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An Investigation of Peer Accountability in Healthcare

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Approval of the Dissertation Committee

This dissertation has been duly read, reviewed, and critiqued by the Committee listed below, which hereby approves the manuscript of Angela DeMichele as fulfilling the scope and quality requirements for meriting the degree of Doctor of Philosophy in Psychology with a concentration in Positive Organizational Psychology.

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Abstract

An Investigation of Peer Accountability in Healthcare

by

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Peer accountability is the practice of providing feedback to, and receiving feedback from, one's colleagues (Lockett et al., 2015)—both for the purposes of recognizing good work when it happens, and correcting risky behaviors in the moment. The concept of peer accountability has been overshadowed by research focusing on teamwork, which tends to focus on reducing the power distance among team members and increasing an individual's ability to speak *up* the hierarchy. Our next opportunity for achieving safety and reliability in healthcare will come from peers monitoring one another's actions. This study analyzes the untapped links between peer accountability behaviors, psychological safety (Edmondson, 1999), and engagement (Schaufeli et al., 2002) to better understand how organizations can foster this behavior in the workplace. To achieve this, a 76-person sample of front line safety coaches were surveyed over a year and a half to assess their peer accountability behaviors over time. The results reveal a two-factor structure underlying peer accountability behaviors (i.e., safe and risky peer accountability behaviors) wherein engagement and psychological safety serve to explain variation in safe accountability behaviors, but not risky accountability behaviors. This suggests that our existing knowledge of psychological safety and engagement cannot fully explain the entire spectrum of an individual's peer accountability behaviors in healthcare. These implications are discussed, and future directions for peer accountability research are presented.

Keywords: peer accountability behaviors, psychological safety, engagement

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An Investigation of Peer Accountability in Healthcare

The world is not a dangerous place because of those who do harm, but because of those who look on and do nothing.

~Albert Einstein~

Patient safety has received extensive attention over the past two decades, since *To Err is Human* (1999) was published, opening the eyes of the industry to the extent of harm happening every day in hospitals in the United States. Because of this groundbreaking report, a great deal of attention has been given to the nature of errors in healthcare. Where possible, efforts have been made to design errors out of the system (e.g., certain feeding tube ports now *only connect* to feeding syringes in order to eliminate the error of giving an intravenous fluid through a nasogastric tube). And team-based trainings have been used extensively in healthcare (e.g., TeamSTEPPS from the Agency for Healthcare Research and Quality; Baker, Day, & Salas, 2006). Despite this devotion to reducing harms in healthcare, the industry has not achieved the kind of safety results from other ultra-safe, highly reliable industries, like nuclear power and aviation.

A common reason provided by those working in healthcare is that the work done in healthcare is more complex, involves more human elements, and cannot be standardized in the same ways that nuclear power and aviation have been (Bagnara, Parlangeli, & Tartaglia, 2010). While there are many arguments to the contrary from experts in aviation, nuclear power, and high reliability (e.g., Chassin & Loeb, 2013; Clapper, 2019), for a moment, let us go along with the belief that the approaches of standardization and technological excellence from other highly reliable industries cannot achieve the same successes in healthcare because there are too many human elements at play to rely solely upon standard operating procedures. This means that in

healthcare, those human elements deserve a greater level of investigation than they have received in other industries. Our broad foci on leaders, teamwork, and power distance (e.g., Baker, Day, & Salas, 2006; Edmondson, 2004; Singer & Vogus, 2013) are important, but no different from the work done in other highly reliable industries. In other words, it does not focus on what other human elements may be at work in driving healthcare's unreliability on a day-to-day basis.

One potential human element that may be of critical importance in achieving high reliability in healthcare is the practice of *peer accountability*—giving and receiving timely, in the moment feedback to those with whom one works (Lockett et al., 2015). It is known that timely feedback is important for behavior change and performance improvement (e.g., Sutcliffe, Paine, & Pronovost, 2017), and it is also common in healthcare for individuals to work largely with peers, outside of the direct visual supervision of a boss or a physician (e.g., Labrague, McEnroe-Petitte, & Tsaras, 2019). Therefore, peers are often the only ones available to cross-monitor one another, looking out for each other, and for their patients on a daily basis. Research from occupational safety (another "industry" wherein a supervisor cannot be governing one's behaviors at all times) goes so far as to suggest that "peers are more likely to be 'right there' when immediate feedback is necessary" and that this immediate "corrective feedback is often perceived as [more] genuine…when it occurs between coworkers" (Geller & Johnson, 2007, p. 98).

Remarkably, peer accountability has remained understudied in healthcare. In healthcare and in organizational behavior, it is unknown why some individuals speak up about problems and consistently look out for their peers while others do not. The psychological phenomena that drive this behavior cannot be observed, but the observations that do occur by practitioners of high reliability methods suggest that when peer accountability behaviors are present, those

individuals could not imagine sitting back and watching someone make the wrong choice without speaking up (Kello, 2015a, 2015b; Sayles, 2019; personal communication G. Smith, 2018; personal communication D. Varnes, 2017).

In order to understand the stagnant changes in healthcare safety (e.g., Makary & Daniel, 2016), we need to return to the fundamentals at play in the industry: the people. Some people consistently practice peer accountability behaviors at work—what work experiences make these individuals different from individuals who remain silent, even amongst their peers? There are many potential explanations out there; this study will address two organizational behavior constructs and their impact on peer accountability behaviors. The first being *psychological safety*—the belief that it is safe to share concerns or ideas with those around you, without fear of retaliation or embarrassment (Edmondson, 1999); the second being *engagement*—a positive experience in the workplace involving "vigor, dedication, and absorption" (Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002, p. 74).

The study will begin with a review of what is known about peer accountability, particularly in healthcare. It will differentiate peer accountability from other similar constructs that have received extensive review, but have yet to offer answers to the presenting research question: why individuals do not speak to peers about problems they witness in the moment. Then the theoretical relationships of psychological safety and engagement with peer accountability will be outlined, along with the details of a program intending to increase the frequency with which one engages in peer accountability behaviors. It will close with the strengths, limitations, and implications of the study.

A Review of Peer Accountability

In 2015, researchers at a Southern California hospital undertook the effort to define peer accountability in nursing (Lockett et al., 2015); their work is the first attempt (known to this author) to define peer accountability. Lockett and colleagues also came to this conclusion after a review of the literature searching for work on peer accountability within and outside of healthcare. The healthcare literature extensively defines nursing *peer review*, a formal process of accountability within hospitals to uphold the standards of the nursing profession (LeClair-Smith et al., 2016; Lockett et al., 2015), and the *Nursing Scope and Standards of Practice* recognizes that nurses are "accountable for their professional actions" (p. 10) not just to themselves, but also to their peers, patients, and their community (American Nurses Association, *Nursing Scope and Standards of Practice,* 2010; Lockett et al., 2015), but there has not been any formal study nor definition of *peer accountability* within healthcare.

Lockett and colleagues' (2015) work involved a qualitative study of 28 nurses from their hospital in an effort to understand how nurses think about and define peer accountability amongst themselves. Their grounded theory approach revealed a definition of peer accountability: "the act of speaking up by reciprocally giving and receiving feedback in an honest and respectful manner regardless of the individuals' position in the organization" (Lockett et al., 2015, p. 561). Accountability does not have to focus solely on the negative or the areas for improvement—although in our society "accountability" is often synonymous with "punishment" (Geller & Johnson, 2007). This author believes recognition is an important piece of the peer accountability puzzle due to the importance of recognition in the workplace (Losada & Heaphy, 2004; Luthans & Stajkovic, 2009). Peer accountability involves recognizing peers for doing the right thing, and also being responsible for correcting peers who are about to do the wrong thing. Other work in the world of voice behaviors has touched on feedback and its importance in

teaming (e.g., Edmondson, 2012), but no work has been devoted exclusively to the study of speaking up to peers to-date (Lockett et al., 2015).

Voice behaviors are similar to, but different from, the above definition of peer accountability. Morrison (2014) defines voice as the "informal and discretionary communication by an employee of ideas, suggestions, concerns, information about problems, or opinions about work-related issues *to persons who might be able to take appropriate action*, with the intent to bring about improvement or change" (p. 174, emphasis added); while Edmondson and Lei (2014) provide a more concise definition of voice as "*upward-directed*, promotive verbal communication" (p. 27, emphasis added). Taken together, the definitions of voice paint a clear picture of the target of one's voice behavior: *a leader*. This distinguishes voice behaviors—directed at a leader—from peer accountability behaviors—directed at a peer. Both peer accountability and voice involve using one's voice to express an opinion, suggestion, or concern—often in the hopes of enacting a change of some sort—but the intended target of this change differs. While peer accountability can, and should, include speaking to leaders, it is behaviorally distinct from this typical conceptualization of voice behavior in organizations because the main intent is to handle a problem or concern in the moment with one's peer, rather than going up the chain of command to involve a leader.

An additional distinction of voice is that it typically is used for broader organizational change, which contributes to its common status as an extra-role behavior (Van Dyne & LePine, 1998). When an individual voices to their leader about a key process that needs to be changed, or an improvement for the organization to make, this is an extra-role behavior. What makes peer accountability unique in healthcare is that it is considered an active part of a nurse's commitment to his or her care for patients, as it is included in the *Nursing Scope and Standards of Practice* set

forth by the American Nurses Association (2010). Peer accountability differs from voice in that the concerns or suggestions an individual communicates are to the individual who performed the act, rather than to a supervisor who can speak to this individual later. When someone is accountable for their peers' actions, the intent is to immediately change the behavior of a peer in the moment. For example, when a nurse is caring for a patient and an individual from food services delivers the patient's meal, but does not wash their hands prior to entering the patient room (a standard requirement for all healthcare workers), the nurse could remind this peer to please wash their hands. Thus, the nurse practices peer accountability in seeking to immediately change the behavior of a peer in the moment. Voicing, in a similar situation, may involve the nurse finding the supervisor and recommending a change in the process for the delivery of food trays. Both of these actions work to solve the presenting problem—a lack of hand hygiene; peer accountability focuses on in the moment, immediate feedback (Lockett et al., 2015) to ensure the correct actions are taken and voice approaches it from the organizational change perspective.

