The Effect of Mobile Support Devices on the Anxiety and Self-Efficacy of Hospital Float Staff

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Floating is the act of staff moving from one unit to another based on the needs of the patients in a hospital. Many staff who float to different units express negative feelings, including anxiety and lack of self-efficacy. However, floating is an economical and efficient method to use staff across the hospital, especially with current staffing shortages in the United States. This study investigated how the use of mobile performance support devices may help reduce anxiety and increase self-efficacy for staff who float to different units. With access to multiple resources available on mobile devices, Bandura's social learning theory and self-efficacy concept set the framework through modeling, observing, and imitating others in order to reproduce certain behaviors and tasks and believe in one's capability to perform. A quantitative study incorporating the retrospective pretest-posttest design was conducted using the population of float staff, both nurses and respiratory therapists, from Children's Medical Center of Dallas. Both the State-Trait Anxiety Inventory and General Self-Efficacy Scale, along with a basic demographic tool, were used to explore anxiety and self-efficacy in relation to the use of mobile performance support devices. Findings can be used to alleviate the negative feelings of staff toward the idea of floating.

As baby boomers age, there is a growing demand on the health care system, including pressure on the workforce (Fox & Abrahamson, 2009). The U.S. Bureau of Labor Statistics predicts a demand for 4.3 million new health care professionals in the decade leading up to 2014 (Swenson, 2008). The increased demand for more health care workers is problematic, and the need to work smarter and more efficiently may play a major role in addressing this issue. Both the American Association of Respiratory Care and the American Association of Colleges of Nursing report that nursing and respiratory therapy, two groups that represent a large population in the health care workforce, are experiencing shortages that will continue into the future (Heisler, 2007; American Association of Colleges of Nursing, 2011). Several surveys in the past few years have aligned with a generally negative overall view of the health care system concerning workforce shortages and the resulting demands on the staff (Buerhaus, Donelan, Ulrich, Norman, & Dittus, 2005a, 2005b). Good and Bishop (2011) find that retention is key to meeting increasing staffing needs and providing quality care.

Thinking strategically about how to do more with less is a challenge that health care organizations must face. Hospitals should consider a number of strategies for dealing with labor shortages, especially if these are long-term problems, including helping staff to develop their skills to work in other areas, redesigning work processes,

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and providing new technologies to increase efficiency and effectiveness (Carlson, 2010; Stimac, 2011).

Need for the Study

One strategy that merits study is the practice of floating nurses, which has become prevalent in the face of the nursing shortage (Kane-Urrabazo, 2006). Floating occurs when staff from one unit are sent to work in another unit based on patient census and acuities (Good & Bishop, 2011). Float staff concerns about the strategy include having to work outside their area of specialization and experiencing slowed work processes caused by working in an unfamiliar unit (Good & Bishop, 2011; Strayer & Daignault-Cerullo, 2008). The literature suggests that the idea of floating is perceived negatively and is associated with words such as *uneasiness, anxiety producing, burdensome*, and *uncomfortable* (Banks, Hardy, & Meskimen, 1999; Dziuba-Ellis, 2006; Kane-Urrabazo, 2006; Kidner, 1999; Nicholls, Duplaga, & Meyer, 1996; Strayer & Daignault-Cerullo, 2008). The level of stress and dissatisfaction from floating has triggered the creation of committees across organizations to target the problems and develop solutions (Dziuba-Ellis, 2006). The literature indicates that no common structural approaches or resources are available for float staff, only designs that meet different organizational needs (Banks et al., 1999; Dziuba-Ellis, 2006; Lugo & Peck, 2008). Various forms of support are given to floaters when they work on different units, including orientation time or assigning less challenging patients to these staff (Good & Bishop, 2011). Lugo and Peck (2008) suggest that reference guides and checklists could be useful resources for float staff as they move from unit to unit. Another approach for support is clustering, which refers floating staff only to areas with which they feel familiar and in which they are competent (Dziuba-Ellis, 2006).

Many types of support systems may be used as resources, but few, if any, references in the literature suggest that technology has been used or studied in a floating environment. Although the concept of electronic performance support systems (EPSSs) has existed for many years, there has been an evident shift to mobile devices. EPSSs are programs that assist workers' performance when they need it and are typically performed on a computer (Lee & Liu, 2006). Mobile technology now includes smart phones, tablets, and personal digital assistants (PDAs), to name a few. These lightweight, portable tools are used for mobile learning and performance support tools. Performance support differs from mobile learning in that it can target priorities and deliver assistance when and where users need it (Rossett, 2010). Rossett describes two types of mobile performance support: sidekicks and planners. Sidekicks support users as they are performing a task, and planners are used prior to and after the task. Both types of support devices can assist users at any time, an attribute that can potentially address the on-demand needs of float staff.

The Children's Medical Center Study

Children's Medical Center of Dallas received a grant that it used to purchase 100 iPod Touches from Hospital U, a nonprofit collaborative organization helping health systems implement technological solutions. Each iPod houses clinical applications, including videos, articles, reference tools, patient education tools, reference guides, and other memory joggers to be used when staff need performance support on the floor or at the bedside. A project team at Children's wanted to find the best use for the mobile devices, so a request concerning current research was made to Hospital U to identify how other hospitals have implemented the mobile devices. The response affirmed that few to no data have been collected to support best practices. This feedback presented a need to study how the mobile devices could best be used, which led Children's to decide to pilot the devices with staff who float to various units, including registered nurses (RNs) and respiratory therapists (RCPs), to identify a performance support solution. The project team reached out to the managers of the variable staff to solicit volunteers to use the devices.

