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## Not Enough Cooks in the Kitchen: An Empirical Test of a Two-Factor Model of Work Unit Understaffing

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Not Enough Cooks in the Kitchen:  
An Empirical Test of a Two-Factor Model of Work Unit Understaffing

by

Cristina K. Hudson

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
Department of Psychology  
College of Arts and Sciences  
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## DEDICATION

This dissertation is dedicated to my family and friends. To my friends – thank you for your understanding and support during times of high stress and pressure. To my parents – your encouragement, love and wisdom have and will continue to guide me throughout my personal and professional life. To my wonderful, patient and loving husband – I could not have achieved this success without you by my side. This has been a journey for us both, and the unconditional and unwavering support and love you have shown throughout is what has made it possible. I am forever grateful for having such incredible people in my life. I love you all dearly.

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## ABSTRACT

Although most working adults possess a lay understanding of understaffing in the workplace and may, in fact, feel they are experiencing such a stressor, a review of the research literature reveals a general lack of empirical work on understaffing and its consequences. Hudson and Shen (2013, *Development and testing of a new measure of understaffing*. Paper presented at the Southern Management Association 2013 Meeting, New Orleans, LA) recently proposed a new model of understaffing that distinguished between two types of personnel deficiencies, manpower and expertise shortages, and linked these dimensions to worker well-being and attitudinal outcomes and identified likely mediating mechanisms. However, Hudson and Shen focused exclusively on the individual level of analysis. Therefore, the current study extends their work by investigating whether prior findings also hold at the group level of analysis. Participants in this study were members of 66 intact work groups and their supervisors ( $N = 57$  for groups with matched supervisor data) from a variety of industries and organizations, who filled out a one-time survey. Results supported that perceptions of understaffing, both manpower and expertise, are shared within work groups and that there is some convergence between work groups and their supervisors regarding levels of understaffing. Results from correlational and regression analyses also supported differential relationships between manpower and expertise understaffing and group outcomes. Finally, structural equation models generally upheld Hudson and Shen's (2013) framework at the group level of analysis; results were consistent with group quantitative workload, potency, and role ambiguity serving as key mediators in the relationships

between shared group perceptions of understaffing and unit well-being and attitudinal outcomes (i.e., group emotional exhaustion and cohesion). This study broadens our understanding of the construct of understaffing and presents a number of promising directions to be pursued in future research.

## INTRODUCTION

Over the past decade, the United States has experienced an economic recession resulting in numerous cases of company downsizing, mergers, and closings. Not surprisingly, one of the most commonly described occupational stressors of the era is “lack of qualified staff.” Problems with staffing shortages are often cited in popular press and academic articles, both nationally and internationally (e.g., Beaudet, 2013; Coffey, Dugdill, & Tattersall, 2004; Edwards & Burnard, 2003; Newport 2010). Unfortunately, many of these claims about the disastrous impact of understaffing are unsubstantiated by the empirical literature. In fact, the construct of understaffing has been the focus of only about a dozen research articles. Even within this handful of studies, results have been inconsistent; some researchers have even reported what appear to be counterintuitive, positive consequences of understaffing, such as greater motivation (e.g., Ganster & Dwyer, 1995; Vecchio & Sussman, 1981) and positive subjective experiences (e.g., Perkins, 1982; Wicker, Kirmeyer, Hanson & Alexander, 1976).

The current economic push for leaner, more efficient companies makes it essential that researchers and practitioners better understand the phenomenon of understaffing. This necessitates more empirical work on understaffing and exploring the reasons for previous contradictory and unexpected results. Hudson and Shen (2013) recently attempted to revitalize work on understaffing by putting forth a multidimensional conceptualization of understaffing, distinguishing between shortages in the number of group members and shortages in the requisite knowledge, skills, abilities, or other characteristics (KSAOs) possessed by those members. They

found initial support for their conceptualization; workers did distinguish between the two forms of understaffing and these staffing perceptions were, in turn, related to worker outcomes (i.e., employee fatigue, decreased perceptions of organizational support). The current investigation builds upon Hudson and Shen's initial work by extending their framework to the group level of analysis. Specifically, I assess 1) agreement between members of work groups regarding the current experience of (under)staffing, 2) agreement between work groups and their supervisors regarding current levels of (under)staffing, and 3) group-level consequences of understaffing.

### What is Understaffing?

The construct of understaffing originated in the mid- to late-1900s with the concept of undermanning (e.g., Barker, 1968; Wicker, 1968, Srivastava, 1974). Undermanning authors investigated settings in everyday life (i.e., churches, towns, schools) in which there were too few inhabitants to carry out all of the necessary functions of the setting. For example, a town would be undermanned if the number of citizens needed to run the local grocery store, mechanic's shop, and town hall was greater than the number of available adults. In the mid-1970s, Wicker and colleagues (e.g., Wicker, McGrath, & Armstrong, 1972; Wicker et al., 1976) expanded upon undermanning theory and brought it into the work domain. Thus, *understaffing* refers to *work units with too few workers* to carry out essential tasks and functions of the unit.<sup>1</sup>

During the following forty years, a number of studies claimed to investigate understaffing, but a more thorough examination of these studies showed only a handful to have truly focused on understanding this phenomenon. Unfortunately, even these studies are deficient with regard to their operationalizations of the construct, focusing only on manpower shortages to

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<sup>1</sup> In the case of understaffing, essential tasks and functions are defined as those duties required of the work unit in order to ensure proper organizational operation. A work unit would therefore not be evaluated as understaffed if these essential duties are being completed correctly and on time, even if some peripheral (i.e., non-core) duties of the work unit were not being completed correctly or on time.

the exclusion of expertise shortages (this distinction is described in greater detail below). The majority of the remaining “understaffing” studies conflated understaffing with related but distinct constructs (e.g., workload) or failed to separate out the potential unique effects of understaffing from other types of organizational stressors or constraints.

The construct most commonly, but inappropriately, used in place of understaffing is workload. For example, in the nursing literature, understaffing is often described as the cause of a multitude of negative outcomes, such as poor patient care, infection outbreaks in hospital wards, and medication administration errors (e.g., Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Kovner & Gergen, 1998; Yang, 2003). However, these studies all operationalize understaffing using nurse-to-patient ratios, which are simply indices of workload (i.e., smaller nurse-to-patient ratios reflect greater nurse workload). They do not adequately represent both types of understaffing nor do they focus on the unit’s inability to complete *core functions*, a key aspect of the definition of understaffing.

The other way understaffing has typically been studied is as one of many organizational constraints and/or stressors employees may face (e.g., Edwards & Burnard, 2003; Coffey et al., 2004; Finn, 1998). This often translates into an item or two inquiring about current staffing levels in either one’s organization or work unit embedded in the midst of a longer list of items assessing other organizational stressors (e.g., faulty equipment, organizational politics). The effects of staffing problems are then combined or aggregated with these other work-related demands. However, prior research suggests different stressors can have differential relationships with workplace outcomes. For example, Jackson and Schuler’s (1985) meta-analysis found role ambiguity to be significantly, negatively correlated with self-rated job performance ( $r = -.24$ ), while they found no relationship between role conflict and self-rated performance ( $r = -.02$ ). This

example highlights the importance of examining different types of workplace stressors separately, as they may possess distinct and/or unequal consequences for workers, groups, and organizations. Thus, although studies interested in organizational constraints faced by workers may ask participants about staffing levels, their failure to distinguish the effects of understaffing from other stressors does little to advance our understanding of the potential unique impact of organizational or work unit understaffing.

### A Reconceptualization of Understaffing

In addition to distinguishing understaffing from workload or other organizational stressors, Hudson and Shen (2013) argued that understaffing should be reconceptualized as a multidimensional construct consisting of manpower and expertise shortages. Manpower understaffing occurs when there are *too few* workers to complete essential tasks and responsibilities of a work unit. This has been the common operationalization of understaffing in the literature since the undermanning line of research began in the 1960s. The second type of resource shortage is expertise. Expertise understaffing occurs when a work unit does not possess workers with the necessary KSAOs to complete essential tasks and functions. Hudson and Shen (2013) found initial support for this distinction and established that these two types of resource shortages had differential relationships with worker attitudes and well-being.

Nearly all existing research on understaffing and related constructs (e.g., undermanning, unit workload, organizational constraints) examines only manpower understaffing. For example, in one common laboratory experiment, groups are asked to drive a slot car around a track with one group member primarily responsible for operating the car. The rest of the group members remove obstacles from the track as the car approaches (e.g., Arnold & Greenberg, 1980; Wicker et al., 1976). In these studies, first an optimal number of group members is determined. For

instance, if there are three obstacles, then the optimal number of group members is four—one driver and three obstacle removers. Groups with four participants are considered adequately staffed, those with five participants are considered overstaffed, and those with three participants are considered understaffed. Note that this definition of understaffing does not account for expertise issues, such as whether individual group members possess the requisite coordination to operate the slot car or to remove the obstacles at the correct time. Similarly, more subjective measures of work unit understaffing often ask participants to indicate an ideal group size in addition to their current group size, without referencing whether group members are qualified to undertake group responsibilities (e.g., Cini, Moreland, & Levine, 1993; Ganster & Dwyer, 1995). Although examinations of manpower understaffing are important and should not be abandoned, they are insufficient in capturing the entire domain of understaffing as they fail to take into account the need for appropriately skilled group members in addition to an adequate number of group members.

Notably, allusions to expertise understaffing can be found as far back as the 1970s, when Wicker et al. (1972) specified that appropriate operationalizations of understaffing should be determined by comparisons of maintenance minimums, setting capacities, and applicants. In their discussion, *maintenance minimum* signifies the minimal number of workers needed to properly carry out all essential group tasks and functions. The *setting capacity* refers to the maximum number of workers who can be present in any given work group. This capacity can be determined by physical restrictions (e.g., there is only enough room in the workspace for four desks, thus the setting capacity is four) or by regulations or standards (e.g., only eleven players per team are allowed on a football field, thus the setting capacity is eleven). *Applicants* denote the total number of workers who are *qualified and eligible* to participate in the unit and who are

also interested in doing so. The requirement of “qualified” in this third component is really the first reference to the possibility of settings in which there are seemingly sufficient numbers of workers, but due to the lack of necessary KSAOs (i.e., qualifications), the group will have difficulty completing all essential tasks and functions. Unfortunately, the research that followed generally failed to examine this idea of lack of expertise or qualifications in understaffing (e.g., Arnold & Greenberg, 1980; Cini et al., 1993; Ganster & Dwyer, 1995; Wicker et al., 1976).

In one study that did allude to expertise understaffing, albeit inadvertently, Treanor and Cotch (1990) observed intact work units in psychiatric wards to determine core staffing levels. Similar to most undermanning and understaffing researchers, Treanor and Cotch focused on manpower understaffing. However, the tables presented in their report broke down staffing requirements by employee qualifications (e.g., number of psychiatrists, medical specialists, and ward nurses needed), highlighting differences in the KSAOs possessed by different types of workers. Unfortunately, although in possession of the requisite data, these authors did not subsequently examine the unit or worker consequences of expertise understaffing.

Only recently have both types of understaffing been examined simultaneously. Hudson and Shen (2013) found that although a worker’s perceptions of his or her work unit’s manpower and expertise understaffing were significantly correlated ( $r = .54$ ), confirmatory factor analyses showed that two correlated-factors, representing manpower and expertise understaffing, better fit the data than a single dimension of understaffing. Furthermore, when examining the relationship between the two types of understaffing and an item assessing overall staffing perceptions, Hudson and Shen found manpower understaffing was more strongly related to overall staffing perceptions than expertise understaffing. This suggests that workers tend to primarily consider manpower shortages when forming overall perceptions of staffing sufficiency. Importantly,



Hudson and Shen (2013) also found that manpower and expertise understaffing were differentially related to worker outcomes. Compared to manpower understaffing, expertise understaffing demonstrated stronger relationships with a worker's feelings of role ambiguity, lack of organizational support, and fatigue. Thus, their research provided initial support for a multidimensional conceptualization of understaffing and highlighted the importance of considering both types of resources shortages.

A major drawback of Hudson and Shen's (2013) study is that it only focused on linking an individual's perception of their work unit's level of understaffing and individual-level workplace outcomes. It remains unclear to what extent perceptions of work unit understaffing are *shared* within a group (and, therefore, likely based in some type of objective reality) and how group perceptions may relate to consequences for the group as a whole. To address this limitation, the current study investigates group agreement regarding work unit understaffing and links shared group perceptions of work unit understaffing to group outcomes.

### Consequences of Understaffing

Although often said to have detrimental effects, there actually exists very little empirical evidence that links understaffing with negative employee, group, and organizational outcomes. From the few studies that have been conducted, the most commonly examined consequences include workload, unit cohesion, group performance, and emotional exhaustion (e.g., Cini et al., 1993; Dietzel & Coursey, 1998; Ganster & Dwyer, 1995; Perkins, 1982; Treanor & Cotch, 1990; Wicker, 1979). The results of these studies are generally inconsistent, with some studies reporting negative and some studies reporting positive consequences of understaffing. For example, research examining nurse unit workloads tends to find negative outcomes of lower nurse-to-patient ratios (i.e., greater overload), such as lower performance, efficiency, and well-

being (e.g., Aiken et al., 2002; Fridkin, Pear, Williamson, Galgiani, & Jarvis, 1996; Wicker & August, 1995). On the other hand, the undermanning literature posits some positive effects of manpower understaffing. For example, Wicker et al. (1976) found that those in understaffed conditions rated their subjective experiences (i.e., perceptions of involvement, contribution, and opportunities for skill demonstration) more positively than those in adequately or overstaffed conditions.<sup>2</sup> The small number of empirical investigations on understaffing and the general lack of consensus regarding magnitude and direction of effects, highlight the need for additional systematic examinations of understaffing as well as identification of potential moderators that may explain these inconsistent findings.

The present study follows the framework laid out by Hudson and Shen (2013), which differentiates between proximal and distal outcomes of work unit understaffing. This section begins with hypotheses linking work unit understaffing with three categories of distal group outcomes—group well-being, behaviors, and attitudes. The following section describes three proximal outcomes (or group-level mediators) which are the mechanisms through which work unit understaffing is expected to be related to distal group outcomes. I draw on theories of cognitive appraisals and occupational stressors as well as principles of self-regulation and goal discrepancy to support these proposed mediating effects. Lastly, given the inconsistent relationships found between understaffing and outcomes, the final section introduces one

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<sup>2</sup> These positive consequences of understaffing, which have primarily been found in the lab, may not replicate in the field for several of reasons. First, as previous authors have pointed out (e.g., Wicker et al., 1976), due to the nature of the task used in these experiments (e.g., racing a slot car around a track), positive outcomes may simply be due to greater interest than would normally be possessed by employees and work groups on the job. (i.e., it may be more interesting to the participants to play a “game” than to complete assigned job tasks). Thus, participants in these studies may have experienced positive outcomes due to motivational factors largely unrelated to the staffing level of the group. Additionally, with regard to performance outcomes, lab studies may be measuring maximal performance rather than typical performance, which would more likely to be assessed in field investigations examining performance over longer periods of time. Previous research has shown that the correlates of maximal and typical performance often differ (e.g., DuBois, Sackett, Zedeck, & Fogli, 1993; Ployhart, Lim & Chan, 2001). Finally, given the short-term nature of most laboratory tasks, lab results may differ from field results if short-term versus long-term consequences of understaffing differ.

promising moderator, teamwork effectiveness, which may serve to buffer groups from the potential negative effects of work unit understaffing and its proximal outcomes (see Figure 1).

### *Distal Outcomes of Understaffing*

Hudson and Shen (2013) suggest that there are two primary distinctions to be made between proximal and distal outcomes. Proximal outcomes of understaffing include characteristics of the job or group such as workload, task scope, or role ambiguity. Distal outcomes are more personal to the employee or group members as a whole and include attitudes, behaviors, and well-being (e.g., satisfaction, burnout, and performance). Compared to distal outcomes, proximal outcomes of understaffing seem to be more strongly and consistently related to staffing conditions. For example, understaffing should be inherently associated with greater workload (e.g., as a group loses workers or gains additional responsibilities, by necessity, the workload for group members increases). These proximal outcomes, in turn, are expected to relate to work unit or group attitudes, behaviors, and well-being.

In contrast, the nature of relationships between understaffing and the proposed distal outcomes is often inconsistent, suggesting there may be moderators that either buffer or exacerbate the relationship between understaffing and worker and group distal outcomes. For example, Cini et al. (1993) found that manpower understaffing was associated with burnout and lower group performance. On the other hand, Ganster and Dwyer (1995) and Vecchio and Sussman (1981) observed positive effects of manpower understaffing on motivation and satisfaction at the individual level of analysis and, in the study by Ganster and Dwyer, also at the group level of analysis.

In this section, I first describe distal outcomes examined in this investigation and their anticipated relationships with work unit understaffing, citing previous research linking

understaffing to each group outcome whenever possible. Then I present hypotheses regarding proximal outcomes (i.e., mediators) as well as a potential moderator of these relationships.

*Group Well-Being.* In this study, I examine two indicators of group well-being: emotional exhaustion and sickness-related absences. Emotional exhaustion, employee's feelings of being "overextended" and fatigued by his or her work, is one of three components of burnout (Maslach & Jackson, 1981). The current investigation focuses on emotional exhaustion, since the other two components of burnout (i.e., depersonalization and personal accomplishment) were deemed to be less applicable at the group level of analysis. For example, even if the group is not performing adequately as a whole, it is possible that a given member may be pleased with his or her own level of productivity (i.e., personal accomplishment). I focus on emotional exhaustion, since it has been proposed to result from situations requiring excessive effort and personal exertion especially over an extended period of time, as might be expected in situations of understaffing.

Although emotional exhaustion has been proposed as an outcome of understaffing by several researchers (e.g., Clements et al., 2008; Wicker, 1979), only one study empirically investigated the relationship with emotional exhaustion (and only at the individual level of analysis). Specifically, Dietzel and Coursey (1998) found that manpower understaffing was positively related to a worker's level of emotional exhaustion ( $r = .33$ ). Similarly, Hudson and Shen (2013) found one's perception of work unit understaffing was positively related to his or her own level of fatigue, with expertise understaffing exhibiting a stronger relationship with personal emotional exhaustion than manpower understaffing.

Though burnout is not often assessed as a group-level variable (for exceptions see Bakker, Blanc, & Schaufeli, 2005 and Garman, Corrigan, & Morris, 2002), some authors have suggested burnout operates at the group level through a contagion effect. For example, Bakker et

al. (2005) found workers' levels of burnout were predicted by the level of burnout they perceived other group members to be suffering from. Relatedly, Semmer et al. (1996) found support for the construct of shared job strain, in which a significant portion of reported strain experienced by employees holding the same jobs was attributable to shared job stressors encountered in those jobs. These studies suggest that if members of the same work unit, not just individuals holding the same job, are subject to similar demands (e.g., staffing shortages and/or greater unit workload), then team members would be expected to also exhibit, to a degree, similarities in well-being or health outcomes. Therefore, the current study examines the effects of work unit understaffing on work unit emotional exhaustion.

*Hypothesis 1: Work unit (a) manpower and (b) expertise understaffing are positively related to work unit emotional exhaustion.*

As a more objective indicator of well-being in the group, the present investigation also examines total number of sickness-related absences in a group. Previous understaffing research has only occasionally discussed sickness-related absences as a criterion of interest. For example, Fagin and colleagues (1995) related staffing levels (among other stressors) to a variety of well-being outcomes, including absences. Their results found negative well-being outcomes resulted from these stressors. Other researchers, such as Gibb et al. (2010) and Edwards and Burnard (2003), have proposed that understaffing should result in poorer employee health outcomes and subsequent sickness-related absences, although these relationships were not empirically tested in their studies. Therefore, I include group sickness-related absences as an indicator of group-well-being, hypothesizing that shared perceptions of work unit understaffing are linked to greater frequency of sickness-related absences in the group as a whole.