The example above used a cross-professional peer accountability interaction, and this was intentional. The definition of peer accountability mentions that feedback should be given "regardless of the individual's position in the organization" (Lockett et al., 2015, p. 561). This relates to Cropanzano, Li, and Benson's (2011) definition of a peer in the context of peer justice: "members of the unit may not be identical in their organizational ranking, but they have no formal authority over each other in the unit" (p. 569). This definition of a peer supports peer accountability being applicable in any setting where individuals work together and can look out for one another. While an individual may not share the same role or title in the organization, it is a lateral feedback-giving and -receiving situation when individuals do not report to one another and therefore have no formal authority over each other. In the remainder of this work peers will

be defined as individuals who have no formal authority over one another; in this way peer accountability can occur between the majority of coworkers in most settings.

A meta-analysis, by Chiaburu and Harrison (2008), analyzing coworker effects on a variety of outcomes found that coworkers have a direct impact on things like individual's perceptions, organizational citizenship behaviors, and performance. These effects explain an additional variance in workplace performance over and above the impact of leaders. As part of this research, the authors call for additional work exploring the within-person effects of how supporting or antagonizing coworkers influence the same individual's experience of work (Chiaburu & Harrison, 2008), which the present study will explore.

A subsequent meta-analysis by Chiaburu and colleagues (2013) discovered that specific coworker support (e.g., inclusive statements, speaking up, and other team learning climate elements) was more impactful on subsequent change-oriented citizenship behaviors, or "proactive actions aimed at identifying and implementing changes in work processes, products, and services" (p. 2), than generic forms of coworker support (e.g., team-member exchange). Peer accountability behaviors embody the description of specific coworker support—they are instances of recognition for specific behaviors and speaking up to colleagues about behaviors that need to change—and are likely to influence additional organizational behavior outcomes (e.g., change-oriented citizenship behavior). But what is left undiscovered is what influences one's likelihood to provide that specific coworker support in the form of immediate feedback and recognition of peers.

In the realm of occupational safety, Geller (e.g., 1994, 2014) suggests specific personality states and traits (i.e., self-esteem, self-efficacy, empowerment, belonging, and optimism) that are beneficial for promoting an *actively caring* environment, wherein coworkers actively care for

one another by speaking up about personal safety concerns (e.g., not buckling one's seatbelt). This work centered on personality traits explains less than half the variance in the construct of actively caring, suggesting that there is more work to be done to fully understand how and why peers look out for one another. The present study will explore what emergent states differentiate a peer who is motivated to practice peer accountability from one who is not.

All of the above examples point to the importance of coworkers in shaping the experience of work on a daily basis. Chiaburu & Harrison (2008) uncovered that peers have a unique influence on individual performance, beyond that which can be explained by leaders. Chiaburu and colleagues (2013) found that specific coworker support, which exemplifies the goal of peer accountability behaviors, were more impactful on other's behaviors than a more generic supportive teamwork climate. And Geller's career of work (e.g., Geller 1994; Geller & Johnson, 2007; Geller, 2014) identifies the individual personality traits that make one more likely to look out for others. All of this work has set the stage for a proper empirical understanding of peer accountability behaviors, and what emergent states make someone more or less likely to practice these behaviors on a daily basis in the healthcare setting.

Typically, the empirical work on patient safety in healthcare has focused on the importance of teamwork and creating a safety culture (e.g., Lark, Kirkpatrick, & Chung, 2018). Less research has been directed to understanding peer accountability, and what microdynamics within the team or organization (Humphrey & Aime, 2014) drive an individual to correct and change their behaviors in support of safe practices every day. This research, therefore, addresses this gap in the literature by: 1) defining peer accountability behaviors; 2) assessing the impact of psychological safety on these behaviors; 3) analyzing how one's engagement at work may change one's peer accountability behaviors; and 4) exploring how these behaviors may change

over time (see Figure 1 for theoretical model). The potential antecedents of peer accountability behaviors are explored next.

[INSERT FIGURE 1 ABOUT HERE]

Hypotheses

Peer Accountability & Psychological Safety

Psychological safety describes a state wherein individuals feel comfortable taking interpersonal risks with one another, such as speaking up about a concern or sharing an out of the box idea (Edmondson, 1999); it is "a team climate characterized by interpersonal trust and mutual respect" (Edmondson, 1999, p. 354). Despite its known importance for team performance and voice behaviors (e.g., Edmondson, 1999, 2003a, 2003b), "very little research has examined how psychological safety interacts with other dimensions of workplace culture such as accountability" (Edmondson, Higgins, Singer, & Weiner, 2016, p. 79). Accountability scholars have stated that in "accountability episodes, relationships matter" (Hall et al., 2017, p. 212), which suggests that psychological safety may function as an antecedent to peer accountability behaviors because peers need to trust and respect one another. Not only do they need trust and respect, they also need to know that their coworkers will not disapprove of or punish them for speaking up about practice standards and workplace expectations (Nembard & Edmondson, 2006).

Because of the similarities between peer accountability and voice, described earlier, and the empirical evidence that psychological safety positively relates to voice (e.g., Edmondson, 2003a; Liang, Farh, & Farh, 2012; Nembard & Edmondson, 2006) it would fit that individuals who feel more psychological safety would be more inclined to practice peer accountability behaviors. However, unlike traditional psychological safety research, the subcultures that are

present among peers may influence psychological safety such that it varies among individuals within a team, rather than the traditional expectation that psychological safety functions as a team-level construct (e.g., Edmondson, 1999). This fits with prior research from Liang, Farh, and Fahr (2012), wherein the authors conceptualized psychological safety as an individual-level construct that would predict one's willingness to speak up at work. The present study follows this model, wherein psychological safety is measured at the individual level, and not aggregated to represent the group's perspective.

Speaking up to a peer about a problem is an inherently risky activity—this is an individual you must continue to work with on a day-to-day basis. Depending on the staffing model and scheduling consistency within a hospital, you may work with the same peer nearly every day that you are at the hospital. Bringing up problems, even those that are objectively in the best interest of patient care, may erode this relationship over time. If one does not experience psychological safety in the relationship with another person, it could decrease their likelihood of speaking up about anything (problems or recognitions). With psychological safety in-tact, an individual feels that their statements will be heard without ridicule, and that there will not be retribution for statements that are made (e.g., Edmondson, 1999; Morrison, 2011). Here, one can imagine the decision-schema that an individual may go through when deciding whether to practice peer accountability in a psychologically unsafe situation: *I've worked with this individual for several years and we even spend time together outside of work, when I've brought up similar problems in the past (e.g., not washing hands prior to entering a patient room) this individual responded saying "don't be such a teacher's pet" and avoided me for a week. I lost my social support at work and in my personal life.* Now, take the same relational context, but insert a sense of psychological safety into the decision schema: *When I've brought up similar*

problems in the past this individual thanks me for looking out for them and appreciates how I've "always got her back." Therefore, the present study suggests that an individual's sense of psychological safety will act as an enabler of peer accountability behaviors.

Hypothesis 1: Psychological safety has a positive relationship with peer accountability behaviors.

Peer Accountability & Engagement

Liang and colleagues (2012) found that the relationship between psychological safety and prohibitive voice, which "describes employees' expressions of concern about work practices, incidents, or employee behavior that are harmful to the organization" (p. 75), was very low and non-significant. This suggests that while psychological safety is an important feature of one's decisions to speak up in a given situation (e.g., Edmondson, 1999), there are additional factors that predict one's likelihood of speaking up about issues and concerns. This author proposes that engagement is likely to be one of those additional factors. Engagement at work is defined as:

> a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption. Rather than a momentary and specific state, engagement refers to a more persistent and pervasive affective-cognitive state that is not focused on any particular object, event, individual or behavior (Schaufeli, Salanova, Gonzalez-Roma, & Bakker, 2002, p. 74).

Research suggests that on smaller teams, consisting of 15 team members or less, the most predictive factor for nurse engagement was the feeling that one's opinions mattered in the workplace (Cathcart et al., 2004). Cathcart and colleagues (2004) suggested that leaders held the sole responsibility for an employee "feeling heard." However, this author would contend that feeling heard by one's leader is only part of the equation for feeling engaged at work.

Specifically, if one's coworkers consistently ignore one's suggestions or concerns, then this individual is *not* "heard" regardless of how welcoming and listening their leader is. The practice of peer accountability may positively influence one's engagement because their opinions and suggestions have the opportunity to be acted upon by peers.

It is known that part of what drives engagement at work are the interactions one has with coworkers (e.g., Nahrgang, Morgeson, & Hofmann, 2010). Prior research on accountability's relationship to job satisfaction suggests that individuals appreciate knowing "their contributions are valued" through recognition, but do not like feeling they are "being 'checked up on'" (Thoms, Dose, & Scott, 2002, p. 319). In fact, Thoms and colleagues (2002) found that the accountability to job satisfaction relationship was stronger for those situations in which employees felt that others were aware of their work, but not that others were assessing their work. These results suggest that an important feature of felt accountability and job satisfaction is recognizing good work as it happens, however it does not explore the impact of practicing peer accountability on one's personal engagement at work. Because engagement and job satisfaction are interrelated (e.g., Alarcon & Lyons, 2011), it would fit to extend this logic to peer accountability behaviors, such that individuals who provide peer accountability experience strong work engagement.