Bandura's theory and concepts help create a foundation for using mobile performance support devices that takes into account observation, modeling, and imitation as a way to reinforce learning.

Theoretical Framework

The theoretical framework for this study is Bandura's (1977) social learning theory and self-efficacy. Bandura's theory and concepts help create a foundation for using mobile performance support devices that takes into account observation, modeling, and imitation as a way to reinforce learning. Self-efficacy provides the groundwork behind one's belief that one can perform a task successfully with the support of a mobile device.

Bandura's Social Learning Theory

Bandura's social learning theory is rooted in many of the basic concepts of a traditional learning theory; however, he adds an influential social element that served as the foundation for this study: that people learn new behaviors and information by observing, imitating, and modeling other people. Modeling, or observational learning, is used to help explain a wide variety of behaviors. In order for modeling to be effective, four conditions are necessary: attention, retention, reproduction, and motivation (Bandura, 1977).

Attention encompasses the various factors that can either increase or decrease the level of focus on the concept. "People learn by observation only when they pay keen attention to the modeled behavior" (Bandura, 1977). Retention is the ability to store information. The learner is able to retain the information through the use of symbols, mnemonic devices,

images, and other memory strategies. Retention can be affected by a variety of factors, but the ability to retrieve the information later and reciprocate is essential to observational learning.

Reproduction, another condition important to modeling, consists of replicating or performing the behavior that is observed and retained and by self-corrective adjustments and feedback (Bandura, 1977). Finally, in order for observational learning to be successful, the learner must be motivated to imitate the behavior. Bandura (1977) suggests that learners are more likely to assume the modeled behavior in response to positive rather than punishing motivation.

These four conditions are accepted and displayed in various ways, even if the same behavior is being reproduced. The social aspect of social learning theory is used in on-the-job performance support, as many tasks that have already been taught may require an additional support tool. DeWitt (2003) states that understanding motivation is important and suggests that the traditional U.S. approach to medical education, "see one, do one, teach one" (p. 756), aligns with the social learning theory of modeling behavior.

Self-Efficacy

Self-efficacy is a person's belief in his or her ability to succeed in a particular situation or task. Psychological responses to situations, including moods, emotional states, reactions, and levels of stress, can play a role in how people feel about their capabilities in certain situations. Lowering stress levels and increasing moods when faced with challenging situations or tasks may help to improve self-efficacy.

Mahon, Nickitas, and Nokes (2010) suggest that "nursing faculty are aware that persistence and practice are foundational for the self-efficacy" (p. 616). Bandura's theory and concepts help lay the groundwork for applying mobile performance support devices that allow observation, modeling, and imitation to emphasize the learning that has already taken place. Self-efficacy provides the basis of one's belief that one can successfully perform a task with the aid of a mobile device.

Purpose of the Study

The purpose of this study is to investigate how the use of mobile performance support devices affects the anxiety levels and self-efficacy of RNs and RCPs who float throughout the hospital. The staff who float were measured on their perception of anxiety and self-efficacy levels both prior to (referred to in the study as "then") the use of mobile performance support devices and after (referred to as "now") use to determine any statistically significant differences. The measures were through self-report using a posttest (now) and retrospective pretest (then) survey. With the foundation of social learning theory and the concept of self-efficacy, the

mobile performance support device will provide multiple resources that staff can observe, imitate, and model in order to perform necessary tasks on various units in the hospital. The findings of the study can be used to design and develop additional customized resources that lend support to reduce anxiety levels among float staff and promote self-efficacy.

We posited two hypotheses:

Hypothesis 1: There will be a statistically significant decrease in anxiety level, as measured by the State-Trait Anxiety Inventory, of float staff prior to (then) the use of a mobile performance support device and after (now) the use of a mobile performance support device.

Hypothesis 2: There will be a statistically significant increase in self-efficacy, as measured by the General Self-Efficacy Scale, of float staff prior to (then) the use of a mobile performance support device and after (now) the use of a mobile performance support device.

Literature Review

The literature review looked at studies regarding current issues surrounding the idea of floating and those examining the impact of performance support devices on various environments. Little to no research is available regarding how mobile performance support devices affect the anxiety and self-efficacy of float staff; however, the following studies provide a framework that supports the uneasiness of float staff and how a variety of performance support tools have suggested a positive effect. Thus, the reviews create a foundation for the two hypotheses of this study.

Float Staff and Performance Support Studies

Several studies have focused on current float staff attitudes toward the act of floating (Banks et al., 1999; Lugo & Peck, 2008; Nicholls et al., 1996; Strayer & Daignault-Cerullo, 2008). The studies help support the need to find a long-term strategy that float staff can use in order to feel more confident and less anxious about moving through different units across the hospital. Each of these studies focuses on aspects of anxiety and confidence relating to this study and the results of implementing different floating strategies.

Although the literature review revealed no studies using mobile performance support devices as a possible intervention, the literature did align with the notion that finding a specific strategy is necessary to address negative feelings and feedback about floating. Nicholls et al. (1996) reviewed the positive and negative aspects of floating to other

units at St. Francis Medical Center in LaCrosse, Wisconsin. The most common negative response was inadequate orientation to the unit to which staff floated, leading to disorganization, anxiety, and uneasiness. The study implies that future studies should focus on strengthening relationships between float staff and unit-based staff as a strategy for creating a less stressful environment.