*Hypothesis 2: Work unit (a) manpower and (b) expertise understaffing are positively related to work unit sickness-related absences.*

*Group Performance.* Group performance is one of the most commonly examined outcomes of understaffing. Intuitively, understaffing should be expected to be associated with lower group performance, since by definition a staffing shortage should cause the work unit to be unable to adequately complete essential tasks and duties. Surprisingly, empirical research has found inconsistent results when linking work unit understaffing to work unit performance. For example, Cini et al.'s (1993) interviews of college groups indicate that poor group performance was the most common problem associated with manpower understaffing. In contrast, Perkins (1982) found understaffed groups (controlling for group size) outperformed overstaffed groups under certain conditions (i.e., when working on conjunctive tasks, tasks in which the group level of performance is determined by the weakest member). Additionally, in their lab study, Wicker and colleagues (1976) found no differences in group performance between understaffed groups and adequately or overstaffed groups. The inconsistency of previous findings further highlights the need for additional investigations of the relationship between work unit understaffing and group performance. Drawing from the work of Cini and colleagues (1993) and the definitional implications of understaffing, I hypothesize the following:

*Hypothesis 3: Work unit (a) manpower and (b) expertise understaffing are negatively related to work unit performance.*

*Group Attitudes.* The third type of outcome included in the present investigation is group attitudes; specifically, I focus on the construct of group cohesion. Similar to group performance, relationships between understaffing and group cohesion has uncovered some counterintuitive findings. For example, studies in the area of undermanning have often found members of

understaffed groups report greater group cohesion and that they work more closely with others in the group (e.g., Perkins, 1982; Wicker et al., 1976). Additionally, some research has found understaffed groups to be more accepting of current members and newcomers (Arnold & Greenberg, 1980; Cini et al., 1993). Some researchers have proposed that these relationships occur because members of understaffed units must put aside preoccupations with personal idiosyncrasies to unite in maintaining adequate group functioning. For example, Bechtel (1974) observed that understaffed groups were less critical of fellow group members and less likely to reject others based on non-task-related characteristics, such as personality or background. Instead, the primary focus of understaffed groups was task-related information (e.g., How was the work going to get done?). Thus, it would seem that understaffed conditions may potentially increase group members' reliance on and closeness with one another (i.e., greater group cohesion).

Although there is some support for positive relationships between understaffing and group cohesion, this positive relationship may nevertheless wane as understaffing reaches more severe levels. For example, some burnout researchers have suggested that the depersonalization component of burnout (i.e., general indifference or lack of caring when relating to others; Maslach & Jackson, 1981) is a coping mechanism for dealing with extreme emotional exhaustion (Jackson et al., 1987). Since greater understaffing is expected to be associated with greater group emotional exhaustion, this would suggest that more severe levels of understaffing may result in greater depersonalization and lower group cohesion. Given contrasting expectations, I examine the nature of the relationship between understaffing and group cohesion as a research question.<sup>3</sup>

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<sup>3</sup> Given that I did not have a directional hypothesis for the relationship between work unit understaffing and group cohesion, I did not subsequently make hypotheses regarding mediating mechanisms of this relationship. However, I did investigate mediating mechanisms in a more exploratory fashion in my analyses for this relationship.

*Research Question 1: What is the relationship between work unit (a) manpower and (b) expertise understaffing and work unit cohesion?*

### *Proximal Outcomes of Understaffing*

Described above are three categories of distal group outcomes expected to result from work unit understaffing—group well-being (i.e., group emotional exhaustion and sickness-related absences), performance, and attitudes (i.e., group cohesion). In addition to examining relationships between these variables, I also hope to shed light on why these group-level relationships occur. Thus, in this next section I discuss three group-level mediators: group quantitative workload, role ambiguity, and potency. I draw upon research on cognitive appraisals, occupational stressors, and motivation (i.e., goal discrepancy) to help support these theorized mediating mechanisms.

*Quantitative Workload.* One of the most immediate consequences proposed to result from understaffing is increases in quantitative workload, or the *amount* of work an individual or group is asked to complete (Nixon, Mazzola, Bauer, Krueger, & Spector, 2011). As the number of employees decreases or a group's tasks and responsibilities increase, understaffing necessitates that employees take on additional tasks and duties to ensure adequate group performance. Hudson and Shen (2013) found that both work unit manpower and expertise understaffing was positively correlated with a worker's personal experience of quantitative workload ( $r = .37$  and  $.35$ , respectively). At the group level, the posited relationship between understaffing, particularly manpower understaffing, and group-level quantitative workload is evidenced by the large number of studies that utilize work-to-staff ratios (e.g., patient-to-nurse ratios) as their operationalization of understaffing (e.g., Clements et al., 2008; Rafferty et al., 2007; Schwab et al., 2012). Additionally, if a work unit loses employees, but the tasks and responsibilities of



those employees remain, then the group may also perceive the amount of work it is responsible for as more demanding (despite the objective workload for the group remaining same as before).

Thus, I hypothesize the following:

*Hypothesis 4: Work unit (a) manpower and (b) expertise understaffing are positively related to work unit quantitative workload.*

Generally, relationships between group quantitative workload and distal group outcomes are expected to be negative. As quantitative workload increases to the point of overload, detrimental effects on group psychological and physical health as well as performance and effort should be observed. Support for this relationship at the individual level of analysis can be drawn from research by Kawada and Otsuka (2011) and Sutton and Rafaeli (1987) who found individual-level overload to be negatively related to worker job satisfaction. Additionally, multiple studies have demonstrated that employees with greater workload demands report greater burnout, especially emotional exhaustion (e.g., Friedman, 2002; Jackson et al., 1987; Posig & Kickul, 2003; Schmidt & Dietsel, 2013) and lower psychological (e.g., anxiety and depression; Daniels & Guppy, 1997) and physical health (e.g., Daniels & Guppy, 1997; Spector & Jex, 1998). Research on the effects of group-level workload is much less prolific than research on individual-level workload (Funke, Knott, Salas, Pavlas, & Strang, 2012). However, there are a few studies that suggest detrimental effects of group workload on group outcomes, such as performance and well-being. For example, in a medical setting, Ong et al. (2007) found that a greater number of patient admissions resulted in negative group outcomes, such as unnecessary and excessive use of resources and increased risk of patient mortality. Similarly, Rafferty and Jimmieson (2010) found that group-level role overload predicted greater group distress. Thus, I

anticipate that group workload mediates the relationship between understaffing and group well-being and performance outcomes.

Studies on cognitive appraisals of stressors also support this mediating pathway. Lazarus and Folkman (1987) describe a two part process by which any given demand or stressor is appraised. Initially, the effect of the stressor on personal goals is evaluated. If the demand is anticipated to have a large impact on the individual and his or her goal pursuit, then the stressor takes on a higher level of importance. The second appraisal deals with the individual's ability to cope with or handle the stressor (i.e., assessment of available resources). If the stressor is not deemed to be important or if the individual has adequate resources to cope with the stressor, Lazarus and Folkman suggest that outcomes should be less negative and, potentially, even positive. In this case, the stressor will be appraised as a challenge to be overcome rather than a serious harm or threat. However, if the demand is important and coping ability is insufficient, then the stressor will be considered harmful or threatening, resulting in worsened affect, psychological well-being, physical health, and social functioning (Lazarus & Folkman, 1987).<sup>4</sup>

Generally, group quantitative workload (and other proximal group outcomes of understaffing) is expected to be perceived by the work unit as harmful or threatening to the group goal of adequate group performance. In the case of understaffing, the greater the group workload, the less likely it will be that the group can achieve their desired level of performance. Since the demand (i.e., understaffing) is inhibiting the group from reaching its goals, it should be appraised by the group as important. Furthermore, under understaffed conditions, by definition

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<sup>4</sup> Although individual differences may affect how arduous a given level of workload (or stressors in general) is perceived, researchers such as Lazarus and Folkman (1987) suggest that many demands are generally appraised consistently across individuals (e.g., death of close family member or friend is always appraised as stressful). Similarly, LePine et al. (2005) suggest "work contexts have a fairly consistent economic meaning for the individuals who experience them, and as a result, they tend to appraise and react to the particular work stressors in those contexts in fairly consistent ways" (p. 764). Thus, the present study does not focus on individual differences, particularly since the focus of this study is on aggregate or shared perceptions of understaffing within a work group.

there are insufficient personnel resources to complete all core tasks and duties of the group in the allotted time. Thus, the group should also see its ability to cope with the stressor as limited. Therefore, via greater group quantitative workload (i.e., a hindrance stressor, defined as a job demand “people tend to appraise as potentially constraining their personal development and work-related accomplishment” (Podsakoff, LePine, & LePine, 2007, p. 438)), understaffing is expected to negatively impact group well-being and performance. Although some researchers have argued that workload is a challenge stressor, a job demand “people tend to appraise as potentially promoting their personal growth and achievement” (Podsakoff et al., 2007, p. 438; see also Cavanaugh, Boswell, Roehling, & Boudreau, 2000; LePine, Podsakoff, & LePine, 2005), more often researchers have investigated workload within the framework of occupational stressors and posited negative appraisals (e.g., Kaufmann & Beehr, 1986; Kawada & Otsuka, 2011; Posig & Kickul, 2003; Spector & Jex, 1998). Given that group performance is likely tied to expectations of job security and valued organizational rewards, I hypothesize that the relationship between work unit understaffing and the resulting group quantitative workload to be negatively associated with group outcomes.

*Hypothesis 5: Work unit quantitative workload mediates the relationship between work unit understaffing and work unit well-being.*

*Hypothesis 6: Work unit quantitative workload mediates the relationship between work unit understaffing and work unit performance.*

Although both manpower and expertise understaffing are expected to be related to quantitative workload (both at the individual and group levels of analysis; Hudson & Shen, 2013), I anticipate that manpower understaffing will be more strongly related to group quantitative workload than expertise understaffing. In the case of manpower understaffing, the

primary issue is a lack of employees to handle the *amount* of work required of the group. However, there are potentially employees *capable* of completing unit core tasks and responsibilities within the work unit. Thus, the group should still feel pressure and responsibility for ensuring that core duties of the group are completed. In this case, it would be expected that manpower understaffing is more strongly related to group perceptions of quantitative workload. In contrast, group perceptions of expertise understaffing may not be as strongly related to group perceptions of quantitative workload, as failure to complete core unit tasks and responsibilities under these conditions are not due to there being too few employees to do so, but rather due to lack of workers possessing the requisite KSAOs. Thus, although the group may feel guilty for not completing core tasks and functions, the group may also consider it inappropriate for these duties to be expected of its current members (i.e., perceive these tasks as illegitimate; Semmer, Tschan, Meier, Facchin, & Jacobshagen, 2010).

As further justification of the differential effects of manpower and expertise understaffing on group workload, I examined a few of the common items used to assess quantitative workload. For example, Spector and Jex's (1998) five-item Quantitative Workload Inventory asks: "How often is there a great deal to be done?" and "How often do you have to do more work than you can do well?" Similarly, Kawada and Osutka's (2011) measure includes items such as: "You have enormous amounts of work" and "You cannot complete all your work in the allotted time." Likewise, Sutton and Rafaeli (1987) assess workload with items such as: "I never seem to have enough time to get everything done on my job" and "My job requires that I work very fast." Each of these items inquires about the amount of work to be completed in comparison to the time allotted. These demands should be more applicable to manpower understaffing conditions, since groups primarily experiencing expertise understaffing may be unable to complete the work of the

unit due to lack of KSAOs, regardless of the amount of time available to them. In this case, the work required of the group is too demanding, but not because there is too much or too little time, but rather because there is no one that is capable of appropriately completing these tasks.

*Hypothesis 7: Work unit manpower understaffing is more strongly related to work unit quantitative workload than work unit expertise understaffing.*

*Role Ambiguity.* A second proximal outcome I anticipate to result from work unit understaffing is higher levels of group role ambiguity. At the individual level of analysis, previous research suggests that understaffing results in increased task scope and skill variety for workers (e.g., Ganster & Dwyer, 1995). Some authors have suggested this role expansion effect should be beneficial with respect to worker attitudes and performance (e.g., Ganster & Dwyer, 1995; Vecchio & Sussman, 2001). However, it is also possible that this broadening of job responsibilities may result in greater role problems, such as greater role ambiguity. In the case of work unit understaffing, the loss of employees or addition of new core tasks or duties results in additional responsibilities that must be assumed by work unit members. Without formal job or role restructuring initiated by supervisors (or the group itself), it may be unclear to a group member which tasks he or she will be held personally responsible for and which tasks are best completed by coworkers. In support of this contention, Hudson and Shen (2013) found that work unit understaffing was positively related to individual workers' perceptions of role ambiguity. Although not commonly studied as a group-level variable, there is some support for the aggregation of employees' perceptions of role ambiguity to the group level of analysis (e.g., Clausen & Borg, 2011; Hauge et al., 2011; Rafferty & Jimmieson, 2010). Thus, I hypothesize that work unit understaffing will be associated with greater group role ambiguity.

*Hypothesis 8: Work unit (a) manpower and (b) expertise understaffing are positively related to work unit role ambiguity.*

Prior research on team effectiveness has argued that role ambiguity, a hindrance stressor (LePine et al., 2005; Podsakoff et al., 2007), negatively impacts groups and individuals. Role clarity (the opposite pole of role ambiguity, greater role ambiguity = less role clarity) has been shown to strongly contribute to group performance and success (e.g., Gladstein, 1984). At the group level of analysis, Rafferty and Jimmieson (2010) found that group role ambiguity (i.e., shared perceptions of role ambiguity within a group) was positively related to group distress. Similarly, Clausen and Borg (2011) found that group role ambiguity was associated with group perceptions of greater emotional demands and poorer team climate. With regard to mediating effects, Hudson and Shen (2013) found results consistent with mediation, such that role ambiguity appeared to mediate the relationship between one's perception of work unit understaffing and one's well-being, attitudes, and performance outcomes (i.e., fatigue, self-rated performance, perceived organizational support). Thus, I anticipate that group role ambiguity serves a similar function at the group level of analysis, mediating relationships between work unit understaffing and group performance and well-being outcomes.

*Hypothesis 9: Work unit role ambiguity mediates the relationship between work unit understaffing and work unit well-being.*

*Hypothesis 10: Work unit role ambiguity mediates the relationship between work unit understaffing and work unit performance.*

Although I expect that both types of work unit understaffing are related to group role ambiguity (i.e., shared lack of clarity with regard to what is expected of group members; Rafferty & Jimmieson, 2010), I anticipate that group role ambiguity is more strongly related to expertise

than manpower understaffing. Expertise understaffing conditions, by definition, are situations in which the work unit as a whole does not possess the necessary KSAOs to complete all core unit tasks and functions. Thus, the determination of who should now be responsible for remaining duties may be less than obvious. In contrast, for manpower understaffing, the group may still have unit members with the appropriate skillsets to complete the remaining work; the question of who should take on these tasks should be more straightforward. Hudson and Shen (2013) found preliminary support for differential relationships between the two types of understaffing and role ambiguity at the individual level of analysis. Although both manpower and expertise understaffing were significantly correlated with personal role ambiguity, multiple regression analyses entering both dimensions simultaneously found only expertise understaffing to be significantly related to one's personal level of role ambiguity. Thus, I hypothesize the following:

*Hypothesis 11: Work unit expertise understaffing is more strongly related to work unit role ambiguity than work unit manpower understaffing.*

*Group Potency.* A third proximal outcome of work unit understaffing is lower group potency. Group potency refers to beliefs about the work unit's performance capabilities and is similar to the construct of group or collective efficacy. Although these terms are often used interchangeably, the two constructs are conceptually distinct. Group efficacy refers to group evaluations of abilities that are task or situation specific (e.g., the work unit will be able to complete a given project), and group potency reflects a more overarching perception of the unit's ability to perform under a variety of situations (Stajkovic, Lee, & Nyberg, 2009).<sup>5</sup>

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<sup>5</sup> Although both collective efficacy and group potency would be expected to be affected by understaffing, the proposed investigation will concentrate on the more general concept of potency, as understaffing should impact group performance expectancies broadly. Additionally, previous research has found some evidence to suggest that group potency precedes collective efficacy rather than the reverse (Stajkovic et al., 2009).

Although no known research has investigated group potency as a consequence of work unit understaffing, some research suggests group size is positively related to group potency (e.g., Duffy & Shaw, 2000; Shelton, Waite, & Makela, 2010). Since groups are typically shrinking as a result of understaffing, understaffing may, likewise, be negatively related to group potency.<sup>6</sup> Additionally, Peltokorpi and Manka (2008) and De Jong et al. (2005) proposed that potency beliefs are related to perceptions of managerial support. In the case of understaffing, the work unit is being forced to function under conditions of inadequate personnel resources, conditions which employees may interpret as indicative of low levels of managerial or organizational support. In support of this contention, Hudson and Shen (2013) found that a worker's perception of his or her work unit's level of expertise understaffing was significantly and negatively related to his or her perceptions of organizational support. Thus, I expect understaffing to also be related to lower perceptions of group potency.

*Hypothesis 12: Work unit (a) manpower and (b) expertise understaffing is negatively related to work unit potency.*

Substantial research has shown that group potency is related to group well-being and performance. For example, Collins and Parker (2010), Lee et al. (2011), and Stajkovic et al. (2009) all found that group potency was positively related to group performance. Additionally, Gil and colleagues (2005) and Lee, Tinsley, and Bobko (2002) found that potency beliefs were related to higher levels of satisfaction. Gelfand et al.'s (2012) study of bank branches found that the potency beliefs held by the branch predicted branch-level well-being. Thus, there is considerable evidence suggesting that group potency may mediate the relationship between work unit understaffing and work unit performance and well-being outcomes.

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<sup>6</sup> Early work in the area of undermanning actually operationalized the construct as the size of the group (e.g., Wicker, 1968, 1979; Wicker & Mehler, 1971).



Additional support for these mediated relationships can be drawn from the self-regulation literature, specifically from research on goal discrepancy. Researchers have found that the larger the distance between one's goal and one's current state of progress, the less likely one would expect to be able to attain the goal (Carver & Scheier, 1990). In the case of work unit understaffing, I assume that one of the group's primary goals is adequate group performance (i.e., timely and proper completion of core unit tasks and functions). Thus, the more severe the level of work unit understaffing, the farther away from the goal the group would be. Therefore, group success expectancies, such as efficacy and potency, would be low. Research on the effects of goal discrepancies has linked larger discrepancies between current and ideal states to negative individual-level outcomes, such as disengagement and despair (Carver & Scheier, 1990; Chang, Johnson, & Lord, 2010). Therefore, I propose the following:

*Hypothesis 13: Work unit potency mediates the relationship between work unit understaffing and work unit well-being.*

*Hypothesis 14: Work unit potency mediates the relationship between work unit understaffing and work unit performance.*

#### Teamwork as a Moderator of the Relationship between Work Unit Understaffing and Outcomes

Although I generally theorize that work group understaffing is negatively related to group outcomes, I am interested in whether there are circumstances and group characteristics that can mitigate these potential adverse effects. These boundary conditions or buffering factors can then be the target of organizational intervention efforts. Specifically, in this study, I examine the moderating role of teamwork effectiveness in buffering work units from the negative impact of group understaffing.

Salas, Cooke, and Rosen (2008) define teamwork as “the interdependent components of performance required to effectively coordinate performance of multiple individuals” (p. 541). Measures of teamwork typically include questions about communication, cooperation, and collaboration skills (e.g., Jehn & Mannix, 2001). Work units engaging in more effective teamwork behaviors should be better able to cope with the immediate results of understaffing (i.e., greater group workload and role ambiguity and lower group potency), ultimately mitigating or preventing negative group distal outcomes (i.e., group performance and well-being). For example, more effective communication and cooperation may increase the efficiency with which group members are able to share information and accomplish tasks, despite increases in group workload associated with understaffing. Alternatively, research on team mental models (i.e., “organized understanding of relevant knowledge that is shared by team members”; Mohammed & Dumville, 2001, p. 89), suggests that effective teamwork skills may aid understaffed groups by providing them with a more complete working knowledge of which employees are qualified and available to assist on which tasks and functions. Therefore, teamwork effectiveness may counteract the effects of group role ambiguity. In other words, teamwork effectiveness can be viewed as a resource for understaffed groups, attenuating the negative impact of group demands such as work unit understaffing and its associated proximal outcomes.

