

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/267326450>

# Physical Work Environment as a Managerial Tool for Decreasing Job-Related Anxiety and Improving Employee-Employer...

Article in *Journal of healthcare management / American College of Healthcare Executives* · April 2015

CITATIONS

3

READS

384

3 authors:



**Hessam Sadatsafavi**

Cornell University

17 PUBLICATIONS 30 CITATIONS

[SEE PROFILE](#)



**John Walewski**

Texas A&M University

19 PUBLICATIONS 73 CITATIONS

[SEE PROFILE](#)



**Mardelle M Shepley**

Cornell University

73 PUBLICATIONS 413 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



An Observational Study of Classroom Acoustical Design and Repetitive Behaviors in Children with Autism

[View project](#)



Developing a Standard for High Performance Buildings in Qatar [View project](#)

# Physical Work Environment as a Managerial Tool for Decreasing Job-Related Anxiety and Improving Employee-Employer Relations

**(SUBMITTED VERSION)**

Hessam Sadatsafavi, Ph.D.  
Research Scientist  
Department of Design and Environmental Analysis  
Cornell University  
1411 Martha Van Rensselaer Hall  
Ithaca, NY 14853  
Voice: 979-209.9350  
E-mail: [hs825@cornell.edu](mailto:hs825@cornell.edu)

John Walewski, Ph.D.  
Associate Professor of Practice  
Zachry Department of Civil Engineering  
Texas A&M University  
3136 TAMU, 705G CE/TTI Building  
College Station, TX 77843-3136  
Voice: 979-862-5673  
E-mail:

Mardelle M. Shepley, D.Arch.  
Professor  
Department of Design and Environmental Analysis  
College of Human Ecology  
Cornell University  
Ithaca, NY 14853-4401  
Voice: 607 255-3165  
E-mail: [mshepley@cornell.edu](mailto:mshepley@cornell.edu)

**Published version can be found at** [https://ache.org/pubs/jhm/jhm\\_index.cfm](https://ache.org/pubs/jhm/jhm_index.cfm)

Sadatsafavi, H., Walewski, J., & Shepley, M. (2014). Physical Work Environment as a Managerial Tool for Decreasing Job-Related Anxiety and Improving Employee-Employer Relations. *Journal of Healthcare Management*, 60 (2), 114-132.

### **Abstract**

Expected growth in healthcare needs resulting from the Affordable Care Act and the growing population of older citizens in the United States is challenging owners and operators of hospitals to improve quality of care and reduce operational costs. Meanwhile, studies have indicated a serious shortage in the healthcare workforce and have highlighted the critical role of employees' job-related attitudes and feelings. The main objective of this study was to test whether employees' evaluations of important environments within hospitals were significantly associated with their job-related attitudes and feelings, and whether this relationship varied across different demographic groups. About 700 healthcare professionals from 10 acute-care hospitals run by three healthcare organizations participated in this cross-sectional study. Structural equation modeling found that employees' evaluations of their physical work environment were significantly associated with lower job-related anxiety, higher job satisfaction, and higher organizational commitment. Perceived organizational support was responsible for mediating part of these relationships, indicating that a healthy work environment can be perceived by employees as their organization valuing them and caring about their well-being. When distinguishing between different spaces, analysis found that satisfaction with rest areas and work spaces had the largest effect size, while the influence of patient areas was small. Employees newer to the facility and to the organization were more influenced by the physical work environment. This study provides preliminary evidence that facility design can be used as a managerial tool for improving job-related attitudes and feelings of employees and earning their commitment.

Keywords: physical work environment, healthcare professionals, perceived organizational support, job satisfaction, job-related anxiety, organizational commitment

## Introduction

Healthcare is one of the biggest sectors of the United States economy. According to the American Hospital Association (AHA), healthcare spending in the United States accounted for 17.9% of the Gross Domestic Product (GDP) in 2011 (AHA, 2013), which was a larger share of GDP than in any other major industrialized country. In the coming years, a growing population of older citizens with chronic health conditions will translate into a greater need for health care services as more of the U.S. population enters advanced age and higher life expectancy. Moreover, improving economic conditions and the Affordable Care Act (ACA) coverage expansions are expected to drive faster projected growth in health spending in 2014 and beyond.

As the need for healthcare is growing, studies have indicated a serious shortage in the healthcare workforce in the U.S. and have highlighted the critical role of job-related attitudes and feelings of caregivers ([Buerhaus, 2008](#)). It has been demonstrated that job attitudes and feelings have important implications for the recruitment and retention of caregivers and significant influence on the quality of care that they deliver ([Aiken et al., 2011](#)). From a managerial perspective, a report by the American Hospital Association (AHA; 2011) also suggested that caring for employees can play an important role in the financial well-being of the organization. The AHA report indicated that approximately 60 cents of every dollar of expenditures goes to caregivers and other hospital workers, making human-resource-related expenses higher than other essential expenses, including medication, devices and other supplies, treatment facility improvements, health information technology installation or upgrades, utilities, and liability coverage.

Among factors that may influence job-related attitudes and feelings of healthcare professionals, this study focused on the physical work environment. The authors used findings of

previous organizational psychology studies to examine the underlying processes that affect job-related attitudes and feelings of healthcare professionals. More specifically, this study focused on the socio-emotional aspects of facility design and operation as factors for improving employees' perceptions of organizational support, decreasing job-related anxiety, and enhancing job satisfaction and organizational commitment. The first objective of this study was to understand how evaluations of their physical work environment might be associated with employees' perceptions of organizational support, job-related anxiety, job satisfaction, and organizational commitment. Moreover, as Gibson (1977) and Sallis, Owen, and Fisher (2008) noted, to fully understand the multiple levels of the environment's influence, individual-level factors should be considered as well. Accordingly, the second objective of this study was to determine if there is a significant difference in the relationship between physical work environment and employees' job-related attitudes across different demographic groups.