Engagement has been proposed as a prerequisite for employees feeling proactive and independent (Bakker, Schaufeli, Leiter, & Taris, 2008). These engaged employees are expected to not only be proactive, but also to "take responsibility for their own professional development" (Bakker et al., 2008, p. 188). Additionally, it is suggested that engaged employees work towards exceptional performance standards (Bakker et al., 2008): these engaged employees find these performance standards more obtainable, feel a sense of responsibility to ensure their colleagues

work to their highest potential, and tend to be critical of individuals who do not meet these performance standards (Vinje & Mittelmark, 2007). It is possible that this critical view of another's performance will lead highly engaged individuals to be more likely to perform correction-based peer accountability behaviors.

Hypothesis 2: Engagement will promote more peer accountability behaviors.

To this author's awareness, the interaction of psychological safety and employee engagement has not been extensively studied. A study by Dollard and Bakker (2010) considered *psychosocial safety,* which they defined as "*freedom* from psychological and social risk or harm" (p. 580). They contend that this construct is distinct from psychological safety because it functions as an antecedent to psychological safety and that it is "*causally prior to* psychosocial working conditions, not indicated by them" (Dollard & Bakker, p. 580). Research by Nembhard and Edmondson (2006) considered psychological safety and *engagement in quality improvement work*, which assessed the involvement of individuals and their coworkers in quality improvement efforts in their healthcare department. Both Dollard and Bakker (2010) and Nembhard and Edmondson (2006) found results suggesting that psychosocial safety and psychological safety, respectively, correlate with greater employee engagement. Given this positive relationship, this study proposes that psychological safety and employee engagement will interact to predict greater peer accountability behaviors.

Hypothesis 3: There will be an interaction such that the relationship between engagement and peer accountability behaviors will be stronger when psychological safety is higher.

Changing Peer Accountability Behaviors

Individuals in this study are participants in a hospital-sponsored Safety Coach Program, a voluntary program for front-line staff members, wherein individuals receive additional training

in giving feedback to peers (i.e., peer accountability behaviors). These individuals are intended to serve as local experts in the safety behaviors that are to be used by all hospital employees on a daily basis. Through their class (see Appendix) the safety coaches are taught specific tactics for giving feedback to others (Patterson, Grenny, McMillan, & Switzler, 2011), as a lack of communication skills was previously identified as a reason why individuals may not engage in peer accountability behaviors (Lockett et al., 2015). Additionally, participation in the safety coach program is sanctioned by the organization, giving individuals a sense of authority to speak up about safety issues, intending to reduce some of the riskiness inherent in bringing up problems and concerns (Morrison, 2011). As part of participation in the safety coach program, it is recommended, but not mandatory, that individuals have monthly meetings with their leader and that they attend the monthly safety coach support meeting. Individuals who engage more with their leaders and who regularly attend the monthly support meeting may experience an additional boost in peer accountability behaviors. This is possible given that a leader can support and back-up a safety coaches concerns with the group, setting the tone for what is expected in this group (Schein, 2010). By participating in the monthly safety coach meetings, individual safety coaches may feel less isolated in their efforts to coach peers, and can learn additional tips and tricks for addressing tough coaching situations.

Hypothesis 4: Individuals who receive the safety coach education will engage in more peer accountability behaviors over time.

Hypothesis 5: Individuals who regularly meet with their leaders will engage in more peer accountability behaviors over time.

Hypothesis 6: Individuals who regularly attend monthly safety coach meetings will engage in more peer accountability behaviors over time.

Methodology

The present study is a repeated-measures study taking place over a one and a half year period. All surveys and responses are secondary data sources from a pre-existing program within the hospitals. This program involved front-line employees, who volunteered for the role of "safety coach," in a one-time training on safety practices (which was an abbreviated repetition of a course that all employees attended) and tactics for coaching peers (which was unique to this group of safety coaches). Those who became safety coaches were asked to meet regularly with their leader (where leader is inclusive of supervisors, managers, and directors) and attend the recurring safety coach meeting, where they could share experiences from the past month, learn from one another, and learn from other leaders (acting as guest speakers) within the organization.

Sample

The individuals included in this study are from two medium-sized hospitals in the Southwestern United States. Their department affiliations include: nursing, food services, rehab therapies, phlebotomy, pharmacy, respiratory therapy, patient transportation, community services, and radiology / imaging. The average years of experience in this sample is 15 and the average years working in their hospital is seven. The majority of the sample is female (64%), which is typical of the healthcare profession. The total sample size of unique individuals is 82. Over time there is attrition in responses and participation in the safety coach program, therefore the sample size for specific analyses will vary and will be described in the statistical analysis section later.

Safety coaches. Safety coaches in the organization are individuals who have volunteered to take on the additional responsibility of looking out for safety on the unit and providing feedback regarding safe and unsafe practices to their peers, as well as to their leaders.

Occasionally a safety coach was "voluntold" to participate; often those safety coaches do not continue past the initial training and first meeting. There is no monetary inducement for becoming a safety coach; hours worked as a safety coach are paid at the individual's regular hourly rate and the time spent coaching peers should be done as part of their regular time on the job. The additional time paid as a safety coach comes from the initial three-hour class, in which they are taught high reliability principles, the specific safety tools and behaviors are reviewed again, and they spend time practicing coaching skills (see Appendix A for a general overview of the class). After the class the safety coaches receive a "badge buddy" (i.e., a laminated badge to place on their lanyard with their workplace ID) which says "Safety Coach" and is visible alongside their workplace ID. The other source of paid time from the safety coach program is a monthly one-hour meeting. This meeting varies in its content from a simple check-in to share with one another the different successes and barriers around coaching peers to a mini-education session, wherein guest speakers (i.e., leaders within the organization) were brought in to share information about their area of work (see Table 1 for details regarding guest speakers, content discussed, and other aspects of the safety coach program). As mentioned above, some safety coaches do not participate past the initial training and/or first meeting; attrition in the safety coach program is also due to shifting job responsibilities (i.e., promotions), a loss of interest in the voluntary program, and individuals leaving the organization.

[INSERT TABLE 1 ABOUT HERE]

Measures

[INSERT TABLE 2 ABOUT HERE]

Peer accountability behaviors. Peer accountability behaviors are measured by a 10-item scale developed for this program. Sample items include "thank coworkers for bringing up

safety concerns" and "speak to coworkers about behaviors that may cause harm to a patient". A full list of peer accountability items, and all items included in this study, can be found in Table 2. These items were rated on a 6 point scale ranging from "zero times this week" to "six or more times a day" and respondents were asked to think about their past week (or last three shifts) at work. This scale was created to match the specific peer accountability behaviors the organization had trained individuals to undertake. Cronbach's alpha from the pre-surveys for all individuals in this sample is .91.

Psychological safety. Psychological safety is measured using a four-item scale from Nembhard and Edmondson (2006). A sample item is "If you make a mistake in this unit, it is often held against you." All items were answered on a five-point scale from "strongly disagree" to "strongly agree." Cronbach's alpha for this scale in previous research was .73 and in this pre-survey sample is .77.

Engagement. Engagement is measured using the three "most characteristic" items from Schaufeli, Bakker, and Salanova (2006) in order to reduce the time required to complete the survey. The three items were "at work, I feel bursting with energy" (vigor), "I am enthusiastic about my job" (dedication), and "I am immersed in my work" (absorption). All items were rated on a seven-point scale from "never" to "always." Cronbach's alpha from the pre-surveys for all individuals in this sample is .84.

Leader meetings. Each safety coach was asked to meet regularly with their leaders. This was measured with one question: "In the past month, did you meet with your leader to discuss your safety coach observations?" This is a yes or no question that is asked every month and will be viewed cumulatively across individual safety coaches.

Monthly meetings. Each safety coach is invited to attend monthly meetings wherein they can receive additional education and peer support. Attendance is tracked using a sign in sheet, the information is subsequently de-identified within the safety coach database and each safety coach has an attendance rate associated with their ID.

Control variables. All participants were asked to provide their age, sex, years with the organization, years in their profession, and their department. These will be used as control variables as appropriate.

Results

This is a secondary data analysis of survey data from the hospitals' 82-person Safety Coach Program. All participants received and completed the pre-survey as part of their Safety Coach Training class. Subsequent follow-up surveys were sent out monthly to assess changes in peer accountability behaviors and beliefs over time.

Tests of normality were done, including assessing the skew and kurtosis for items across time and graphing the box and whisker plots to identify outliers. These analyses identified some positive skew and kurtosis on the dependent variable (DV), peer accountability, and the independent variables (IVs), psychological safety and engagement. The most conservative approach to identifying outliers was taken to prevent recurring factor-loading abnormalities during the factor analyses. Each item from the DV and IVs was assessed individually for outliers using box and whisker plots wherein the outlying individual was more than three standard deviations above or below the mean for all individuals on the individual item. Using this tactic, the box and whisker plots identified seven individuals to be completely removed from the analyses because they were consistent outliers across items on the DV and IVs across multiple time points, dropping the total N of unique individuals from 82 to 76. Additional one-

time outliers were identified using the same process described above, and cases were removed at each time point, as needed. The N for each analysis will be reported alongside their respective results.

An exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA) were performed in order to assess the validity of the DV, peer accountability behaviors. The EFA on the pre-class data (N = 63), using a principle axis factoring method which allowed factors to be identified by Eigenvalues greater than 1.00, suggested a two-factor solution for the peer accountability DV: *safe accountability behaviors* (Eigenvalue = 4.88) and *risky accountability behaviors* (Eigenvalue = 1.16). The factor loadings, Cronbach's alpha if each item is removed, and the full item wording are listed in Table 3.

