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Title: Physical Work Environment: Testing an Expanded Model of Job Satisfaction in a Sample of Registered Nurses

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Background: The impact of personal, organizational, and economic factors on nurses' job satisfaction has been extensively studied, but a dearth of studies exists in which the effect of physical work environment, including perceptions of architectural, interior design, and ambient features on job satisfaction is examined.

Objectives: In order to extend the theoretical and empirical base of job satisfaction determinants, necessary for development of effective nurse retention strategies, the study aimed to examine the effect of perceived physical work environment on job satisfaction adjusting for multiple personal, organizational, and economic determinants of job satisfaction.

Method: The study used a cross-sectional, predictive design and a web-based survey instrument to collect data from staff RNs in a large metropolitan hospital. The survey was comprised of 34 questions about multiple job satisfaction determinants, including 18 Likert-type measures with established good validity (CFI = .90; TLI = .89; RMSEA = .04) and reliability ($r \geq .70$).

Results: A response rate of 48.5% resulted in a sample of 362 with 80% power to detect a medium effect of perceived physical environment on job satisfaction. On average, nurses had negative perceptions of physical work environment ($M = 2.9$, $SD = 2.2$). While physical environment was positively related to job satisfaction ($r = .256$, $p = .01$) in bivariate analysis, in ordered probit regression, no effect of physical work environment on job satisfaction was found.

Discussion: Future studies should re-examine this relationship in larger and more representative samples of nurses as well as use qualitative methods to explore in what ways negatively perceived physical work environment does impact nurses. Rebuilding of U.S. hospitals, with a planned investment of \$200 billion, without considering how physical environment contributes to nurse work outcomes, threatens to exacerbate organizational nurse turnover.

Physical Work Environment: Testing an Expanded Model of Job Satisfaction in a Sample of
Registered Nurses

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1 Abstract

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5 features on job satisfaction is examined.

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20 samples of nurses as well as use qualitative methods to explore in what ways negatively
21 perceived physical work environment does impact nurses. Rebuilding of U.S. hospitals, with a
22 planned investment of \$200 billion, without considering how physical environment contributes
23 to nurse work outcomes, threatens to exacerbate organizational nurse turnover.

1 Key Words: Nursing Personnel, Job Satisfaction, Physical Work Environment

2

1 such as temperature, lighting, workspace crowding, workspace aesthetic appearance, ventilation,
2 and furniture arrangement more poorly than organizational characteristics such as peer cohesion,
3 supervisor support, managerial control, work pressure, and autonomy. Similarly, hospital staff
4 RNs reported lower ratings of the physical environment features, including, being exposed to
5 high levels of noise, moisture, dust, heat, cold, light, poisonous substances, unpleasant odors,
6 compared to organizational attributes such as social support, role overload, role ambiguity,
7 interpersonal strain (Santos et al., 2003).

8 In several studies, negative RN perceptions of individual physical environment features,
9 including, access to supplies and equipment (Norbeck, 1985; Parish, Berry, & Lam, 2008),
10 nursing unit layout (Adams & Bond, 2000), window view (Shepley, Harris, & White, 2008), and
11 room size (Janssen, Harris, Soolsma, Klein, & Seymour, 2001) were found to be related to lower
12 job satisfaction. Also, negative RN perceptions of nursing unit décor were related to lower job
13 satisfaction (Parish et al., 2008; Shepley et al., 2008). Janssen et al. (2001) found perception of
14 higher noise levels were associated with lower RN job satisfaction, while Norbeck (1985) found
15 no such relationship. Additionally, Alimoglu and Donmez (2005) reported that nurses who were
16 exposed to more than 3 hours of daylight in a work shift reported higher job satisfaction than the
17 RNs exposed to less than 3 hours of daylight per work shift. Likewise, Janssen et al. (2001)
18 noted that the RNs who reported better perceptions of the overall workplace lighting also
19 reported higher levels of job satisfaction.

20 In summary, the findings from the reviewed studies suggest that RNs have negative
21 perceptions of their physical work environment and that the negative RN perceptions of
22 individual physical environment features are linked to lower job satisfaction. However, due to
23 limited control of confounding job satisfaction factors in the reviewed studies, the effect of

1 physical work environment on RN job satisfaction over and above the effects of personal,
2 organizational, and economic job satisfaction determinants is difficult to establish. Further, the
3 combined effect of multiple physical environment features on RN job satisfaction has not been
4 examined. In order to address these limitations and to further develop theoretical foundation of
5 RN job satisfaction determinants, this study aimed to test an expanded conceptual model of job
6 satisfaction that includes a measure of perceived physical work environment in order to answer
7 the research question: What is the effect of perceived physical work environment on job
8 satisfaction adjusting for personal, organizational, and economic determinants of job satisfaction
9 in a sample of staff RNs?