### **Background and Proposed Model**

Previous studies in healthcare settings indicated that the effect of physical work environment on job satisfaction is mediated through factors such as stress, health, and safety (Djukic, Kovner, Budin, & Norman, 2010; Ulrich et al., 2008). In this study, the authors investigated the mediating role of perceived organization support (POS), a construct used in previous organizational psychology studies, in the relationship between satisfaction with the physical work environment and job attitudes of healthcare professionals.

Eisenberger, Huntington, Hutchison, and Sowa (1986) defined POS as “an experience-based attribution concerning the benevolent or malevolent intent of the organization's policies, norms, procedures, and actions as they affect employees” (p. 42). These authors also noted that employees have a tendency to assign humanlike characteristics to their organization and view

favorable or unfavorable treatment as an indication that the organization favors or disfavors them. In line with the findings of previous organizational psychology studies, in this study, the authors assumed that providing a healthy environment with a high indoor environmental quality sends the message that senior management values and respects employees and cares about their health and well-being. Accordingly, the researchers expected to find a positive relationship between employees' satisfaction with the architectural and physical features of their work environment and POS. Moreover, Rhoades and Eisenberger (2002) suggested that when employees feel that their organization gives special attention to their needs, a sense of obligation and motivation develops and leads them to care about the welfare of the organization and help it achieve its goals. Accordingly, POS was expected to have a positive relationship with attitudinal outcomes. The attitudinal variables in this study were job satisfaction (JS), job-related anxiety (JRA), and organizational commitment (OC).

The positive impact of POS on job attitudes and feelings has been well documented in previous healthcare studies. In a cross-sectional study of 650 nurses, Mallette (2011) found a strong, positive relationship ( $r = .53$ ) between POS and job satisfaction. Kwak, Chung, Xu, and Eun-Jung's (2010) cross-sectional study of 496 registered nurses also found that job satisfaction was positively correlated with POS ( $r = .36$ ). Previous meta-analyses indicated a strong, positive relationship ( $r = .59-.61$ ) between POS and job satisfaction ([Rhoades & Eisenberger, 2002](#); [Riggle, Edmondson, & Hansen, 2009](#)).

POS may also reduce job-related anxiety, as it conveys to employees that the organization will provide resources such as physical assistance and emotional support when needed (Witt & Carlson, 2006). Moreover, according to [Johnson and Hall \(1988\)](#), Job Demand-Control-Support model suggests that employees' perception of support may increase sense of

control and the ability to manage stress and anxiety. Previous studies of job stratification among caregivers also found that job satisfaction decreases as job-related anxiety increases (Newbury-Birch & Kamali, 2001; Spector, 1997).

As for organizational commitment, R. Eisenberger et al. (1986) noted that positive valuation and attention to employees' well-being, connoted by POS, fulfills socio-emotional needs of employees and leads them to incorporate organizational membership and exchange their commitment for the support they receive. A significant and positive relationship between POS and desire to remain ( $r = .59$ ) and overall organizational commitment ( $r = .71$ ) has been reported in previous meta-analyses (Rhoades & Eisenberger, 2002; Riggle et al., 2009). Finally, in a study of withdrawal behavior, Tett and Meyer (1993) found that commitment develops from job satisfaction.

Figure 1 provides an overview of the proposed relationships between the variables of this study. Because employees spend their working time at different locations, the authors distinguished between three different types of spaces, defined as follows:

- *Patient areas*, including spaces that are designed to be used by patients and families, such as inpatient rooms, patient rooms in critical-access nursing units, critical care rooms, maternity rooms, and support areas for families and visitors.
- *Staff work spaces*, including individual work spaces, shared work spaces (e.g., report rooms, nurse stations), patient treatment areas, examination rooms, operation rooms, therapy rooms, and other spaces where staff spend the majority of their working time performing their tasks.
- *Staff areas*, including spaces that are used solely by employees, such as staff lounges and caregiver sleeping areas.

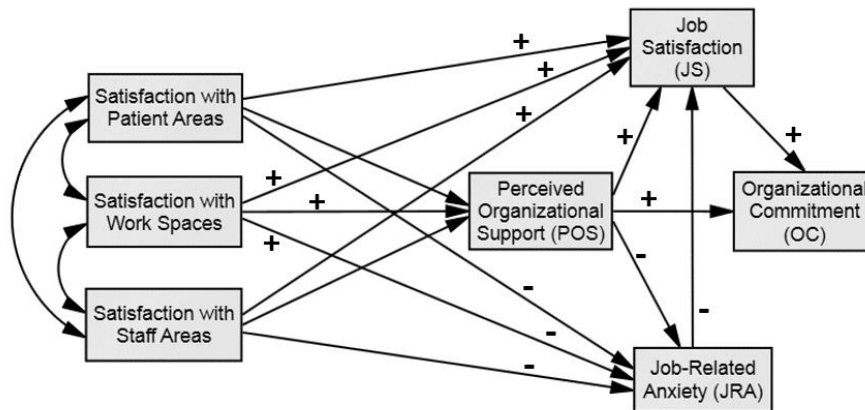


Figure 1. Overview of proposed study relationships.

The authors also controlled for age, education level, employment duration, number of years worked in building, number of working hours per week, and employees' satisfaction with their relationships at work. Age, educational level, and tenure (employment duration) might be positively related to autonomy and negatively related to job stress, both of which are an important predictor of job satisfaction (Djukic & Kovner, 2009). Previous meta-analyses also reported that communication of nurses with their supervisors and physicians is an important antecedent of job satisfaction (Rhoades & Eisenberger, 2002; Riggle et al., 2009).

### Method

This study used a cross-sectional research design. The authors used self-reported data of employees' evaluations of their physical work environments and their job-related attitudes and feelings. The authors decided to use self-reported data as the focus of this study was on the cognitive processes that impact job attitudes and feelings and the outcome variables of the study were subjective responses of employees regarding their experiences at their job.