*Hypothesis 15: Teamwork effectiveness moderates the relationship between proximal outcomes of work unit understaffing and the distal outcomes of (a) work unit well-being and (b) performance, such that those units which are more effective at teamwork will be less negatively impacted by understaffing and its proximal outcomes.*

## The Current Study

In summary, the current study sought to examine the impact of work unit understaffing, both manpower and expertise dimensions, on work unit outcomes. Specifically, I focus on relationships with four proposed distal group-level outcomes – group emotional exhaustion and sickness-related absences (*Hypotheses 1 and 2*), group performance (*Hypothesis 3*), and group cohesion (*Research Question 1*). I also examined three mediators that I anticipated would explain the relationships between work unit understaffing and distal outcomes: group workload (*Hypotheses 4, 5, 6, and 7*), group role ambiguity (*Hypotheses 8, 9, 10, and 11*), and group potency (*Hypothesis 12, 13, and 14*). Lastly, I aimed to identify a potential buffer against the negative outcomes of work unit understaffing by investigating the potential moderating effect of teamwork effectiveness (*Hypothesis 15*). Together, these relationships are reflected in the model depicted in Figure 1.

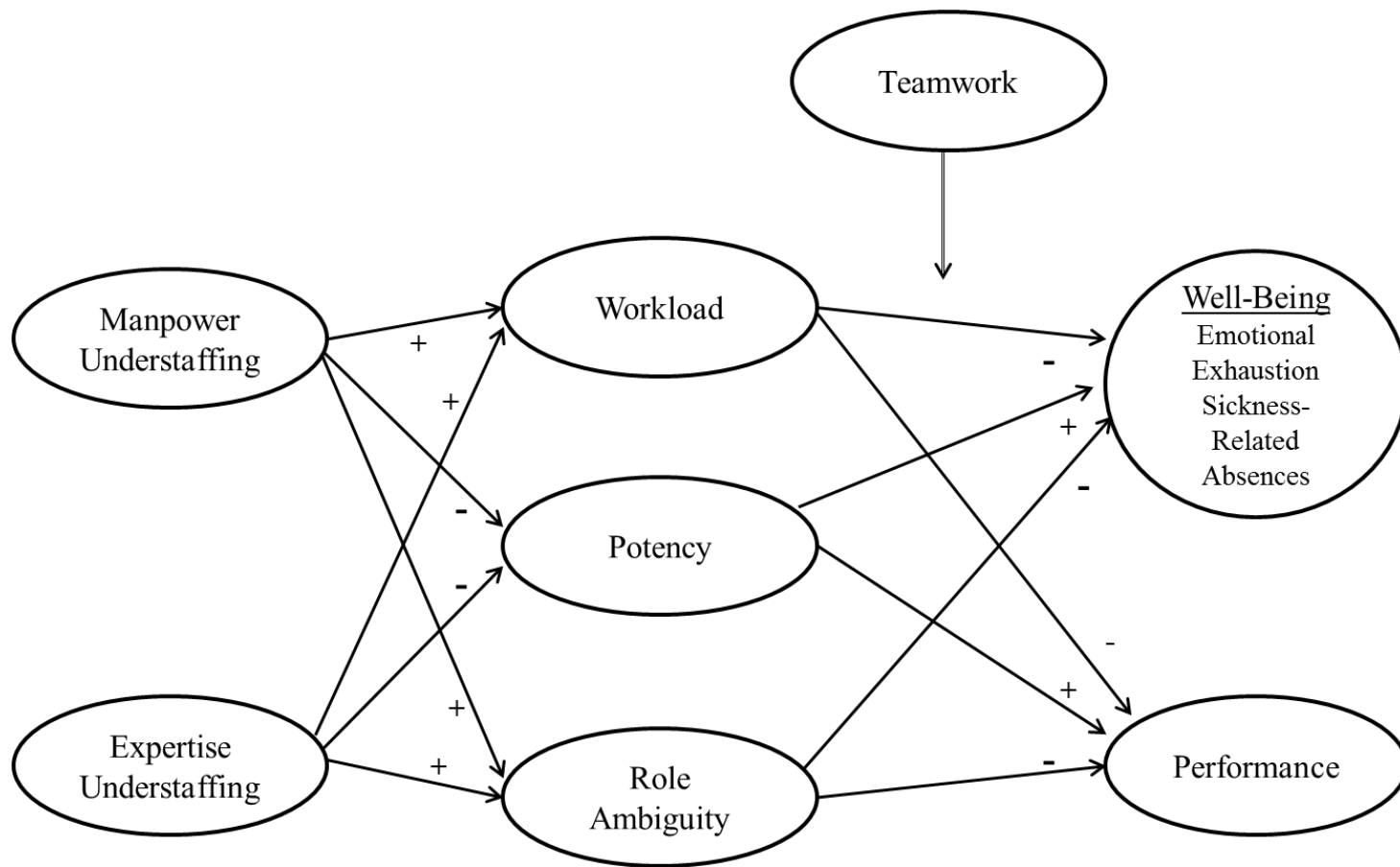


Figure 1. Conceptual model depicting the relationships between work unit manpower and expertise understaffing and the group-level outcomes of well-being and performance as mediated by group-level quantitative workload (or overload), potency, and role ambiguity.

In this study, I focused on group-level outcomes for several reasons. First, Hudson and Shen (2013) previously demonstrated that employees' perceptions of their own work unit's level of understaffing were related to their personal outcomes (e.g., personal fatigue and job performance). Use cross-sectional data, they also found results consistent with mediation, such that it appears that one's personal quantitative workload and experience of role ambiguity appeared to mediate the relationship between understaffing and personal outcomes. However, given understaffing is a property of a group, a fundamental question regarding the validity of these understaffing perceptions is whether and to what extent these perceptions are shared across group members. In this current study, I addressed this question by examining agreement between group members in intact work groups regarding their perceptions of group understaffing. Second, prior multilevel research and theorizing has shown that relationships at one level of analysis do not necessarily generalize to another (Klein, Dansereau, & Hall, 1994). In fact, relationships between the same variables at different levels of analysis can differ in both magnitude and direction. Thus, additional empirical work is needed to uncover and understand relationships between work unit understaffing and work unit outcomes. Finally, I wanted to examine whether group characteristics, such as teamwork effectiveness, moderated relationships between work unit understaffing and work unit outcomes.

## METHOD

### Participants and Procedures

Work units and their members were recruited primarily through personal contacts of the principal investigator (PI) and by contacting local organizations. Subsequently, I used snowball sampling based on these initial contacts to recruit other groups and their members. For each organization, an appropriate representative (e.g., Owner, Director, Head of Human Resources, or Office Manager) was approached to provide written permission for me to speak with supervisors and group members in the organization. Supervisors of specific work units were identified based on job titles (e.g., Manager, Supervisor, or Vice President) or via their position in organizational hierarchy (e.g., via organizational charts) that identified them as having a unit or group of employees reporting to them. Supervisors of work units were then contacted either in person or via phone or e-mail to inform them of the purpose and requirements of the study, invite them to participate in the study, and solicit permission to approach their group members. Supervisors were given the choice of completing either a hard copy (with prepaid postage) or online version of the survey (see Appendix A for the supervisor survey) and were provided a copy of the informed consent form with the PI's contact information. After securing permission from supervisors, I then separately approached members of each work unit either in person or via phone or e-mail. Group members were provided study information, invited to participate, presented with informed consent with the PI's contact information, and were given either a hard copy (with prepaid postage) or online version of the same survey (see Appendix B for the group

member survey). Each participant, supervisor or group member, was compensated with a \$15 gift card to Amazon.com.

In total, 265 employees and 107 supervisors participated in this study. In order to investigate agreement within groups, only units with two or more responding group members were retained. This resulted in 66 groups ( $N = 245$ ). For 57 of the 66 groups, the supervisor of the group also participated. For most of the hypothesis testing, the focal sample was the full 66 groups. However, to reduce concerns of common method variance, I used supervisor ratings to assess group performance. Therefore, any analysis which investigated supervisor-rated job performance (including structural equation model testing) was based on the smaller sample of 57 groups. Of the 66 groups, 42.4% ( $N = 28$ ) were from higher education, 43.9% ( $N = 29$ ) were from financial or insurance industries, and the remaining 13.7% were from retail/service or unidentified industries ( $N = 7$  and  $N = 2$ , respectively).

The mean age of group members was 36.60 years old ( $SD = 9.44$ ), average group tenure was 5.18 years ( $SD = 4.89$ ), and average hours worked per week was 38.21 hours ( $SD = 8.05$ ). On average, group composition was 72.51% female and 66.17% white. According to the 49 supervisors who reported the current size of the group, mean group size was 7.21 members (excluding one outlier group with 125 members; average group response rate = 65.06%). Of the 57 supervisors who participated, mean supervisor age was 46.67 years ( $SD = 12.08$ ) and the average length of supervision for the group was 6.53 years ( $SD = 7.52$ ). The majority (58.90%) of supervisors was female and 80.70% were white.

### Measures<sup>7</sup>

In group-level research it is common to collect information from individuals and then aggregate the resulting data to the group level of analysis. To ensure appropriate interpretation of

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<sup>7</sup> A complete list of the measures and associated citations can be found in Appendix A.

results, investigators must align the level of theory, data, and analysis (Klein et al., 1994). In this context, given the interest in group phenomenon, this meant collecting data that is inherently group level (e.g., supervisor reports of the current number of employees in the group) or with survey items that referenced group perceptions and experiences (e.g., How often does your work unit have more work to do than it can do well? vs. How often do you have more work to do than you can do well?). This was done for most of the variables examined, the exceptions were constructs that have not often been examined at the group level of analysis and for which I was unsure if there would be a similar intuitive meaning at the group level (i.e., role ambiguity, emotional exhaustion).

In addition to using a group referent when surveying individuals, Klein et al. (1994) argue that data should also demonstrate support for aggregation prior to aggregation (e.g., within-group agreement, significant effect of group membership, reliability in group means).  $ICC(1)$  indicates the proportion of variance that is accounted for by group membership.  $ICC(1) \geq .05$  (i.e., at least 5% of the variance is accounted for by group membership) is often used to justify aggregation use of multilevel modeling (Klein et al., 2000). In contrast,  $ICC(2)$  indexes the reliability of the group mean, and a commonly accepted cutoff to support aggregation using  $ICC(2)$  is .50 (Klein et al., 2000). Note that  $ICC(2)$  is affected by the number of respondents in a group, similar to internal consistency reliabilities which are affected by number of items in a measure. Ehrhart, Schneider, and Macey (2014) reported that in organizational climate research  $ICC(2)$ s are often between .40-.60 in studies utilizing smaller groups. Given the relatively small number of respondents per group ( $M = 3.71$ ,  $SD = 1.75$ ) in this study and the lower likelihood of finding significant results when using less reliable estimates, I aggregated several variables to the group level of analysis whose  $ICC(2)$ s were marginal (i.e.,  $\geq .40$ ) and did not reach conventional



levels of support for aggregation. Therefore, I acknowledge that these findings may be considered more exploratory and require future replication.

### *Demographics*

Demographic questions included participants' age, gender and ethnicity, and current employment conditions (i.e., job title, job tenure, and average hours worked per week). These demographics were also aggregated to represent group-level variables such as the average number of hours worked in the group or the average length of tenure for members of the group. Given that gender and ethnicity are categorical, these variables at the group level became percent male and percent white of the group. In addition, supervisor surveys asked about the current size of the group and the centrality of the work group to organizational functioning. Industry specific codes were used to link supervisor and group member responses (e.g., participant code *E1* referred to a member or supervisor from the first targeted group working in higher education) and to protect participant anonymity. Industry was transformed into two dummy coded variables with education as the referent (Dummy 1: Financial/Insurance = 1, Education = 0; Dummy 2: Retail Service/Other = 1, Education = 0).

### *Work Unit Understaffing*

Manpower and expertise understaffing were assessed using the measure developed by Hudson and Shen (2013). Although the original measure consisted of two five-item subscales (assessing manpower and expertise, respectively), subsequent research has supported use of shortened three-item versions of each subscale. Therefore, I opted to use the revised three-item subscales in this study.<sup>8</sup> For each item, participants responded on a Likert scale from 1 to 5 (“strongly disagree” to “strongly agree”). Understaffing items used a group referent and *ICC(1)*

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<sup>8</sup> For the data in this study, the three item versions of each subscale also fit the data better than the five item version. Reliability estimates did not vary significantly between the three and five-item version of the subscales for both the group and supervisor data.

statistics showed reasonable levels of within-group agreement [ $ICC(1) = .29$  for manpower,  $ICC(1) = .16$  for expertise], supporting aggregation. Additionally,  $ICC(2)$  suggested the group means to be reasonably reliable, more so for manpower understaffing compared to expertise understaffing [ $ICC(2) = .58$  for manpower,  $ICC(2) = .40$  for expertise]. An example item for the manpower subscale is: “This work unit needs more employees.” An example item for the expertise subscale is: “This work unit is missing personnel with key knowledge and skills.” For the aggregated group-level data, both subscales demonstrated acceptable internal consistency reliability (manpower  $\alpha = .87$ , expertise  $\alpha = .77$ ).

Supervisors were also asked to rate the unit’s current level of understaffing using the same measure. The two understaffing subscales demonstrated higher reliability when rated by supervisors compared to when rated by the group (manpower  $\alpha = .94$ , expertise  $\alpha = .85$ ). In addition, both group members and supervisors were also asked to respond to a single item asking them to rate the overall level of staffing in the group, from 1 to 5 (“very understaffed” to “very overstaffed”). For easier interpretation, this variable was reverse scored prior to analyses. Therefore, higher scores reflect less sufficient staffing (i.e., greater understaffing) overall.

### *Workload*

The five-item Quantitative Workload Inventory (QWI) developed by Spector and Jex (1998) was used to investigate group quantitative workload. Items on this scale were adapted to reference the *group* rather than the individual and demonstrated good internal consistency ( $\alpha = .89$ ). Responses were on a 1 to 5 frequency scale ranging from “less than once per month or never” to “several times per day”. Example item: “How often does your work unit have more work to do than it can do well?” Scores were aggregated across group members to form a group quantitative workload score [ $ICC(1) = .21$  and  $ICC(2) = .48$ ].

### *Role Ambiguity*

Role ambiguity was measured with the six-item Rizzo et al. (1970) scale. Employees were asked about their clarity regarding their *own* work tasks, thus using an individual rather than a group referent for this measure. Example items include: “There are clear, planned goals and objectives for my job” and “I know what my responsibilities are.” Each item was rated on a seven-point Likert scale, from “very false” to “very true”. For easier interpretation, this variable was reverse-scored prior to conducting analyses. Thus, higher scores reflect higher levels of role ambiguity. At the individual level of analysis, this scale demonstrated good reliability ( $\alpha = .90$ ). Although there was evidence of nesting within groups on this variable [ $ICC(1) = .15$ ],  $ICC(2)$  was below the typically accepted level used to support aggregation [ $ICC(2) = .37$ ]. Given the lower  $ICC(2)$  and the use of an individual rather than group referent in this measure, I chose not to aggregate this variable initially and instead examined role ambiguity at the individual level of analysis (i.e., within groups) using multilevel modeling.

### *Group Potency*

Group potency was assessed using the abbreviated four-item form of Guzzo et al.’s (1993) measure (shortened by Lee et al., 2011). Items were rated on a five-point Likert scale from “strongly disagree” to “strongly agree”. Example item: “My team has confidence in itself.” Group member scores for potency were aggregated to the group level [ $ICC(1) = .21$ ,  $ICC(2) = .47$ ] and the items referenced the group. The internal consistency estimate for the group data was  $\alpha = .89$ .

### *Teamwork Effectiveness*

Campion and colleagues’ (1993) three-item scale assessing group communication and cooperation was employed. Example item: “Members of my team cooperate to get the work

done.” Responses were on a 1 to 5 Likert scale, from “strongly disagree” to “strongly agree”. Although internal consistency reliability was acceptable with the individual level data ( $\alpha = .74$ ), unfortunately and ironically, ICCs for teamwork effectiveness showed little support for within-group agreement and, therefore, very low reliability in group means [ $ICC(1) = .04$ ,  $ICC(2) = .13$ ]. Given the lack of support for aggregation, despite the use of a group referent, this variable was not included in any of my subsequent analyses.

### *Emotional Exhaustion*

The nine-item emotional exhaustion subscale from the Maslach Burnout Inventory (MBI; Maslach & Jackson, 1986), which references personal feelings of emotional exhaustion, was used in the present study. Example items: “I feel emotionally drained from my work” and “I feel like I am at the end of my rope.” Participants responded on a 0 to 6 frequency scale from “never” to “everyday”. This scale demonstrated good reliability with both individual and group-level data ( $\alpha = .93$  and  $.94$ , respectively). Agreement statistics also demonstrated support for aggregation [ $ICC(1) = .21$ ,  $ICC(2) = .47$ ]; however, given that items were not altered to refer to a group referent, I also examined emotional exhaustion at the individual (or within-group) level of analysis using multilevel modeling.

### *Sickness-Related Absences*

As a second indicator of group well-being, I assessed sickness-related absences. Each group member was asked the number of days over the past month that he or she was absent from work due to health-related issues. The number of absent days was summed across group members to provide an estimate of the total number of absences due to sickness within the group during the past month.

### *Work Unit Performance*

Conger et al.'s (2000) five-item scale, which asks about the quality of the group's work, efficiency with which it is completed, and the group's ability to meet its objectives, was used to assess group performance. Both group members and supervisors provided ratings. Example item: "We/[This work unit] always achieve a high standard of task accomplishment". Responses were on a five-point Likert scale from "strongly disagree" to "strongly agree". Reliability was high for both group ( $\alpha = .91$ ) and supervisor ratings ( $\alpha = .84$ ). Aggregation of group member responses was supported [ $ICC(1) = .20$ ,  $ICC(2) = .47$ ]; however, to reduce potential concerns of common method variance, I used supervisor-ratings of group performance (using the same scale) in all analyses. Note that a paired sample *t*-test found group performance as rated by group members (aggregated) did not differ significantly from group performance as rated by the supervisors,  $t(56) = -.14$ ,  $p = .89$ .

### *Work Unit Cohesion*

Group cohesion was measured with the three-item scale from Jehn and Mannix (2001). Example item: "To what extent is your group cohesive?" Responses were on a seven-point Likert scale from "Not at all" to "A lot". Strong support for aggregation was found for this construct [ $ICC(1) = .32$ ,  $ICC(2) = .62$ ] and reliability was also found to be high for this measure using aggregated data ( $\alpha = .95$ ).

### Data Analysis Strategy

After examining whether there was support for aggregation for each variable to the work unit level of analysis, I aggregated variables for which there was sufficient support (i.e.,  $ICC(1) \geq .05$  and  $ICC(2) \geq .40$ ). Next, I conducted correlational analyses to examine bivariate relationships between shared group perceptions of understaffing and group outcomes, both

proximal and distal. I also examined relationships between focal variables and group demographics in order to determine which variables should be included in subsequent model testing as control variables. I used multiple regression analyses to further investigate the potential need for controls as well as to examine potential differential relationships between manpower and expertise understaffing and group outcomes. For all analyses, with the exception of those analyses investigating group performance, the focal sample consisted of 66 groups.

Many of the hypotheses focused on mediational pathways. Since nearly all primary variables demonstrated sufficient support to be aggregated to the group level of analysis (with the exception of role ambiguity), I utilized structural equation modeling (SEM) to examine these proposed links as they existed within the larger framework modeled in Figure 1. Sixty-six groups (57 groups when using supervisor-rated group performance as a dependent variable) is a small sample for SEM. However, my interest in examining the model holistically and to examine multiple mediators simultaneously, rather than piecemeal, necessitated this approach. Given the relatively small group sample size available for these analyses, I adopted the more liberal criteria of  $p < .10$  to determine statistical significance. Lastly, for the two constructs that were measured with an individual referent (i.e., role ambiguity and emotional exhaustion), I used multilevel modeling to investigate the relationship between understaffing and these outcomes and disambiguated between within and between group sources of variance.

## RESULTS

### Understaffing as a Group Phenomenon

Prior to hypothesis testing, I examined whether understaffing exhibited a multidimensional structure at the group level of analysis as it had at the individual level of analysis in Hudson and Shen (2013). To do so, I first conducted confirmatory factor analyses (CFA) comparing a two-factor model that distinguished between manpower and expertise shortages to a one-factor model that combined the two dimensions. Results showed that the two-factor model demonstrated significantly better fit to the data than the one-factor model. This was true for both the aggregated group and supervisor data (see Table 1). Further supporting their distinctiveness, the two dimensions also demonstrated relatively low correlations in both the aggregated group ( $r = .08, p = .55$ ) and supervisor data ( $r = .30, p < .05$ ), although manpower and expertise were significantly and positively correlated in the supervisor data (see Table 2). Examinations of *ICCs* also revealed that perceptions of both manpower and expertise understaffing demonstrated nesting or clustering within groups, with group membership more strongly predicting perceptions of manpower understaffing [ $ICC(1) = .29$ ] than expertise understaffing [ $ICC(1) = .16$ ]. These results support the proposition that understaffing is indeed a group phenomenon possessing a multidimensional structure.