10 Conceptual Framework

11 The conceptual model (see Figure 1) used to guide this study is an extension of RN job
12 satisfaction model specified by Price (2001) and Kovner et al. (2009) and empirically supported
13 in studies of hospital staff RNs in the United States (Irvine & Evans, 1995; Kovner et al., 2006,
14 2009). According to this conceptual model multiple personal, organizational, and economic
15 factors impact RN job satisfaction. These factors represent control variables in this study and
16 they are described in detail in Table 1. Further, as shown in Figure 1, variables that Kovner et al.
17 (2006, 2009) added to the original Price's model (2001) include several demographic variables
18 and organizational attributes found in studies of RNs to be significant predictors of job
19 satisfaction. Lastly, Price (2001, p. 606) suggested that "research has narrowly examined the job
20 itself and has ignored larger issues that are pertinent to the job, such as ...the physical conditions
21 of work, the physical design of work environment." Therefore, examining the contribution of
22 physical work environment to explaining RN job satisfaction, over and above the stated control
23 variables was the logical next step for theoretical expansion of this model.

1 Site

2 The study was conducted at a large urban hospital, including 32 inpatient units with
3 substantial variance in their physical environment features. This was a non-government, not-for-
4 profit, general medical and surgical major teaching hospital. The hospital, located in the U.S.
5 northeast region, employed about 1,300 staff RNs at the time of study.

6 Participants

7 A total of 746 RNs who met eligibility criteria were invited to participate in the study.
8 The eligible RNs were those who had a functioning work e-mail account and who worked full-
9 time, on inpatient units, providing direct patient care. To ensure an optimal response rate and to
10 decrease non-response error, the Tailored Design Method (Dillman, 2007) with individual
11 incentives was implemented to recruit subjects in this study. As suggested by Dillman, there
12 were five contacts with the subjects. The contacts included a pre-survey e-mail letter sent a week
13 before the e-mail letter that contained \$5 dollar e-mail gift certificate and a web-link to the
14 survey instrument, as well as three reminder e-mail letters, at two, four, and eight weeks from the
15 initial contact with the subjects. Survey instrument was distributed by e-mail from January to
16 March of 2009.

17 Survey Instrument

18 The survey instrument used in this study was adapted from Kovner et al. (2007) who, in
19 concert with a group of national experts in nursing and medical workforce, carefully designed
20 the instrument based on the Price Model of Voluntary Turnover (Price, 2001), revisions of the
21 model by Kovner et al. (2006, 2009) and the 2004 National Sample Survey of Registered Nurses.
22 The adapted survey instrument used in this study consisted of 34 questions and a total of 91

1 items. SurveyMonkey^R survey software was used to administer the survey in a web-based
2 platform. Five staff RNs pilot tested the web-based version of the survey to ensure its usability.

3 **Measures.** Dependent variable, job satisfaction was measured with a global job
4 satisfaction scale (Quinn & Staines, 1979). It is a five-item, Likert type scale with response
5 categories that vary among the items. For example, for the first scale item, the responses vary
6 from 1 (*very dissatisfied*) to 7 (*very satisfied*). For the fourth scale item, the responses vary from
7 1 (*not very much like the job I wanted*) to 3 (*very much like the job I wanted*). These responses
8 were rescaled to a common seven-point scale to obtain the total scale score. Further, to facilitate
9 analysis in the ordered probit regression framework, job satisfaction response categories were
10 collapsed from the original number of response categories of 31 to 5 which ensured equal
11 distribution of observations across response category cells.

12 Independent variable, physical work environment, was measured with Moos (1994)
13 nine-item Physical Comfort subscale of the Work Environment Scale (WES) to assess nurses'
14 subjective evaluation of physical work environment. The measure captured one architectural
15 feature, which is the perception of workspace size (e.g., “workspace is awfully crowded”), four
16 interior design features (e.g., “the furniture is usually well arranged”), and four ambient features,
17 including perception of temperature, lighting, and air flow. The responses were measured on
18 two-point scale, with responses options ranging from 0 (*no*) to 1 (*yes*) for each of the nine scale
19 items for a possible summed score ranging from 0 to 9.

20 The sources, conceptual definitions, response categories, and the number of items for
21 control measures are stated in Table 1.

22 **Validity and reliability of measures.** Confirmatory factor analysis of the 18 latent
23 variables measured with Likert-type scales was performed in Mplus (Muthén & Muthén, 2007)

1 for the studied sample. The overall chi-square for the 18 factor model was statistically significant
2 (Model $\chi^2 [347] = 4308.34, p < .000$), but it is considered an overly conservative measure of fit,
3 especially in a model with large number of indicator variables. Other fit indices (CFI = .90; TLI
4 = .89; RMSEA = .04) indicated good overall fit of the 18 factor model to data. The 77 factor
5 loadings also showed that the items loaded highly on their respective latent variables, except for
6 one item in the variety measure (“how repetitious are your duties”) with a factor loading of .33
7 and two items in the physical environment measure with factor loadings of .10 (“it sometimes
8 gets too hot”) and .12 (“it is rather drafty at times”). Additionally, internal reliability analysis
9 showed that all scales had good internal consistency reliability with Cronbach's alpha values
10 $r > .70$, except for the physical work environment measure ($r = .68$) and variety measure ($r =$
11 $.63$).