Providing staff with an array of resources to help fill work flow gaps between units has been a strategy source for several studies (Banks et al., 1999; Lugo & Peck, 2008). A study at a 500-bed trauma center focused on implementing several interventions affecting staff attitudes toward a recent change in their floating policy, such as fact sheets about each unit, the buddy system, and cheat sheets (Banks et al., 1999). Similarly, a Florida Hospital—Altamonte looked at developing a strategy for clustering similar units for reassignment; reeducation; welcome resources for each unit; and a pocket guide with protocols, checklists, and guidelines (Lugo & Peck, 2008). Through anecdotal information, literature reviews, and best practices from other hospitals, both studies were able to create and implement a strategy consisting of multiple resources available to float staff that ultimately affected survey results after their implementation (Lugo & Peck, 2008).

Although almost no research focuses on the use of mobile devices as floating support resources, many studies highlight the use of technological and nontechnological tools for performance support in various environments. Several studies encourage the idea of using performance support tools and devices to play a major role in learner attitudes (Broyles, Cyr, & Korsen, 2005; Cibulka & Crane-Wider, 2011; Dominick et al., 2009; Nguyen, 2009).

Nguyen (2009) suggests that institutions "incorporate any performance support systems that will be available to performers on the job" (p. 112) as a reinforcement to the training. Desmarais, Leclair, Fiset, and Talbi (cited in McManus & Rossett, 2006) noted the potential benefits of using EPSS: "increased productivity; lower training costs; increased work self-sufficiency; increased product quality due to standardized practices; and establishment of a means to capture, store, and grow an organization's knowledge capital" (p. 15). While there is optimism in the use of performance support systems, such as EPSS, the focus is on the technique to effortlessly mesh task with support to benefit the user.

Another system support tool studied evaluated the efficacy and anxiety of recently bereaved individuals (Dominick et al., 2009). The support tool is an Internet-based intervention designed to help users better understand their grief and find positive ways to cope with their loss. The tool includes interactive exercises, videos, and checklists for users to reference. Results indicated that both anxiety and self-efficacy levels were significantly and substantively affected, supporting the use of the tool. Similar to the focus of our study, with the use of iPods as a performance support device, Cibulka and Crane-Wider (2011) studied the use of PDAs from a group of nursing students' perspectives. A faculty

review of nursing curricula at a Midwest university found that the "most significant gap occurred in the use of mobile technologies that provide quick access to information" (Cibulka & Crane-Wider, 2011, p. 115). Several teaching strategies were used to level the playing field on how students used the functionality of the device and referenced the content, similar to the approach used in our study. Common themes include an assessment of whether the devices made them feel more secure and confident, contributed to their learning, and helped them feel more organized.

Methodology

Research Design

This study used a quantitative research design incorporating the retrospective pretest-posttest control group design to explore anxiety and confidence levels in relation to the use of mobile performance support devices. Nimon (2007; citing Lamb & Tschillard, 2005; Martineua, 2004; and Raidl et al., 2004) suggest "replacing the traditional pretest in pretest-posttest designs with the retrospective pretest as a practical and valid means to determine program outcomes, mitigating the effects of experience limitation, pretest sensitization, maturity, and mortality" (p. 1). Data were collected from variable float staff from Children's Medical Center of Dallas at one time.

Population

The study population was made up of variable float staff, including RNs and RCPs, from Children's Medical Center of Dallas hospital. Registered nurse floaters made up about 30% of the study population, and respiratory therapist floaters represented about the other 70% of the study population. Variable float staff are those who float to different units based on patient census and clinical need as part of their job. A minimum of 41 participants was recommended through the G-Power analysis in order to provide enough statistical power to support statistical significance. The type of G-Power statistical *t* test selected focused on the difference between two dependent means (matched pairs). The effect size was set at .4, along with a .05 alpha. According to Cohen (1988), an effect size of .30 to .50 defines a moderate to medium effect. The projected power was set at .80, so there is an 80% or greater chance of finding a statistically significant result when in fact there is one.

Instrumentation

Data were collected using surveys as a retrospective pretest (then) and posttest (now). The State-Trait Anxiety Inventory for Adults (STAI) is used to measure anxiety in adults, differentiating between a temporary condition or feeling and a long-standing quality (Spielberger, 1983). The

General Self-Efficacy Scale (GSE) is used to assess a general sense of perceived self-efficacy, or the ability to cope with daily, stressful situations. Both of the instruments are self-report and were administered at the same time. Each instrument was used as a posttest after (now) the use of the mobile performance support device, as well as a retrospective pretest (then). The use of the retrospective pretest helped to avoid a response-shift effect, which may occur when the participants' frame of mind or reference changes significantly during a study because they do not put it into context (Lamb, 2005). Demographic data were also collected using a survey developed by the researcher to help describe the study population.

State-Trait Anxiety Inventory. The STAI, a self-reporting instrument used extensively in clinical practice (Spielberger, 1983), clearly differentiates between how an individual is currently feeling versus how he or she typically feels in regard to his or her anxiety level. The STAI consists of two 20-item scales measuring temporary and permanent levels of anxiety. The first 20 items address how individuals are feeling at a given moment, and the second set addresses how they feel in general. All 40 items use a 4-point Likert scale ranging from *not at all* to *very much so* in regard to the statements listed. The scores are added for each of the two sections to identify anxiety level. Anxiety scales can vary from a minimum of 20 to a maximum of 80.