[INSERT TABLE 3 ABOUT HERE]

The CFA on time one data (N = 54) confirmed a two-factor solution as the best-fitting model, with slight modifications: due to some cross-loading between the two factors, the best fitting model excluded the item "*Thank or recognize coworkers for using our safety tools*." This best-fitting model for this sample approached the statistical recommendations for model fit: *Chi-Square* = 36.39, *df* = 26, *p* = .09; *GFI* = .88 (recommendation *GFI* > .95); *RMSEA* = .09 (recommendation *RMSEA* < .05); *AIC* = 74.39. Thus, the final DV solution indicated a two-factor solution: 1) *safe accountability behaviors*, with 6-items and a Cronbach's alpha of .87; and 2) *risky accountability behaviors,* with 3-items and a Cronbach's alpha of .87.

The two-factor structure underlying the construct of peer accountability behaviors (*safe accountability behaviors* and *risky accountability behaviors)* reveals an underlying difference in peer accountability, suggesting a difference in approach behind each type of accountability. The safe accountability behavior items predominantly center on thanking coworkers for safe work (as

can be seen in Table 3); for example, two items involving thanking include "Thank coworkers for bringing up safety concerns" and "Thank coworkers when they stopped you from making a mistake." While recognition is the main focus of this six-item factor, reporting one's own mistakes, listening to others concerns, and coaching others on the workplace safety behaviors also hang together with these recognition-focused items. Meanwhile, the risky accountability behaviors focus exclusively on speaking to a coworker about behaviors that may cause harm, either to a patient, to the coworker, or to the organization. These items are less diverse than the safe accountability behaviors factor, but suggest a different decision schema underlying them, given that they consistently hang together in the factor structure.

Additionally, reliability analyses were performed for each IV. The results of the reliability analysis for psychological safety suggested one item be removed—this is the reverse-scored statement "*If you make a mistake on this unit, it is often held against you.*" When this item was included in the 4-item scale, the Cronbach's alpha indicated a poor scale reliability (*alpha* = .64). When this item was removed, the scale reliability improved to *alpha* = .77. The engagement scale reliability analysis revealed no required changes, with a Cronbach's alpha of .84. The correlations for all scales, based on their above modifications, is presented in Table 4, along with the N, mean, and standard deviation for each variable at each time point.

[INSERT TABLE 4 ABOUT HERE]

Hypothesis 1

Testing hypothesis 1—*psychological safety has a positive relationship with peer accountability behaviors*—yields mixed results. The basic correlation between psychological safety and safe accountability behaviors suggests a statistically significant relationship at time zero (pre-class) and time one (first monthly meeting post-class), but this relationship does not

exist at subsequent time points. Additionally, there is no statistically significant correlation between psychological safety and risky accountability behaviors at any time point.

The regression results for hypothesis 1 suggests a predictive relationship between psychological safety and safe accountability behaviors at time zero (R^2 = .08, p = .035, N = 59), but this relationship disappears when psychological safety is included in the model with engagement (this interaction will be explicitly outlined with hypothesis 3). This statistically significant relationship at time zero remains in place when including the control variable differentiating registered nurses (RNs) from all other employees acting as safety coaches (see Table 5), with two main effects (RN β = .33, p = .009; psychological safety β = .28, p = .025) and no interaction.

[INSERT TABLE 5 ABOUT HERE]

At time one, this relationship continues to exist both with the control variable (R^2 = .13, p = .042, N = 35; see Table 6)—with a main effect of psychological safety in predicting safe accountability behaviors (β = .35, p = .042), and no main effect for RNs as a control variable (β = .12, p = .483)—and without the control variable (R^2 = .12, p = .045, β = .34). This relationship ceases to exist at time two (N = 25), and the sample size becomes too small for meaningful interpretation after time two (N < 25). There were no other control variables that had a statistically significant effect on these relationships.

[INSERT TABLE 6 ABOUT HERE]

Psychological safety has no statistically significant predictive effect on risky accountability behaviors under any condition. Thus, the overall results for hypothesis 1 suggestion partial support and partial explanatory ability of psychological safety in predicting safe accountability behaviors, and no predictive ability for risky accountability behaviors.

Hypothesis 2

Testing hypothesis 2—*engagement will promote more peer accountability behaviors*—also yields mixed results. The basic correlation between engagement and safe accountability behaviors suggests a statistically significant relationship at time zero (pre-class) and time one (first monthly meeting post-class), but this relationship does not exist at subsequent time points. Additionally, there is no statistically significant correlation between engagement and risky accountability behaviors at any time point.

The regression results for hypothesis 1 suggests a predictive relationship between engagement and safe accountability behaviors at time zero ($R^2 = .11$, $p = .026$, N = 45). This statistically significant relationship at time zero remains in place when including the control variable differentiating registered nurses (RNs) from all other employees acting as safety coaches (see Table 7), with two main effects (RN $\beta = .45$, $p = .002$; engagement $\beta = .46$, $p = .002$) and an interaction effect that approaches significance ($p = .083$) suggesting that RNs who are highly engaged are more likely to engage in safe accountability behaviors than those in other roles.

[INSERT TABLE 7 ABOUT HERE]

At time one, this relationship continues to exist both with the control variable ($R^2 = .46$, $p = .022$, N = 26; see Table 8)—with a main effect of engagement in predicting safe accountability behaviors ($\beta = .47$, $p = .022$), and no main effect for RNs as a control variable ($\beta = .22$, $p = .267$)—and without the control variable ($R^2 = .17$, $p = .037$, $\beta = .41$). This relationship ceases to exist at time two (N = 17), and the sample size becomes too small for meaningful interpretation after time two (N < 17). There were no other control variables that had a statistically significant effect on these relationships.

[INSERT TABLE 8 ABOUT HERE]

Engagement has no statistically significant predictive effect on risky accountability behaviors under any condition. Thus, the overall results for hypothesis 2 suggest partial support and partial explanatory ability of engagement in predicting safe accountability behaviors, and no predictive ability for risky accountability behaviors.

Hypothesis 3

The results for hypothesis 3—*there will be an interaction such that the relationship between engagement and peer accountability behaviors will be stronger when psychological safety is higher*—suggest that there is no statistically significant interaction effect for psychological safety with engagement in predicting either safe accountability behaviors or risky accountability behaviors at any time point under any condition (see Figures 2 and 3). Due to the small repeated sample size over time (N = 46), this hypothesis was under-powered for testing using a multilevel model. No additional tests were completed outside of the regressions at each time point.

[INSERT FIGURES 2 AND 3 ABOUT HERE]

Multilevel Modeling Results

The sample of 76 individual safety coaches was used for a multilevel modeling examination to isolate various effects over time by taking into account the likely similarities in scores both within a single time point, and within individuals across times (Heck et al., 2013; Meyers, Gamst, & Guarino, 2013). The DV in this model remained the same as the above hypotheses: predicting *safe accountability behaviors* and *risky accountability behaviors* separately. The level one predictors in the models tested below included time (ranging from one timepoint to four time points), psychological safety, and engagement. The level two predictors

in the models tested below included the total number of times an individual met with their leader and the rate of attendance at the safety coach monthly meetings.

The null model for safe accountability behaviors revealed a statistically significant estimated individual variance of .69 (Wald $Z = 5.83$, $p < .001$) with a statistically significant estimated residual variance of .04 (Wald $Z = 7.26$, $p < .001$). The intraclass correlation coefficient of this null model was calculated as .9482, suggesting that 94.82% of the variance in safe accountability behaviors is associated with individuals and that the assumption of independence was violated, thus indicating a sufficient condition for performing a multilevel model.

The null model for risky accountability behaviors revealed a statistically significant estimated individual variance of .76 (Wald $Z = 5.91$, $p < .001$) with a statistically significant estimated residual variance of .02 (Wald $Z = 7.29$, $p < .001$). The intraclass correlation coefficient of this null model was calculated as .9692, suggesting that 96.92% of the variance in risky accountability behaviors is associated with individuals and that the assumption of independence was violated, thus indicating a sufficient condition for performing a multilevel model.

Hypothesis 4. Using a repeated measures multi-level model, the test of hypothesis 4, that safety coaches will engage in more peer accountability behaviors over time, reveals a non-significant effect of time on both safe accountability behaviors (N = 75, $F(25) = 1.96$, *Estimate* = -.02, $p = .174$) and risky accountability behaviors (N = 74, $F(34) = 1.32$, *Estimate* = .02, $p = .259$). Additionally, the AIC, which is recommended for comparing models over time (Heck, Thomas, & Tabata, 2013), for the safe accountability behavior model did not evidence an improvement (*AIC* = 205.48) in model fit from the null model (*AIC* = 199.87). The same is true

for the risky accountability behaviors model fit (*AIC* = 162.72) compared to the null model (*AIC* = 155.67). This suggests that an individual's peer accountability behaviors did not change over time, and that including time did not provide a better fit to the model in explaining peer accountability behaviors.

Hypothesis 5. A repeated measures multi-level model was used to test hypothesis 5, that safety coaches who meet with their leaders more often will engage in more peer accountability behaviors over time, wherein the total number of meetings with leaders was treated as a fixed effect in the model. Overall the effect of meeting with one's leader had a non-significant effect on safe accountability behaviors (N = 75, *F(70)* = 3.23, *Estimate* = -.15, *p* = .077) and risky accountability behaviors (N = 74, *F(71)* = 1.00, *Estimate* = -.09, *p* = .322). The model fit also did not improve over the null model with the addition of leader meetings for the safe accountability behaviors model (new model *AIC* = 205.48; null model *AIC* = 199.87) or the risky accountability behaviors model (new model *AIC* = 164.78; null model *AIC* = 155.67). This suggests that an individual's peer accountability behaviors did not change with an increase in meeting with one's leader, and that including leader meetings did not provide a better fit to the model in explaining peer accountability behaviors.