12 Data Analysis

13 To answer the stated research question, ordered probit regression (Long, 1997) and
14 STATA v.10 statistical software were used, because ordered probit is the appropriate analytic
15 technique for modeling effects of single or multiple, continuous or categorical independent
16 variables, on a single dependent variable, in this case job satisfaction, that is measured on an
17 ordered scale. Testing the expanded model of job satisfaction to answer the stated research
18 question required a two-step approach within the ordered probit regression framework (Long,
19 1997). In the first step, the researcher determined if physical work environment had any effect on
20 job satisfaction by assessing whether the improvement in model fit from the analytic model that
21 did not include physical work environment (controls only model) to the model that included the
22 physical work environment measure (expanded model) was statistically significant ($p < 0.05$) by
23 determining if the difference in $-2 * \log\text{-likelihood} (\chi^2)$ from the two models was significant

1 (Tabachnick & Fidell, 2007). Caution was taken to ensure that the two models were nested
2 within each other and that same sample was used for estimating both models (Long, 1997).

3 To determine the size of the effect for the significant predictors of job satisfaction
4 identified in step one, marginal effect or partial change analysis was done in step two. In the
5 analysis, all variables in the model were set at their mean values and the effect of one unit
6 change in predictor variable on the cumulative probability of selecting outcomes above an
7 outcome level of job satisfaction where the change in probability was the greatest was
8 determined. Cumulative probability was obtained by summing the positive marginal effects. The
9 significance level for partial change was set at $p < 0.05$. If the sign associated with partial change
10 was positive, that meant that increasing value of independent variable (x) increased the
11 probability of higher values of dependent variable (y) being selected at the selected values of x
12 and y . The opposite was true for the negative sign associated with the measures of partial change
13 (Long, 1997). Lastly, given that nurses were nested within 32 hospital inpatient units, to account
14 for the non-independence of errors within hospital units error adjustment was made in STATA
15 v.10 using *Svyset* command. Also, finite population correction factor was employed to yield
16 more precise standard error estimates, because the sample was greater than five percent of the
17 target population which had a known size.

18 Preliminary analyses included screening data for out of range values and missing values,
19 response rate calculation, post-hoc power analysis, and assessing data for presence of
20 multicollinearity. Based on multicollinearity analysis, in which tolerance levels, expressed as $1 -$
21 SMC (squared multiple correlations) were examined in a series of multiple linear regressions,
22 only hospital tenure had sufficiently high SMC value ($R^2 = .837$) to be excluded from ordered
23 probit regression analysis (Tabachnick & Fidell, 2007). Examination of frequency histograms for

1 than 4% had an associate degree as the highest nursing degree. On average, the staff RNs in the
2 sample worked at the hospital for 5.7 years ($SD = 7$) and a year less in their current units ($M =$
3 4.7, $SD = 5.7$). Nearly 92% of the sample reported being in good, very good, or excellent overall
4 health. Additionally, Tables 2 and 3 detail results regarding RNs' reported unit type, shift type,
5 overtime, and patient load as well as descriptive statistics and internal consistency reliability
6 coefficients for measured personal, organizational, and economic factors.

7 The job satisfaction scale score ranged from 0 to 4 and the respondents reported median
8 level of job satisfaction at 2.0 (Interquartile Range $[IQR] = 2.0$; (25th percentile) $Q1 = 1.0$; (75th
9 percentile) $Q3 = 3.0$). The job satisfaction measure had the Cronbach's alpha value of .80. The
10 responding RNs reported mean physical work environment score of 2.9 ($M = 2.2$) on a scale that
11 ranged from 0 to 9. The physical work environment measure had the Cronbach's alpha value of
12 .68. Further, analysis of responses to the individual items of the physical work environment scale
13 indicated that the majority of respondents did not agree that the interior design in their workplace
14 created a cheerful or warm work climate (71.1%), had a contemporary appearance (77.8%), or an
15 optimal furniture arrangement (75.2%). Also, 85.2% affirmed that their workplace is in need of
16 redecorating. Additionally, most of the RNs perceived their workplace to be crowded (73.5%),
17 with suboptimal ventilation (66.3%) and temperature regulation (62.5%). About 55% of the
18 sample rated lighting in the workplace positively.

19 Bivariate Analysis

20 The Spearman rank correlation was used for bivariate analysis. Job satisfaction, the
21 dependent variable, had positive and significant correlations with physical work environment (r
22 $= .256$, $p = .01$).