The STAI has been found to be reliable and internally consistent, with a test-retest reliability ranging from .65 to .75 and a median reliability coefficient of .695 (Spielberger, 1983). Potvin et al. (2011, citing Bruchon-Schweitzer & Paulhan, 1993; Gauthier & Bouchard, 1993; Fountoulakis et al., 2006; and Spielberger, 1983) note that "the STAI-Y showed good internal consistency, test-retest reliability and construct validity in samples of healthy younger adults" (p. 870). In addition, Potvin et al. (2011, citing Stanley et al., 1996 Kabacoff et al., 1997; Bouchard et al., 1998; Fuentes & Cox, 2000; and Stanley et al., 2001) suggest that "for older adults, the reliability and the validity of the STAI-Y are also satisfactory" (p. 870). A study conducted using a short form of the state scale of the STAI reported a Cronbach's alpha of .93 from the full form, as opposed to a .83 with the short form, suggesting that the full form contains a higher reliability than what has been reported (van der Bij, de Weerd, Cikot, Steegers, & Braspenning, 2003). "The STAI has correlated well with other personality measures, suggesting good convergent and divergent validity" (Seebode, 2003, p. 69).

The General Self-Efficacy Scale. The GSE is a self-report instrument used to measure a general sense of perceived self-efficacy that predicts coping with daily problems, as well as adapting after experiencing various stressful life events (Jerusalem & Schwarzer, 1992). According to Schwarzer and Scholz (2000), general self-efficacy basically describes

having a broad sense of personal competence in order to effectively deal with stressful situations. The GSE consists of 10 items using a 4-point Likert scale. Answers range from *not at all true* to *exactly true.* The scores are added, yielding a composite score with a minimum of 10 and a maximum of 40. "A score greater than 25 is considered moderate to high general self-efficacy" (Collins, 2005, p. 42).

The instrument has been tested in 27 languages, and samples from 23 nations yield a Cronbach's alpha ranging from .76 to .90 (Schwarzer, 2004). Chen, Gully, and Eden (2001) and Scholz, Gutierrez-Doza, Sud, and Schwarzer (2002) also reported good internal consistency for the instrument. Scherbaum, Cohen-Charash, and Kern (2006) compared three general self-efficacy instruments and reported criticisms, based on their research, that the average reliability may not be justified. Criterion-related validity has been addressed documenting both positive and negative coefficients (Jerusalem & Schwarzer, 1992).

Demographic Data. For this study, we developed a demographic data instrument, consisting of 10 questions, in order to gain information from the participants. This information described the participants in terms of results and statistical characteristics of the study population. The instrument was included in the survey packet given to participants.

Data Collection Procedures

A project team from Children's Medical Center of Dallas reached out to managers of the float staff to explain the purpose and expectations of the study and assist in encouraging their float staff to participate. Once participants were identified, the project lead conducted 8 to 10 one-hour training sessions before using the devices in order to create consistency, with all participants having a baseline knowledge of how to use the device.

For three months, participants used the device as a support tool with resources such as videos, articles, reference tools, patient education tools, reference guides, and other memory joggers to assist them as they floated to various units throughout the hospital. At the end of the period, participants completed the three surveys in an open lab format. A verbal consent script, the preferred method at Children's, was used in order to keep the data and participants anonymous. On arrival at the lab, participants were given a packet containing the STAI, the GSE, and the basic demographic survey, as well as instructions for completing the surveys. Both the STAI and GSE tools were answered as "then" and "now." As participants addressed each question from the survey, they answered it once from the perspective of how they felt in terms of anxiety and self-efficacy levels prior to the use of the device (then), as well as a second time from their perspective after they had used the device (now). The submission of the sealed, completed packet to the researcher was a second consent to use their data. Participants

were each given a $20 gift card to be used at Children's after completion of the surveys.

Data Analysis

The data were analyzed to determine the acceptance or rejection of each hypothesis of the study using SPSS version 19.0. An alpha level of .05 was used for both research questions to determine statistical significance, and a medium effect size of .4 was used to determine practical significance. Several statistical assumptions were made before running the *t* tests. The statistical assumptions included the following:

- Observations are independent of each other, the dependent variable is measured on an interval scale, and the differences are normally distributed in the population.
- The paired samples *t* test assumed that the differences were normally distributed, which was assessed by producing a Q-Q Plot in SPSS.
- The statistical test, conducted in SPSS, was a paired-samples *t* test on each tool to compare the means of the dependent variables of the mobile support device then and now.

Hypothesis 1. The first hypothesis states that there will be a statistically significant decrease in anxiety level, as measured by the STAI, of float staff prior to the use of the mobile performance support device and after the use of the device.

The STAI scores from then and now were added to determine whether there is a difference in mean between anxiety levels from the use of a mobile performance support device. Statistical significance occurred if the paired-samples *t* test was less than .05 between time 2 and time 1. Using a medium effect size of .4 helped to compare the effectiveness and practical significance between use of the device and anxiety level. If the results were not statistically significant, it could then be assumed that the use of the device had no impact on anxiety level.

Hypothesis 2. The second hypothesis states that there will be a statistically significant increase in self-efficacy, as measured by the GSE, of float staff prior to the use of the mobile performance support device and after the use of the device.

The GSE was determined by summation of scores from then and now to validate whether there was a difference in mean between self-efficacy from the use of a mobile performance support device. Statistical significance occurred if the paired-samples *t* test was less than .05 between time 2 and time 1. Using a medium effect size of .4 focused on the practical significance between use of the device and self-efficacy. If the results were

not statistically significant, it could be assumed that the use of the device had no impact on self-efficacy.