**Study Participants**

Ten short-term acute-care hospitals run by three nongovernment and nonprofit healthcare organizations in one Midwestern state and one Southern state in the United States participated in the study in fall 2012. Regarding the size (between 33 and 772 beds, average size = 294) and age (built between 1954 and 2008, average age = 43 years) of facilities, hospitals selected for this study represented a wide range of spatial and physical conditions. Healthcare professionals that were employed full-time and involved in delivering care services requiring direct interactions with patients were the subject population of this study.

**Measurement**

Two nurse researchers, two chief nursing officers from participating organizations, three staff registered nurses, and two healthcare environmental researchers reviewed the draft questionnaire and the final online survey instrument for accuracy and content validity. Based on the comments provided by the review panel, the authors decided to provide definitions of important terms along with more information about selected environmental features to ensure the consistency of respondents' interpretations. The final version of the online survey questionnaire is accessible at <https://www.surveymonkey.com/s/QRV7C29>.

**Explanatory variables.** As advised by P. B. Harris, McBride, Ross, and Curtis (2002), the authors studied three relevant dimensions of the physical environment, including architectural features, interior design features, and ambient features. In total, 31 different features, including building layout, furniture and finishing materials, thermal comfort, lighting (natural daylight and electric lighting), acoustic environment, indoor air quality, cleanliness and maintenance, and window views were measured. The survey distinguished between three different types of spaces (patient areas, staff work space, and staff areas) and asked respondents to rate architectural and

physical features of each space separately, using a 7-point scale (1 = *very dissatisfied*, 2 = *mostly dissatisfied*, 3 = *somewhat dissatisfied*, 4 = *neither satisfied nor dissatisfied*, 5 = *somewhat satisfied*, 6 = *mostly satisfied*, 7 = *very satisfied*).

**Outcome variables.** The authors used standardized survey instruments commonly used in literature to measure perceived organizational support (R. Eisenberger et al., 1986), job-related anxiety (Warr, 1990), job satisfaction (Cammann, Fichman, Jenkins, & Klesh, 1983), and organizational commitment (John Meyer, 1993).

**Control variables:** Background and demographic information of employees were covered in the first section of the survey. In the last section of the survey, respondents were asked to indicate their satisfaction with their working relationships with the physician(s) with whom they worked, their immediate supervisor, and other members of their work group. A composite score representing employees' overall satisfaction with their relationships at work was calculated and included in the analysis.

### **Analysis Approach**

The authors employed structural equation modeling (SEM) techniques and performed a multivariable path analysis to simultaneously test and estimate the relationships between explanatory variables (predictors) and outcome variables (Figure 1). The unit of analysis for the study was the individual caregivers. The authors used SPSS AMOS with maximum-likelihood estimation and employed the covariance matrix with pairwise deletion of cases to deal with missing data. After testing and estimating the relationships shown in Figure 1, the authors performed multiple-group analysis to examine how demographic characteristics of employees may influence the relationships. To perform multigroup comparisons, the authors used critical ratios for differences between parameters, a statistic reported by AMOS, and performed pairwise

parameter comparisons for testing the hypothesis that estimated effect sizes associated with each path in Figure 1 would be equal across groups.

## Results

Approximately 2,800 individuals who met eligibility criteria were invited to participate in the study (1,800 registered nurses and 1,000 other healthcare professionals). A total of 698 surveys were received, resulting in a response rate of 25.50% for registered nurses and 24.20% for other healthcare professionals.

### Preliminary Analysis

Table 1 shows the relationships among the study variables and indicates that predictor variables were related to the outcome variables and all correlations were significant at the  $p < .01$  level.

Table 1. Means, Standard Deviations, and Correlations Among Study Variables

Variables	<i>M</i>	<i>SD</i>	<i>Coefficient alpha</i>	Patient Areas	Work Spaces	Staff Areas	POS	JRA	JS	OC	C1	C2	C3	C4	C5
Patient Areas	4.49	1.27	.84	1											
Work Spaces	4.40	1.25	.83	.789**	1										
Staff Areas	4.30	1.38	.76	.655**	.745**	1									
POS	4.59	1.38	.92	.402**	.447**	.445**	1								
JRA	2.08	0.74	.90	-.377**	-.409**	-.365**	-.517**	1							
JS	5.55	1.26	.89	.391**	.444**	.393**	.671**	-.574**	1						
OC	4.87	1.27	.89	.375**	.426**	.400**	.748**	-.515**	.766**	1					
C1	5.86	0.95	-	.320**	.372**	.339**	.557**	-.429**	.597**	.603**	1				
C2	3.06	1.02	-	-.071	-.113**	-.105**	.050	-.002	.105*	.108*	.023	1			
C3	2.69	0.80	-	.058	.024	-.019	.094*	-.035	.057	.125**	.129**	-.040	1		
C4	5.15	1.17	-	-.080*	-.065	-.026	-.011	.050	.028	.065	.046	.495**	-.084*	1	
C5	4.84	1.23	-	-.152**	-.136**	-.104*	-.047	.143**	-.012	.023	-.002	.445**	-.074	.782**	1
C6	3.94	0.76	-	.020	.035	.025	.101*	.032	.057	.091*	-.001	.023	.102**	-.002	-.038

Table notes:

M: mean; SD: standard deviation; POS: perceived organizational support; JRA: job-related anxiety; JS: job satisfaction; OC: organizational commitment; C1: relationship at work; C2: age; C3: education; C4: employment duration; C5: number of years worked in building; C6: number of working hours per week.

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

To assess the possible impact of clustering structure (respondents clustered within facilities) on study results, the authors calculated the intraclass correlation coefficient (ICC) for all study variables. The results did not indicate strong similarities among employees working in

the same facility, and ICC values were less than .11. The reliability coefficients (coefficient alphas) for all scales were higher than the .70 recommended by Nunnally and Bernstein (1995).

### The Structural Equation Model

The results of the SEM analysis are presented in Table 2 and Figure 2. None of the paths linking the evaluation of patient areas to outcome variables reached the .05 significance level. Work spaces had two significant paths, and staff areas had one significant path. The relationships among outcome variables were significant and in the predicted directions.