Table 1.

*Confirmatory factor analyses comparing single-factor versus two-factor structures of understaffing using aggregated group data and supervisor data.*

	$X^2$	(df)	$p$	SRMSR	RMSEA	CFI
Group Data ( $N = 66$ )						
1 - Factor Model	84.42	9	< .0001	0.21	0.36	0.54
2 - Factor Model	40.74	19	< .01	0.08	0.13	0.93
Supervisor Data ( $N = 57$ )						
1 - Factor Model	78.80	9	< .0001	0.22	0.37	0.71
2 - Factor Model	44.85	24	< .01	0.09	0.12	0.96

Table 2.

*Intercorrelations among group and supervisor understaffing perceptions.*

	$M$	$SD$	1	2	3	4	5	6
Group								
1 Manpower	2.92	0.70	0.87					
2 Expertise	2.44	0.62	0.08	0.77				
3 Overall	2.63	0.45	<b>0.76</b>	0.14	-			
Supervisor								
4 Manpower	3.07	1.22	<b>0.39</b>	0.18	<b>0.40</b>	0.94		
5 Expertise	2.64	1.07	0.12	0.16	0.13	<i>0.30</i>	0.85	
6 Overall	2.51	0.66	<b>0.44</b>	0.15	<b>0.51</b>	<b>0.83</b>	<i>0.27</i>	-

*Note.* Bold =  $p < .01$ ; Italics =  $p < .05$ . No additional  $r$  were significant at  $p < .10$ .  $N = 57$  to 66.

For easier interpretation, means and standard deviations have been divided by the number of items in the scale.

Comparing aggregated group perceptions to supervisor ratings, correlations also showed that work unit understaffing ratings demonstrated some convergence across sources, particularly for perceptions of manpower shortages (see Table 2). For manpower understaffing, group and supervisor ratings were significantly correlated ( $r = .39, p < .01$ ). For expertise understaffing, group and supervisor ratings demonstrated lower convergence ( $r = .16, p = .23$ ). Results of paired sample  $t$ -tests also showed that average ratings of manpower [ $t(56) = -1.00, p = .32$ ] and expertise understaffing [ $t(56) = -1.32, p = .19$ ] did not differ significantly between groups and their supervisors, though supervisors, compared to their groups, had a tendency to report slightly higher levels of understaffing. Responses to the single item inquiring about overall staffing perceptions found supervisors to rate their groups as significantly more deficient on personnel



resources (i.e., more understaffed) than their group members [ $t(56) = -1.77, p < .10$ ]. Lastly, similar to prior findings at the individual level of analysis (Hudson & Shen, 2013), results showed that manpower understaffing, compared to expertise understaffing, was more strongly related to perceptions of overall staffing levels ( $r = .76, p = .00$  for aggregated group data,  $r = .83, p = .00$  for supervisor data). This suggests manpower shortages were considered more strongly than expertise inadequacies in forming overall staffing perceptions.

### Relationships with Distal Outcomes

Table 3 presents the means, standard deviations, inter-correlations, and reliability estimates for study variables. In partial support of *Hypothesis 1*, shared group perceptions of manpower understaffing were significantly related to group emotional exhaustion ( $r = .25, p < .05$ ), though shared group perceptions of expertise understaffing were not ( $r = .15, p = .23$ ). With regard to sickness-related absences, *Hypothesis 2* was generally not supported. Group manpower understaffing was not significantly related to group sickness-related absences ( $r = -.09, p = .49$ ), and contrary to expectations, group expertise understaffing was significantly, but negatively related to number of sickness-related absences reported in the group ( $r = -.23, p < .10$ ). This suggests that greater expertise understaffing within a work unit is actually related to a lower likelihood of group members being absent. I also found that group manpower and expertise understaffing were not related to supervisor-rated group performance ( $r = -.20, p = .14$  and  $r = -.05, p = .69$ , respectively), failing to support *Hypothesis 3*. Lastly, correlational results found neither group manpower ( $r = .16, p = .21$ ) nor group expertise understaffing ( $r = -.19, p = .13$ ) was significantly correlated with group cohesion (*Research Question 1*).

Table 3.

*Intercorrelations among primary group-level variables and controls.*

		<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10
1	Finance/Insurance Industry	0.44	0.50	-									
2	Retail/Service/Other Industry	0.14	0.35	<b>-0.35</b>	-								
3	Percent Male	27.49	27.70	-0.18	0.16	-							
4	Average Age	36.60	9.44	<i>0.31</i>	<i>-0.04</i>	-0.08	-						
5	Percent White	66.17	31.47	0.12	<i>0.30</i>	0.11	<b>0.37</b>	-					
6	Average Tenure	5.18	4.89	0.09	-0.03	-0.07	<b>0.65</b>	0.16	-				
7	Average Work Hours	38.21	8.05	0.19	0.09	0.11	<i>0.30</i>	0.10	0.13	-			
8	Current Group Size	9.30	16.79	-0.17	-0.07	-0.09	0.25	0.16	0.17	0.15	-		
9	Unit Centrality	3.12	1.73	-0.08	-0.04	-0.13	-0.09	0.21	-0.20	-0.19	-0.07	-	
10	Manpower (Group)	2.92	0.70	0.06	0.06	-0.03	0.12	0.17	-0.12	<i>0.29</i>	0.25	-0.06	0.87
11	Expertise (Group)	2.44	0.62	-0.08	0.04	0.07	<i>-0.27</i>	-0.21	-0.20	-0.04	-0.11	0.00	0.08
12	Overall Understaffing (Group)	2.37	0.45	0.01	-0.01	0.07	0.08	0.09	-0.05	<i>0.25</i>	0.12	-0.09	<b>0.76</b>
13	Manpower (Supervisor)	3.07	1.22	0.08	<i>-0.27</i>	0.18	-0.09	0.04	<i>-0.29</i>	-0.08	0.16	0.16	<b>0.39</b>
14	Expertise (Supervisor)	2.64	1.07	0.15	-0.09	0.09	-0.06	-0.04	0.01	0.16	-0.04	-0.18	0.12
15	Overall Understaffing (Supervisor)	2.49	0.66	0.12	-0.20	<i>0.26</i>	0.04	0.05	-0.24	0.00	0.15	0.01	<b>0.44</b>
16	Quantitative Workload	2.94	0.66	0.14	-0.05	0.00	0.16	<i>0.26</i>	-0.12	<b>0.39</b>	0.25	-0.01	<b>0.57</b>
17	Potency	3.00	0.37	-0.11	0.09	-0.09	0.18	0.06	0.16	0.05	0.17	-0.07	0.18
18	Emotional Exhaustion	2.75	0.89	-0.04	0.07	<i>0.27</i>	-0.02	<i>0.30</i>	-0.09	<b>0.35</b>	0.05	0.09	<i>0.25</i>
19	Group Absences	1.87	1.81	<i>-0.25</i>	-0.09	-0.06	-0.01	0.06	0.03	0.05	0.10	0.22	-0.09
20	Cohesion	5.23	1.22	-0.17	0.15	-0.11	-0.11	-0.04	0.05	-0.02	0.06	-0.03	0.16
21	Performance (Group)	3.97	0.47	<i>-0.25</i>	-0.01	-0.09	-0.03	-0.01	0.06	0.00	0.21	0.14	0.04
22	Performance (Supervisor)	3.99	0.58	<i>-0.35</i>	-0.01	0.03	-0.12	-0.16	-0.01	-0.02	0.03	<i>0.32</i>	-0.20

Note. *N* ranges from 54 to 66. Bold =  $p < .01$ , italics =  $p < .05$ .

For easier interpretation, means and standard deviations have been divided by the number of items in the scale.

Table 3 (continued).

*Intercorrelations among primary group-level variables and controls.*

	11	12	13	14	15	16	17	18	19	20	21	22
1 Finance/Insurance Industry												
2 Retail/Service/Other Industry												
3 Percent Male												
4 Average Age												
5 Percent White												
6 Average Tenure												
7 Average Work Hours												
8 Current Group Size												
9 Unit Centrality												
10 Manpower (Group)												
11 Expertise (Group)	0.77											
12 Overall Understaffing (Group)	-0.14	-										
13 Manpower (Supervisor)	0.18	<b>0.40</b>	0.94									
14 Expertise (Supervisor)	0.16	0.13	<i>0.30</i>	0.85								
15 Overall Understaffing (Supervisor)	0.15	<b>0.51</b>	<b>0.83</b>	<i>0.27</i>	-							
16 Quantitative Workload	0.06	<b>0.45</b>	0.19	0.13	0.12	0.89						
17 Potency	<b>-0.36</b>	0.13	-0.05	-0.09	-0.03	0.07	0.86					
18 Emotional Exhaustion	0.15	0.16	0.04	0.16	-0.07	<b>0.51</b>	<b>-0.35</b>	0.94				
19 Group Absences	-0.23	-0.03	0.03	0.03	-0.09	0.04	-0.05	<i>0.28</i>	-			
20 Cohesion	-0.19	0.23	0.05	-0.07	0.09	-0.10	<b>0.68</b>	<b>-0.36</b>	-0.08	0.95		
21 Performance (Group)	-0.15	0.06	-0.07	-0.22	-0.05	-0.05	<b>0.66</b>	-0.22	0.09	<b>0.54</b>	0.91	
22 Performance (Supervisor)	-0.05	-0.10	-0.01	-0.23	-0.09	-0.13	0.19	0.01	<i>0.26</i>	0.13	<b>0.34</b>	<b>0.84</b>

Note. *N* ranges from 54 to 66. Bold =  $p < .01$ , italics =  $p < .05$ .

For easier interpretation, means and standard deviations have been divided by the number of items in the scale.

To further investigate relationships between work unit understaffing and distal group outcomes, I next conducted a series of multiple regressions. Correlations show significant relationships with at least one dependent variable for percent male in group, percent white in group, average hours worked per week in the group, and unit centrality (i.e., supervisor's indication of how central the work unit was to the functioning of the organization as a whole; see Table 3). Therefore, I included these variables as controls in the regression analyses. To investigate the potential differences in outcomes based on industry, I ran a series of one-way analysis of variance (ANOVAs) for each dependent variable, comparing work units from education, financial/insurance, and retail/service industries.<sup>9</sup> Results showed significant differences for group sickness-related absences [ $F(2, 63) = 3.53, p < .05$ ] and supervisor-rated group performance [ $F(2, 63) = 4.35, p < .05$ ]. Follow-up *t*-tests with Bonferroni corrections showed group absences [ $t(50) = 2.50, p < .05$ ] and performance [ $t(48) = 2.87, p < .01$ ] in education groups to be significantly higher than in financial/insurance groups. These results suggest the need to control for industry, particularly in regression analyses examining sickness-related absences and group performance. Thus, the dummy coded variables for industry were also included as control variables in the regression analyses.

Generally, the results of multiple regression analyses examining group manpower and expertise understaffing simultaneously were in line with the correlational results. Neither group manpower nor expertise understaffing was significant in predicting supervisor-rated group performance (manpower  $\beta = -.14, p = .32$ ; expertise  $\beta = -.07, p = .62$ ; *Hypothesis 3*). Group

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<sup>9</sup> The retail/services industry category contained seven groups. There were two groups with uncertain industries. Therefore, these two groups were combined with those from retail/services. Excluding these two groups with uncertain industries, ANOVA results still indicated a significant difference among industries for group sickness-related absences [ $F(2, 61) = 3.30, p < .05$ ] and group performance [ $F(2, 54) = 4.35, p < .05$ ]. There were no significant differences among industries with regard to group levels of emotional exhaustion or cohesion.

manpower understaffing was also unrelated to group sickness-related absences ( $\beta = -.10, p = .41$ ; *Hypothesis 2*) and group cohesion ( $\beta = .21, p = .12$ ; *Research Question 1*). However, group expertise understaffing was related to both group absences ( $\beta = -.21, p < .10$ ; *Hypothesis 2*) and group cohesion ( $\beta = -.24, p < .10$ ; *Research Question 1*). In contrast to the correlational results, when group manpower and expertise understaffing were entered simultaneously in the regression equation, only expertise understaffing significantly predicted group emotional exhaustion (manpower,  $\beta = .11, p = .35$ ; expertise,  $\beta = .20, p < .10$ ). Due to the relatively strong relationship between average hours worked in the group and one of the proposed mediators, group quantitative workload ( $r = .39, p < .01$ ), I ran an additional set of multiple regression analyses not controlling for average group work hours (but still controlling for industry, percent male in group, percent white in group, and unit centrality). In this case, only group manpower understaffing was statistically significant in predicting group emotional exhaustion (manpower,  $\beta = .20, p < .10$ ; expertise,  $\beta = .18, p = .14$ ), suggesting that group work hours may be a consequence of understaffing, perhaps one linked with greater group workload (i.e., group members may be staying late and working longer hours in the face of greater group workload). Therefore, controlling for group work hours was deemed inappropriate in this study as doing so may be removing variance of interest from my dependent variables.

In light of this new information, I reran the multiple regression analyses for the other distal outcomes not controlling for average hours worked in the work unit. Table 4 presents the final results from these multiple regression analyses. When not controlling for average group work hours, group manpower understaffing significantly predicted group emotional exhaustion ( $\beta = .20, p < .10$ ). Group expertise understaffing was still significant in predicting both group

Table 4.

*Multiple regression for predicting distal group-level outcomes from group perceptions of manpower and expertise understaffing*

	<u>Emotional Exhaustion</u>		<u>Group Absences</u>		<u>Cohesion</u>		<u>Performance</u>	
	<i>B</i>	$\beta$	<i>B</i>	$\beta$	<i>B</i>	$\beta$	<i>B</i>	$\beta$
Intercept	5.05		3.65 (1.39)*		18.08 (2.94)**		20.56 (3.16)**	
Controls								
Financial/Insurance	-.99 (2.09)	-0.06	-1.30 (.48)	-0.36**	-1.13 (1.01)	-0.16	-1.66 (.87)	-.29 <sup>†</sup>
Retail/Service/Other	-2.30 (3.10)	-0.10	-1.19 (.71)	-0.23	1.60 (1.51)	0.15	-.94 (1.27)	-0.11
Percent Male	.07 (.04)	.24 <sup>†</sup>	-.01 (.01)	-.07	-.02 (.02)	-0.13	.00 (.01)	-0.03
Percent White	.08 (.04)	.30*	.01 (.01)	0.11	-.02 (.02)	-0.14	-.01 (.01)	-0.09
Unit Centrality	.27 (.57)	0.06	.16 (.13)	0.15	-.03 (.28)	-0.01	.73 (.46)	0.22
$R^2$	0.15		0.16		0.07		0.19	
Manpower	.77 (.45)	0.20 <sup>†</sup>	-.05 (.10)	-0.05	.34 (.22)	0.19	-.16 (.19)	-.11
Expertise	.79 (.52)	0.18	-.21 (.12)	-.22 <sup>†</sup>	-.48 (.25)	-.24 <sup>†</sup>	-.13 (.21)	-.08
$\Delta R^2$	0.08		0.05		0.08		0.02	

Note. \*\* $p < .01$ , \* $p < .05$ , <sup>†</sup> $p < .10$ .

sickness-related absences ( $\beta = -.22, p < .10$ ) and group cohesion ( $\beta = -.24, p < .10$ ); group manpower understaffing was not a significant predictor of group sickness-related absences ( $\beta = -.05, p = .69$ ) or group cohesion ( $\beta = .19, p = .13$ ). Results for supervisor-rated group performance also remained unchanged, as neither type of understaffing were significant predictors (manpower  $\beta = -.11, p = .42$ ; expertise  $\beta = -.08, p = .54$ ).

### Relationships with Proximal Outcomes

With regard to the proposed proximal outcomes of understaffing, correlations showed group quantitative workload was strongly related to group manpower understaffing ( $r = .57, p < .01$ ), but unrelated to group expertise understaffing ( $r = .06, p = .52$ ), partially supporting *Hypothesis 4* (see Table 3). Group potency was not correlated with group manpower understaffing ( $r = .18, p = .15$ ), but was moderately and negatively related to group expertise understaffing ( $r = -.36, p < .01$ ), partially supporting *Hypothesis 12*. Unfortunately, since there was unclear support for aggregating role ambiguity to the group level, I was unable to test *Hypotheses 8 – 11* (i.e., direct and differential relationships between understaffing dimensions and group role ambiguity and the mediating role of group role ambiguity in the relationships between group understaffing and distal group outcomes).

Since understaffing, particularly manpower shortages, and group quantitative workload have often been used interchangeably in prior research, I conducted supplemental CFAs to explore whether shared group perceptions of manpower understaffing and group quantitative workload were better represented as two constructs or a single construct. Although the two group variables are significantly correlated ( $r = .57, p = .00$ ), the two-factor model [ $X^2(19) = 60.59, p < .0001, SRMSR = .08, RMSEA = .18, CFI = .87$ ] fit the data better than the single factor model [ $X^2(20) = 114.97, p < .0001, SRMSR = .12, RMSEA = .27, CFI = .71$ ], with each item loading

strongly on its respective factor (loadings of  $\geq .70$ ).<sup>10</sup> This supported my contention that manpower understaffing and group workload should be viewed as related, but distinct constructs.

As I had done for the distal group outcomes, I also employed multiple regression analyses with manpower and expertise understaffing simultaneously entered in the model to examine their potential differential relationships with proximal group outcomes. Due to the meaningful overlap between average group work hours and manpower understaffing observed in my prior analyses, I did not control for average group work hours when predicting group quantitative workload (but did control for industry, percent male in group, percent white in group, and unit centrality). In support of differential relationships with group quantitative workload (*Hypothesis 7*), manpower understaffing was a significant predictor ( $\beta = .53, p < .01$ ), but group expertise understaffing was not ( $\beta = .07, p = .52$ ; see Table 5). With regard to group potency, both expertise ( $\beta = -.39, p < .01$ ) and manpower understaffing were significant predictors ( $\beta = .21, p < .10$ ).<sup>11</sup> Interestingly, the relationship between group expertise understaffing and group potency was in the anticipated negative direction (i.e., greater expertise understaffing was related to lower group potency), but the relationship between group manpower understaffing and group potency was in the opposite direction than anticipated (i.e., greater manpower understaffing was associated with greater group potency).

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<sup>10</sup> Compared to a one-factor model [ $X^2(44) = 226.66, p < .0001, SRSMR = .16, RMSEA = .25, CFI = .57$ ], a three-factor model [ $X^2(39) = 111.35, p < .0001, SRSMR = .10, RMSEA = .17, CFI = .83$ ] separating group-level manpower understaffing, expertise understaffing, and quantitative workload also demonstrated significantly better fit to the data with each item loading strongly on its respective factor (loadings of  $\geq .77$ ).

<sup>11</sup> Choosing not to control for the average hours worked per week in the group altered only one set of results for the multiple regression analyses. Specifically, when controlling for work hours, only expertise understaffing was significant in predicting emotional exhaustion; when not controlling for work hours, only manpower understaffing was significant in predicting emotional exhaustion. Not controlling for work hours when predicting quantitative workload, potency, sickness-related absences, cohesion, and performance did not significantly change the results of those multiple regression analyses.



Table 5.