The demographic data were analyzed using descriptive statistics in SPSS. An analysis of the demographic data instrument provided additional information relating to the use of mobile performance support devices.

Findings

Forty-five of the float staff out of fifty were given a mobile support device at Children's. Participation was based on the staff's willingness to participate in a research study, with a 90% overall participation in completing the surveys. Surveys were assessed for missing data. There were no missing data from the STAI or the GSE; however, there were missing data from the demographic survey. SPSS was used to test for reliability for coefficient alpha and paired-samples *t* tests for statistical significance.

Descriptive Statistics

Demographic information were collected from each participant in order to determine different classifications (Table 1).

Registered nurses made up 31% of the participants, and 69% were RCPs. (The researcher had anticipated that the breakdown of roles would be closer to 50% RN and RCP.) There was a split in question 9 regarding whether resources are provided to float staff when they move to different units. Of those reporting, all received resources when they float; the types of resources listed on the survey include job aids, tip sheets, a team lead resource, computer-on-wheels, and floor binders. A majority of the resources listed were paper based as opposed to online or actual coworkers on the unit. Questions 3, 4, 9, and 10 had missing data, as reported in Table 1.

Instrument Analysis

The STAI differentiates between how an individual is currently feeling versus how he or she typically feels in regard to his or her anxiety level. The STAI consists of two 20-item scales measuring temporary and permanent levels of anxiety using a 4-point Likert scale. The first 20 items address how individuals are feeling at a given moment, and the second set of 20 items addresses how they feel in general terms. The GSE helps describe a broad sense of personal competence with which to deal effectively with stressful situations. The GSE consists of 10 items, also using a 4-point Likert scale.

Reliability. Cronbach's alpha was calculated for each of the instruments and then analyzed to determine their reliability, as shown in Table 2. The internal consistency reliability of the STAI and GSE was

TABLE 1 DEMOGRAPHICS

QUESTION	FREQUENCY	PERCENTAGE
Gender		
Male	9	20
Female	36	80
Age		
18–25	2	4
26–40	25	56
41–65	18	40
Over 65	0	0
Gender		
Caucasian	28	62
African American	3	7
Hispanic	6	13
Other	5	11
Missing	3	7
Highest		
Associate degree	19	42
Bachelor's degree	24	53
Master's degree	0	0
Doctoral degree	0	0
Missing	2	4
Current role		
RN	14	31
RCP	31	69
Years spent floating		
0–5	32	71
6–10	8	18
11–15	3	7
Over 15	2	4
Times per week floating		
0–2	26	58
3–5	18	40
11–15	0	0
Over 15	1	2
Resources provided		
Yes	24	53
No	20	45
Missing	1	2
Years using similar device		
0–2	24	53
3–5	13	29
6–8	4	9
Over 8	0	0
Missing	4	9

established for this study using coefficient alpha. The reliability for the STAI overall instrument for then was .935, while for the overall instrument for now was .923, which suggests excellent reliability. The breakdown of the STAI into state and trait provides greater insight into the instrument's reliability. The state then was .891, while the trait then was .874. The state now reported at .860, while the trait now was .935. These results still reflect a good reliability, with the trait now reflecting the highest reliability. The GSE instrument was also broken down into then and now, with a .907 and .917, respectively. According to Kline (2005), above .90 is an "excellent" reliability coefficient, above .80 is "very good," and above .70 is "adequate".

Validity. The type of pretest-posttest group design helps control for threats to validity, including history, maturation, instrumentation, and mortality. The group was not tested at different times in vastly different settings between time 1 and time 2 because a retrospective pretest was used, thus controlling for differences that may have affected the results. Instrumentation was controlled through the use of self-report surveys instead of observers or interviewers, which may have had an effect on the results. No one who actually used the device dropped out of the study; however, five decided not to participate in completing the surveys. The instruments were used in a fashion similar to other studies that had used them and measured anxiety and self-efficacy.

Hypothesis Analysis

Hypotheses were analyzed using paired-samples *t* tests to compare the mean of float staff anxiety prior to and after the use of the mobile device, as well as comparing the mean of the float staff's self-efficacy prior to and after using the device. Several statistical assumptions were made before running the *t* tests. The statistical assumptions included that observations are independent of each other, the dependent variable is measured on an interval scale, and the differences are normally distributed in the population. The dependent variables were measured

TABLE 2 RELIABILITY COEFFICIENTS FOR INSTRUMENTS

INSTRUMENTS	CRONBACH'S ALPHA
STAI overall then	.935
STAI overall now	.923
State then	.891
Trait then	.874
State now	.860
Trait now	.935
GSE then	.907
GSE now	.917

on an interval scale using self-report scores with equal intervals between values on both instruments. The observations are independent of each other because it was assumed that no person's score had been influenced by other people's scores. Q-Q plots were run to determine normal distribution (see Figures 1 to 4). An extreme value test was also run in SPSS to confirm the Q-Q plots.