23

1 Model Testing

2 To determine the effect of physical work environment on job satisfaction, the baseline
3 model and expanded model were estimated using ordered probit regression. In the expanded
4 model (not shown here), the physical work environment had no significant effect on job
5 satisfaction ($p = .995$; $SE = .025$) adjusting for the specified personal, organizational, and
6 economic job satisfaction determinants. There was no need to formally evaluate difference in the
7 fit between the baseline and expanded models because physical work environment was not
8 statistically significant in the expanded model.

9 A number of controls specified in the baseline model were statistically significant
10 predictors of job satisfaction. Therefore marginal effect analysis was done for the significant
11 predictors in the baseline model. Prior to proceeding with marginal effect analysis, parallel
12 regressions assumption for the baseline model was tested. Based on the non-significant result for
13 the Brant Test ($p = 0.07$) the parallel regressions assumption was met (Long, 1997). As shown in
14 Table 4, variables from the baseline model that were positive and significant ($p < .05$) predictors
15 of job satisfaction in the studied sample were, autonomy, supervisor support, workgroup
16 cohesion, working in a unit other than ICU, step-down unit or general medical-surgical unit, and
17 number of hours of voluntary overtime worked in a typical work week. Negative and significant
18 ($p < .05$) predictors of job satisfaction in the baseline model included negative affectivity, being
19 Black, Asian, or of Other race, and working a 12-hour shift.

20 Marginal effects of the significant job satisfaction predictors are also presented in Table
21 4. Based on marginal effects analysis, one unit increase in autonomy, supervisor support,
22 workgroup cohesion, and number of hours of voluntary overtime worked in a typical work week
23 increased the probability of an RN from this sample scoring at the median value of job

1 satisfaction ($Mdn = 2.0$) or above by .04, .02, .03, and .02 respectively, holding all other
2 predictors at their means. Conversely, one unit increase in negative affectivity decreased the
3 probability of an RN from this sample scoring at the median value of job satisfaction or above by
4 .02, holding all other predictors at their means.

5 Further, for an average RN, being Black, Asian, or of Other race versus being White,
6 decreased the probability of scoring at the median value of job satisfaction or above by .24, .25,
7 and .24 respectively. Similarly, working 12-hour shift versus 8-hour, 10-hour, or flex shift
8 decreased the probability of an average RN scoring at 75th percentile of job satisfaction or higher
9 by .32, while working in a unit other than ICU, step-down unit, or medical-surgical unit
10 increased the probability of scoring at 75th percentile of job satisfaction or higher by .25.

11 Discussion

12 The Agency for Healthcare Research and Quality (Nelson, West, & Goodman, 2005)
13 identified research on the effect of physical environment on worker outcomes in healthcare
14 settings a priority. This study makes a unique contribution to the current knowledge because it is
15 the first study to examine the effect of multiple combined physical work environment features on
16 RNs' job satisfaction providing control of multiple covariates of job satisfaction. Although, on
17 average, the RNs from the studied sample negatively perceived their physical work environment,
18 adjusting for the specified controls, no direct effect of PWE on job satisfaction was found. A
19 number of personal and organizational factors in the baseline model affected job satisfaction as
20 predicted by the conceptual framework used to guide the study.

21 The descriptive findings from this study are consistent with findings of Kotzer and
22 Arellana (2008) and Kotzer et al. (2006) and Santos et al. (2003) that found the RNs rated
23 physical work environment more negatively than other work environment characteristics. Based

1 on bivariate analysis, positive perceptions of physical work environment were positively related
2 to job satisfaction in this study. Similarly, others have found that individual features such as
3 physical setup of the unit (Norbeck, 1985) and unit layout (Adams & Bond, 2000) had
4 significant zero-order correlations with job satisfaction. However, the results from ordered
5 probit regression analysis indicated that physical work environment had no significant effect on
6 job satisfaction. This is incongruent with results from related studies that examined the effect of
7 individual physical environment features on RN job satisfaction in multivariate analysis
8 (Alimoglu & Donmez, 2005; Janssen et al., 2001; Parish et al., 2008).

9 There are several probable explanations for divergence in findings from multivariate
10 analysis between this study and other studies available in the literature, including differences in
11 samples, physical work environment and job satisfaction measures, as well as analytic techniques
12 employed across studies. Mainly, there were few confounders included in studies that found
13 significant relationship between individual physical environment features and job satisfaction
14 (Alimoglu & Donmez, 2005; Janssen et al., 2001; Parish et al., 2008), while the current study
15 provided control of multiple confounders. Given the multi-factorial nature of RN job satisfaction
16 determinants, researchers who pursue the study of physical environment in hospital settings
17 should control for confounders explicated in this study, in order to determine the independent
18 effect of physical environment on RN job satisfaction. Differentiating the magnitude of impact
19 among different job satisfaction determinants is necessary for effective investment of limited
20 resources into those work environment factors that have the greatest potential for improving RN
21 job satisfaction and consequently decreasing organizational turnover.

