following questions to the best of your ability. Thank you!

Answer options following this warning:

a) I would like to continue taking the survey.

b) I would like to end my participation in this study.

Appendix B - Model Measures & Instructions

Nursing Stress Scale (NSS; Gray-Toft & Anderson, 1981; stressor-specific subscales in italics)

Instructions: *Using the separate response scales, please share how often the events described in the following items happen to you (Left Column) and how much stress you feel as a direct result of them (Right Column).*

Death & Dying
1. Performing procedures that patients experience as painful.
2. Feeling helpless in the case of a patient who fails to improve.
3. Listening or talking to a patient about their approaching death.
4. The death of a patient.
5. The death of a patient with whom you developed a close relationship.
6. Physician not being present when a patient dies.
7. Watching a patient suffer.

Conflict with Physicians
8. Criticism by a physician.
9. Conflict with a physician.
10. Fear of making a mistake in treating a patient.
11. Disagreement concerning the treatment of a patient.
12. Making a decision concerning a patient when the physician is unavailable.

Lack of Support
13. Lack of an opportunity to talk openly with other unit personnel about problems on the unit.
14. Feeling unsupported by my employer.*
15. Lack of an opportunity to share experiences and feelings with other personnel on the unit.
16. Feeling unsupported by colleagues.*
17. Lack of an opportunity to express to other personnel on the unit my negative feelings toward patients.

Workload
18. Breakdown of computer or other equipment.**
19. Unpredictable staffing and scheduling.
20. Too many non-nursing tasks required, such as clerical work.
21. Not enough time to provide emotional support to a patient.
22. Not enough time to complete all of my nursing tasks.
23. Not enough staff to adequately cover the unit.

Uncertainty Concerning Treatment
24. Inadequate information from a physician regarding the medical condition of a patient.
25. A physician ordering what appears to be inappropriate treatment for a patient.
26. A physician not being present in a medical emergency.

27. Not knowing what a patient or a patient's family ought to be told about the patient's condition and its treatment.
28. Uncertainty regarding the operation and functioning of specialized equipment.

*These items were added by the present researcher for the sake of expanding the scale to capture further information relevant to the dimension and making the stressor-specific scales more comparable in length.
**The phrase "or other equipment" has been added to this item by the present researcher.

Coping Preparedness (original items; stressor-specific subscales in italics)

Instructions: *Using the following response scale, please indicate how well each of the following statements describes you.*

Death & Dying
1. When dealing with a patient who is in pain, I can handle any distress that I myself feel.
2. I know how to cope with any frustration I feel when a patient gets worse and not better.
3. I am prepared to cope with the death of a patient.
4. When a patient suffers because of their treatment, I can manage my own feelings about it.
5. I have figured out how to help patients prepare for approaching death.

Conflict with Physicians
6. I am capable of coping with criticism from physicians.
7. I am equipped to respond to mistakes made during a patient's treatment.
8. I can navigate disagreements with physicians over a patient's treatment.
9. I have figured out how to handle conflict with physicians in general.
10. If decisions must be made during physicians' absence, I am prepared to handle the situation.

Lack of Support
11. If I cannot talk openly about work-related problems, I have alternative tactics for addressing my feelings.
12. I know how to cope if I do not feel supported by my employer.
13. I have figured out how to deal with job-related feelings and experiences if I cannot share them.
14. If I fail to receive support from my colleagues, I know how to handle any resulting stress.
15. I have figured out how to keep it together when I do not feel supported.

Workload
16. I know how to address issues related to broken or malfunctioning equipment.
17. I can handle issues related to understaffing and/or unpredictable scheduling.
18. I am familiar with how to manage an overwhelming amount of non-nursing tasks.
19. If I do not have time to address the emotional needs of my patients, I know how to come to terms with that.
20. If I cannot complete all my nursing tasks, I know how to resolve the situation.

Uncertainty Concerning Treatment
21. I know how to deal with situations when there is uncertainty regarding a patient's medical condition.
22. I am capable of addressing medical emergencies when physicians are not present.
23. I know how to handle ambiguity when discussing a patient's condition and treatment with them and/or their family.
24. I know what to do if I believe a patient is being treated incorrectly.
25. I know what to do if I am unsure how to operate specialized equipment.

Perceived Coworker Stress (original items; stressor-specific subscales in italics)

Instructions: *Using the following response scale, please indicate how well the following statements describe the coworker(s) you have chosen.*

Death & Dying
1. Dealing with a patient who is in pain is stressful for them.
2. It is frustrating for them when a patient gets worse and not better.
3. They are generally distressed when a patient dies.
4. It is hard for them to watch a patient suffer when undergoing treatment.
5. Helping patients prepare for approaching death is emotionally taxing for them.

Conflict with Physicians
6. Receiving criticism from physicians is stressful for them.
7. Making a mistake when treating a patient is a source of anxiety for them.
8. Disagreeing with physicians over a patient's treatment makes them upset.
9. Conflict with physicians in general is distressing for them.
10. They find it stressful to make decisions regarding patients when physicians are absent.

Lack of Support
11. It stresses them out if they are unable to talk openly about work-related problems.
12. Feeling unsupported by their employer is a source of stress for them.
13. Having to keep their feelings and experiences about their job to themselves makes them anxious.
14. They feel stressed if they perceive a lack of support from other colleagues.
15. They seem distressed if they do not feel supported while they are having a hard time on the job.