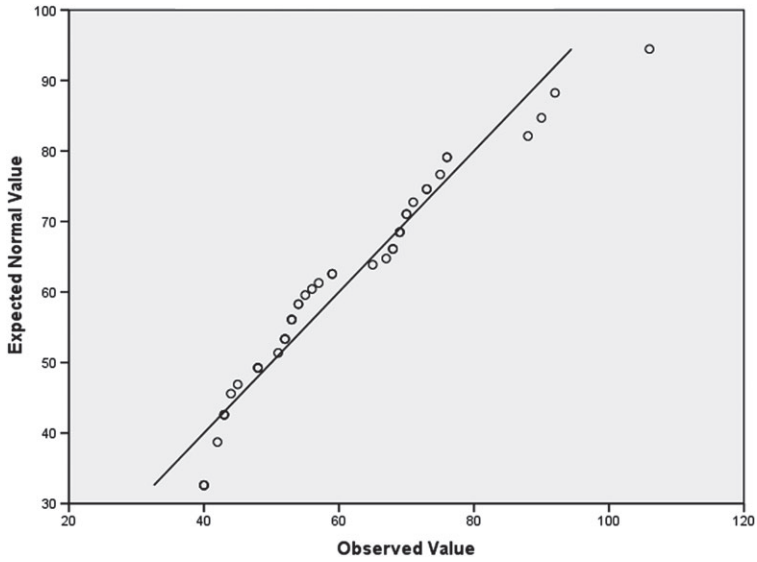

FIGURE 1. Q-Q PLOT OF STAI THEN

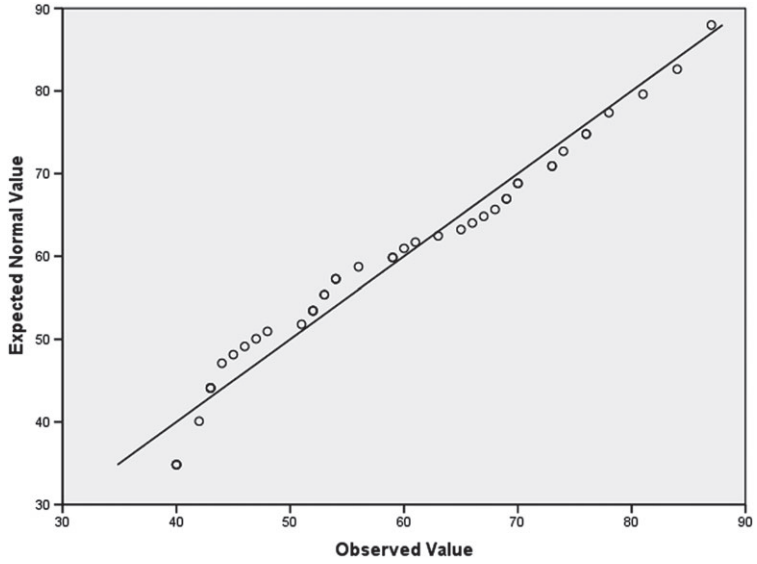

FIGURE 2. Q-Q PLOT OF STAI NOW

Figure 1 provides a Q-Q plot of the STAI then, and Figure 2 depicts now, which suggests that the data are normally distributed because the data points are close to the diagonal line. However, one outlier was removed in order for the criteria for the paired samples *t* test to meet the third assumption. This was also confirmed in the extreme values test run in SPSS; however, Howell (2007) noted that the general conclusion of numerous studies shows that "violating the assumption of homogeneity of variance produces very small effects" (p. 203).

H1: There will be a statistically significant decrease in anxiety level, as measured by the State-Trait Anxiety Inventory, of float staff prior to (then) the use of a mobile performance support device and after (now) the use of a mobile performance support device.

A paired-samples *t* test was performed to determine whether there was a statistically significant difference between anxiety levels then and now. Table 3 reflects the analysis, for a 95% confidence rating. The results indicate no statistically significant difference between the mean of anxiety prior to (then) the use of the mobile devices ($M = 59.4$, $SD = 13.96$) and after (now) the use of the devices ($M = 58.2$, $SD = 12.99$) the use of the devices; $t(43) = 1.70$, $p = .096$; thus, the hypothesis is rejected. Similarly, when anxiety is broken into its two components of state and trait, the results are not significant. The results indicate that for the state component (questions 1–20 of the survey), there is no statistically significant difference between the mean of the anxiety prior to (then) the use of mobile devices ($M = 28.9$, $SD = 7.59$) and after (now) the use of the devices ($M = 28.3$, $SD = 6.94$); $t(43) = 1.42$, $p = .164$. Also, the results for the trait component (questions 21–40) indicate no significant difference prior to (then) the use of medical devices ($M = 30.5$, $SD = 7.05$) versus after (now) the use of the devices ($M = 30.0$, $SD = 6.83$); $t(43) = 1.78$, $p = .082$. These results suggest that overall anxiety does not decrease when float staff use mobile performance support devices.

TABLE 3 STATE-TRAIT ANXIETY

DEPENDENT VARIABLE	MEAN	*SD*	*t*	*df*	*p*	COHEN'S *d*
Overall anxiety			1.70	43	.096	.09
Then	59.4	13.96				
Now	58.2	12.99				
State anxiety			1.42	43	.164	.08
Then	28.9	7.59				
Now	28.3	6.94				
Trait anxiety			1.78	43	.082	.07
Then	30.5	7.05				
Now	30.0	6.83				

Cohen's d was determined to be the appropriate measure of effect size to use with paired-samples t tests. Effect size is a measure of the strength of a relationship between two variables, which indicates practical significance. Cohen's d was determined using an online calculator with the following formula: $d = M_1 - M_2/S_{pooled}$ where $S_{pooled} = \sqrt{(n_1 - 1)}$ ${s_1}^2 + (n_2 - 1){s_2}^2/n_1 + n_2$ (Becker, 2000). For the STAI data, the d was calculated at .09, where .20 is generally an indicator of a small effect; .50, a medium effect; and .80, a large effect (Cohen, 1988). Breaking down the overall STAI, the "state" d was calculated at .08, a very small effect size. The "trait" d was reported as .07, signifying less than a small practical significance for a statistically significant result.