*Multiple regression for predicting proximal group-level outcomes from group perceptions of manpower and expertise understaffing*

	<u>Quantitative Workload</u>		<u>Potency</u>	
	<i>B</i>	$\beta$	<i>B</i>	$\beta$
Intercept	5.14 (2.27)*		13.59 (1.14)**	
Controls				
Financial/Insurance	.25 (.78)	0.04	-.44 (.40)	-0.15
Retail/Service/Other	-1.29 (1.16)	-0.14	.28 (.59)	0.06
Percent Male	.00 (.01)	0.01	-.01 (.01)	-0.09
Percent White	.02 (.01)	0.22	.00 (.01)	-0.04
Unit Centrality	-.04 (.21)	-.02	-.06 (.11)	-0.06
	$R^2$	0.09	0.04	
Manpower	.83 (.17)	.53**	.15 (.09)	.21 <sup>†</sup>
Expertise	.13 (.19)	0.07	-.31 (.10)	-.39**
	$\Delta R^2$	0.28	0.17	

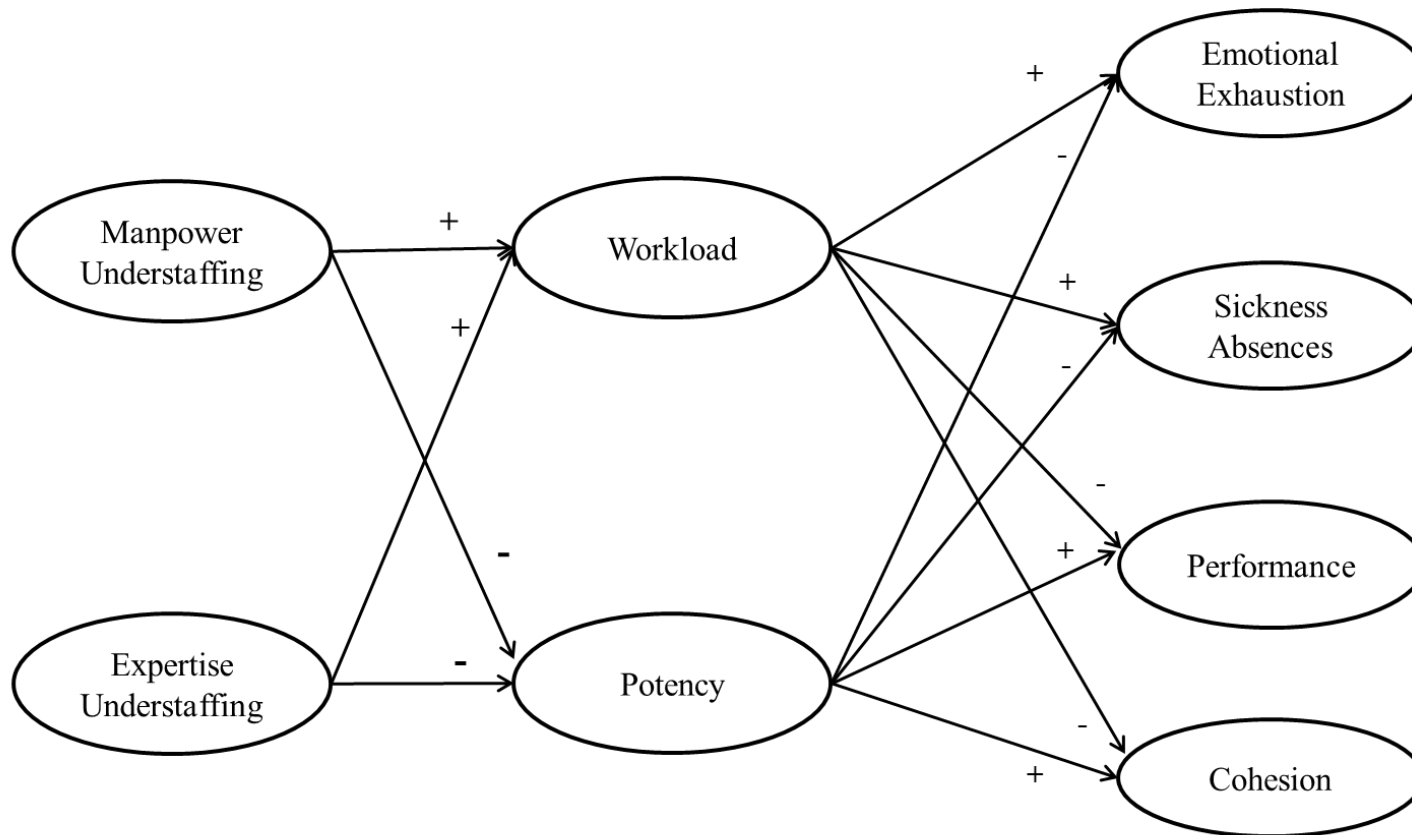
*Note.* \*\* $p < .01$ , \* $p < .05$ , <sup>†</sup>  $p < .10$ .

### Model Testing

In addition to examining direct relationships between understaffing dimensions and group outcomes (both proximal and distal), I was also interested in investigating the proposed mediational model as a whole. To do so, I used SEM. The original model (Figure 1) proposed that group manpower and expertise understaffing would both be related to group emotional exhaustion, sickness-related absences, and performance through group quantitative workload, potency, and role ambiguity. The relationships between proposed mediators and outcomes were expected to be moderated by teamwork effectiveness. Due to low support for aggregation, I removed the proposed mediating effect of group role ambiguity and the moderating effect of teamwork effectiveness. Given the significant relationship between group expertise understaffing and group cohesion, I added group cohesion to the model as a fourth distal group outcome. Group quantitative workload and group potency were retained as the primary mediators. Although correlations and multiple regression analyses found no direct relationship between

understaffing and supervisor-rated job performance, prior research has shown that observing a direct relationship is not necessary to establish a mediational path (Fritz & MacKinnon, 2007; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Thus, I decided to retain group performance as a dependent variable in the initial model. The revised model (Figure 2) depicts group manpower and expertise understaffing as independent variables, group quantitative workload and potency as mediators, and group emotional exhaustion, sickness-related absences, supervisor-rated performance, and cohesion as distal group outcomes. Based on results from the prior multiple regression analyses, I controlled for percent male and percent white in work unit in predicting group emotional exhaustion, and work unit industry for group performance and sickness-related absences.

Prior to testing this revised model, I parceled the nine items from the emotional exhaustion scale. An exploratory factor analysis indicated that all items loaded strongly onto one factor (i.e., the scale exhibited uni-dimensionality). Therefore, items were parceled arbitrarily, a common practice in SEM (Bandalos & Finney, 2001), into three parcels of three items each. Next, I reviewed results for univariate normality to ensure all indicators were within the acceptable limits (skewness < 1.00; kurtosis < 4.00). Only the values for group sickness-related absences were out of range with a significant positive skew. This skewness did not appear to be due to any outliers, but rather due to lack of variability, since the majority of groups reported a total of two or less sickness-related absences in the past month. Given that the rest of the indicators exhibited univariate normality, I retained group absences at this point and proceeded with model testing.



*Figure 2.* Revised group-level model demonstrating the mediating effects of group workload and potency in the relationships between manpower and expertise understaffing and group well-being, performance and attitudes.

At least in part due to the fairly small number of groups<sup>12</sup> and relative complexity of the model, Model 1 demonstrated a relatively poor fit to the data [ $X^2(406) = 647.40, p < .0001$ ;  $SRMSR = .11, RMSEA = .10, CFI = .79$ ; see Figure 3]. However, the values for other fit statistics (i.e.,  $SRMSR$  and  $RMSEA$ ) supported the plausibility of some paths contained in the model. Furthermore, investigation of parameter estimates showed results consistent with group workload mediating the relationship between group manpower understaffing and group emotional exhaustion (indirect effect = .36, 95% CI: [.207, .526], *Hypothesis 5*). None of the other indirect effects for the relationship between group manpower understaffing and distal outcomes via quantitative workload were significant (i.e., all 95% confidence intervals for indirect effects contained 0). These results failed to support the potential mediating effect of group workload in the relationships between group manpower understaffing and group sickness-related absences (*Hypothesis 5*), performance (*Hypothesis 6*), and cohesion (*Research Question 1*).

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<sup>12</sup> Since supervisor ratings of job performance were included in this model, the final  $N$  for model testing was 57.

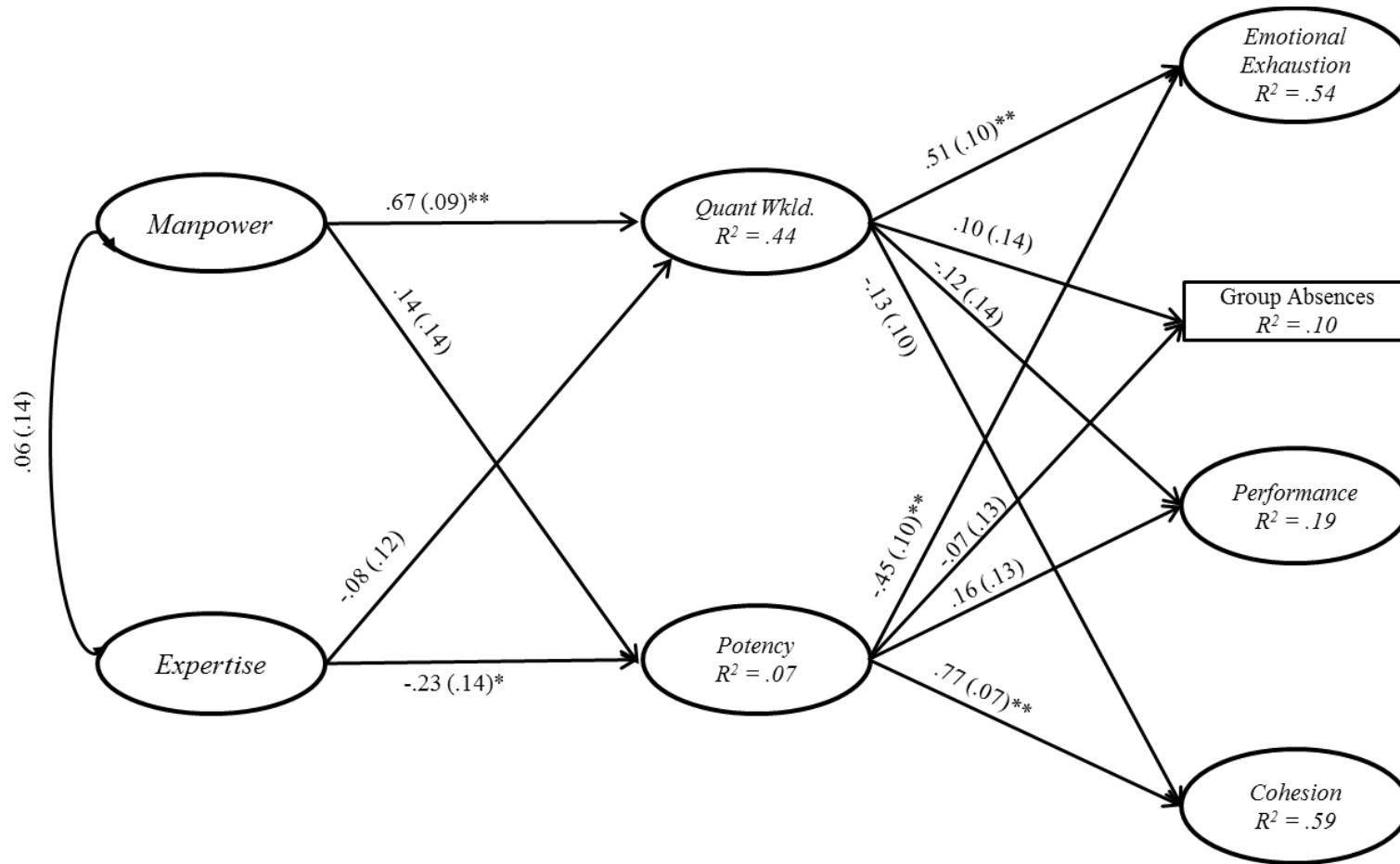


Figure 3. Model 1 - Standardized solution depicting the mediating effects of group workload and potency in the relationships between manpower and expertise understaffing work unit well-being, performance and attitudes.  $\chi^2 (406) = 647.40, p < .0001$ ;  $SRMSR = .11$ ,  $RMSEA = .10$ ,  $CFI = .79$ .

Additionally, group quantitative workload did not appear to mediate any relationships between expertise understaffing and distal group outcomes. Rather, for expertise understaffing, results demonstrated results consistent with group potency as the primary mediating mechanism; specifically, for group emotional exhaustion (indirect effect = .18, 95% CI [.063, .329], *Hypothesis 5*) and cohesion (indirect effect = -.31, 95% CI [-.505, -.124], *Research Question 1*). However, group potency was not a significant mediator in the relationships between group expertise understaffing and group sickness-related absences or performance. It also did not mediate any of the relationships between group manpower understaffing and the four distal outcomes (i.e., all 95% confidence intervals of these indirect effects contained 0). Ultimately, these paths in Model 1, as well as the three control variables, accounted for 54% of the variance in group emotional exhaustion and 59% of the variance in group cohesion. As there were no significant relationships between posited mediators and sickness-related absences and group performance, it appeared that the control variable of industry was primarily responsible for the 10% of the variance in group absences and the 19% of the variance in group performance explained by the model.

Since model fit indices indicated that Model 1 was a poorer fit to the data than desired, I examined two modification indices – the Wald test statistic and the LaGrange Multiplier. The former advocated for the removal of a handful of paths. With regard to the understaffing → proposed mediator relationships, the Wald test statistics suggested removing the links from manpower understaffing to group potency and expertise understaffing to group quantitative workload. With regard to proposed mediator → proposed distal outcome relationships, it was suggested to remove the four paths from group quantitative workload and potency to group absences and performance. Lastly, the Wald test statistic advocated for removing the covariance

between group expertise and manpower understaffing. The LaGrange Multiplier did not suggest the addition of any new paths of any theoretical value. Based on the modifications suggested by the Wald test, I examined a revised model. Model 2 depicted a simplified model removing the eight paths suggested by the Wald test statistic, four of which completely removed the distal outcomes of group sickness-related absences and performance (see Figure 4). The decision to remove the group performance variable from the model also had the added benefit of allowing me to rely on the larger sample of 66 groups (as only a subset of 57 groups had supervisor ratings of performance).

These revisions in Model 2 did not significantly alter the parameter estimates for the retained paths, but Model 2 did demonstrate a better fit to the data [ $X^2(219) = 347.34, p < .0001$ ;  $SRMSR = .11, RMSEA = .10, CFI = .88$ ].<sup>13</sup> Given that it was the more parsimonious model and significantly improved the chi-square and *CFI* statistics, Model 2 was retained as better fitting the current data. Therefore, model testing found results consistent with group quantitative workload as the primary mediator in the relationship between group manpower understaffing and group emotional exhaustion (indirect effect = .35, 95% CI [.209, .500]); results were also consistent with group potency as the primary mediator in the relationships between group expertise understaffing and both group emotional exhaustion (indirect effect = .15, 95% CI [.045, .278]) and cohesion (indirect effect = -.27, 95% CI [-.463, -.094]).

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<sup>13</sup> I also ran a version of Model 2 with only the data from the original 57 groups used for estimating Model 1. The fit statistics for Model 2 regardless of *N* significantly improved compared to those for Model 1. Furthermore, they were not significantly different for the version estimated with the data from 66 groups versus the data from 57 groups.

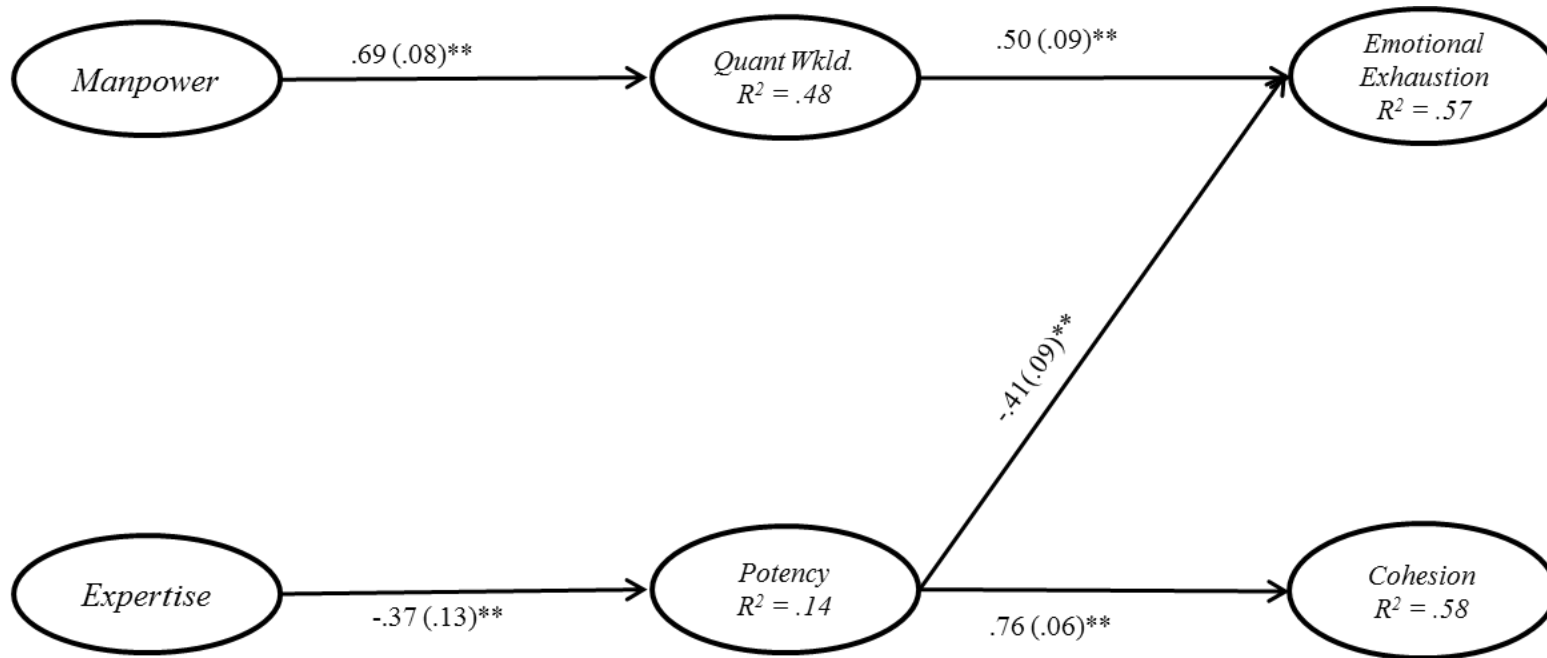


Figure 4. Model 2 - Standardized solution depicting the mediating effects of group workload and potency in the relationship between manpower and expertise understaffing work unit well-being and attitudes.

$\chi^2 (219) = 347.34, p < .0001; SRMSR = .11, RMSEA = .10, CFI = .88.$

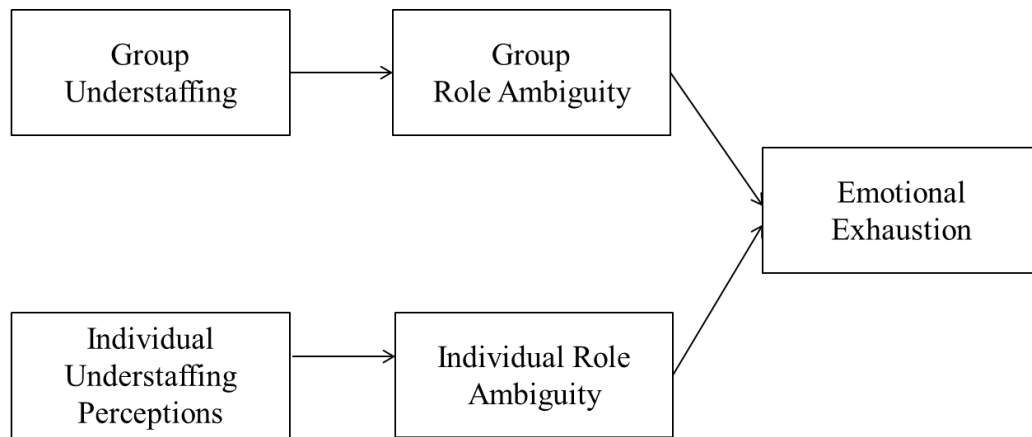


### Exploratory Multilevel Modeling

Although there is some prior research supporting the existence of role ambiguity at the group level (e.g., Clausen & Borg, 2011; Hauge et al., 2011; Rafferty & Jimmieson, 2010), aggregation of this variable was not strongly supported by the *ICCs* in the current sample. Particularly, the group means demonstrated a lower than desired reliability [ $ICC(2) = .37$ ]. Therefore, I removed group role ambiguity as a mediator from the group-level SEM models, focusing only on group quantitative workload and potency as likely mediators. However, given that role ambiguity and emotional exhaustion were both measured using individual referents (i.e., referring to a worker's personal experiences) and that both variables did show nesting effects due to group membership [i.e.,  $ICC(1) \geq .05$ ], I employed hierarchical linear modeling (HLM) to simultaneously model individual and group-level pathways. In other words, I disambiguated effects of within-group variations in understaffing on within-group variations in emotional exhaustion from between-group variations in understaffing on between-group variations in group emotional exhaustion. This also allowed me to examine whether an individual's experience of role ambiguity mediated the relationship between an individual's perception of work unit understaffing and their personal level of emotional exhaustion, as suggested by prior research (Hudson & Shen, 2013), while taking into account the fact that my data was nested (i.e., work group members are nested within work groups). At the same time, I was able to examine the potential mediating effect of group role ambiguity in the relationship between shared group perceptions of understaffing and shared group perceptions of emotional exhaustion (see Figure 5). Although some aggregation statistics suggested that the reliability of group means may be somewhat lower than desired for group role ambiguity [i.e.,  $ICC(2) = .37$ ], low reliability of

group means should attenuate my ability to detect significant group-level effects in HLM. Thus, I examined this mediating effect on an exploratory basis.