22

23

1 Limitations

2 There are several limitations in this study. In terms of external validity threats, the
3 response rate of slightly less than 50% and inability to establish the presence of differences
4 between responders and non-responders limits generalizability of the findings to the target
5 population. Further, limiting the target population to a single hospital limits generalization of the
6 findings to a larger RN population. The studied sample was generally younger and had a higher
7 percent of baccalaureate prepared, Black non-Hispanic, and Asian RNs than is found in general
8 U.S. RN population (U.S. Department of Health and Human Services, 2004). In terms of internal
9 validity threats, the physical environment measure (Moos, 1994) used in this study had lower
10 than desired internal consistency reliability and two items loaded poorly in construct validity
11 analysis. Suboptimal reliability and construct validity of the measure contribute to increased
12 measurement error, which decreases likelihood of obtaining significant findings (Tabachnick &
13 Fidell, 2007). Further, although, the sample size in the current study was sufficient to yield stable
14 estimates using ordered probit regression, based on approximation from linear regression power
15 analysis, the sample size in this study was sufficient to detect medium, but not a small effect of
16 physical environment on job satisfaction, if it existed. Lastly, due to the research design used in
17 the study, causality of the discussed significant correlations cannot be established. To extend
18 generalizability of the findings beyond the staff RNs from the single hospital site, a nationally
19 representative sample of hospital staff RNs with sufficient power to detect small effect of
20 physical work environment on job satisfaction. In addition, the results of psychometric testing of
21 the Moos' Physical Comfort subscale warrant further scale development to enhance the current
22 scale's reliability and construct validity.

23

1 Conclusion

2 Within the confines of these limitations, the conclusion is that although nurses are sensitive
3 to deficiencies in their physical work environment, these perceived deficiencies do not directly
4 affect RN job satisfaction. The effect is probably mediated through some of the organizational
5 factors that do directly impact satisfaction. For example, findings from a study that examined
6 nurses' perceptions of newly built units with single occupancy rooms indicate that working in
7 single occupancy rooms resulted in increased nurses' perceptions of isolation and impaired
8 nurses' ability to work in teams, rely on each other in times of heightened stress, and
9 communicate effectively with other nurses and physicians (Walsh, McCullough, & White, 2006).
10 Isolation, team work, and communication are closely related to workgroup cohesion and
11 autonomy, variables found to directly affect job satisfaction in this study. Further, the importance
12 of supervisor support, another direct predictor of nurses' job satisfaction, may be accentuated in
13 presence of unit designs perceived to impede coworker support. Therefore, mediation processes
14 of physical work environment through some of the more proximal job satisfaction predictors,
15 such as supervisor support, workgroup cohesion, and autonomy should be further explored.

16 To explicate processes and nurses' perceptions related to physical environment,
17 qualitative research methods, including, observations, focus groups, and interviews should be
18 used in future studies. The qualitative approach can also facilitate inclusion of staff RNs in
19 design process from which they report feeling excluded, despite having a distinctive
20 understanding of workflow processes that can inform design decisions to best support nurses'
21 work needs (Commission for Architecture & the Built Environment, 2004). Further, qualitative
22 inquiry of RNs' perceptions of what specific physical environment features impact their work
23 processes can be utilized to develop more comprehensive measures of physical environment that

1 would allow for analysis to determine which particular physical environment feature (e.g.
2 lighting or workplace size) has the greatest impact on nurses' job satisfaction. Having the
3 understanding of these differential effects would be particularly useful for guiding investment of
4 resources into those physical environment features that nurses' consider would make the biggest
5 impact in making their workplaces more aesthetically and functionally appealing than the
6 hospitals in which they currently work.

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Table 1

Specification of Dependent, Independent, and Control Variables

Variable Name (Source of Measure)	Conceptual Definition	Response Categories	Number of Items
Personal Factors			
Age ^a (Kovner et al., 2006)	The variable is computed by subtracting the year in which participants reported being born from the current year.	-	1
Education ^a (Kovner et al., 2006)	The reported highest educational degree completed in nursing.	1) Associate 2) Bachelor's 3) Master's or Doctoral	1
Gender ^a (Kovner et al., 2006)	The participants self identify as either male or female.	1) Male 2) Female	1
Race ^a (Kovner et al., 2006)	This variable is computed by combining the self-reported ethnicity categories (Hispanic or Latino and Not Hispanic or Latino) with self-reported race categories (American Indian or Alaskan Native, Asian,	1) White Non-Hispanic 2) Black Non-Hispanic 3) Asian 4) Other	1