Table 2. Standardized Direct And Total Effect Sizes

	Work Spaces	Staff Areas	POS	JRA	JS	C1	C2	C3	C4	C5	C6
Standardized Direct Effects											
POS	.136	.173	NA	NA	NA	.435*	.109*	.009	-.095	.032	.078*
JRA	n.s.	n.s.	-.388	NA	NA	-.171*	-.054	.036	-.054	.160*	.075*
JS	.144	n.s.	.348	-.241	NA	.263*	.095*	-.029	.095	.044	.025
OC	n.s.	n.s.	.387	NA	.429	.124*	.014	.053*	.014	.029	.020
Standardized Total Effects											
POS	.136	.173	NA	NA	NA	.435	.109	.009	-.095	.032	.078
JRA	-.046	-.058	-.388	NA	NA	-.319	-.091	-.091	-.022	.149	.049
JS	.202	.074	.430	-.241	NA	.491	.155	.155	-.074	.020	.041
OC	.139	.099	.571	-.103	.429	.503	.123	.123	-.046	.050	.068

Table notes:

chi-square ( $\chi^2$ ) = 2.31,  $\chi^2$ /degree of freedom = .578, comparative fit index = 1.00, 90% confidence interval for root mean square error of approximation (RMSEA) = .00 and .043.

POS: perceived organizational support; JRA: job-related anxiety; JS: job satisfaction; OC: organizational commitment; C1: relationship at work; C2: age; C3: education; C4: employment duration; C5: number of years worked in building; C6: number of working hours per week.

NA = not applicable, the path was not specified.

n.s. = not significant.

\* Significant at  $p < 0.05$ .

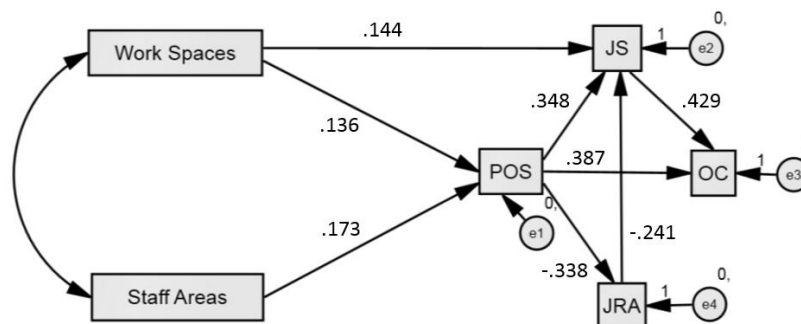


Figure 2. Standardized effect sizes found in the SEM analysis.

The relative size of the estimated structural coefficients (standardized total effects), shown in Table 2, indicated that evaluations of staff areas and work spaces had comparable influences on POS ( $\beta = .173$  and  $.136$ , respectively,  $p \leq .01$ ) and JRA ( $\beta = -.058$  and  $-.046$ , respectively,  $p \leq .01$ ). However, evaluation of work spaces had stronger effects on JS and OC compared with the evaluation of staff areas. In the final model, 42% of the variance in POS, 60% of the variance in JS, 36% of the variance in JRA, and 71% of the variance in OC were explained.

### **Multiple-Group Analysis**

Table 3 shows standardized direct effects associated with paths linking patient areas, work spaces, and staff areas to outcome variables across each demographic group. For example, Table 3 shows that for employees over 50 years old, only the path from work space to job satisfaction was significant at  $p < .05$ , and the standardized effect size for this path was  $.22$ . Table 3 also summarizes the results of pairwise parameter comparisons and indicates significant differences across demographic groups. For example, the influence of staff areas on POS was significantly larger for employees who had been working in the facility for more than 10 years compared with those who had been working in the facility for less than 2 years.

Table 3. *Estimated Effect Sizes Associated With Paths Linking Space to Job-Related Attitudes for Each Demographic Group*

Type of space	Patient Areas			Work Spaces			Staff Areas		
Outcome variable	POS	JS	JRA	POS	JS	JRA	POS	JS	JRA
<b>Age</b>									
$(\chi^2 = 11.050, df = 12, RMSEA = 0.00, CFI = 1, TLI = 1)$									
Under 39 years	n.s.	n.s.	n.s.	n.s.	.26	-.41	n.s.	n.s.	n.s.
40-49 years	n.s.	n.s.	n.s.	0.21	n.s.	n.s.	n.s.	n.s.	n.s.
Over 50 years	n.s.	n.s.	n.s.	n.s.	.22	n.s.	n.s.	n.s.	n.s.
<b>Number of Working Hours Per Week</b>									
$(\chi^2 = 17.433, df = 12, RMSEA = 0.25, CFI = .998, TLI = 0.971)$									
<34 hours	n.s.	n.s.	n.s.	n.s.	n.s.	-.46	n.s.	n.s.	-.31
35-40 hours	n.s.	n.s.	n.s.	n.s.	.24	n.s.	.29	n.s.	-.18
>41 hours	n.s.	n.s.	n.s.	.30	n.s.	n.s.	n.s.	n.s.	n.s.
<b>Number of Years Worked in Building</b>									
$(\chi^2 = 10.585, df = 16, RMSEA = 0.00, CFI = 1, TLI = 1)$									
<2 years	n.s.	n.s.	n.s.	.38	n.s.	n.s.	.37*	.38*	n.s.
3-5 years	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
5-10 years	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	.18*	n.s.
>10 years	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	.15*	n.s.	n.s.
<b>Employment Duration</b>									
$(\chi^2 = 24.594, df = 16, RMSEA = 0.027, CFI = .997, TLI = 0.940)$									
<2 years	n.s.	n.s.	n.s.	.47*	n.s.	n.s.	.37	n.s.	n.s.
3-5 years	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
5-10 years	.30	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.
>10 years	n.s.	n.s.	n.s.	.19*	n.s.	n.s.	n.s.	n.s.	n.s.
<b>Work Shift</b>									
$(\chi^2 = 7.879, df = 12, RMSEA = 0.00, CFI = 1, TLI = 1)$									
Dayshift	n.s.	n.s.	n.s.	.15*	n.s.	n.s.	.27	n.s.	n.s.
Nightshift	.32	n.s.	n.s.	.41*	n.s.	-.11	.37	n.s.	n.s.
Rotating	n.s.	n.s.	n.s.	n.s.	.28	n.s.	n.s.	n.s.	n.s.
<b>Job Title</b>									
$(\chi^2 = 7.954, df = 12, RMSEA = 0.00, CFI = 1, TLI = 1)$									
Nurses	n.s.	n.s.	-.16	.39	n.s.	n.s.	.45	n.s.	n.s.
Technologists/Therapists	.27	n.s.	n.s.	n.s.	.22	n.s.	n.s.	n.s.	-.34
Assistants	n.s.	n.s.	n.s.	n.s.	.36	n.s.	n.s.	.22	n.s.