Hypothesis 6. A repeated measures multi-level model was used to test hypothesis 6, that safety coaches who attend more monthly meetings will engage in more peer accountability behaviors over time, wherein the attendance rate was treated as a fixed effect in the model. The effect of attending the monthly meetings had a statistically significant effect on safe accountability behaviors (N = 72, *F(69)* = 13.50, *Estimate* = -.01, $p < .001$), while time remained a statistically non-significant effect (*F(24)* = 1.08, *Estimate* = -.02, *p* = .310). The results for the risky accountability behaviors model were similar wherein the attendance rate had a statistically

significant effect on risky accountability behaviors (N = 71, *F(69)* = 5.15, *Estimate* = -.01, *p* = .026), while time remained a statistically non-significant effect (*F(34)* = 1.64, *Estimate* = .02, *p* = .209). The model fit improved over the null model with the addition of an individual's monthly meeting attendance rate for the safe accountability behaviors model (new model *AIC* = 187.76; null model *AIC* = 199.87), but not for the risky accountability behaviors model (new model *AIC* = 161.25; null model *AIC* = 155.67).

Overall, these results suggest that each one unit increase in monthly meeting attendance rates yielded a *decrease* of .01 in the performance of both types of peer accountability behaviors; for safe accountability behaviors, the effect of time continues to diminish the performance of these behaviors by .02 over each time point, but for risky accountability behaviors the effect of time increases the performance of these behaviors by .02, yielding a net increase in risky accountability behaviors for those who attended more meetings over time.

The effects of one's attendance at monthly meetings held constant even when leader meetings were included in the model (see Table 9), and no additional effect was revealed by the interaction between leader meetings and attendance rate on either form of peer accountability behavior. The model improvement index suggested that for safe accountability behaviors, the model including time, attendance rate, and total number of leader meetings provided a better fit over the null model (new model *AIC* = 190.20; null model *AIC* = 199.87), but for risky accountability behaviors there was no improvement over the null model (new model *AIC* = 163.78; null model *AIC* = 155.67).

[INSERT TABLE 9 ABOUT HERE]

In this combined model the results suggest that, for safe accountability behaviors, an individual who attends more monthly meetings and has more meetings with their leader will

decrease their performance of safe accountability behaviors by .10 for each one unit increase over time. And, for risky accountability behaviors, those individuals will decrease their performance of risky accountability behaviors by .05 for each one unit increase in monthly meetings and leader meetings over time.

Discussion

This paper examined the as-yet untested relationships between peer accountability behaviors, psychological safety, and engagement among hospital employees who volunteered to serve as "safety coaches" wherein, as part of their day-to-day job, they engage in peer accountability behaviors that are sanctioned by their leader and the organization. If peer accountability is the solution for how healthcare can achieve high reliability—being that the industry is less standardized, in both technology and practice standards, than other high reliability industries—then these results suggest that our current methods for promoting peer accountability behaviors are lacking. Overall, only engagement proved to be a positive predictor of safe peer accountability behaviors under a variety of conditions; while these safe accountability behaviors are important (as positive reinforcement is an important component of any successful organization and culture; Luthans & Stajkovic, 2009), they are not the behaviors that will stop a safety issue in its tracks. Rather, risky peer accountability behaviors are those that have the opportunity to prevent a safety event before it occurs, and the results of this study only show how to reduce one's likelihood of engaging in risky peer accountability behaviors, which is through attending a monthly meeting with one's organizational colleagues who are also safety coaches.

Safe and Risky Peer Accountability Behaviors

The results suggested a divide in type of peer accountability behavior, where those behaviors that one may consider "safer" hung together (e.g., thanking a colleague for a safety behavior) and those that may be considered "risky" hung together (e.g., speaking to a colleague on a missed opportunity where harm may have [almost] occurred). This separation in type of peer accountability behaviors is reminiscent of the distinction between promotive and prohibitive voice behaviors (e.g., Liang, Farh, & Farh, 2012), which have received limited study as a peer-to-peer construct. Additionally, this distinction between safe and risky accountability behaviors, and the discussion to follow, suggests a different psychological state may be required to engage in each type of peer accountability behavior. This is an important difference that will require further study to uncover the respective antecedents for safe and risky peer accountability behavior.

Psychological Safety and Engagement

The results reveal a mixed relationship between psychological safety and peer accountability (hypothesis 1). Psychological safety has a modest statistically significant correlation with safe accountability behaviors at some time points, but not with risky accountability behaviors, and the regression results reveal a statistically significant relationship with safe accountability behaviors at only two time points (and no relationship with risky accountability behaviors). In all, these findings suggest that psychological safety is an important antecedent to an individual's safe peer accountability behaviors, which is consistent with previous research on upward voice behaviors (e.g., Edmondson, 1999; Liang et al., 2012; Nembhard & Edmondson, 2006); but for risky peer accountability behaviors, a type of behavior that one would think would require more psychological safety in order to perform, there is no statistically meaningful relationship. This unexpected finding merits further investigation in

future research. This finding is reminiscent of the author's prior research within healthcare on peer accountability (DeMichele, 2015)—using a different scale and a different sample, the results suggested that nurses with more than 20 years of experience, who had a strong sense of psychological safety and strongly held implicit voice beliefs (i.e., that there will be consequences for speaking up; Detert & Edmondson, 2011) spoke up to peers using prohibitive voice the least out of any condition. This is similar to the current findings wherein the sample, as a whole, has a very strong sense of psychological safety, and yet engages in risky peer accountability behaviors very minimally, such that there is no effect of psychological safety on these behaviors.

Interestingly, when including whether an individual was a registered nurse (RN) or not as a control variable for the pre-class (time zero) survey data, it revealed that RNs are more likely to engage in safe accountability behaviors from the get-go, yielding two main effects in the pre-class sample: one for RNs and one for psychological safety increasing one's likelihood of engaging in safe peer accountability behaviors. There was no interaction effect. In the time one data, however, there was no difference for being a RN, suggesting that the class may have neutralized the professional hierarchy and empowered non-RNs to engage in more safe peer accountability behaviors, thus leveling out the previously identified difference. Psychological safety remained a statistically significant main effect at time one.

In testing hypothesis 2, that engagement has a positive relationship with peer accountability behaviors, the results were, again, mixed. For safe accountability behaviors, the relationship was positive, as expected. However, for risky accountability behaviors, engagement had a null relationship, just like the findings for psychological safety. Once again, this result is cause for perplex because it is counter to the literature and the expectations that fit in with past research, which suggested that highly engaged individuals would be more likely to critique the

performance of their peers who were not meeting expectations at work (Bakker et al., 2008; Vinje & Mittelmark, 2007).

When RNs were included as a control variable with engagement in the pre-class (time zero) sample, we again see two main effects and no interaction effect in predicting an increase in safe accountability behaviors: one for being a RN and one for engagement. Similar to the psychological safety results, the RN main effect disappears in the time one sample, suggesting again that the class may have served to neutralize the previously existent professional differences in engaging in safe peer accountability behaviors, but not further enhance the RN's engagement in peer accountability behaviors. Including RNs as a control variable also did not unveil any relationship with risky peer accountability behaviors, much like in the psychological safety tests.

Future research needs to delve into this riskier and more negative side of feedback and accountability among peers to better understand its driving forces. Prior research (Nahrgang et al., 2010) found that social support explained 25% of the variance in engagement levels at work. Perhaps risky accountability behaviors are so detrimental to one's sense of social support at work that those who are highly engaged choose to exhibit less of this peer accountability behavior. Instead, individuals focus on those safe accountability behaviors, with which engagement has a positive and statistically significant relationship, which are likely to foster social support through recognition and reinforcement of positive workplace behaviors (Grant, 2007; Luthans & Stajkovic, 2009).

When testing for the interaction effect of psychological safety and engagement in the same model (hypothesis 3), the relationship between psychological safety and safe accountability behaviors disappears, but engagement remains a statistically significant main effect in predicting safe peer accountability behaviors. There was no interaction effect revealed in these analyses. It

is evident in the correlation results from the pre-class data (time zero) that psychological safety and engagement share a lot of explanatory power due to their high correlation, but this disappears over time. Despite the lower correlations between psychological safety and engagement, engagement continues to eclipse psychological safety in predicting safe accountability behaviors when psychological safety is tested as a moderator of this relationship. Additionally, in predicting risky peer accountability behaviors, the interaction of psychological safety and engagement did not reveal any additional results, leaving hypothesis 3 with a null finding.

Organizational Support for Peer Accountability Behaviors

All of the multilevel modeling analyses revealed results that were null findings or counter to expectations: peer accountability behaviors did not change in a statistically significant way over time, despite the organizational support and education that safety coaches received; more meetings with one's leader contributed to a non-statistically significant decrease in the performance of both types of peer accountability behaviors over time; and attending more safety coach monthly group meetings contributed to a statistically significant decrease in both types of peer accountability behaviors.

Specifically, the results for hypothesis 4—testing whether peer accountability behaviors change over time—is likely evidence of a middling safety coach class experience (i.e., the program itself merits further development), coupled with a group of highly engaged individuals who may already be at the top end of what one could consider a "reasonable" amount of peer accountability in the workplace. It also indicates that within individuals over time, they remained remarkably consistent in their peer accountability behaviors, which is good if an

individual was already performing a great number of these behaviors, but needs more investigation for how to enhance someone's peer accountability behaviors within the hospital.