To investigate these mediational pathways, I broke the analyses down into three steps (i.e., Predictor → Proposed Mediator, Proposed Mediator → Proposed Distal Outcome, Predictor and Proposed Mediator → Proposed Distal Outcome). The sequence below was conducted twice, once for manpower and once for expertise understaffing.



*Figure 5.* Conceptual model linking understaffing, role ambiguity, and emotional exhaustion at the group and individual (within-group) levels of analysis.

### *Step 1 – Understaffing → Role Ambiguity*

First, I examined the level-1 (i.e., within-group or individual-level) relationship between an employee’s perceptions of unit understaffing and his or her personal role ambiguity while simultaneously examining the level-2 (i.e., between-group or group-level) relationship between group understaffing and group role ambiguity. The level-1 predictor was group mean centered (i.e., the group mean for each group was subtracted from the corresponding group members’ raw understaffing scores). This method of centering served to remove the effects of group membership or nesting from the individual-level variable. The level-2 understaffing variable,

shared group perceptions of understaffing, was the same as the aggregated group understaffing variable that was used in the previous SEM analyses.

Results showed significant relationships between manpower understaffing and role ambiguity at both the individual ( $\beta = .48, p < .01$ ) and group level of analysis ( $\beta = .48, p < .05$ ). In a separate analysis, expertise understaffing significantly predicted role ambiguity at the individual level ( $\beta = .67, p < .01$ ), but not at the group level of analysis ( $\beta = .39, p = .16$ ). In other words, shared group perceptions of manpower understaffing were positively related to shared perceptions of role ambiguity, but shared group perceptions of expertise understaffing were not related to shared group perceptions of role ambiguity (partial support for *Hypothesis 8*). At level-1, employees with more severe perceptions of either manpower or expertise understaffing relative to their group members reported greater role ambiguity relative to their group members.

Importantly, the significant group-level relationship between manpower understaffing and group role ambiguity provided additional support for aggregating role ambiguity to the work unit level of analysis. *ICC(1)* for role ambiguity had suggested sufficient within-group agreement for aggregation, but it was due to a lower than desired *ICC(2)* (i.e., reliability of the group means) that aggregation of role ambiguity had been called into question. However, in my multilevel analysis I did find a significant group-level relationship between manpower understaffing and role ambiguity, suggesting that the group means of role ambiguity were sufficiently reliable and could be related to other variables. Otherwise, unreliability in group role ambiguity should have reduced my ability to detect this relationship.

### *Step 2 – Role Ambiguity → Emotional Exhaustion*

Next, I examined a similar model investigating the level-1 and level-2 relationships between role ambiguity and emotional exhaustion. Since percent male in group and the percent white in group had been significant in predicting group emotional exhaustion in my multiple regression and SEM analyses, I included both as controls at level-2 and included gender and ethnicity<sup>14</sup> as controls at level-1. Results showed a significant relationship between individual role ambiguity and individual emotional exhaustion ( $\beta = .61, p < .01$ ) as well as group role ambiguity and group emotional exhaustion ( $\beta = .94, p < .01$ ). In other words, those workers reporting higher role ambiguity than their group members also reported greater levels of emotional exhaustion than their group members, and groups with greater shared perceptions of role ambiguity also reported greater shared perceptions of emotional exhaustion. Gender and ethnicity (at both levels) were not significantly related to emotional exhaustion in this model. Therefore, no controls were used in the final HLM models.<sup>15</sup>

### *Step 3 – Role Ambiguity and Understaffing → Emotional Exhaustion*

The last two models were used to investigate the possible mediating effect of role ambiguity in the relationship between understaffing and emotional exhaustion. Results for manpower understaffing are presented in Figure 6, and results for expertise understaffing are presented in Figure 7. At level-2, I examined whether results were consistent with group role ambiguity mediating the relationship between group understaffing and group emotional exhaustion. At level-1, I examined whether results were consistent with workers who perceived greater understaffing than their group members also experienced greater emotional exhaustion

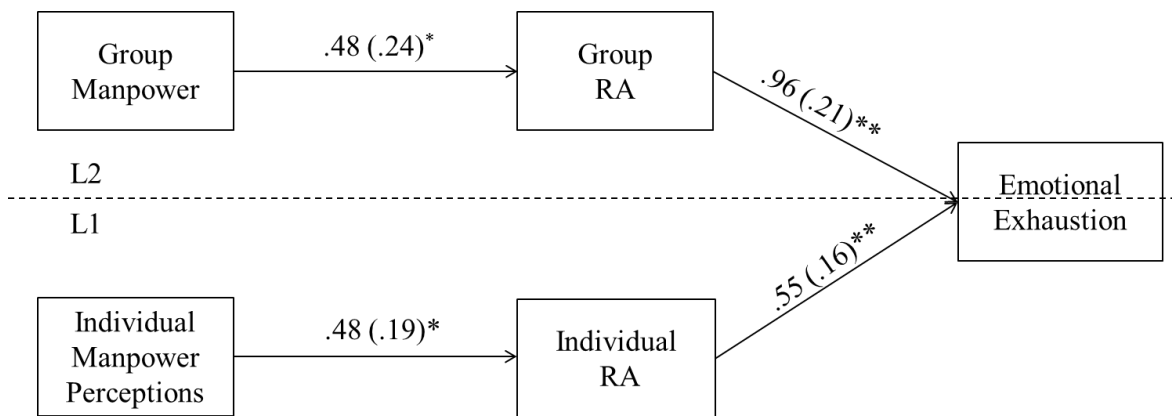
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<sup>14</sup> To more closely reflect the percent white control variable at the group level, individual-level ethnicity was dummy coded as 1 = white (i.e., the majority) and 0 = all other ethnicities.

<sup>15</sup> Note that the difference between the present HLM and prior multiple regression analysis results regarding % male and % White in group likely stems from differences in the inclusion of other group-level control variables.

than their group members because they experienced greater role ambiguity than their group members.

For both manpower and expertise understaffing, respectively, the level-1 or within-group results were significant and consistent with mediating effects (manpower indirect effect = .26, 95% CI [.046, .562]; expertise indirect effect = .39, 95% CI [.126, .735]). At the group level, the indirect effect of group understaffing on group emotional exhaustion via role ambiguity was significant for manpower understaffing (indirect effect = .46, 95% CI [.009, 1.015]), but not for expertise understaffing (indirect effect = .39, 95% CI [-.154, 1.013]). Thus, in line with Hudson and Shen's (2013) work, I found results consistent with mediation, such that workers who perceived higher levels of work unit understaffing than their group members experienced greater role ambiguity than their group members, which likely resulted in higher levels of emotional exhaustion for them compared to their group members. As a whole, those groups experiencing greater manpower understaffing also reported greater role ambiguity and emotional exhaustion as a group (partial support for *Hypothesis 9*).



*Figure 6.* Relationships among manpower understaffing, role ambiguity, and emotional exhaustion at the group and individual (within-group) levels of analysis.  
 Group-level indirect effect = .46, 95% CI [.009, 1.015]  
 Individual-level indirect effect = .26, 95% CI [.046, .562]

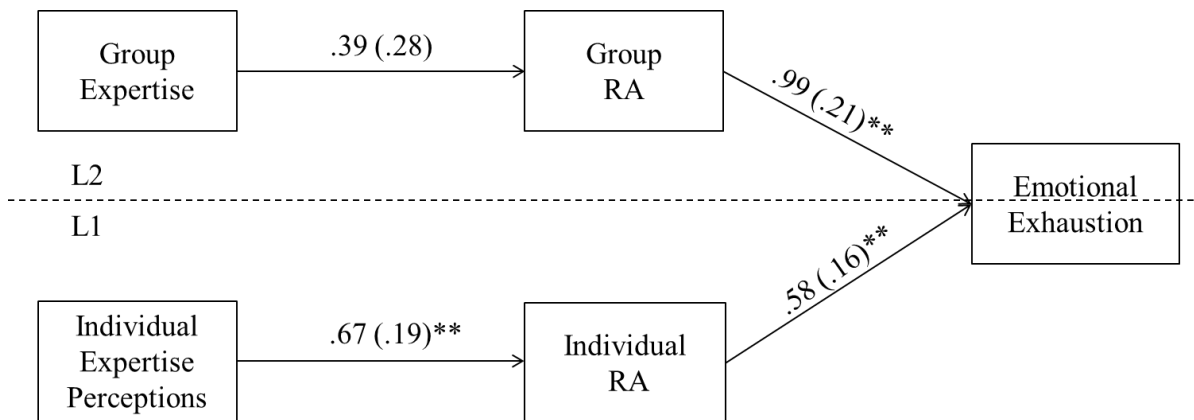


Figure 7. Relationships among expertise understaffing, role ambiguity, and emotional exhaustion at the group and individual (within-group) levels of analysis.

Group-level indirect effect = .39, 95% CI [-.154, 1.013]

Individual-level indirect effect = .39, 95% CI [.126, .735]

### Revisiting the Group-Level SEM Model

Although initially  $ICC(2)$  for role ambiguity [ $ICC(2) = .37$ ] did not strongly support aggregation to the group level, the results of my HLM analyses, which disambiguated between and within-group sources of variance, found that group role ambiguity was related to both group manpower understaffing and group emotional exhaustion. This suggested that group means for role ambiguity were sufficiently reliable to be used at the group level of analysis. Thus, I chose to revisit the revised SEM model and incorporate group role ambiguity as a potential mediator in the relationship between manpower understaffing and distal outcomes. My goal was to determine (1) whether group quantitative workload and group role ambiguity independently explained the relationship between manpower understaffing and emotional exhaustion, and (2) whether the inclusion of group role ambiguity impacted the relationships between other variables in the model and/or improved the fit of the model to my data (Figure 8).

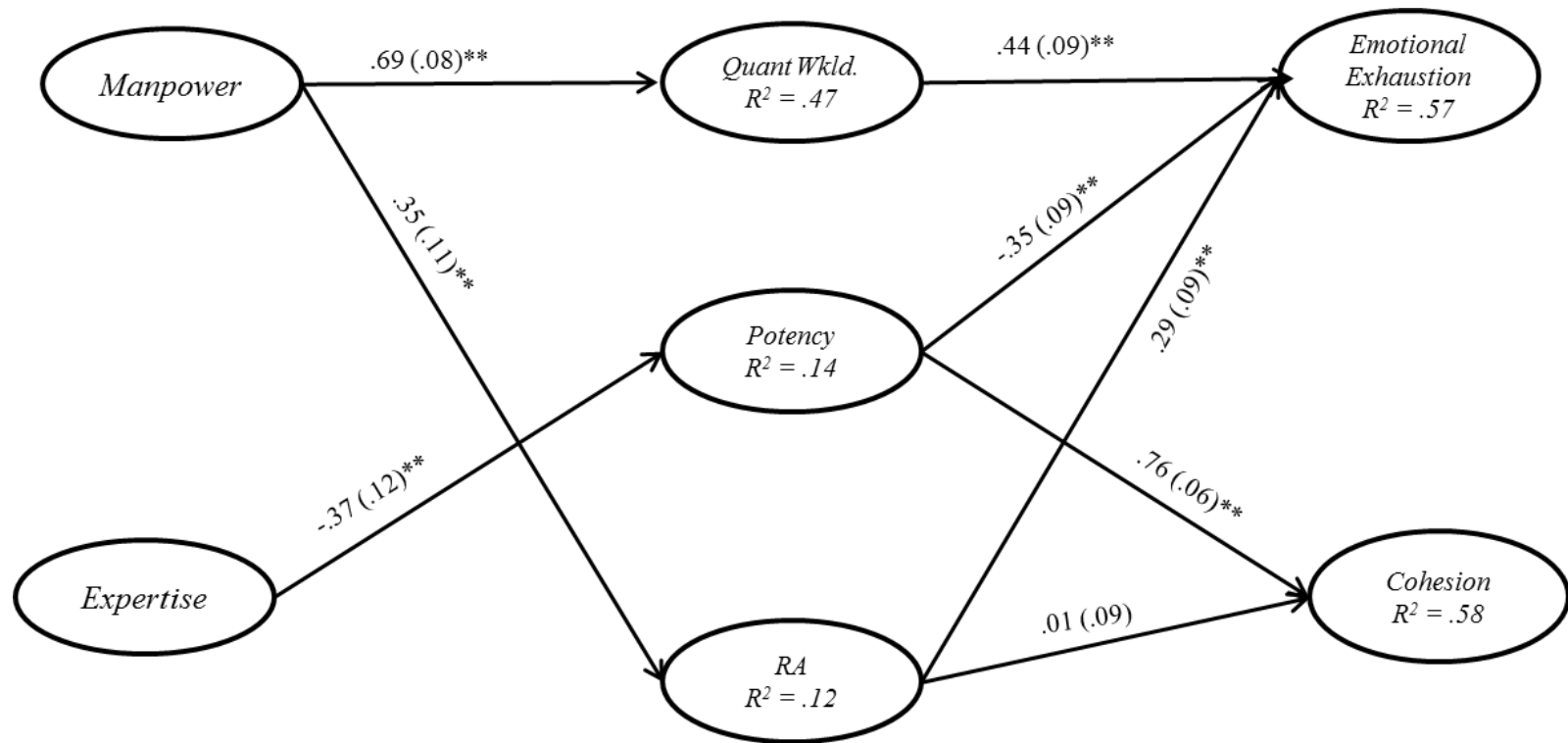


Figure 8. Model 3 - Standardized solution depicting the mediating effects of group workload, potency, and role ambiguity in the relationship between manpower and expertise understaffing and work unit emotional exhaustion and cohesion.  $X^2(363) = 576.60$ ,  $p < .0001$ ;  $SRMSR = .13$ ,  $RMSEA = .10$ ,  $CFI = .85$ .

The addition of group role ambiguity significantly decreased the fit of the model to the data [ $X^2(219) = 347.34$  in Model 2 vs.  $X^2(363) = 576.60$  in Model 3]. This was presumed to be largely due to the added complexity of the model, since the other fit indices remained relatively unchanged. Adding group role ambiguity to the model generally did not increase the variance accounted for in the distal group outcomes. However, the indirect effect of group manpower understaffing on group emotional exhaustion through group role ambiguity was significant in this model (indirect effect = .20, 95% CI [.076, .338]), suggesting that results are influenced by whether one takes into account the inter-relationship between proposed group mediators. Examination of the Wald test statistic did not suggest improvements in fit if I removed role ambiguity as a mediator entirely. However, it did advocate for the removal of the non-significant path between group role ambiguity and group cohesion (see Model 4 depicted in Figure 9).

Fit statistics for Model 4 were almost identical to Model 3 [ $X^2(364) = 576.61$ ,  $p < .0001$ ;  $SRMSR = .13$ ,  $RMSEA = .09$ ,  $CFI = .85$ ], as were parameter estimates for the remaining paths and variance accounted for in group emotional exhaustion and cohesion. Given that this was the more parsimonious model, I determined Model 4 to best fit the current data. This final model suggests that group manpower understaffing is related to group emotional exhaustion likely via group quantitative workload (indirect effect = .30, 95% CI: [.17, .45]) and role ambiguity (indirect effect = .10, 95% CI: [.03, .20]), while group expertise understaffing is related to both group emotional exhaustion and group cohesion likely via group potency (see Table 6 for complete indirect effects for Model 4).<sup>16</sup>

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<sup>16</sup> Not controlling for percent male and percent white in the group when predicting group emotional exhaustion did not significantly alter the fit of the final model to the current data [ $X^2(316) = 508.85$ ,  $SRMSR = .13$ ,  $RMSEA = .10$ ,  $CFI = .87$ ]. All parameter estimates and indirect effects remained significant, in the same direction, and of similar magnitudes. However, the variance accounted for in group emotional exhaustion decreased slightly in the model without the two control variables, from 58% to 52%.



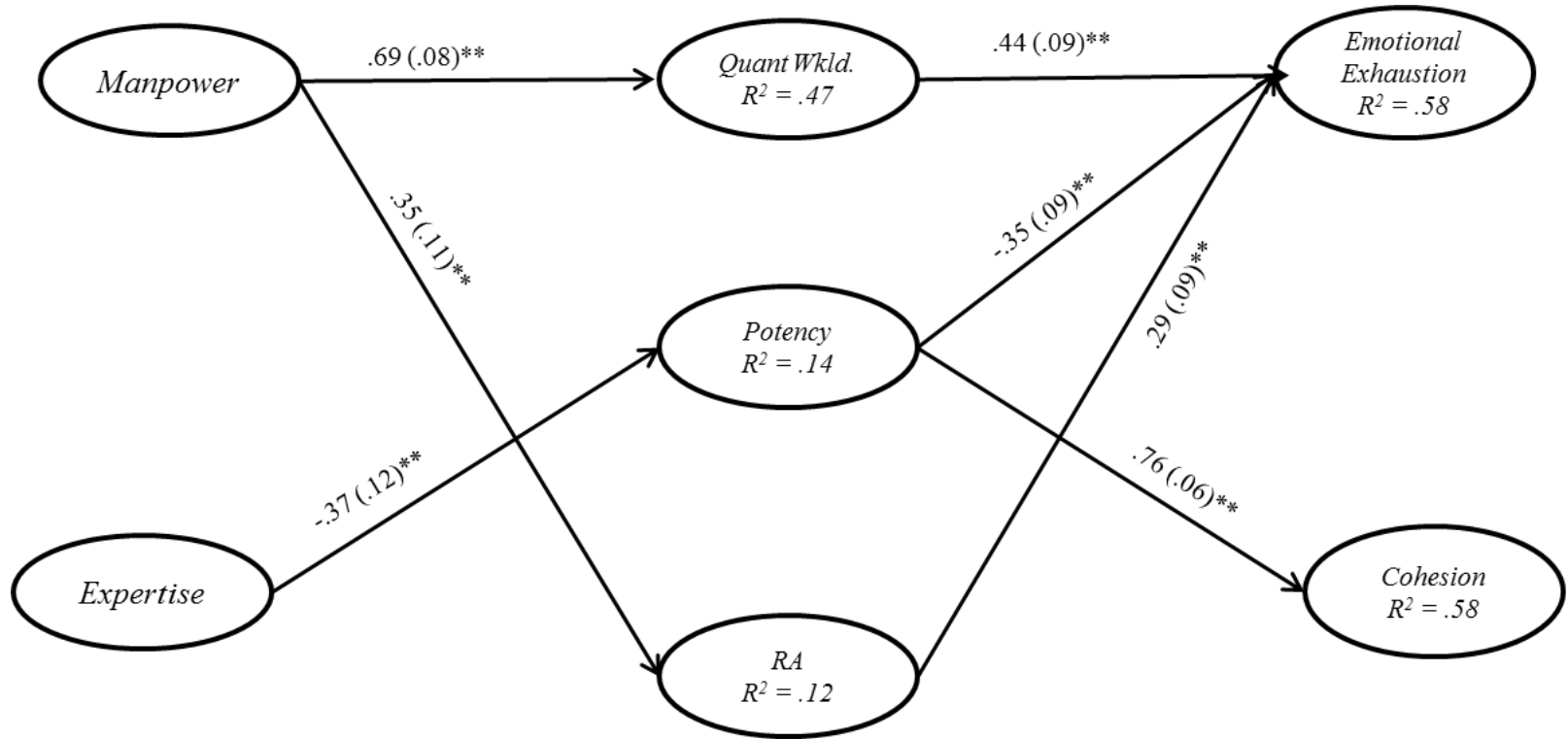


Figure 9. Model 4 – Final standardized solutions depicting the mediating effects of group workload, potency, and role ambiguity in the relationships between manpower and expertise understaffing and emotional exhaustion and cohesion.  $X^2 (364) = 576.61$ ,  $p < .0001$ ,  $SRMSR = .13$ ,  $RMSEA = .09$ ,  $CFI = .85$ .