Note:

n.s.: not significant at  $p < .05$ . Estimated effect sizes shown in Table 2 apply.

POS: perceived organizational support; JS: job satisfaction; JRA: job-related anxiety.

 $\chi^2$  = chi-square;  $df$  = degrees of freedom;  $RMSEA$  = root mean square error of approximation;  $CFI$  = comparative fit index;  $TLI$  = Tucker-Lewis index.\* The null hypothesis for the equality of effect sizes in the pairwise comparisons across groups is rejected. The authors performed a Bonferroni correction by dividing the critical P-value ( $\alpha = .05$ ) by the number of comparisons being made.

## Discussion

### **Influence of the Physical Environment on Job-Related Attitudes and Feelings**

The analysis found a positive relationship between employees' satisfaction with the architectural/physical features of their environment and POS, possibly because of the positive message that providing a well-designed work environment sends to employees. As for organizational commitment, a positive relationship between the physical environment and POS and between POS and OC showed the role of facility design in improving the affective bond between employees and their organization. This finding suggests that providing a well-designed work environment can be perceived by employees as an indicator of the benevolent intent of the organization. As [Eisenberger et al. \(1986\)](#) noted, this fulfills employees' socio-emotional needs and leads them to incorporate organizational membership and exchange their commitment for the support they receive. Caring about the well-being of employees is specifically important in healthcare settings, as healthcare service delivery is emotionally demanding for caregivers ([Aiken, Clarke, Sloane, Sochalski, & Silber, 2002](#)). The estimated association between the physical work environment and job-related anxiety was very small (Table 2), which can be explained by the substantial role of other factors that impact the anxiety of caregivers at work. Previous studies have shown that autonomy, workload, uncertainty about treatments, and experience with patient death and dying are among the most important work-related factors that cause anxiety and stress among healthcare workers ([Aiken et al., 2002](#)).

In general, although the estimated effect sizes for the influence of architectural and physical features on outcome variables are small, they are still significant despite providing control of multiple confounders, including employees' relationships at work (with immediate supervisor, with members of work group, and with physicians). As for different environments in

the facility, SEM analysis found that work spaces and staff areas had a considerable influence on job-related feelings and attitudes of employees, while the impact of patient areas was negligible. Multigroup comparisons across demographic variables confirmed this general finding. Table 3 shows that each of the variables representing satisfaction with patient areas, work spaces, and staff areas was involved in a total of 60 different relationships with outcome variables. For patient areas, only four paths were found to be statistically significant, while for work spaces and staff areas, 16 and 13 paths were significant, respectively.

As noted by [Halford and Leonard \(2003\)](#), higher effect sizes associated with work spaces can be explained by the fact that staff members have a strong spatial identification with their work spaces because of their confinement to their work areas. Moreover, work spaces and staff areas are solely used by staff members, and employees may value the quality of the physical environment in these spaces as indications that the organization cares about their well-being. Similarly, small effect sizes for paths linking patient areas to outcome variables can be explained by the fact that these spaces are dominantly used by patients and their families, leading staff members to perceive that the organization pays more attention to the safety and comfort of patients and families in these areas.

### **Differences Across Demographic Groups**

Estimated effect sizes, displayed in Table 3, showed that employees newer to the facility and to the organization were more sensitive to the physical work environment than those who had been working in the facility and in the organization for a longer period of time. The theory of work adjustment ([Dawis & Lofquist, 1984](#)) can be used to explain this finding. According to Dawis and Lofquist, the work environment requires that certain tasks be performed by employees. To perform these tasks, employees require compensation for their performance, as well as the



presence of certain conditions. To continue this interaction, the work environment and the employee need to continue to meet each other's requirements, and the success of work relations depends on the degree to which requirements of each side are met (correspondence between individual and environment characteristics). Work adjustment refers to the process of achieving and maintaining the state of correspondence. Based on this theory, new employees are affected by their physical work environment to a greater extent since they might be in the process of achieving the state of correspondence, while those who have been working for a longer period of time might have achieved that state and are accustomed to their environment. Besides, newer employees normally have lower levels of work experience and confidence in their skills, which might lead them to be more influenced by their work environment, including its architectural and physical features.

Multigroup analysis also found that compared with dayshift staff, nightshift employees were more sensitive to the physical work environment. Physical work environment might have high importance for nightshift employees because they normally have less interaction with administrative staff and family members of patients in comparison with dayshift staff members. Less personal interaction escalates the influence of other environmental factors, such as architectural and physical features of the workplace. Shift work might also create negative physical and psychological effects ([Applebaum, Fowler, Fiedler, Osinubi, & Robson, 2010](#); [Berger & Hobbs, 2006](#); [Coffey, Skipper, & Jung, 1988](#); [Fitzpatrick, While, & Roberts, 1999](#)), and these negative consequences may make nightshift staff members more susceptible to environmental stimuli such as noise, temperature, and lighting.