For the second hypothesis, Figures 3 and 4 also provide a Q-Q plot, but with normally distributed data for the GSE then and now, thus meeting the criteria for the paired-samples t test by removing the same case as an outlier from the anxiety data.

H2: There will be a statistically significant increase in self-efficacy, as measured by the General Self-Efficacy Scale, of float staff prior to (then) the use of a mobile performance support device and after (now) the use of a mobile performance support device.

A paired-samples t test was also performed to determine a statistically significant difference between then and now self-efficacy levels using 95% confidence rating (see Table 4). The results indicate that a statistically significant difference exists between the mean of self-efficacy prior to (then) the use of mobile devices ($M = 33.4$, $SD = 4.22$) and after (now) the

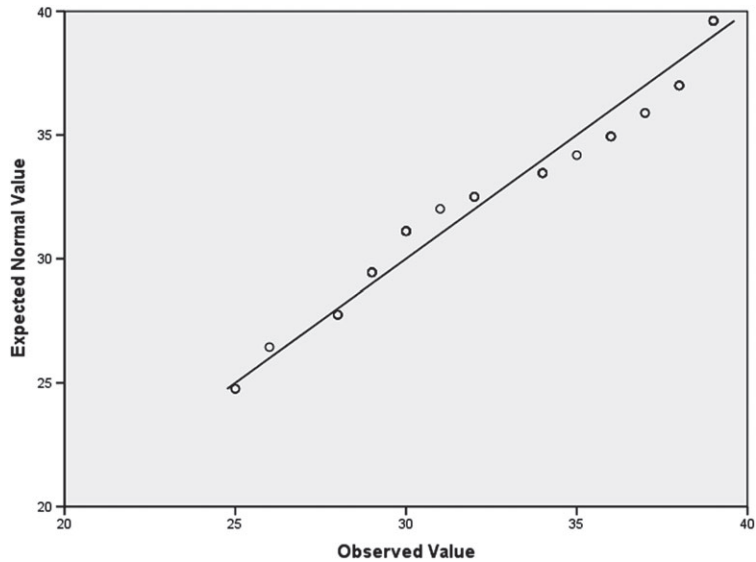

FIGURE 3. Q-Q PLOT OF GSE THEN

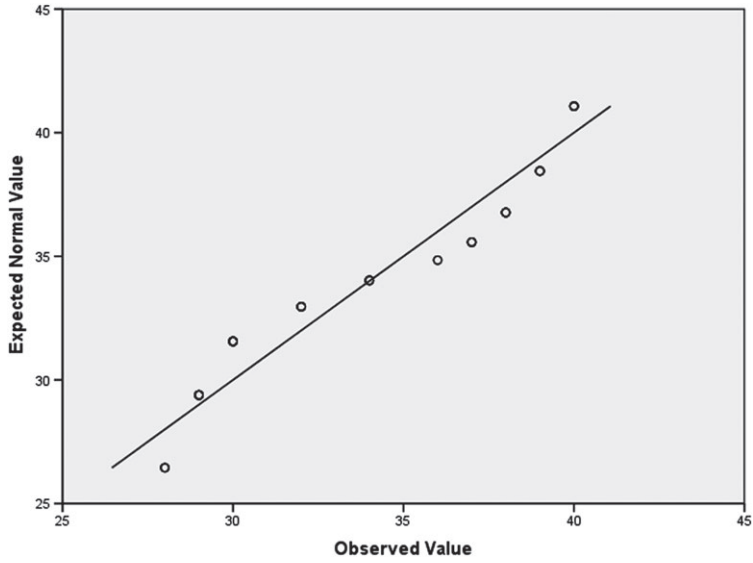

FIGURE 4. Q-Q PLOT OF GSE NOW

TABLE 4 SELF-EFFICACY

DEPENDENT VARIABLE	MEAN	*SD*	*t*	*df*	*p*	COHEN'S *d*
Overall self-efficacy			−3.44	43	.001*	.17
Then	33.4	4.22				
Now	34.1	4.21				

*Statistically significant.

use of the devices ($M = 34.1$, $SD = 4.21$); $t(43) = -3.44$, $p = .001$); thus, the hypothesis fails to be rejected. Cohen's d was computed, using the online calculator, to be .17, which indicates a very small effect size.

Summary, Conclusions, and Recommendations

Synthesis of Findings

The purpose of this study was to examine the anxiety and self-efficacy of float staff in a hospital setting prior to (then) the use of a mobile device and after (now) the use of a device to determine any statistical differences. Two self-assessment surveys were administered to the participants after the mobile devices had been used for three months. Participants answered the 40 questions of the STAI on how they felt about the use of the device then versus now through a retrospective pretest and posttest approach. The same strategy was used for the 10 questions on the GSE questionnaire.

The data for each hypothesis were tested using the paired-samples *t* test statistical technique. As a result of the test, hypothesis 1 was rejected for overall anxiety ($p = .096$, $p <. 05$) and failed to reject hypothesis 2 for overall self-efficacy ($p = .001$, $p <. 05$). In addition to the quantitative data, several pieces of anecdotal information were collected. Some comments included, "More Children's specific videos would have added more value," and "Supplying clips to attach to our scrubs would have enabled me to carry the device more often." Other suggestions included, "Wasn't exactly sure when it was appropriate to use with patients and families," and "Videos specific to our floors at Children's would have been helpful." Many of these comments have been considered and addressed in the recommendations for future studies section.