	Black or African American, Native Hawaiian or Pacific Islander, White, and Other)		
Marital status ^a (Kovner et al., 2006)	The RNs self-report if they are married (or in a domestic partnership); widowed, divorced, or separated or never married.	1) Married (or domestic partnership) 2) Widowed, divorced, or separated, or never married	1
Health status ^a (Kovner et al., 2006)	Rating of an overall health status at the time of the survey completion.	1) Poor or fair 2) Good, very good, or excellent	1
Organizational tenure ^a (Kovner et al., 2006)	The RNs are asked to provide the month and the year when they started their employment as an RN at the hospital.	-	1
Unit tenure ^a (Kovner et al., 2006)	The RNs are asked to provide the month and the year when they started their employment as an RN at the unit where they currently	-	1

	work.		
Positive affectivity ^b (Watson & Tellegen, 1985)	Degree of personal predisposition to have a positive outlook on life in general.	1 = Strongly disagree to 5 = Strongly agree	5
Negative affectivity ^b (Watson & Tellegen, 1985)	Degree of personal predisposition to have a negative outlook on life in general.	1 = Strongly disagree to 5 = Strongly agree	5
Work motivation ^c (Gurney, 1990)	Degree of personal predisposition to organize life around work.	1 = Strongly disagree to 5 = Strongly agree	3

Organizational Factors

Unit type ^a (Kovner et al. 2006)	There was a drop-down menu listing 32 inpatient nursing units from which the RN was asked to select the unit where she or he worked.	1) ICU or step-down 2) General 3) Other	1
Shift type ^a (Kovner et al. 2006)	The shift the RN typically works.	1) 12-hr shift 2) 8-hr, 10-hr, flex, or	1

		other	
Hours of voluntary overtime ^a (Kovner et al. 2006)	Number of paid or unpaid voluntary overtime hours worked in a typical work week.	-	1
Patient load ^a (Kovner et al., 2006)	Reported number of patients the RN cared for on the most recent shift.	-	1
Autonomy ^d (Gurney et al., 1997)	Degree to which an employee is able to perform his or her job independently.	1 = None at all to 5 = A great deal	3
Variety ^d (Gurney et al., 1997)	Degree to which job tasks are varied.	1 = None at all to 5 = A great deal	3
Collegial RN-MD relations ^e (Lake, 2002)	Degree of teamwork, collaboration, and overall good working relationship between nurses and physicians.	1 = Strongly disagree to 5 = Strongly agree	3
Supervisor support ^d (Gurney et al., 1997)	Degree to which supervisor is attentive to employee work needs.	1 = Strongly disagree to 5 = Strongly agree	4

Workgroup cohesion ^d (Gurney et al., 1997)	Degree to which members of a workgroup are friendly, helpful, and take an interest in each other.	1 = Never to 5 = Very Often	3
Mentor support ^d (Gurney et al., 1997)	Degree of contact with a senior person who advises employee and creates opportunities for his or her professional advancement.	1 = Not at all to 5 = To a very great extent	5
Quantitative workload ^f (Spector & Jex, 1998)	Degree of physical demands and time constraints present in a job.	1 = Not at all to 5 = To a very great extent	4
Organizational constraints ^f (Spector & Jex, 1998)	Degree to which organizational policies, human and environmental resources limit employee's job performance.	1 = Never to 6 = 5 or more days per week	8
Distributive justice ^d (Gurney et al., 1997)	Degree to which an employee perceives that his or her level of professional responsibility, education, effort, and experience are fairly rewarded.	1 = None at all to 5 = A great deal	4
Procedural justice ^g (Fields, 2002)	Degree to which employee perceives that organizational	1 = Not at all to	4

	decision making is based on expertise, data, and input from the members of the workgroup affected by the decisions.	5 = To a very great extent	
Promotional opportunities ^d (Gurney et al., 1997)	Degree of availability of organizational mechanisms that facilitate promotions within organization.	1 = Strongly disagree to 5 = Strongly agree	3
Economic Factors			
Local job opportunity ^h (Price, 2001)	Employee's perceived ease of finding a job in the local job market as good as or better than his or her current job.	1 = Very difficult to 6 = Very easy	3
Non-local job opportunity ^h (Price, 2001)	Employee's perceived ease of finding a job in the non- local job market as good as or better than his or her current job.	1 = Very difficult to 6 = Very easy	3

^a Kovner, C., Brewer, C., Wu, Y., Cheng, Y., & Suzuki, M. (2006). Factors associated with work satisfaction of registered nurses. *Journal of Nursing Scholarship, 38*(1), 71-9.

^b Watson, D., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin, 98*(2), 219-235.

^c Gurney, C. A., (1990). *Determinants of intent to leave among nurses with doctoral degrees*. Unpublished doctoral dissertation, University of Illinois, Chicago.

^d Gurney, C. A. (1997). Job satisfaction and organizational attachment of nurses holding doctoral degrees. *Nursing Research, 46*(3), 163-171.

^e Lake, E. T. (2002). Development of the practice environment scale of the Nursing Work Index. *Research in Nursing and Health, 25*(3), 176-188.

- ^fSpector, P. E., & Jex, S. M. (1998). Development of four self-report measures of job stressors and strain: Interpersonal Conflict at Work Scale, Organizational Constraints Scale, Quantitative Workload Inventory, and Physical Symptoms Inventory. *Journal of Occupational Health Psychology, 3*(4), 356-367.
- ^gFields, D. L. (2002). *Taking the measure of work: A guide to validates scales for organizational research and diagnosis*. Thousand Oaks, CA: Sage Publications.
- ^hPrice, J. L. (2001). Reflections on the predictors of voluntary turnover. *International Journal of Manpower, 22*(7), 600-24.

