Staff Satisfaction: Glossary (variables, metrics and measurement methods)

	Term	Definition	Metrics	Measurement method
Environmental variable	**Acuity-adaptable room (single room maternity care)**	Single-room maternity care refers to maternity care rooms where families are admitted and stay throughout the intrapartum and postpartum periods. The rooms are spacious and include amenities for families. They differ from the traditional care model which requires patients to transfer between multiple rooms, depending upon their care status (Janssen et al., 2001).	- Yes/no, before/after (Janssen et al., 2001)	**Design manipulation** - Survey responses from a same group of nurses were collected 6 months before and 3 months after moving from a traditional unit to a single-room maternity care unit (Janssen et al., 2001).
	Attractiveness, physical environment	Aesthetic appeal of the physical environment, including the surrounding external environment, the architectural design, facility upkeep and cleanliness, and other physical elements (Becker & Douglass, 2008)	- Two types of design: an old cement building (transferred from a juvenile hall, ugly and depressing, dimly lighted, glare, stuffy, noisy) versus a new facility (pleasant-looking wood-paneled cottages where staff felt freer, lighter, and more positive; well lighted, adequate ventilation, quiet) (Folkins, O'Reilly, Roberts, & Miller, 1977)	**Design manipulation** - Pleasant-looking wood-paneled cottages where staff felt freer, lighter, and more positive; well lighted, adequate ventilation, quiet (Folkins et al., 1977).
	Daylight	Light originating from the sun that reaches Earth's surface after reflecting off the sky's vault (Zunde & Bougdah, 2006)	- Hours of exposure to direct daylight in a typical work day (less than 3h versus 3h or more) (Alimoglu & Donmez, 2005	**Questionnaire survey** - Self-reported by a question asking about length of exposure in a personal data collection form (Alimoglu & Donmez, 2005).
	Noise	A sound that is loud, unpleasant, unexpected, or undesired (Free Dictionary)	- Equivalent sound pressure level (LAeq) (weighted average sound pressure level in dBA), minimum and maximum sound level, auditory events (alarm, telephone, etc.) (Morrison et al., 2003) - Perception of noise (Applebaum et al., 2010).	**Acoustic measurement** - Sound pressure levels recorded continuously by a Quest Advanced 1900 precision integrating logging sound level meter (Morrison et al., 2003) **Questionnaire survey** - Items about perceived noise in M. D. Anderson Patient Contact Survey (Applebaum et al., 2010).

	Term	Definition	Metrics	Measurement method
	Patient room occupancy	The number of patients per patient room--one per room (single room, private room), two (double room), four-bed room, multi-bed open bays (Shepley, Harris, & White, 2008).	Single family room versus open bay (Shepley, Harris, & White, 2008).	**Design manipulation** - Comparison between three types of patient spaces: single rooms from an all-single-room NICU, single rooms and open bays from another NICU (Shepley, Harris, & White, 2008)
Outcome	**Burnout**	A prolonged psychological response to chronic emotional and interpersonal stressors on the job and defined by three dimensions –emotional exhaustion (EE), depersonalization (D), and low personal accomplishment (PA). EE refers to feelings of being overextended and depleted of emotional and physical resources. D refers to a negative, callous, or excessively detached response to various aspects of the job. PA refers to feelings of incompetence and a lack of achievement and productivity at work (Alimoglu & Donmez, 2005).	Self-reported burnout scores (Alimoglu & Donmez, 2005)	**Questionnaire survey** - Maslach Burnout Inventory (22 items in 3 subscales 'emotional exhaustion', 'depersonalization', 'personal accomplishment', 5-point scale 0 never to 4 always, [Maslach & Jackson, 1996], Turkey translation [Ergin, 1992) (Alimoglu & Donmez, 2005; Tyson et al., 2002)