Table 6.

*Test of Indirect Effects for Model 4.*

Variable	Indirect effects	95% confidence interval	
		Lower bound	Upper bound
Manpower Understaffing → Quant. Workload → Emotional Exhaustion	0.304	0.172	0.453
Manpower Understaffing → Role Ambiguity → Emotional Exhaustion	0.102	0.026	0.204
Expertise Understaffing → Potency → Emotional Exhaustion	0.126	0.035	0.246
Expertise Understaffing → Potency → Cohesion	-0.274	-0.463	-0.094

## DISCUSSION

Although many workers possess an intuitive understanding of understaffing, little research has systematically examined the consequences of understaffing or has comprehensively assessed both manpower and expertise dimensions. The primary goal of the current study was to extend Hudson and Shen's (2013) prior work on a multidimensional approach to understaffing to the group level of analysis. This investigation contributes to our understanding of the phenomenon by examining whether perceptions of work unit understaffing, both manpower and expertise, are shared by members of a work unit and whether and why these shared perceptions are then related to important group outcomes. Generally, the results of this study supported both contentions.

### Summary of Results

First and foremost, the current investigation supports the proposition that understaffing is a shared, group-level experience; perceptions of work unit manpower and expertise understaffing are not solely unique to the individual, but, rather, converge across members of the same work group. Specifically, my data showed that belonging to a particular work unit accounted for 29% of the variance in manpower understaffing ratings and 16% of the variance in expertise understaffing ratings. Furthermore, group ratings (i.e., averaged across group members) of understaffing demonstrated some agreement with supervisor ratings. However, this relationship was stronger for manpower than for expertise understaffing. Potentially, the weaker relationship found between supervisors and their work units regarding expertise understaffing may be due to

the fact that supervisors considered KSAOs needed for *future* group projects or functions in addition to currently required KSAOs. This observation was spurred by a comment from a participating supervisor, who noted that although her employees may think the team possesses the right KSAOs to complete the work she is currently asking of them, they are largely unaware of the multitude of projects the team *could* and should take on for the organization if it was staffed with employees possessing additional or different skillsets. This might also help to explain why supervisor ratings of overall staffing levels in the work unit were more severe (i.e., perceived the group as more understaffed) than ratings provided by group members.

Alternatively, disagreement between supervisors and group members may be due to group members' general unfamiliarity with the other jobs in the work group and their requisite KSAOs. Regardless, I conclude that the findings of this study generally support the notion that understaffing is indeed a group-level phenomenon.

In addition to showing that understaffing is a meaningful group-level construct, whose perception is shared across group members, this study further supports the reconceptualization of understaffing as consisting of two relatively distinct types of resource shortages – manpower and expertise deficiencies. This multidimensional framework was originally proposed and supported by Hudson and Shen (2013) at the individual level of analysis. The current data showed that groups and their supervisors also distinguish between these two types of understaffing and that there are likely differential relationships between the two types of understaffing and group outcomes. This is important as it suggests prior research, which has primarily focused on manpower understaffing, has neglected an important aspect of the concept.

Results also showed that group perceptions of understaffing were significantly related to some group outcomes, particularly attitudes and well-being. Importantly, these relationships and

likely mediating mechanisms that underlie them differed depending on the type of staffing shortage experienced by the work unit. This further highlights the need for researchers to differentiate between these two types of understaffing. Manpower shortages were more strongly related to group quantitative workload and role ambiguity, which is then expected to be related to greater group emotional exhaustion. In contrast, expertise understaffing was more strongly associated with group potency, which is then expected to be related to greater group cohesion and emotional exhaustion. Overall, likely mediators of the manpower understaffing-group outcome relationships (i.e., group workload, role ambiguity) were generally the same as those found by Hudson and Shen (2013) at the individual level of analysis. Somewhat differently from Hudson and Shen, their individual-level mediating effect of role ambiguity in the relationship between expertise understaffing and exhaustion was not mirrored at the group level; however, HLM analyses did replicate and were consistent with the individual-level mediating effect.

Supporting my hypotheses, the significant relationships between understaffing and group outcomes were generally negative (i.e., greater understaffing was detrimentally related to group outcomes). However, multiple regression analyses uncovered two counterintuitive findings. When manpower and expertise understaffing were simultaneously entered in the model, greater manpower understaffing was positively related to group potency beliefs, though this relationship was non-significant when included in the full model. This unexpected positive relationship has received some support in prior research. In the undermanning literature, Perkins (1982) and Wicker et al. (1972) found that understaffed groups reported greater feelings of responsibility, desire to participate, and cohesiveness among members than more fully staffed groups. Since groups experiencing manpower understaffing may still have members who are qualified to complete core tasks and responsibilities, remaining members may experience a greater sense of

felt responsibility for these tasks; they may pool their resources or find more efficient ways to allocate work. Additionally, in the group potency literature, some researchers have found that this type of cooperation and coordination was related to greater cohesion and team efficacy, a construct closely related to group potency (e.g., West, Patera, & Carsten, 2009).

The second counterintuitive finding was a negative relationship between expertise understaffing and the number of sickness-related absences in the group (i.e., groups with greater expertise understaffing reported fewer absences in the group), though this relationship also became non-significant when included in the full model. According to concepts from absence culture (Nicholson & Johns, 1985), regardless of the level of discretion awarded to an employee by formal organizational policies, if one's group imposes strong norms restricting absences, a given employee may be less likely to call in sick. In understaffed situations, it is possible that the group "need" could result in stronger norms discouraging absences, especially for minor illnesses. However, this absence culture explanation would also predict a negative relationship between manpower understaffing and group sickness-related absences, which was not found in the present study. Future research should continue to examine and clarify the relationship between understaffing and absences.

### Limitations

This study is not without limitations. Although Shen and colleagues (2011) found the median number of units for group research published in the *Journal of Applied Psychology* was 62 (ranging from 20 to 210), likely reflecting the difficulty of collecting group level data, 66 groups is a small sample given the complexity of the models being tested. Even though some direct relationships and results consistent with mediation were uncovered in the present research, the relatively small number of groups does reduce power to detect effects. Therefore, I may have

been more prone to committing Type II errors, failing to reject the null hypothesis when there was in fact a real effect in the population. Thus, I encourage future research to replicate and extend my current results using larger numbers of groups. Also, for generalizability purposes, I encourage future work to include work units from additional industries responsible for a variety of work. For example, Ganster and Dwyer (1995) found preliminary evidence for differential relationships between staffing levels and commitment and motivating potential for individuals and work groups in blue versus white-collar functions.

Another limitation of the current study is the response rate across groups. The mean size of the work units (i.e., number of group members) in this study was 7.21. However, the average number of respondents per group was only 3.71. Liden et al. (2006) argued that researchers should be cautious when calculating within-group agreement statistics for groups with less than 60% response rates as responding members may not accurately reflect the views of the group as a whole. Given my desire to maximize the number of groups available for analyses, I did not employ this criterion as it would have resulted in excluding a relatively large number of groups. However, I did conduct supplemental correlational and multiple regression analyses on the subset of group that met this criterion ( $N = 39$ ). Presumably due to loss of power, I found fewer significant relationships between understaffing and outcomes in this subsample, but the direction of effects and differential relationships for manpower and expertise understaffing with outcomes were generally consistent with the results I presented for the full 66 groups.

A third limitation of this study was the use of cross-sectional data to examine questions of mediation. Although the results showed that the posited mediational pathways and ordering of variables were a plausible fit to the data, cross-sectional data cannot be used to definitively draw causal conclusions. The reader must be cognizant of this fact when viewing my results.

However, I did examine an alternative model reversing the order of proposed mediators and outcomes. This model resulted in a significant increase in the chi-square statistic (from 576.61 to 611.56), but the other fit indices (i.e., absolute fit, parsimony, and incremental fit) were relatively unchanged. Therefore, statistically, it appears that this reversed model was also a plausible fit to the data. This may be particularly true for the sequential ordering of group potency and cohesion. In all analyses in the current study, group potency and cohesion were strongly correlated ( $r = .68$ ) and this is in line with prior research ( $r = .56$ ; Gelfand et al., 2012). Additionally, in both versions of the SEM model, 58% of the variance was explained in whichever variable was considered the distal outcome (i.e., cohesion → potency vs. potency → cohesion) and the magnitude of the relationship was very similar. However, I had investigated an additional model, prior to flipping the order of proposed mediators and outcomes. In this additional model I included a reciprocal path from the proposed dependent variable, group cohesion, to the proposed mediator, group potency. Interestingly, the Wald test statistics advocated for the removal of this reciprocal path.

With regard to seemingly statistical plausibility of an alternative order for quantitative workload and emotional exhaustion (i.e., emotional exhaustion → quantitative workload rather than quantitative workload → emotional exhaustion), I suspect the use of *perceived* group quantitative workload in the present study to be largely responsible. In other words, if the members of a work unit are already fatigued (i.e., greater group emotional exhaustion), the group might also *perceive* the amount work required of them as more demanding than if they were less emotionally drained (i.e., greater qualitative workload). However, it seems unlikely that group emotional exhaustion could cause increases in the *actual* amount of work the group is required to complete (i.e., objective levels of group quantitative workload). Furthermore, researchers



typically classify quantitative workload as a job demand that predicts a host of employee outcomes, including emotional exhaustion, rather than the other way around (see Friedman, 2002; Posig & Kickul, 2003; Schmidt & Diestel, 2013). Still, it is important for future researchers to challenge themselves to combine group-level data collection efforts with longitudinal research designs in order to introduce temporal separation between variables when assessing mediation. Lab studies of understaffing could also be employed to help answer questions of causation by directly manipulating group staffing levels.

### Directions for Future Research

Given that shortages of personnel and the resulting negative workplace consequences may be inevitable in work life, an important endeavor for future research is to identify personal and/or group characteristics that may buffer one or one's group against the negative impact of understaffing. A better understanding of these protective factors will be invaluable in developing intervention efforts. As a starting point, if additional research continues to support current findings that quantitative workload and role ambiguity are proximal outcomes of understaffing, then interventions can target these variables. For example, to combat the negative impact of higher group workload, supervisors could actively assess and reprioritize task demands placed on individual group members and/or the group as a whole, ensuring time and resources are appropriately allocated to the most critical group functions. To address role ambiguity issues, supervisors could better ensure group members understand which tasks they are personally responsible for by formally redistributing group tasks. Additionally, if the primary concern is expertise understaffing, skills inventories could be used to assess the KSAOs currently possessed by workers in the group. Targeted training opportunities could then be used to reduce

misalignment between KSAOs available among team members and requirements of the unit to complete core tasks.

In addition to interventions that target proximal outcomes of understaffing, it will also be necessary to identify strategies that buffer employees and work groups against the more distal outcomes of understaffing (e.g., greater emotional exhaustion). I originally had proposed to examine teamwork effectiveness as a moderator of the relationship between understaffing and these distal group outcomes. Unfortunately, the particular units in this study demonstrated low within-group agreement regarding teamwork effectiveness, failing to support aggregation. However, in samples where there is higher agreement regarding teamwork effectiveness, I encourage future researchers to investigate whether effective teamwork skills may serve to buffer groups against the negative outcomes of understaffing.

Alternatively, future researchers could investigate the potential “bright side” of understaffing. Although not significant in the full model, my results indicate that manpower understaffing may be positively related to group potency, such that greater manpower shortages may bolster potency beliefs. Subsequently, my results suggested that greater group potency may be related to lower levels of group emotional exhaustion and greater group cohesion. Future research should seek to better understand the circumstances under which there may be positive outcomes of understaffing and whether it is possible to capitalize on these potentially beneficial effects while avoiding the negative consequences of staffing deficiencies.

A second potential “bright side” area for research revolves around the fact that neither form of understaffing predicted supervisor ratings of group performance. Perhaps, this is because more moderate levels of understaffing may actually benefit individuals or the group (e.g., increase motivation, affect, or performance), with more negative effects occurring as

understaffing becomes more severe. Studies by Vecchio and Sussman (1981), Ganster and Dwyer (1995), and Greenberg et al. (1982) found initial support for the potential motivating effects of less severe forms of understaffing. This highlights a need for investigators to also examine whether understaffing (or staffing more generally) is curvilinearly related to outcomes such as group performance and potency. In order to explore curvilinear relationships, it will be important to sample the full staffing distribution. In this study, group staffing levels generally reflected a relatively limited range of the spectrum, ranging from moderately understaffed to moderately overstaffed. Investigation of scatterplots plotting group outcomes against the two types of understaffing with the present data generally revealed little evidence of curvilinear relationships. Thus, if curvilinear relationships do exist between understaffing and group outcomes, it appears I did not have the data necessary to detect these departures from linearity. Future researchers should strategically plan their sampling method to ensure that participating groups reflect the full range of staffing to facilitate empirical examinations of curvilinear relationships.

An alternative explanation for the lack of significant relationships between understaffing and group performance may be because of changing standards for performance based on available resources, including personnel resources. Specifically, the concept of *shifting standards* suggests that regardless of objective similarity, objects, people, and/or situations can be subjectively judged as different based on context, salience, and stereotypes (e.g., Biernat, Collins, Katzarska-Miller, & Thompson, 2009; Biernat, Kobrynowicz, & Weber, 2003). For example, Biernat et al. (2009) explain one situation in which a male and female of objectively equal math ability (based on SAT scores) may be subjectively rated differently due to differing stereotypes. Specifically, if the stereotype is that females tend to be lower in math ability

compared to males, then relative to the stereotypes, the female might be rated as performing *better* than the male regardless of their actual or objective math ability.

Applied to the concept of understaffing, shifting standards would suggest two groups, one objectively understaffed and the other objectively adequately or overstaffed, could be rated as performing at a similar level if the subjective performance ratings are in comparison to the expected level of performance (i.e., groups with fewer or less adequate personnel resources are *expected* to perform worse). This would not only apply to situations comparing two different groups (e.g., one overstaffed and one understaffed), but could also apply to the same group across time (e.g., one group recently exposed to downsizing). In the current investigation, performance was operationalized as supervisor ratings of the group's ability to set/achieve high standards of task accomplishment, to always beat targets, and to do so quickly and efficiently using subjective scale anchors (i.e., strongly disagree to strongly agree) rather than objective anchors (i.e., rating the actual percentile of performance that group is at relative to other groups in the organization). Thus, my findings beg the question of whether groups truly performed at moderate to high levels *regardless of the level of staffing* or whether supervisors thought their groups performed at high levels *given their level of staffing*. If more objective indicators of group performance (e.g., sales numbers, customers served, widgets made, or projects completed) were employed, results of this study may have found the expected negative relationship between understaffing and group performance. This possibility should be further explored in future work.

It is also important for future researchers to investigate differences between actual versus perceived levels of manpower and expertise understaffing. Notably, a study by Wicker et al. (1976) suggested the potential for carryover effects in subjective ratings of understaffing. In their experimental, two-phase study, Wicker and colleagues found that participants who belonged to

overstaffed groups during Phase 1, but then moved to understaffed or even adequately staffed groups in Phase 2 reported needing more members in Phase 2 to appropriately handle the tasks required of them compared to those originally in understaffed or adequately staffed groups in Phase 1. This would suggest, regardless of the objective level of staffing, depending on the previous staffing levels faced by the group, group members' and supervisors' ratings of understaffing could be more or less severe than what the actual level of staffing would imply. Therefore, future research should not only compare objective levels (i.e., perhaps as determined via job analysis) and subjective ratings of understaffing for consistency, but should also explore under what circumstances actual versus perceived group understaffing differ versus converge and their potential differential effects on outcomes.

Lastly, investigators should begin to incorporate time into future studies of understaffing (i.e., duration of the current state of staffing). In this and prior studies, participants were asked about the current level of understaffing in their work unit. However, they were not asked how long the group had been under-/adequately/overstaffed. Chang, Johnson, and Lord (2010) found velocity (i.e., rate of change) moderated the effects of goal discrepancy on individual outcomes. If one of the goals of a work unit is adequate group performance, presumably, understaffed groups will perceive a discrepancy between their goal of adequate group performance and their current level of group performance. Due to perceptions of how quickly the staffing inadequacy is being corrected (i.e., velocity), a work unit that has been understaffed for a month may experience different outcomes than a group that has been understaffed for the past couple of years. Notably, Chang et al. (2010) found that even small discrepancies, if perceived to last for too long, can produce detrimental outcomes for employees (e.g., poor job attitudes). If this effect is true for understaffing, then even the beneficial motivational outcomes of understaffing

suggested by Vecchio and Sussman (1981) or the potential positive relationship between manpower understaffing and group potency found in the current study may diminish over time. Therefore, it is important for future research to begin to incorporate duration of understaffing into staffing research.

### Conclusion

In an era riddled with cases of understaffing, many of which appear to be unavoidable due to budget cuts and organizational mergers, the current shortage of theory and empirical work on the nature and consequences of understaffing is unacceptable. This investigation not only adds to the conceptual foundation of understaffing, but also sheds light on the impact of work unit understaffing on group outcomes. My results show how shortages in both manpower and expertise are related to group well-being and attitudes. Furthermore, I uncover potential mediating pathways for these relationships, highlighting points where organizations may be able to intervene to minimize negative effects of understaffing. It is critical that future researchers and practitioners continue to study this phenomenon, searching for the means to mitigate understaffing's detrimental effects on employees, work groups, and organizations as a whole.

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## APPENDICES

Appendix A: Supervisor Survey

**Group Staffing Study - Survey for Supervisors**

Dear Potential Participant,

Thank you for your interest in our investigation (IRB # 13477). This study aims to explore staffing levels in work groups. Your participation would greatly assist in our understanding of employees' responses to important characteristics of their jobs and work groups. This short confidential survey should only take about *5-10 minutes* to complete. You may complete the hard copy of the survey and return it anonymously in the preaddressed envelope provided. If you prefer, you may instead complete the survey anonymously online using the link provided. In exchange for your participation, you will receive an e-mailed *\$15 gift card to Amazon.com*. At the end of the survey you will be asked to provide an e-mail address solely for this purpose. Upon receiving your survey responses, your e-mail address will be immediately separated from your survey to ensure the anonymity of your responses.

To participate, *you must be at least 18 years old*. If you choose to partake, please remember that it is extremely important that you record your honest thoughts and feelings, so I need you to be as truthful as possible when marking your responses. **There is no right or wrong answer and all responses will remain confidential**. If you choose to withdraw from this survey that decision will in no way affect your employment status. As this study is not retaining any identifying information, you are *not* required to complete an informed consent form. Rather, your completion of the study will be considered your consent to participate.

If at any point you have any further questions or comments, please do not hesitate to contact the primary investigator, Cristina Hudson, at [CKawamot@mail.usf.edu](mailto:CKawamot@mail.usf.edu). If you would like to discuss general questions, concerns, or complaints with someone outside the research team, you may also contact the University of South Florida IRB at (813) 974-5638.

**Web Link to Electronic Survey on Qualtrics:**

**[http://usf.qualtrics.com/SE/?SID=SV\\_4NRPCRUwePiqk9T](http://usf.qualtrics.com/SE/?SID=SV_4NRPCRUwePiqk9T)**

**Password:**

**Staffing13477**

(The IRB at the University of South Florida and the Department of Health and Human Services reserve the right to review research records).