The finding for hypothesis 5—that meeting with one's leader would result in more peer accountability behaviors over time—had a non-statistically significant effect on both types of peer accountability behaviors. This is surprising, however it does align with previous research in a meta-analysis in which Chiaburu and Harrison (2008) discovered that individual's behaviors at work were significantly influenced by coworkers, even when the effect of a leader was included in the model. In other words, a leader's influence over an individual's behavior at work was less important than coworkers' influence over that individual. Perhaps the more important, albeit unrealistic, expectation to set for future safety coaches would be to meet regularly with their peers. In this way the safety coaches could foster the important peer-to-peer relationships (i.e., relational social capital; Nahapiet & Ghoshal, 1998) that, perhaps, are being damaged through their peer accountability efforts (Bolino, Turnley, & Bloodgood, 2002; Nahapiet & Ghoshal, 1998). Meanwhile, the interaction with a leader is likely important in those situations where the leader is considered "part of" the team, but in those departments wherein leaders hold themselves as separate from the workforce, there could be a negative effect. An alternative explanation is simply that a leader may coach their safety coach to give less feedback, especially if they have received complaints from other employees who say that a safety coach has gone over the top in their role. Therefore, the safety coach would reduce the amount of peer accountability behaviors they engage in, in order to conform to their leader's request.

Finally, the finding for hypothesis 6 that, in fact, attending regular monthly meetings with peer safety coaches contributed to a statistically significant *decrease* in both safe and risky peer accountability behaviors is unexpected. Prior theoretical work suggests that social support and

connection with others contributes to an individual's helping behaviors (such as organizational citizenship behaviors; Bolino et al., 2002; Grant, 2007). Ironically, these monthly meetings, which were intended to build this social support network and connection with others, instead appear to have served to temper one's peer accountability behaviors. A few explanations are possible. First, perhaps safety coaches who had engaged in a fair amount of safe and risky peer accountability behaviors and shared horror stories of their feedback not being taken well served as an example to other safety coaches: if I do too much of this, I could experience retribution from my peers. Second, it is possible that safety coaches who were engaging in more of both safe and risky accountability behaviors felt that their co-safety coaches in these meetings were not engaging in a similar amount of peer accountability behaviors; therefore they decreased their performance of both types of peer accountability to match their peers' effort. Third, during these meetings, when tough situations were brought up, individuals were advised to focus on the positive feedback (i.e., the safe accountability behaviors) that could be given to promote safe behaviors, rather than aiming to call out all of the negatives in the workplace; this may serve as an explanation for the decrease in risky accountability behaviors when one attended a larger number of safety coach monthly meetings. However, this does not explain the decrease in safe accountability behaviors. It is possible that safe accountability behaviors also decreased because individuals felt they were not being held accountable for any type of peer accountability behavior. This is a voluntary program joined by individuals who are highly engaged at work—they could have felt over-burdened by all of the voluntary tasks they participate in and given that there is no punishment for not engaging in more peer accountability behaviors, individuals learned the informal rule for the safety coaches: engage in fewer peer accountability behaviors over time and no one will notice.

Limitations and Future Directions

While having a real-life sample of 76 hospital employees engaging in peer accountability behaviors is a strength of this study, it is a small sample with respect to advanced statistical analyses. The multilevel modeling analyses that are reported all converged without any additional warnings or issues, but are likely slightly under-powered and therefore open to variability in their results. Tabachnik and Fidell (2013) recommend a minimum sample size of 60 for multilevel models that have five parameters (i.e., slopes and intercepts assessed for fixed and/or random effects), or approximately a 12:1 ratio of sample size to parameters; other sources recommend as little as a 5:1 ratio (Bentler & Chou, 1987), but the results from this sample in which five to seven parameters were successfully tested suggest the 12:1 ratio is required for convergence. The convergence issues for tests including more than seven parameters prevented additional potentially interesting multilevel interactions from being tested. In all, this suggests a minimum sample size of 100 in future studies to provide adequate power and stability to the existing analyses, and to be able to test additional multilevel interactions. Specifically, a multilevel interaction that was untested in this sample and should be addressed in a future study is the potential interaction between meeting with one's leader and one's sense of psychological safety and/or engagement over time. This future study may benefit from a structural equation modeling approach to provide the best nuance to the questions. For example, does meeting with one's leader have an immediate effect on one's sense of engagement or psychological safety at that same time point? Can we predict an increase or decrease in the performance of peer accountability behaviors at a subsequent time point, after one has met with their leader? These tests of the direct relationships across timepoints, through structural equation modeling, would be a great contribution to the literature. Unfortunately, the current dataset is both too small, and

suffers from too much missing data across time points (a non-issue for multilevel modeling analyses) for a structural equation model to provide meaningful results.

This study successfully assessed a subset of employees who engaged in a safety coach program over time, all of whom had varying levels of engagement in the program, offering potentially interesting variability in results. However, this also limits the study's results because it lacks a control sample to compare with over the same timeframe. While those safety coaches who were less participative and engaged in various aspects of the program offer one type of "control" for the analyses, a true separate sample (both within and outside of the hospital) would be a more ideal control for comparison's sake. A future study that could anticipate the creation of a safety coach program (and a hospital's work to become highly reliable) and capture several pre-intervention time points to see if a commitment to high reliability on its own can be attributed with enhancing peer accountability behaviors would be of interest. If this future study could capture two hospitals: both of which committed to becoming highly reliable, but only one of which started a safety coach program, it could more directly assess whether peer accountability is fostered by the program or by the organization's culture. An additional direction for a future study is one with matched control individuals who are similar to those who become safety coaches. This would allow for evaluation of whether those who participate in a safety coach program are simply different types of individuals who are more willing to engage in peer accountability behaviors.

A methodological future direction, that would also benefit the theory supporting peer accountability, can delve into the measurement of peer accountability behaviors at work. The distinction between safer and riskier peer accountability behaviors merits further understanding and study. Ideally this study could take the shape of a qualitative study that is similar to, but

more extensive than, Lockett and colleagues' (2015) original work on peer accountability in healthcare, followed up by detailed survey item development that is intended to capture actual behaviors in the workplace, not hypothetical scenarios (as is more commonly researched; see Geller, Roberts, & Gilmore, 1996; Schwappach & Gehrig, 2014a for examples of items that rely upon hypothetical situations).

An additional future direction for research would be a snowball or experience sampling method style of study, wherein a safety coach could identify with whom they engaged in peer accountability behaviors that day and then those individuals can be immediately pinged to provide their perspective on the experience: was the peer accountability done in an appropriate manner, was it effective, how does the individual now feel about the safety coach with whom they engaged? This study is unlikely to be possible in a hospital setting—there are so many competing priorities and far more urgent and emergent issues happening on a minute-by-minute basis. However, it could make for a unique laboratory or classroom study, wherein we can begin to understand the interwoven nature of peer accountability behaviors: do those who engage in peer accountability behaviors have any immediate negative or positive effects (e.g., heightened sense of engagement or a decrease in psychological safety)? Are these effects dependent upon the reaction of the individual with whom they engaged (e.g., a heightened sense of engagement when a peer is receptive to the feedback)? These results could then be generalized to other samples and shape the practice of enhancing peer accountability in the workplace.

Implications for Research

The present study suggests that peer accountability functions differently from our existing knowledge of voice behaviors, which are traditionally studied as voicing up the chain of command to a leader (e.g., Edmondson, 1999; Edmondson & Lei, 2014; Morrison, 2011). This

is especially true for those risky peer accountability behaviors, wherein a peer must correct the actions of a coworker by calling out this coworker's unsafe behavior. For safe accountability behaviors, psychological safety and engagement have a positive impact, but no interaction; and the main effect of psychological safety disappears when included in the model with engagement. To this author's knowledge, there are not many studies that include both psychological safety and engagement as variables of interest. This should be changed, as the implication in the present sample and study is that psychological safety does not matter as a predictor of safe accountability behaviors; rather, engagement accounts for all of the variability in safe accountability behaviors without needing psychological safety to explain additional variation. If other studies were to include both engagement and psychological safety in their prediction of voice behaviors (of any type), would engagement again erase the effect of psychological safety?

Other research in the realm of accountability includes work done by Geller and colleagues (e.g., 1996) on *actively caring*, and by Hall and colleagues (e.g., 2009) on *felt accountability*. These streams of research differ from the present study in a few ways—most notably, the present study asks individuals to reflect on their performance of peer accountability behaviors over the past week. The work on actively caring, while similar to peer accountability, focused on hypothetical scenarios and one's general willingness to speak up in a variety of situations about safety issues. For example, the nine-item scale to measure willingness to actively care included items such as "I am willing to warn other coworkers about working unsafely" and "I am willing to do whatever I can to improve safety, even confronting other coworkers about their unsafe acts" (Geller et al., 1996). As can be seen in these items, they are asking about potential future behaviors, not behaviors undertaken in the moment; and they are distinctly focused on correcting unsafe behaviors. Out of the nine items, only one relates to

recognition and praise, and it is worded differently from all of the other items: "I feel comfortable praising my coworkers for working safely." Rather than being a hypothetical, would you be willing-style question, it is more retrospective, taking on a "when you have done this in the past" tone to gauge one's comfort with the behavior. In sum, this scale does not get at whether an individual actually performs the behaviors in question—only their willingness and comfort, which leaves a lot to be desired in this stream of research because people may believe they are willing and comfortable until, in hindsight, they realize they have not once performed a single act of peer accountability all week.