## Study Implications

The growing population of older citizens in the United States, improving economic conditions, and Affordable Care Act coverage expansions are expected to drive faster projected growth in healthcare needs in 2014 and beyond. Given the expected changes in the U.S. population age structure by 2050, studies have projected about 72% growth in required inpatient capacity in the U.S. to meet the future demand for healthcare. In the coming years, expected growth in healthcare needs will likely result in the building of new hospitals, and experts forecast that between 2014 and 2017, the U.S. will spend more than \$200 billion on healthcare construction, with construction project costs that could exceed \$55 billion per year by 2017 (Giggard, 2013). The field of evidence-based design, modeled based on evidence-based medicine, has focused on optimizing the design operation and management of healthcare facilities to improve healthcare outcomes (Hamilton & Watkins, 2009). During the past 25 years, more than 2,000 empirical studies that have documented the impact of the design and operation of healthcare facilities on key organizational outcomes have been published in the fields of architecture, medicine, nursing, and environmental psychology ([Ulrich, Berry, Xiaobo, & Parish, 2010](#)). If communicated effectively to decision-makers, the growing body of evidence-based research and design knowledge base can inform decisions about investments in healthcare facilities ([Verderber, Jiang, Hughes, & Xiao, 2014](#)). This study suggests scholarly, yet practical, strategies for utilizing facility design and operation to enhance recruitment, engagement, and retention of healthcare employees and improve the quality of care and financial well-being of healthcare organizations. Findings showed that facility design and operation can be used as a managerial tool for improving job-related attitudes and feelings of employees and earning their commitment. Attention to job attitudes and feelings of employees becomes specifically important when we

consider the fact that nurses and other healthcare professionals normally rate the physical environment more negatively than other characteristics of their work environment ([Applebaum et al., 2010](#); [Kotzer, Zacharakis, Raynolds, & Buenning, 2011](#)).

This study also found that new employees are more sensitive to the way a facility is designed and operated compared to older employees. This is important because previous studies showed that as the population of healthcare professionals is aging, a wave of recruitment of new employees is approaching in the coming years ([Buerhaus, Auerbach, & Staiger, 2009](#)). While factors such as age, education, and work experience of the new generation of healthcare professionals are less controlled by hospital executives, a well-designed work environment could assist organizations in improving job-related attitudes and feelings of employees.

On the basis of previous healthcare design studies, important considerations and recommendations to improve the role of the physical work environment include the followings:

- In general, to improve staff members' evaluation of their physical work environment, attention to cleanliness and ease of maintenance, air quality, noise level, and thermal comfort are critical ([Monjur & Yisong, 2012](#)).
- In patient areas, cleanliness, quietness, in-room sinks, charting alcoves with a window, availability of supplies and computers in the alcoves, and close proximity between the bed and bathroom are important considerations ([Becker, Sweeney, & Parsons, 2008](#); [Kotzer et al., 2011](#); [Watkins, Kennedy, Ducharme, & Padula, 2011](#)).
- In staff work areas, adequately available space, adequate countertop size, well-organized supplies, adequate task lighting, and reduced noise level are important considerations ([Simmons, 2003](#)).

- In staff lounges and caregiver sleeping areas, where employees spend their rest time, features that improve the aesthetic attributes of the physical environment might be valued by employees. These features include presence of artwork, access to nature, and improved interior design features, such as furnishings and colors ([Mroczek, Mikitarian, Vieira, & Rotarius, 2005](#)).

### **Study Limitations and Directions for Future Studies**

Although this study makes important contributions to the field, it does have some limitations that need to be acknowledged and possibly addressed in future studies. First, because of the sampling approach, the findings can only be generalized to healthcare professionals in acute-care settings in the United States. Moreover, while the study sample size was adequate to perform all the analyses required for answering the study questions, it should be acknowledged that the response rate (25%) was relatively low, and the study sample may not be representative of the population of healthcare professionals in acute-care settings as a whole. Second, although the results of the structural equation modeling were satisfactory and the respondent sample was large, the cross-sectional design of the study is an important limitation. Relationships identified in this study should be verified using time-series data or cross-sectional studies conducted in multiple phases. Third, findings are limited by the self-reporting nature of the survey. Although relevant information was provided as web links in the online questionnaire, some of the questions for quantifying employees' evaluations of their physical work environment may have been inadequately defined. Fourth, the influence of work requirements in different medical departments should be taken into account before generalizing the findings of this study. For example, caregivers may feel a greater need for cleanliness in surgical or intensive-care units, where the risk of infection transferred from patients to caregivers is higher. Finally, this study

did not include personal characteristics of employees, such as personality dimensions and the strength of socio-emotional needs. According to Eisenberger and Stinglhamber (2011), dispositional differences may not have an independent influence on employees' feelings and attitudes, but they may alter the influence of other work-related variables.

In addition to looking at the impact of personal characteristics of employees and work requirements in different medical departments, future studies should investigate the influence of facility design and operation on employees' performance and behavioral outcomes. Studies have found that job satisfaction is positively correlated ( $r = 0.30$ ) with focal performance of employees (work behaviors that are prescribed by formal job roles; [Harrison, Newman, & Roth, 2006](#)) and organizational commitment is negatively correlated ( $r = -0.22$ ) with turnover ([Meyer, Stanley, Herscovitch, & Topolnytsky, 2002](#)). More importantly, given the increased urgency to reduce costs and improve outcomes of care in the U.S., benefits gained from enhanced performance should be compared to costs for clarifying the return on investment of facility design and operation. For example, a recent empirical study of the relationship among hospital environments and employee engagement and turnover in a green hospital in the U.S. found that perceptions of the built environment improved employee engagement and well-being up to 14% ([Harris, 2014](#)). According to the study, the corresponding annual cost avoidance associated with reductions in turnover and injury was calculated to be as high as \$2.2 million, outweighing the costs associated with the design and operation interventions. Future studies should translate benefits gained from improved performance into economic terms and compare them with costs associated with the design and operation of facilities to help healthcare executives evaluate investments on space modernization. It is important to note that improvements in the design and operation of healthcare facilities can result in considerable improvements in safety and quality of

care (e.g., patient falls, medication errors, length of stay, and perceived quality of care by patients and family members) as well (Ulrich et al., 2008), and these improvements should also be included in financial analyses to aid the decision-making process regarding capital spending for designing, building, and renovating healthcare facilities.