Conclusions

Regarding hypothesis 1, the study found no statistically significant difference in the anxiety levels of the float staff prior to the use of mobile performance support devices and after. This finding adds to Strayer and Daignault-Cerullo (2008), who found that using a closed staffing strategy on floating reduces the amount of anxiety related to floating. Because this study showed no effect on the anxiety level through the use of mobile performance support devices, perhaps using a more strategic approach rather than a performance support device can lower the level of anxiety in float staff.

For hypothesis 2, this study found a statistically significant difference in self-efficacy of the float staff prior to the use of mobile performance support devices and after. Several studies have focused on current float staff attitudes toward the act of floating, including Banks et al. (1999), Lugo and Peck (2008), Nicholls et al. (1996), and Strayer and Daignault-Cerullo (2008), in terms of needing to find a long-term strategy that float staff can use in order to feel more confident about moving through different units across the hospital. This finding supports the need for implementing an approach to address these issues.

This finding supports the conclusions of Banks et al. (1999) and Lugo and Peck (2008), whose studies focused on providing staff with resources to help mitigate negative feelings toward floating. This finding also adds to the literature of using mobile performance support devices as one of those resources. Mobile devices were not considered a resource in the two studies, but the concept that float staff will be more confident adds to the idea that providing staff with resources can help address negative feelings.

This study helps to support the conclusions of Dominick et al. (2009), who used a support tool on the Internet to increase self-efficacy. This is an addition to the literature suggesting that mobile performance support devices also affect and increase self-efficacy, but with a target audience of float staff in a hospital setting.

While Cibulka and Crane-Wider (2011) focused on nursing students using PDAs as mobile performance support devices, this finding supports the idea that mobile devices have an impact on confidence levels. The

PDAs were loaded with content on topics familiar to the students, similar to the approach used in this study. Findings from both support the concept that using mobile performance support devices will increase confidence.

Limitations and Delimitations

Several limitations may have affected the study, such as the willingness, honesty, comfort level, and stress of the participants. It is difficult to predict the willingness of participants to stay actively involved and return completed surveys. Participants may not have been honest due to the nature of the information requested, which included self-assessments. Float staff's anxiety could be attributed to other situations. The participants' comfort level with mobile devices could be a factor. The ability to generalize results to other staff outside Children's is limited. There may be bias in how participants respond to then and now survey items based on formatting the survey items vertically as opposed to an adjacent format (Nimon, Zigarmi, & Allen, 2010).

It is essential for health care organizations to provide staff with the right technology to maximize resources and increase performance.

Multiple delimitations may have affected the study, including the number of participants, roles, use of devices, and type of measurement tools used. The population study was limited to registered nurses and respiratory therapists at Children's Medical Center Dallas who float a majority of the time (more than 50%). Float staff used the mobile performance support device based on their needs on the floor and at the bedside. Participants completed surveys at the end of the study as a posttest, as well as a retrospective pretest. Measurement tools identified in the use of the study were the STAI, the GSE, and a demographic survey.

Implications

Practical. As institutions strive to use the most appropriate modalities and resources to educate and improve performance, it is apparent through the literature review that the use of new technology is lacking in the hospital setting. While many hospitals use state-of-the-art equipment and devices for their patients and families, the same striving for excellence should also be considered for staff who care for the patients and their families. In the fast-paced environment of a hospital, it is vital that staff have access to and use the most suitable support tools to improve performance. Mobile performance support devices are key to working smarter, giving staff the reinforcement, resources, and technology they need to execute their work, especially with staffing at a low point. Being able to use staff where they are most needed and providing them with mobile tools to support their performance can benefit the hospital environment on many levels. It is essential for health care organizations to provide staff with the right technology to maximize resources and increase performance.

Research. While several literature review studies have addressed elements of this study and the results of this particular study support certain aspects of other research, no refereed studies were found that specifically examined float staff using mobile performance support devices as a way to increase self-efficacy. In a review of the literature, no refereed studies were found that examined float staff using mobile performance support devices as a way to decrease anxiety levels. This study should serve as a starting point for further investigation for examining both anxiety and self-efficacy and the effect it has on the use of mobile performance support devices. Using a larger sample size and applying the framework to similar hospitals to examine these concepts would strengthen the literature available.

In addition, further research could address the important question of whether float staff actually perform better using mobile support. Specifically, performance indicators may include reduced errors, reduced amount of time on tasks, increased quality of patient education, and customer satisfaction, to name a few. Many other fields have the ability to align tasks with mobile support in order to increase performance. According to Rossett (2010), "Mobile support will help us switch money from one account to another, pick wines, invest in green enterprises, monitor blood pressure, select employees and accounting packages, find parking spaces," which seem to indicate the capacity for increased performance.

In terms of anxiety and self-efficacy and beyond health care, further research may be needed to identify whether these factors play a critical role in other professions' performances. We suspect professions that involve life-or-death decisions, such as firefighters, police officers, and first responders, would be an appealing start. Like health care providers, these types of professions generally take place in high-stress environments requiring confidence and a decreased amount of anxiety in order to perform. The use of mobile support devices to increase efficacy and decrease anxiety in these types of settings spark many appealing and motivating ideas for further research.

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