The work on felt accountability from Hall and colleagues (e.g., 2009) provides another lens on the idea of accountability in the workplace: whether individuals feel accountable for their actions at work. In general, the construct focuses on how the leader or leadership team influences one's sense of accountability at work. The eight-item scale used to capture the felt accountability construct includes items such as "Top management holds me accountable for all of my decisions" and "If things don't go the way they should, I will hear about it from top management" with only one question out of the eight explicitly naming coworkers, "Coworkers, subordinates, and bosses closely scrutinize my efforts at work" (Hall et al., 2009). Much like the actively caring construct, this scale lacks any indication of one's performance of safe or risky peer accountability behaviors at work; rather, the felt accountability scale targets the psychological state of feeling accountable, an important but separate construct from one's performance of safe and risky accountability behaviors.

In general, this study supports the need for additional research on safe and risky peer accountability behaviors. The results herein are unexpected based on what is known from other streams of research (e.g., the psychological safety literature, Edmondson & Lei, 2014; the

research on voice behaviors, Morrison, 2011). It appears that different psychological constructs and processes are enacted when an individual is asked to engage in accountability behaviors with their peers. The field needs to better understand these constructs and processes as work continues to shift towards a more team-based, and less command-and-control approach (Rousseau, 1997), wherein peers are going to be asked to cross-monitor one another more consistently.

Implications for Practice

The results of this study have some interesting practical implications. Organizational practice has shifted towards more frequent meetings with direct reports to provide a better feedback cycle than a once-a-year approach to feedback (Gorbatov & Lane, 2018). But, as Gorbatov and Lane point out, the implications of these meetings on organizational performance are untested. The findings of this study suggest that regular meetings with one's leader may not have a positive effect on peer accountability behaviors. This begs the question of why this negative relationship exists. Are leaders avoiding the tough conversations with their employees (Gorbatov & Lane, 2018)? Do leaders take on too much responsibility in these one-on-one meetings, unintentionally advising their employees to be less accountable (to one another) and to engage in fewer instances of safe and/or risky accountability behaviors? It is known that leaders set the tone for their organization and team (Schein, 2010), but are good leaders crippling their teams by not encouraging them to look out for one another and instead foster a "tattle tell" culture wherein the leader must be involved in every accountability interaction. This method of leader involvement in all accountability moments would likely be a contributor to leader burnout, and creates a culture in which employees do not feel empowered to handle issues in the moment

with their peers. This is a major implication for the practice of leadership and how leaders can learn to foster peer accountability behaviors among their direct reports.

With respect to a safety coach program that an organization seeks to foster—it begs the question whether having a "select few" engage in this work is the correct approach. In this sample, it is apparent that attending the one-time training on being a safety coach does not change (for better or worse) their subsequent peer accountability behaviors. These individuals were recruited given their interest in, and enthusiasm for, safety behaviors after the initial education on safety behaviors that all hospital employees participated in. It is possible that a second educational intervention is not enough to increase the peer accountability behaviors that safety coaches should perform (Geller et al., 1990). Geller and colleagues (1990) propose that different types of interventions are required to reach different individuals, based on their receptiveness to the behavior change message (Geller, Roberts, & Gilmore, 1996). What is surprising in this sample is that these individuals were receptive to the original message (i.e., engage in safety behaviors), but appear to be unchanged by the new educational message (i.e., engage in peer accountability behaviors, monitoring your peer's use of safety behaviors). Thus, perhaps a different, and more intensive, type of behavior change intervention is needed to obtain higher levels of peer accountability behaviors in healthcare (see Geller et al., 1990 for recommended levels of intervention).

The education is followed by monthly check-in meetings, but the evidence in this sample suggests that these meetings actually decrease how much one engages in peer accountability behaviors, which is the opposite of the goal of the safety coach program. Perhaps the safety coach program is not best supported by collective meetings and instead needs to be supported more locally: by the leader and the team with whom the safety coach regularly interacts.

Alternatively, maybe there needs to be a shift-by-shift, unit-by-unit approach to safety coaching: bring a full team on-board with the principles of safety coaching, monitor this closely (e.g., through observations, meetings with the team and with leaders), and then move on to the next unit so that the entirety of the unit's team is exposed to the new peer accountability expectations, which will (hopefully) become the new norms and culture of the group.

Conclusion

This study extends the current empirical literature base on peer accountability in healthcare and answers the call from Hall and colleagues (2017) to perform more field studies on accountability. This work revealed a two-factor structure underlying peer accountability behaviors in healthcare: safe accountability behaviors (i.e., recognition-based accountability) and risky accountability behaviors (i.e., correction-based accountability), which is a first of its kind finding in the realm of peer-to-peer accountability. The findings provide some preliminary support for the existence of positive relationships between psychological safety, engagement, and safe peer accountability behaviors. But this support wanes for risky peer accountability behaviors, leaving an open question as to what serves to drive one's engagement with that type of peer accountability. Additionally, the study examines how peer accountability behaviors change over time under various conditions of organizational support (i.e., meeting with one's leader, attending monthly safety coach meetings), and finds these organizational support methods to be lacking in their ability to promote both types of peer accountability behaviors. In all, the results suggest an urgent need for additional research to facilitate our understanding of, and ability to foster, peer accountability behaviors among healthcare workers.

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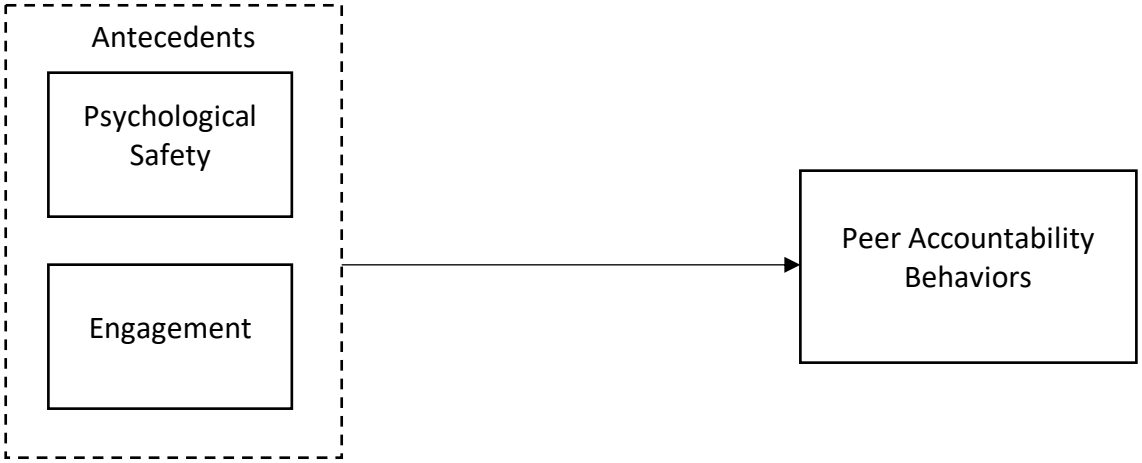

Figure 1. Theoretical model of hypothesized antecedents of peer accountability behaviors.

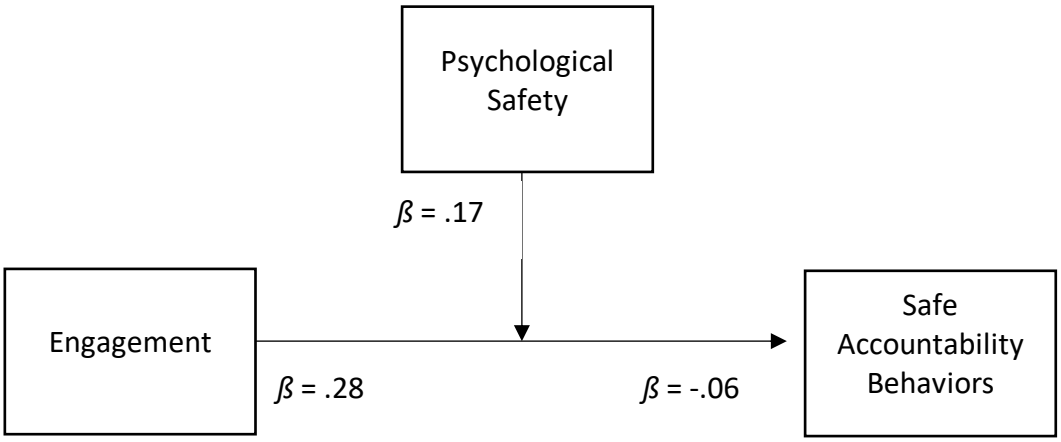

Figure 2. Model depicting the interaction between psychological safety and engagement in predicting safe accountability behaviors at time zero (hypothesis 3). The individual beta weights from the regression are shown on the left-hand side of the model, the interaction effect is depicted on the right; all are statistically non-significant.

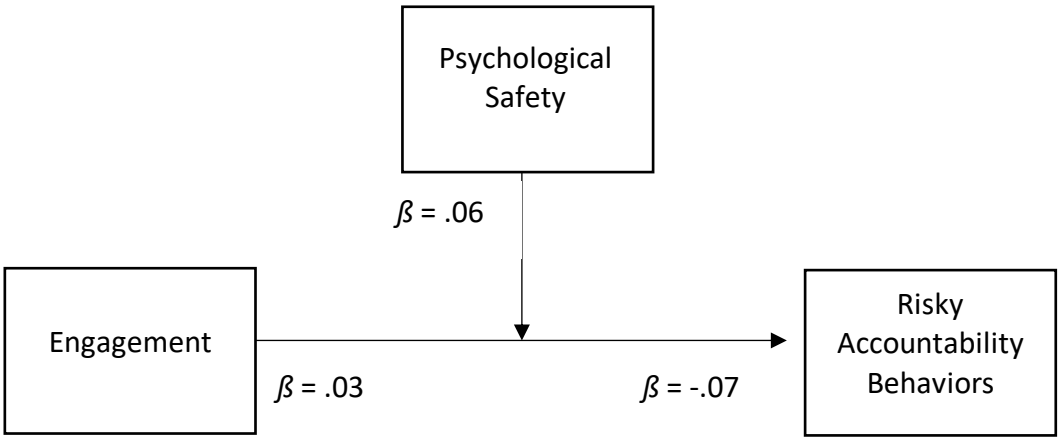

Figure 3. Model depicting the interaction between psychological safety and engagement in predicting risky accountability behaviors at time zero (hypothesis 3). The individual beta weights from the regression are shown on the left-hand side of the model, the interaction effect is depicted on the right; all are statistically non-significant.