### **Conclusion**

In this study, the authors used perceived organizational support, a construct proposed by organization psychologists, and investigated the influence of the physical work environment on job-related anxiety, job satisfaction, and organizational commitment of healthcare professionals. Analysis found that positive evaluations of the physical work environment were significantly associated with higher levels of perceived organizational support, indicating that providing a healthy work environment can be perceived by employees as their organization valuing them and caring about their well-being. Analysis also found that perceived organizational support was significantly associated with lower job-related anxiety, higher job satisfaction, and higher organizational commitment. This finding indicates that attention to employees' well-being can be reciprocated with higher levels of motivation and commitment toward the organization and can lead employees to care about the welfare of the organization, thereby helping it achieve its goals.

In summary, this study provides preliminary evidence that facility design and operation can be used as a managerial tool for improving job-related attitudes and feelings of employees and earning their commitment. Previous studies showed that attitudes and feelings at work have important implications for the recruitment and retention of healthcare employees, and they significantly impact the quality of care that caregivers deliver. As for different environments in the facility, results of this study indicated that work spaces and staff areas were highly valued by employees, while the association between evaluations of patient areas and job-related attitudes

and feelings of employees was negligible. As for demographic characteristics of employees, multigroup analysis found that the employees newer to the facility and the organization, along with nightshift staff members, were more sensitive to the physical work environment compared to other groups of staff members.

## References

- Aiken, L. H., Clarke, S. P., Sloane, D. M., Sochalski, J., & Silber, J. H. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *Journal of the American Medical Association*, 288(16), 23-30.
- Aiken, L. H., Sloane, Douglas M., Clarke, Sean, Poghosyan, Lusine, Cho, Eunhee, You, Liming, . . . Aunguroch, Yupin. (2011). Importance of work environments on hospital outcomes in nine countries. *International Journal for Quality in Health Care*, 23(4), 357-364.
- American Hospital Association (AHA). (March 2011). The cost of caring: drivers of spending on hospital care. Retrieved January, 28, 2014, from <http://www.aha.org/aha/research-and-trends/index.html>
- American Hospital Association (AHA). (2013). Trendwatch chartbook 2013, trends in the overall health care market. Retrieved January, 28, 2014, from <http://www.aha.org/research/reports/tw/chartbook/ch1.shtml>
- Applebaum, Diane, Fowler, Susan, Fiedler, Nancy, Osinubi, Omowunmi, & Robson, Mark. (2010). The impact of environmental factors on nursing stress, job satisfaction, and turnover intention. *The Journal of Nursing Administration*, 40(7/8), 323-328.
- Becker, F, Sweeney, B. , & Parsons, K. (2008). Ambulatory facility design and patients' perceptions of healthcare quality. *Health Environments Research and Design*, 1(4), 35-54.

- Berger, A. M., & Hobbs, B. B. (2006). Impact of shift work on the health and safety of nurses and patients. *Clinical Journal of Oncology Nursing*, 10(4), 465-472. doi: 10.1188/06.cjon.465-471
- Buerhaus, P. I. (2008). Current and future state of the US nursing workforce. *Journal of The American Medical Association*, 300(20), 2422-2424.
- Buerhaus, P. I., Auerbach, D. I., & Staiger, D. O. (2009). The recent surge in nurse employment: causes and implications. *Health Affairs (Project Hope)*, 28(4), 657-668.
- Cammann, C. , Fichman, M., Jenkins, G. D., Jr., & Klesh, J. R. . (1983). Assessing the attitudes and perceptions of organizational members. In S. E. Seashore, E. E. Lawler III, P. H. Mirvis & C. Cammann (Eds.), *Assessing organizational change: A guide to methods, measures, and practices* (pp. 71-138). New York: Wiley.
- Centers for Medicare and Medicaid Services (CMS). (2013). National health expenditure projections 2012-2022 Retrieved January, 24, 2014, from <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/index.html>
- Coffey, L. C., Skipper, J. K., Jr., & Jung, F. D. (1988). Nurses and shift work: effects on job performance and job-related stress. *Journal of Advanced Nursing*, 13(2), 245-254.
- Dawis, René V. , & Lofquist, Lloyd H. (1984). *A psychological theory of work adjustment : An individual-differences model and its applications*. Minneapolis, IN: University of Minnesota Press.
- Djukic, Maja, & Kovner, Christine. (2009). *Physical work environment: Testing an expanded job satisfaction model in a sample of hospital staff registered nurses*. Unpublished doctoral dissertation, New York University, New York.



- Djukic, Maja, Kovner, Christine, Budin, Wendy, & Norman, Robert. (2010). Physical work environment: testing an expanded model of job satisfaction in a sample of registered nurses. *Nursing Research*, 59(6), 441-451.
- Eisenberger, R., & Stinglhamber, F. (2011). Antecedents of perceived organizational support. In R. Eisenberger & F. Stinglhamber (Eds.), *Perceived organizational support : fostering enthusiastic and productive employees* (pp. 61-97). Washington, D.C.: American Psychological Association.
- Eisenberger, R., Huntington, R., Hutchison, S., & Sowa, D. (1986). Perceived organizational support. *Journal of Applied Psychology*, 71(3), 500-507.
- Fitzpatrick, J. M., While, A. E., & Roberts, J. D. (1999). Shift work and its impact upon nurse performance: current knowledge and research issues. *Journal of Advanced Nursing*, 29(1), 18-27.
- Gibson, James. (1977). The theory of affordances In R. E. Shaw & J. Bransford (Eds.), *Perceiving, acting, and knowing: toward an ecological psychology* (pp. 127–143). Hoboken, NJ: John Wiley & Sons Inc.
- Giggard, J. R. . (2013). FMI's construction outlook, 2nd quarter 2013 report. Retrieved January, 28, 2014, from [http://www.fminet.com/media/pdf/forecasts/Outlook\\_2013Q2\\_FMI.pdf](http://www.fminet.com/media/pdf/forecasts/Outlook_2013Q2_FMI.pdf)
- Halford, Susan , & Leonard, Pauline. (2003). Space and place in the construction and performance of gendered nursing identities. *Journal of Advanced Nursing*, 42(2), 201-208.
- Hamilton, D. K., & Watkins, David H. . (2009). *Evidence-based design for multiple building types*. Hoboken, N.J.: John Wiley & Sons.