Table 2

*Descriptive Statistics for Personal, Organizational, and Economic Categorical Variables
(N = 347)*

Variable	<i>n</i>	%
Education (highest degree in nursing)		
Associate	12	3.6
Baccalaureate	289	87.0
Masters or doctoral	31	9.3
Gender		
Male	24	7.3
Female	307	92.7
Race		
White non-Hispanic	187	56.8
Black non-Hispanic	36	10.9
Asian	52	15.8
Other ^a	54	16.4
Marital status		
Married	104	31.8
Widowed, divorced, separated, or never married	223	68.2
Overall health status		
Poor or fair	28	8.4
Good, very good, or excellent	304	91.6

Unit spent most time working

ICU or step-down	120	35.0
General medical-surgical	160	46.6
Other ^b	63	18.4

Shift typically worked

8 hr, 10 hr, or flex	29	8.4
12 hr	317	91.6

^aOther includes Black, American Indian, Native Hawaiian, and Other race.

^bOther includes operating room, recovery room and cardiac catheterization, electrophysiology, hemodialysis, and radiology units.

Table 3

Descriptive and Reliability Statistics for Continuous Personal, Organizational, and Economic Variables (N = 347)

Variable	n	M (SD)	Possible scale	
			range	Cronbach's alpha
Age in 2009	307	32.6 (9.10)	22-62	-
Organizational tenure (in years)	308	5.7 (7.0)	0-34	-
Unit tenure (in years)	305	5.7 (7.0)	0-34	-
Positive affectivity	339	18.2 (3.4)	5-25	.88
Negative affectivity	339	13.0 (4.4)	5-25	.86
Work motivation	338	7.1 (2.3)	3-15	.76
Hours of voluntary overtime in a typical work week	338	2.5 (4.7)	0-40	-
Patient load in most recent shift	346	4.9 (3.2)	0-34	-
Autonomy	347	9.5 (2.4)	3-15	.78
Variety	347	9.2 (2.0)	3-15	.63
Collegial RN-MD relations	346	10.1 (2.5)	3-15	.90
Supervisor support	347	13.5 (4.0)	4-20	.94
Work group cohesion	347	11.8 (2.4)	3-15	.88
Mentor support	346	15.3 (4.3)	5-25	.92
Quantitative workload	347	16.9 (4.0)	4-24	.88
Organizational constraints	347	23.8 (8.0)	8-48	.89
Distributive justice	340	10.7 (3.4)	4-20	.94

Procedural justice	340	12.6 (3.1)	4-20	.85
Promotional opportunities	337	10.0 (2.4)	3-15	.77
Local job opportunity	336	10.5 (3.4)	3-18	.92
Non-local job opportunity	335	10.6 (3.7)	3-18	.94

Table 4

*Summed Marginal Effects for the Variables Predicting Job Satisfaction in the Baseline Model
(n = 260)*

Variable	<i>M</i> (X)	<i>B</i>	<i>SE</i>	<i>p</i>	<i>ME</i>	<i>Y</i>
Age	32.6	-.004	.013	.739	_____	_____
Education (associate)						
Baccalaureate	_____	.241	.385	.535	_____	_____
Masters or doctoral	_____	.128	.455	.780	_____	_____
Gender (male)						
Female	_____	.046	.280	.868	_____	_____
Race (White non-Hispanic)						
Black non-Hispanic	_____	-.606	.241	.018	.238	2
Asian	_____	-.632	.199	.004	.249	2
Other ^a	_____	-.603	.232	.015	.237	2
Marital status (married)						
Widowed, divorced, separated, or never married	_____	-.073	.171	.673	_____	_____

Overall health status (poor or fair)						
Good, very good, or excellent overall health status	_____	-.361	.324	.275	_____	_____
Unit tenure	4.7	.013	.018	.481	_____	_____
Positive affectivity	18.2	.036	.030	.237	_____	_____
Negative affectivity	13.0	-.048	.018	.011	.020	2
Work motivation	7.1	.050	.030	.109	_____	_____
Unit type (ICU or Step-down)						
General medical - surgical	_____	.312	.200	.129	_____	_____
Other unit ^b	_____	.670	.230	.007	.252	3
Shift type (8 hr, 10 hr, or flex)						
12 hr shift	_____	-.826	.237	.002	.318	3
Hours of voluntary overtime	2.5	.053	.014	.001	.021	2
Number of patients cared for in the most recent shift	4.9	.025	.014	.088		
Autonomy	9.5	.092	.041	.032	.040	2
Variety	9.2	-.042	.041	.321	_____	_____
Collegial RN-MD relations	10.1	.044	.035	.217	_____	_____

Supervisor support	13.5	.051	.019	.014	.020	2
Work group cohesion	11.8	.089	.037	.023	.034	2
Mentor support	15.3	-.011	.021	.592	_____	_____
Quantitative workload	16.9	-.026	.023	.273	_____	_____
Distributive justice	10.7	.043	.022	.059	_____	_____
Procedural justice	12.6	.043	.033	.212	_____	_____
Organizational constraints	23.8	-.010	.011	.398	_____	_____
Promotional opportunities	10.0	.069	.048	.166	_____	_____
Local job opportunities	10.5	.020	.035	.576	_____	_____
Non-local job opportunities	10.6	-.069	.040	.085	_____	_____

Note. Partial marginal effects displayed only for significant variables.