Table 1.
Safety Coach Monthly Meetings

Guest Speakers	• Infection Preventionist • Employee Health Manager • Patient Experience Director • Risk Manager • IT Director • Facilities Manager • Biomedical Manager • COO, CMO, VPMA, CNO, VP Operations
Average Attendance	• 17 safety coaches
Time of Day	• 0730-0830 and 1630-1730
Additional Content Discussed	• Days since last serious safety event • Safety concerns from previous month • Safety tool of the month • Tips for giving/receiving feedback
Additional Inducements	• Paid for time in meeting • Occasionally food is offered

Note. COO = Chief Operating Officer; CMO = Chief Medical Officer; VPMA = Vice President of Medical Affairs; CNO = Chief Nursing Officer.

Table 2.
Scales and Survey Items From Safety Coach Program

Peer Accountability Behaviors

1. Thank coworkers for bringing up safety concerns.
2. Celebrate coworkers who stopped errors before they cause harm.
3. Thank coworkers when they stopped you from making a mistake.
4. Thank or recognize coworkers for using our safety tools.
5. Actively listen when coworkers communicated safety concerns.
6. Speak to coworkers about behaviors that may cause harm to a *patient*.
7. Speak to coworkers about behaviors that may cause harm to *them*.
8. Speak to coworkers about behaviors that may cause harm to the *organization*.
9. Report problems, errors, and events to my team.
10. Coach coworkers when they should have used a safety tool.

Psychological Safety

1. If you make a mistake on this unit, it is often held against you.*
2. People on this unit are comfortable checking in with each other if they have a question about the right way to do something.
3. The people on this unit value others' unique skills and talents.
4. Members of this unit are able to bring up problems and tough issues.

Engagement

1. At my work, I feel bursting with energy.
2. I am enthusiastic about my job.
3. I am immersed in my work.

Leader Meetings

1. In the past month, did you meet with your leader to discuss your safety coach observations?

Note. Scale names are bolded, items for each scale are numbered and indented below their scale. Items with an asterisk are reverse scored.

Table 3.
Rotated 2-Factor Solution with Cronbach's Alphas if Item is Removed

Item	Factor 1 Loading	Factor 2 Loading	Factor 1 alpha if item removed	Factor 2 alpha if item removed
Thank coworkers for bringing up safety concerns.	.938		.860	
Celebrate coworkers who stopped errors before they cause harm.	.885		.855	
Thank coworkers when they stopped you from making a mistake.	.563		.881	
*Thank or recognize coworkers for using our safety tools.**	.578		.869	
Actively listen when coworkers communicated safety concerns.	.802		.869	
*Speak to coworkers about behaviors that may cause harm to a **patient**.*		.626		.875
*Speak to coworkers about behaviors that may cause harm to **them**.*		.936		.760
*Speak to coworkers about behaviors that may cause harm to the **organization**.*		.817		.818
Report problems, errors, and events to my team.	.530		.880	
Coach coworkers when they should have used a safety tool.	.529		.874	

Note. Only values > .300 are presented. This is the pattern matrix solution from the exploratory factor analysis. *Item was removed from the final model.

Table 4.
Correlations Over Time

	Time	N	M	SD	Safe Account.	Risky Account.	Psych Safe	Engage-ment	Total Leader Meetings
Safe Account.	*0* *1* *2*	62 54 38	2.08 1.80 1.85	.84 .55 .71	-				
Risky Account.	*0* *1* *2*	62 54 38	1.73 1.59 1.67	.85 .73 .79	.58*** .48*** .72***	-			
Psych Safe	*0* *1* *2*	59 35 25	4.25 4.17 4.05	.47 .43 .51	.28** .34** .06	.06 .18 -.11	-		
Engagement	*0* *1* *2*	45 26 17	5.45 5.44 5.35	.91 .82 .74	.33** .41** .31	.03 .12 -.07	.40** .29 .16	-	
Total Leader Meetings	*0* *1* *2*	63 54 38	1.05 1.24 1.47	1.25 1.27 1.39	-.24* -.03 -.13	-.12 < -.01 -.14	-.30** -.23 -.07	-.14 -.11 -.15	-
Monthly Meeting Attend Rate	*0* *1* *2*	62 52 38	25.86 37.00 42.20	22.67 19.64 18.82	-.41*** -.30** -.32**	-.28** -.12 -.13	-.18 -.06 < -.01	.08 .01 .02	.24* < .01 -.15

Note. SD = standard deviation. Safe Account = safe accountability behaviors. Risky Account = risky accountability behaviors. Psych Safe = psychological safety
*$p < .10$, **$p < .05$, ***$p < .001$.

Table 5.
Regression of Psychological Safety Predicting Safe Accountability Behaviors at Time Zero

Model	r	R^2	R^2 Change	F	p	Beta
1. RN	.32	.10	.10	6.56	.013	.33
2. Psych Safety	.42	.18	.08	5.34	.025	.28
3. Psych Safety x RN	.45	.20	.02	1.34	.252	-

Note. Psych Safety = Psychological Safety. RN = registered nurse, which serves as the control variable differentiating registered nurses from all other employees in the safety coach program. The beta weights are from model 2, inclusive of RN and Psychological Safety, but without the interaction term.

Table 6.
Regression of Psychological Safety Predicting Safe Accountability Behaviors at Time One

Model	r	R^2	R^2 Change	F	p	Beta
1. RN	.09	.01	.01	.29	.595	.12
2. Psych Safety	.36	.13	.12	4.47	.042	.35
3. Psych Safety x RN	.36	.13	.001	.05	.826	-

Note. Psych Safety = Psychological Safety. RN = registered nurse, which serves as the control variable differentiating registered nurses from all other employees in the safety coach program. The beta weights are from model 2, inclusive of RN and Psychological Safety, but without the interaction term.

Table 7.
Regression of Engagement Predicting Safe Accountability Behaviors at Time Zero

Model	r	R^2	R^2 Change	F	p	Beta
1. RN	.32	.10	.10	4.95	.031	.45
2. Engagement	.54	.30	.19	11.46	.002	.46
3. Engagement x RN	.59	.35	.05	3.16	.083	-

Note. RN = registered nurse, which serves as the control variable differentiating registered nurses from all other employees in the safety coach program. The beta weights are from model 2, inclusive of RN and Engagement, but without the interaction term.

Table 8.
Regression of Engagement Predicting Safe Accountability Behaviors at Time One

Model	r	R^2	R^2 Change	F	p	Beta
1. RN	.09	.01	.01	.21	.651	.22
2. Engagement	.46	.21	.21	6.00	.022	.47
3. Engagement x RN	.47	.22	.004	.10	.752	-

Note. RN = registered nurse, which serves as the control variable differentiating registered nurses from all other employees in the safety coach program. The beta weights are from model 2, inclusive of RN and Engagement, but without the interaction term.

Table 9.
Multilevel Model of Fixed Effects of Attendance Rate and Leader Meetings on Accountability Behaviors

	Safe Accountability Behaviors				**Risky Accountability Behaviors**			
	F	*df*	*Estimate*	*t*	*F*	*df*	*Estimate*	*t*
Intercept	278.71***	69	2.48	16.69***	140.66***	68	2.12	11.89***
Attendance Rate	11.56***	68	-.01	-3.40***	4.33*	68	-.01	-2.08*
Leader Meetings	.92	65	-.07	-.96	.47	67	-.06	-.69
Time	1.03	23	-.02	-1.01	1.67	34	.02	1.29

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

Appendix

Safety Coach Class Content Outline

The Safety Coach Class is a three-hour program that all volunteer safety coaches must attend prior to becoming a safety coach. The class involves didactic learning accompanied by time to practice the feedback skills learned in the class.

I. Introductions & Safety Story
II. Safety and Reliability Concept Review
    a. Patient's Perspective
    b. High Reliability Organizations & Principles (Weick & Sutcliffe)
    c. What are Serious Safety Events
    d. Swiss Cheese Effect (James Reason)
    e. Human Error Classification (Gens Rasmussen)
III. The Importance of Safety Coaches in Culture Transformation
    a. Coaches Make it Stick
    b. Overview of Non-Compliance
        i. Addressing perceived burden to comply
        ii. Addressing perceived risk of action
        iii. Addressing power of coworker coaching
IV. Safety Behavior Toolkit & Identifying Safe Practices
    a. Being an Accountable Team Member
    b. Practicing and Accepting a Questioning Attitude
    c. Communicating Clearly
    d. Paying Attention to Detail
V. Behavior Observation & Performance Coaching
    a. Attributes of a Good Coach
        i. Discussion held here
    b. Defining Accountability
VI. Giving Feedback
    a. How Feedback Usually Goes
        i. Discussion held here
    b. 5:1 Feedback Ratio (John Gottman)
        i. Positive and negative feedback
        ii. The power of praise
    c. Methods of giving feedback
        i. Examples and time for practice in pairs
VII. Overview of Safety Coach Responsibilities
    a. Meetings with leaders, with fellow safety coaches
    b. Observing and giving feedback