- Harris, D. D. . (2014). Return on investment of a LEED platinum hospital: the influence of healthcare facility environments on healthcare employees and organizational effectiveness. *Journal of Hospital Administration*, 3(6), 37. doi: 10.5430/jha.v3n6p37
- Harris, P. B., McBride, G., Ross, C., & Curtis, L. (2002). A place to heal: environmental sources of satisfaction among hospital patients. *Journal of Applied Social Psychology*, 32, 1276-1299.
- Harrison, David A., Newman, Daniel A., & Roth, Philip L. (2006). How important are job attitudes? Meta-analytic comparisons of integrative behavioral outcomes and time sequences. *Academy of Management Journal*, 49(2), 305-325.
- Johnson, J. V., & Hall, E. M. (1988). Job strain, work place social support, and cardiovascular disease: a cross-sectional study of a random sample of the Swedish working population. *American Journal of Public Health*, 78(10), 1336-1342.
- Kotzer, A. M., Zacharakis, S. K., Raynolds, M., & Buenning, F. (2011). Evaluation of the built environment: Staff and family satisfaction pre- and post-occupancy of the Children's hospital. *Health Environments Research & Design Journal*, 4(4), 60-78.
- Kwak, Chanyeong, Chung, Bok Yae, Xu, Yu, & Eun-Jung, Cho. (2010). Relationship of job satisfaction with perceived organizational support and quality of care among South Korean nurses: A questionnaire survey. *International Journal of Nursing Studies*, 47(10), 1292-1298. doi: <http://dx.doi.org/10.1016/j.ijnurstu.2010.02.014>
- Mallette, Claire. (2011). Nurses' work patterns: perceived organizational support and psychological contracts. *Journal of Research in Nursing*, 16(6), 518-532.
- Meyer, J., Stanley, D., Herscovitch, L., & Topolnytsky, L. (2002). Affective, continuance, and normative commitment to the organization: a meta-analysis of antecedents, correlates,

- and consequences. *Journal of Vocational Behavior*, 61(1), 20-52. doi: DOI: 10.1006/jvbe.2001.1842
- Meyer, John. (1993). Commitment to organizations and occupations: Extension and test of a three-component conceptualization. *Journal of Applied Psychology*, 78(4), 538.
- Monjur, M., & Yisong, Z. (2012). Healthcare providers' perception of design factors related to physical environments in hospitals. *Journal of Environmental Psychology*, 32(4), 362-370.
- Mroczek, J., Mikitarian, G., Vieira, E. K., & Rotarius, T. (2005). Hospital design and staff perceptions: An exploratory analysis. *Health Care Manager*, 24(3), 233-244.
- Newbury-Birch, D, & Kamali, F. (2001). Psychological stress, anxiety, depression, job satisfaction, and personality characteristics in preregistration house officers. *Postgraduate Medical Journal*, 77(904), 109-111.
- Nunnally, Jum C., & Bernstein, Ira H. (1995). *Psychometric theory*. New York: McGraw-Hill.
- Rhoades, L., & Eisenberger, R. (2002). Perceived organizational support: A review of the literature. *Journal of Applied Psychology*, 87, 698-714.
- Riggle, Robert J., Edmondson, Diane R., & Hansen, John D. (2009). A meta-analysis of the relationship between perceived organizational support and job outcomes: 20 years of research. *Journal of Business Research*, 62(10), 1027-1030. doi: 10.1016/j.jbusres.2008.05.003
- Sallis, JF, Owen, N, & Fisher, EB. (2008). Ecological models of health behavior. In K. Glanz, B. K. Rimer & F. M. Lewis (Eds.), *Health behavior and health education : theory, research, and practice* (4th ed., pp. 65-86). San Francisco Jossey-Bass.

- Simmons, J. C. . (2003). Designing for quality: hospitals look to the built environment to provide better patient care and outcomes. *The Quality Letter for Healthcare Leaders*, 15(4), 2-13.
- Spector, Paul E. (1997). *Job satisfaction : application, assessment, cause, and consequences*. Thousand Oaks, Calif.: Sage Publications.
- Tett, Robert P., & Meyer, John P. (1993). Job satisfaction, organizational commitment, turnover intention: Path analyses based on meta-analytic findings. *Personnel Psychology*, 46(2), 259-293.
- Ulrich, R., Berry, L. L., Xiaobo, Q., & Parish, J. (2010). A conceptual framework for the domain of evidence-based design. *Health Environments Research & Design Journal*, 4(1), 95-114.
- Ulrich, R., Zimring, C., Barch, X. Z., Dubose, J., Seo, H. B., Choi, Y. S., . . . Joseph, A. (2008). A review of the research literature on evidence-based healthcare design. *Health Environments Research & Design Journal*, 1(3), 61-125.
- Verderber, S., Jiang, S., Hughes, G., & Xiao, Y. (2014). The evolving role of evidence-based research in healthcare facility design competitions. *Frontiers of Architectural Research*, 3(3), 238-249. doi: <http://dx.doi.org/10.1016/j.foar.2013.12.001>
- Warr, Peter. (1990). The measurement of well-being and other aspects of mental health. *Journal of Occupational Psychology*, 63(3), 193-210.
- Watkins, N. , Kennedy, M. , Ducharme, M. , & Padula, C. (2011). Same-handed and mirrored unit configurations: Is there a difference in patient and nurse outcomes? *Journal of Nursing Administration*, 41(6), 273-279.

- Witt, L. A., & Carlson, D. S. . (2006). The work–family interface and job performance: Moderating effects of conscientiousness and perceived organizational support. *Journal of Occupational Health Psychology, 11*, 343–357.