^aOther includes Black, American Indian, Native Hawaiian, and Other race.

^bOther includes operating room, recovery room and cardiac catheterization, electrophysiology, hemodialysis, and radiology units.

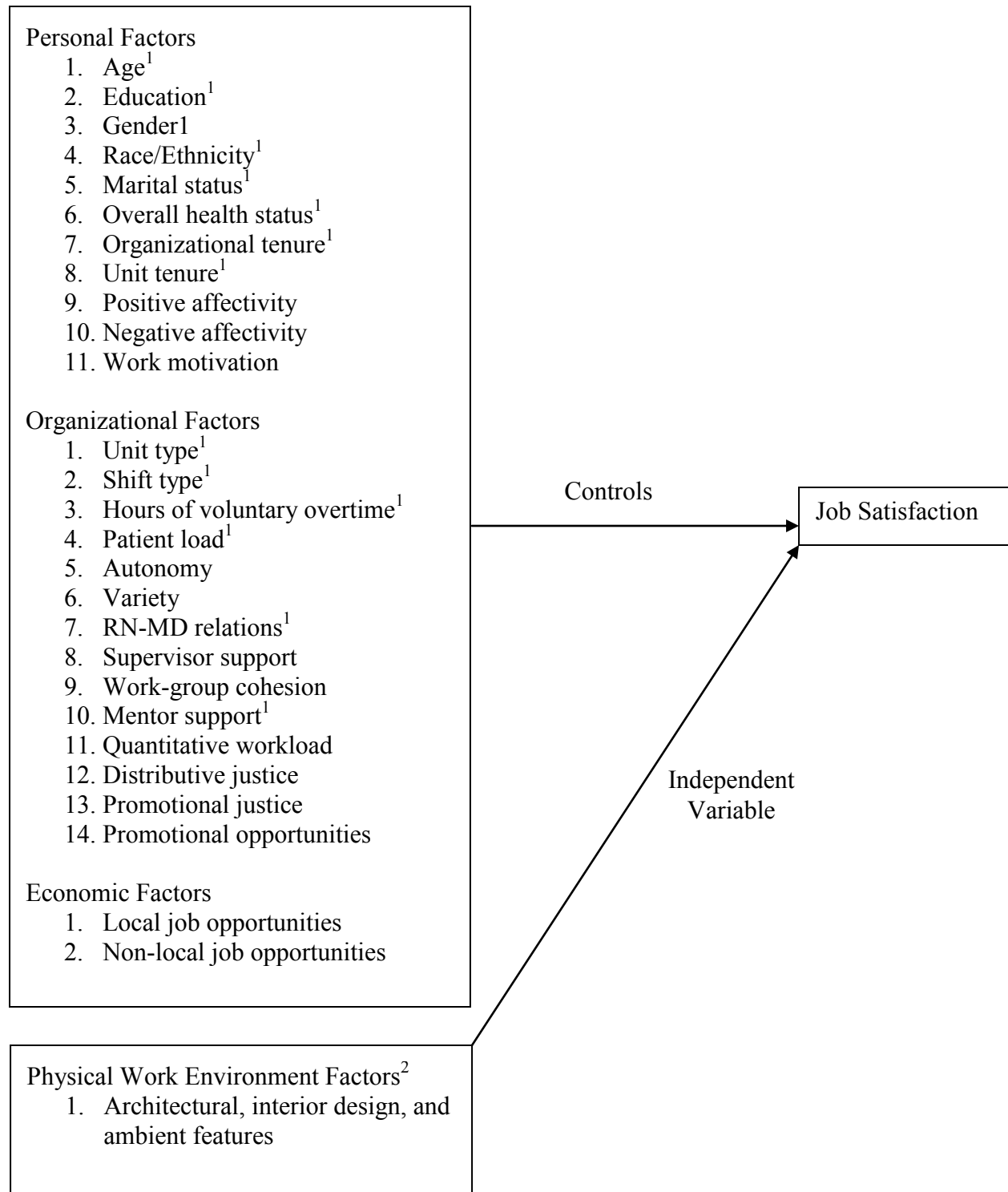


Figure 1. The conceptual model of job satisfaction includes the variables specified by the Price (2001) model, variables¹ added by Kovner et al. (2006, 2009) and the physical environment variable² added in this study.