Workload
16. Broken or malfunctioning equipment is a source of stress for them.
17. They feel the strain of understaffing and/or unpredictable scheduling.
18. They feel overwhelmed when too many non-nursing tasks are expected of them.
19. Not having enough time to attend to patients' emotional needs is hard on them.
20. Being unable to complete all of their nursing tasks makes them feel anxious.

Uncertainty Concerning Treatment
21. Uncertainty regarding a patient's medical condition causes them anxiety.
22. Facing a medical emergency without a physician is distressing for them.
23. Ambiguity about what to tell a patient and/or their family about their condition and treatment is stressful for them.
24. They find it upsetting if they believe a patient is being treated incorrectly.
25. They become stressed if they are unsure how to operate specialized equipment.

Perceived Coworker Coping (original items; stressor-specific subscales in italics)

Instructions: *Using the following response scale, please indicate how well the following statements describe what you understand of your coworkers.*

Death & Dying
1. When dealing with a patient who is in pain, I know how they handle any distress that they themselves might feel.
2. I am aware of how they cope with any frustration they feel when a patient gets worse and not better.
3. I know how they generally cope with the death of a patient.
4. When a patient suffers because of their treatment, I am aware of how my coworkers handle their own feelings about it.
5. I have figured out how they help patients prepare for approaching death.

Conflict with Physicians
6. I am familiar with how my coworkers cope with criticism from physicians.
7. I am aware of how they respond when mistakes are made during a patient's treatment.
8. I know how they handle disagreements with physicians over a patient's treatment.
9. I have figured out how they handle conflict with physicians in general.
10. If decisions must be made during physicians' absence, I know how they handle the situation.

Lack of Support
11. If they cannot talk openly about work-related problems, I am aware of alternative tactics my coworkers use to address their feelings.
12. I know how they cope when they are not feeling supported by their employer(s).
13. I have figured out how they deal with their job-related feelings and experiences if they cannot share them.
14. If they fail to receive support from their colleagues, I know how they handle any resulting stress.
15. I have figured out how they keep it together when they do not feel supported.

Workload
16. I am aware of how they address issues related to broken or malfunctioning equipment.
17. I know how they handle issues related to understaffing and/or unpredictable scheduling.

18. I am familiar with how they manage an overwhelming amount of non-nursing tasks.
19. If they do not have time to address the emotional needs of their patients, I know how they come to terms with that.
20. If they cannot complete all their nursing tasks, I know how they resolve the situation.

Uncertainty Concerning Treatment
21. I know how they handle situations when there is uncertainty regarding a patient's medical condition.
22. I am familiar with how they address medical emergencies when no physician is present.
23. I know what they generally do when there is ambiguity regarding what to tell a patient and/or their family about their condition and treatment.
24. I am aware of what they do when they believe a patient is being treated incorrectly.
25. I know what they do when they are unsure how to operate specialized equipment.

Appendix C - Screenshot of Stressor Choice Prompt

Research by the World Health Organization (WHO) shows that work-related stress is a huge problem! Even before the Covid-19 global health crisis began, healthcare workers had consistently reported certain aspects of their jobs that cause them to feel highly stressed. **Listed below are 5 of the biggest stressors that nurses deal with in the workplace.**

Of these 5 stressors commonly reported by nurses, **please pick the 3 stressors that you personally deal with the most while on the job.** (Drag & drop the items one-by-one into the box on the right; the order does not matter!)

Items	**My Top 3 Stressors**
Death & Dying	
Conflict with Physicians	
Lack of Support	
Workload	
Uncertainty Concerning Treatment	

Appendix D - Screenshot of Coping Prompt

Coping refers to the mental and behavioral efforts we make to manage our stress. This means dealing with negative feelings and physical symptoms of stress, as well as handling the sources of stress themselves.

The following questions will address how confident you feel in your ability to cope with work-related stress.

# Appendix E - Screenshot of Coworker Choice Prompt

We don't go through stress alone. The people around us may be facing the same sources of stress that we are!

For the next part of this survey, please think of a few coworkers whom you work with on a regular basis. You can think of **one, two, or three coworkers** (but no more than three). These should be coworkers whom you have had a lot of time to observe (how they do their job, how they respond to stressful situations at work, etc.). If possible, it would be good if their job is similar to (or the same as) yours.

Use the following questions to tell us a bit about these coworkers.

Appendix F - Screenshot of Coworker Instructions Prompt
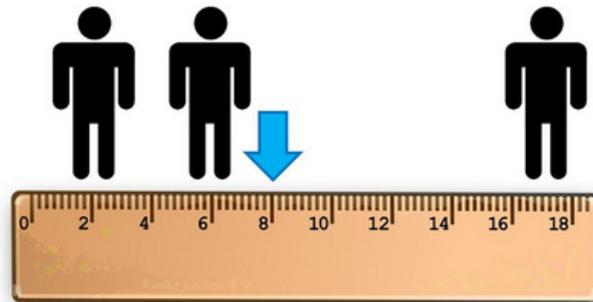
The following pages will ask you how the chosen coworker(s) handle the top 3 work stressors that you've already specified. The questions will refer to your coworker(s) as a *group*, rather than asking about each one individually.

If you have only one coworker in mind, that is okay.

If you have two or three coworkers in mind (rather than just one), it is possible that these people do *not* behave or react to stress in a similar manner to each other. For example, one coworker might feel lots of stress regarding the events described by a particular survey item, while another feels almost none. That is alright! Try to imagine your coworkers lining up on a ruler, then simply choose a point that represents a "middle ground" between them. If they were blended into one person, what rating summarizes them the best? (It does not have to be super exact; a rough estimate is just fine!)