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	<i>Please indicate your level of agreement with the following statements regarding the behavior of the work group you supervise.</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	The unit has high work performance.	1	2	3	4	5
2	Most of the unit's tasks are accomplished quickly and efficiently.	1	2	3	4	5
3	The unit always <i>sets</i> a high standard of task accomplishment.	1	2	3	4	5
4	The unit always <i>achieves</i> a high standard of task accomplishment.	1	2	3	4	5
5	The unit almost always beats its targets.	1	2	3	4	5

	<i>When responding to the following items, please keep in mind the condition of the work group you supervise <u>as a whole</u>.</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
6	This work unit needs more employees.	1	2	3	4	5
7	This unit has sufficient staff to get all essential work done.	1	2	3	4	5
8	This work unit has more than enough employees to function properly.	1	2	3	4	5
9	There are not enough employees in this work unit to complete all required job tasks.	1	2	3	4	5
10	If work goes undone in this unit, it is primarily due to not having <i>enough</i> employees to do it.	1	2	3	4	5
11	The current employees are able to cover all of the unique job roles in this work unit.	1	2	3	4	5
12	This work unit is missing personnel with key knowledge and skills.	1	2	3	4	5
13	The knowledge and skills possessed by the members of this work unit are appropriate for the type of work we are required to perform.	1	2	3	4	5
14	This work unit needs employees with different skills from those the group currently possesses.	1	2	3	4	5
15	If work goes undone in this work unit, it is primarily due to not having someone who <i>knows how to do it properly</i> .	1	2	3	4	5

Continued on next page...

		Very Understaffed	Moderately Understaffed	Optimally Staffed	Moderately Overstaffed	Very Overstaffed
16	Rate the present level of staffing in this work group.	1	2	3	4	5

17. I am \_\_\_\_\_ Male \_\_\_\_\_ Female

18. I am \_\_\_\_\_ years old.

19. My ethnicity is

White

Black

American Indian or Alaskan Native

Asian

Native Hawaiian or Other Pacific Islander

Hispanic or Latino

Two or More Races

Other

20. I work, on average, \_\_\_\_\_ hours per week.

21. I have supervised this work unit for approximately \_\_\_\_\_ years and \_\_\_\_\_ months.

22. Have you previously participated in this study as a group member (non-supervisory position) for another group? Yes \_\_\_\_\_ No \_\_\_\_\_

23. How many members were in the group when it was at its *largest*? \_\_\_\_\_

24. How many members were in the group when it was at its *smallest*? \_\_\_\_\_

25. In as much detail as possible, please describe any staffing changes the unit has undergone in the past year (e.g., downsizing, merger, restructuring, etc.). \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
26	The work unit is central to the functioning of our organization as a whole.	1	2	3	4	5

Continued on next page...

Thank you again for your time! Your participation will greatly assist in our research!

To receive your Amazon.com gift card, please provide your e-mail address in the space provided. Once your survey has been received, this page containing your e-mail will immediately be separated from your responses. Your e-mail will *only* be used to send you your gift card to Amazon.com. If you have not received your gift card within 1 week of returning your survey, please contact Cristina at CKawamot@mail.usf.edu.

(Please write legibly as this will be our only means of giving you your gift card).

E-mail Address: \_\_\_\_\_

If you would like to receive an e-mailed copy of the final report from this study, please indicate below. This final report will contain only aggregated data. No individual group member, supervisor, work unit, or organization will be identifiable.

Completion of the study is currently anticipated for Spring/Summer 2014.

\_\_\_\_\_ Yes, please e-mail me a copy of the final report.

\_\_\_\_\_ No, I do not want a copy of the final report.

## Appendix B: Employee Survey

### **Group Staffing Study - Survey for Employees**

Dear Potential Participant,

Thank you for your interest in our investigation (IRB # 13477). This study aims to explore staffing levels in work groups. Your participation would greatly assist in our understanding of employees' responses to important characteristics of their jobs and work groups. This confidential survey should only take about *15-20 minutes* to complete. You may complete the hard copy of the survey and return it anonymously in the preaddressed envelope provided. If you prefer, you may instead complete the survey anonymously online using the link provided. In exchange for your participation, you will receive an e-mailed *\$15 gift card to Amazon.com*. At the end of the survey you will be asked to provide an e-mail address solely for this purpose. Upon receiving your survey responses, your e-mail address will be immediately separated from your survey to ensure the anonymity of your responses.

To participate, *you must be at least 18 years old, working at least 20 hours/work in paid employment, and have been at your current job for at least 2 months*. If you choose to partake, please remember that it is extremely important that you record your honest thoughts and feelings, so I need you to be as truthful as possible when marking your responses. **There is no right or wrong answer and all responses will remain confidential.** If you choose to withdraw from this survey that decision will in no way affect your employment status. As this study is not retaining any identifying information, you are *not* required to complete an informed consent form. Rather, your completion of the study will be considered your consent to participate.

If at any point you have any further questions or comments, please do not hesitate to contact the primary investigator, Cristina Hudson, at [CKawamot@mail.usf.edu](mailto:CKawamot@mail.usf.edu). If you would like to discuss general questions, concerns, or complaints with someone outside the research team, you may also contact the University of South Florida IRB at (813) 974-5638.

#### **Web Link to Electronic Survey on Qualtrics:**

**[http://usf.qualtrics.com/SE/?SID=SV\\_9RekdLqCiOjPQep](http://usf.qualtrics.com/SE/?SID=SV_9RekdLqCiOjPQep)**

#### **Password:**

**Staffing13477**

(The IRB at the University of South Florida and the Department of Health and Human Services reserve the right to review research records).

\*This study is funded by the NIOSH Pilot Research Project Grant.

	<i>Please choose the response that best represents your feelings and experiences at work.</i>	Very False	Moderately False	Somewhat False	Neutral	Somewhat True	Moderately True	Very True
1	I feel certain about how much authority I have.	1	2	3	4	5	6	7
2	There are clear, planned goals and objectives for my job.	1	2	3	4	5	6	7
3	I know that I have divided my time properly.	1	2	3	4	5	6	7
4	I know what my responsibilities are.	1	2	3	4	5	6	7
5	I know exactly what is expected of me.	1	2	3	4	5	6	7
6	Explanation is clear of what has to be done.	1	2	3	4	5	6	7

	<i>Please indicate the extent to which you agree or disagree with the following statements about <u>your job</u>.</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	<i>(Note that the response scale has changed from the previous section)</i>					
7	My job requires that I work very fast.	1	2	3	4	5
8	My job requires that I work very hard.	1	2	3	4	5
9	I never seem to have enough time to get everything done on my job.	1	2	3	4	5
10	I have too much to do everything well.	1	2	3	4	5
11	My job requires me to remember a lot of information.	1	2	3	4	5
12	My job requires high levels of concentration.	1	2	3	4	5
13	My job requires high levels of precision and attention to detail.	1	2	3	4	5
14	My job is complicated.	1	2	3	4	5
15	My job requires me to make complex decisions.	1	2	3	4	5

16. Please indicate the number of times you were absent from work in the past month.

\_\_\_\_\_

Of these absences, how many were due to:

\_\_\_\_\_ Sickness or Health-Related Reasons

\_\_\_\_\_ “Just Needing a Break”

\_\_\_\_\_ Family Responsibilities

\_\_\_\_\_ Other

Continued on the next page....



	<b><i>Please choose the response that best represents your feelings and experiences.</i></b>  <b><i>(Note that the response scale has changed from the previous section)</i></b>	Never	A few times a year or less	Once a month or less	A few times a month	Once a week	A few times a week	Everyday
17	I feel emotionally drained from my work.	1	2	3	4	5	6	7
18	I feel used up at the end of the workday.	1	2	3	4	5	6	7
25	I feel like I am at the end of my rope.	1	2	3	4	5	6	7

*(Due to copyright, the full set of scale items indexing emotional exhaustion cannot be displayed)*

	<b><i>Please answer the following questions about your <u>work group</u>.</i></b>  <b><i>(Note that the response scale has changed from the previous section)</i></b>	Not at all	Slightly	Somewhat	Neutral	Fairly	Moderately	A lot
26	To what extent is your group cohesive?	1	2	3	4	5	6	7
27	How much do you feel like your team has group spirit?	1	2	3	4	5	6	7
28	To what degree would you talk up this group to your friends as a great group to work in?	1	2	3	4	5	6	7

	<b><i>Please indicate how often <u>your work group</u> performs the following behaviors at work.</i></b>  <b><i>(Note that the response scale has changes from the previous question)</i></b>	Less than once per month or never	Once or twice per month	Once or twice per week	Once or twice per day	Several times per day
29	How often does the work of your unit require your group to work very fast?	1	2	3	4	5
30	How often does the work of your unit require your group to work very hard?	1	2	3	4	5
31	How often does the work of your unit leave your group with little time to get things done?	1	2	3	4	5
32	How often is there a great deal to be done by your work group?	1	2	3	4	5
33	How often does your work unit have to do more work than it can do well?	1	2	3	4	5

Continued on the next page....

	<i>Please indicate your level of agreement with the following statements regarding your <u>work group</u>'s behavior.</i>					
	<i>(Note that the response scale has changed from the previous section)</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
34	We have high work performance.	1	2	3	4	5
35	Most of our tasks are accomplished quickly and efficiently.	1	2	3	4	5
36	We always <i>set</i> a high standard of task accomplishment.	1	2	3	4	5
37	We always <i>achieve</i> a high standard of task accomplishment.	1	2	3	4	5
38	We almost always beat our targets.	1	2	3	4	5

	<i>Please indicate your level of agreement with the following statements regarding your <u>work group</u>'s attitudes and behavior.</i>					
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
39	My team has confidence in itself.	1	2	3	4	5
40	No task is too tough for my team.	1	2	3	4	5
41	My team expects to be known as a high performing team.	1	2	3	4	5
42	My team can get a lot done when it works hard.	1	2	3	4	5
43	Members of my team are very willing to share information with other team members about our work.	1	2	3	4	5
45	Teams enhance the communication among people working on the same product.	1	2	3	4	5
46	Members of my team cooperate to get the work done.	1	2	3	4	5
47	I cannot accomplish my tasks without information or materials from other members of my team.	1	2	3	4	5
48	Other members of my team depend on me for information or materials needed to perform their tasks.	1	2	3	4	5
49	Within my team, job performance by team members is related to one another.	1	2	3	4	5

Continued on next page...

	<b><i>When responding to the following items, please keep in mind the condition of the work group (or immediate team) <u>as a whole.</u></i></b>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
50	This work unit needs more employees.	1	2	3	4	5
51	This unit has sufficient staff to get all essential work done.	1	2	3	4	5
52	This work unit has more than enough employees to function properly.	1	2	3	4	5
53	There are not enough employees in this work unit to complete all required job tasks.	1	2	3	4	5
54	If work goes undone in this unit, it is primarily due to not having <i>enough</i> employees to do it.	1	2	3	4	5
55	The current employees are able to cover all of the unique job roles in this work unit.	1	2	3	4	5
56	This work unit is missing personnel with key knowledge and skills.	1	2	3	4	5
57	The knowledge and skills possessed by the members of this work unit are appropriate for the type of work we are required to perform.	1	2	3	4	5
58	This work unit needs employees with different skills from those the group currently possesses.	1	2	3	4	5
59	If work goes undone in this work unit, it is primarily due to not having someone who <i>knows how to do it properly.</i>	1	2	3	4	5

		Very Understaffed	Moderately Understaffed	Adequately Staffed	Moderately Overstaffed	Very Overstaffed
60	Rate the present level of staffing in your work group.	1	2	3	4	5

	<b><i>Please respond to the next few questions <u>IF your work unit has too few employees to complete all the required work of your unit.</u></i></b>  <b><i>If you have enough employees, please choose "We have enough employees" as your response.</i></b>	Not at all	Slightly	Somewhat	Moderately	A lot	We have enough employees
61	To what extent is the shortage a temporary condition (i.e., lasting for only a few days or less)?	1	2	3	4	5	6

62. If it is a temporary condition, please describe the cause of the current level of staffing.

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Continued on the next page...

		Not at all	Slightly	Somewhat	Moderately	A lot	We have enough employees
63	To what extent is the shortage a recurring condition (i.e., your work unit or group goes through regular cycles of being over or understaffed)?	1	2	3	4	5	6

64. If yes, where would you consider your work unit's current level of staffing in the cycle?

Understaffed    
 Adequately Staffed    
 Overstaffed    
 We have enough employees

65. If yes, please describe the primary reason for the cyclical nature (e.g., "I work in a restaurant so there are regular lunch and dinner rushes" or "I work in retail with greater staffing needs during the holidays"). \_\_\_\_\_

		Not at all	Slightly	Somewhat	Moderately	A lot	We have enough employees
66	To what extent is the shortage a long-term, relatively stable condition (i.e., your work unit has consistently been with too few employees for quite some time)?	1	2	3	4	5	6

67. What is the primary cause of this level of staffing in your work unit?

	<p><b><i>Please respond to the next few questions <u>IF</u> the employees in your work unit as a whole do not possess the necessary knowledge, skills, expertise, and/or abilities to complete all required work.</i></b></p> <p><b><i>If your work unit as whole possesses the necessary knowledge, skills, expertise, and/or abilities, please choose "We have the appropriate qualifications" as your response.</i></b></p>	Not at all	Slightly	Somewhat	Moderately	A lot	We have the appropriate qualifications
68	To what extent is the shortage a temporary condition (i.e., lasting for only a few days or less)?	1	2	3	4	5	6

Continued on the next page...

69. If it is a temporary condition, please describe the cause of the current level of staffing.

		Not at all	Slightly	Somewhat	Moderately	A lot	We have the appropriate qualifications
70	To what extent is the shortage a recurring condition (i.e., your work unit or group goes through regular cycles of being over or understaffed)?	1	2	3	4	5	6

71. If yes, where would you consider your work unit's current level of staffing in the cycle?

Understaffed   
  Adequately Staffed   
  Overstaffed   
  We have the appropriate qualifications

72. If yes, please describe the primary reason for the cyclical nature (e.g., "I work in a restaurant so there are regular lunch and dinner rushes" or "I work in retail with greater staffing needs during the holidays"). \_\_\_\_\_

		Not at all	Slightly	Somewhat	Moderately	A lot	We have the appropriate qualifications
73	To what extent is the shortage a long-term, relatively stable condition (i.e., your work unit has consistently been with two few employees for quite some time)?	1	2	3	4	5	6

74. What is the primary cause of this level of staffing in your work unit?

	<i>Please indicate your level of agreement with the following statements.</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
75	My role is central to the functioning of my work unit.	1	2	3	4	5
76	My work unit is central to the functioning of our organization as a whole.	1	2	3	4	5

Continued on the next page...

		Very Understaffed	Moderately Understaffed	Optimally Staffed	Moderately Overstaffed	Very Overstaffed
77	Please indicate the level of staffing of your work group at your <i>previous</i> job.	1	2	3	4	5

78. I am \_\_\_\_\_ Male \_\_\_\_\_ Female

79. I am \_\_\_\_\_ years old.

80. My ethnicity is  
 \_\_\_ White \_\_\_ Black \_\_\_ American Indian/Alaskan Native \_\_\_ Asian  
 \_\_\_ Native Hawaiian/Other Pacific Islander \_\_\_ Hispanic/Latino  
 \_\_\_ Two or More Races \_\_\_ Other

81. I have been at my job approximately \_\_\_\_\_ years and \_\_\_\_\_ months.

82. I work, on average, \_\_\_\_\_ hours per week.

83. My current job title is \_\_\_\_\_.

84. Have you previously participated in this study as a supervisor for another group?  
 Yes \_\_\_\_\_ No \_\_\_\_\_

85. In which of the following industries does your company belong?

___ Agriculture, Food, and Natural Resources	___ Human Services
___ Architecture and Construction	___ Informational Technology
___ Arts, Audio/Video Technology and Communication	___ Law, Public Safety, Corrections, and Security
___ Business, Management, and Administration	___ Manufacturing
___ Education and Training	___ Marketing, Sales, and Service
___ Finance	___ Government and Public Admin.
___ Science, Technology, Engineering and Mathematics	___ Transportation, Distribution, and Logistics
___ Health Services	___ Other
___ Hospitality and Tourism	

86. There are approximately \_\_\_\_\_ members in my work unit (i.e., immediate work team).

87. Some of the primary responsibilities of my work unit include \_\_\_\_\_  
 \_\_\_\_\_

Continued on the next page...

Thank you again for your time! Your participation will greatly assist in our research!

To receive your Amazon.com gift card, please provide your e-mail address in the space provided. Once your survey has been received, this page containing your e-mail will immediately be separated from your responses. Your e-mail will *only* be used to send you your gift card to Amazon.com. If you have not received your gift card within 1 week of returning your survey, please contact Cristina at CKawamot@mail.usf.edu.

(Please write legibly as this will be our only means of giving you your gift card).

E-mail Address: \_\_\_\_\_

If you would like to receive an e-mailed copy of the final report from this study, please indicate below. This final report will contain only aggregated data. No individual group member, supervisor, work unit, or organization will be identifiable.

Completion of the study is currently anticipated for Spring/Summer 2014.

\_\_\_\_\_ Yes, please e-mail me a copy of the final report.

\_\_\_\_\_ No, I do not want a copy of the final report.

Appendix C: IRB Approval Forms



RESEARCH INTEGRITY AND COMPLIANCE  
Institutional Review Boards, FWA No. 00001669  
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799  
(813) 974-5638 • FAX (813) 974-7091

7/17/2013

Cristina Hudson  
Psychology  
4202 E Fowler Ave, PCD 4118G  
Tampa, FL 33620

RE: **Exempt Certification**

IRB#: Pro00013477

Title: Not Enough Cooks in the Kitchen: An Empirical Test of a Two-Factor Model of Work Unit Understaffing

**Study Approval Period: 7/17/2013 to 7/17/2018**

**Items**

**Approved:**

**Protocol**

**Document:**

[Hudson Dissertation Proposal\\_Final\\_IRB](#)

**Consent Scripts:**

[Understaffing Dissertation\\_Informed Consent for Employees\\_Version 1](#)

[Understaffing Dissertation\\_Informed Consent for Supervisors\\_Version 1](#)

Dear Ms. Hudson:

On 7/17/2013, the Institutional Review Board (IRB) determined that your research meets USF requirements and Federal Exemption criteria as outlined in the federal regulations at 45CFR46.101(b):

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:

(i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of



criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

As the principal investigator for this study, it is your responsibility to ensure that this research is conducted as outlined in your application and consistent with the ethical principles outlined in the Belmont Report and with USF IRB policies and procedures. Please note that changes to this protocol may disqualify it from exempt status. Please note that you are responsible for notifying the IRB prior to implementing any changes to the currently approved protocol.

Your study qualifies for a waiver of the requirements for the documentation of informed consent as outlined in the federal regulations at 45CFR46.117(c) which states that an IRB may waive the requirement for the investigator to obtain a signed consent form for some or all subjects.

The Institutional Review Board will maintain your exemption application for a period of five years from the date of this letter or for three years after a Final Progress Report is received, whichever is longer. If you wish to continue this protocol beyond five years, you will need to submit a new application at least 60 days prior to the end of your exemption approval period. Should you complete this study prior to the end of the five-year period, you must submit a request to close the study.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kristen Salomon', with a horizontal line extending to the right.

Kristen Salomon, Ph.D., Vice Chairperson  
USF Institutional Review Board



RESEARCH INTEGRITY AND COMPLIANCE  
Institutional Review Boards, FWA No. 00001669  
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799  
(813) 974-5638 • FAX (813) 974-7091

9/25/2013

Cristina Hudson  
Psychology  
4202 E. Fowler Ave, PCD4118G  
Tampa, FL 33620

RE: **Expedited Approval for Amendment**

IRB#: Ame1\_Pro00013477

Title: Not Enough Cooks in the Kitchen: An Empirical Test of a Two-Factor Model of Work Unit Understaffing

Dear Dr. Hudson:

On 9/25/2013, the Institutional Review Board (IRB) reviewed and **APPROVED** your Amendment. The submitted request has been approved for the following:

Changes to Consent Documents: Study team is now providing study participants with a \$15 Amazon.com gift cards for completion of study survey. Participants must provide email address to receive gift card.

**Approved**

**Item(s): Protocol**

**Document(s):**

[Hudson Dissertation Proposal\\_Final\\_IRB\\_Version 2\\_Clean](#)

**Consent Document(s)\*:**

[Understaffing Dissertation\\_Informed Consent for Employees\\_Version 2\\_Clean](#)

[Understaffing Dissertation\\_Informed Consent for Supervisors\\_Version 2\\_Clean](#)

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

A handwritten signature in black ink that reads "John A. Schinka, Ph.D." The signature is written in a cursive style with a large, prominent initial 'J'.

John Schinka, Ph.D.,  
Chairperson  
USF Institutional Review  
Board