	Term	Definition	Metrics	Measurement method
	Job satisfaction	A pleasurable or positive emotional state in an individual, resulting from the appraisal of that person's job or job experiences (Berry & Parish, 2008).	Self-reported job satisfaction scores (Alimoglu & Donmez, 2005; Applebaum et al., 2010; Berry & Parish, 2008; Djukic et al., 2010; Folkins et al., 1977; Harris et al, 2006; Jason, et al., 2002; Shepley et al, 2008; Tyson et al., 2002; Varni et al., 2004)	**Questionnaire survey** - Job Satisfaction Scale (JSS), a 5-item subscale from the Nurse Stress Index by Harris, Hingley, and Cooper (1988) (Harris et al., 2006; Shepley et al., 2008) - Work Satisfaction Questionnaire (14 items, 5-point scale from 1 never satisfies me to 5 highly satisfies me, [Hackman & Oldham, 1980] (Alimoglu & Donmez, 2005) - One item in a staff questionnaire (Berry & Parish, 2008) - Nurses' Intent to Stay Questionnaire (NISQ) (Job satisfaction 7 items, turnover intent 4 items (Applebaum et al., 2010) - A five-item Likert type job satisfaction scale with response category varying among items and rescaled to a 7-point scale (Djukic et al., 2010) - Minnesota Satisfaction Questionnaire (Weiss, Dawis, England, & Lofquist, 1967) - GM Faces Scale (Kunin, 1955), a simple, well-validated measure including seven drawings of faces with facial expressions ranging from a frown to a smile (Folkins et al., 1977) - Rehabilitation Job Satisfaction Inventory (Wright & Terrian, 1987) including 15 items, agreement with the statement on a 5-point scale, the final score of job satisfaction was calculated from 4 items (satisfied with job, plan on staying, the best compared to past jobs, look forward to going to work) (Jason et al., 2002) - Job Satisfaction (Warr et al., 1979), satisfaction with extrinsic and intrinsic features of the job as well as overall job satisfaction, 16 items (Tyson et al., 2002) - PedQL Staff Satisfaction Coworker Module (Varni et al., 2004)
	Perception of physical environment	Quality of the physical environment as perceived by healthcare staff members. May include perceptions of environmental aspects such as quality of the patient care area (comfort and privacy afforded to patients and families due to the design of patient areas), safety (degree of hazard for staff and patients related to facility design), pleasantness (ambience of the facility design due to specific design features) (Berry & Parish, 2008).	Subjective rating of physical environment (Berry & Parish, 2008; Harris et al, 2006; Shepley et al, 2008)	**Questionnaire survey** - Perception of physical environment (quality of patient areas [4 items], safety [3 items], pleasantness [3 items], quality of workspace [6 items]) (Berry & Parish, 2008) - Level of agreement with statement regarding the physical environment, 12 questions, 5-point scale, average score (e.g., quiet, private space for family to be alone, atmosphere tense and stressful for staff/family) (Harris et al, 2006; Shepley et al, 2008)

	Term	Definition	Metrics	Measurement method
	Stress, staff	A state of mental or bodily tension caused by the imbalance between an individual's environmental demands or perceived demands and the individual's ability or perceived ability to cope with the environmental demands (Stokols & Montero, 2002).	**Physiology measures** - Heart rate (average HR [bpm], minimum, maximum HR for every half-hour period, percent of time in tachycardia [HR>100], number of episodes of ectopy [disturbance of the cardiac rhythm]) (Morrison et al., 2003) - Salivary amylase concentration (units per mL) (Morrison et al., 2003) **Psychology measures** - Self-reported stress and annoyance (Alimoglu & Donmez, 2005; Morrison et al., 2003)	**Electrocardiography (ECG) monitoring** - A portable cassette battery-driven Holter monitor (GE Marquette 8500 series, Milwaukee, WI) (Morrison et al., 2003) - Salivary hormone analysis - A citric acid impregnated cellulose sponge, salivary amylase field test kits (Morrison et al., 2003). **Questionnaire survey** - Expanded Nurse Stress Scale (ENSS) by French, Lenton, Walters, and Eyles (2000), 59 items in 9 subscales (Harris et al., 2006; Shepley et al., 2008). - Specific Rating of Events Scale, nurses rated how stressed or annoyed "right now" on a scale of 0 for "not at all stressful" or "not at all annoyed" to 100 for "most stress possible" or "most annoyance possible" (Morrison et al., 2003) - Work Related Starin Inventory (18 items about work-related expectations, stress, interpersonal relations, productivity, working habits, interactions between work and family [Revicki et al., 1991], 4 point scale from 1 surely agree to 4 surely disagree (Alimoglu & Donmez, 2005) - 3 items in a questionnaire developed specifically for the study (Berry & Parish, 2008)
	Turnover intent	Employees' inclination to voluntarily leave their organization (Haybatollahi, 2009).	Self-reported turnover intent (Applebaum et al., 2010; Lin et al., 2008)	**Questionnaire survey** - Nurses' Intent to Stay Questionnaire (NISQ) (turnover intent 4 items) (Applebaum et al., 2010) - Variables measured on a 0-100 scale (Lin et al., 2008).

Staff Satisfaction: Article Analysis

Reference	Environmental feature		Outcome		Study design	Results	Setting	Sample
	Variable	Metric	Variable	Metric				
Alimoglu, M. K., & Donmez, L. (2005). Daylight exposure and the other predictors of burnout among nurses in a University Hospital. I*nternational Journal of Nursing Studies, 42*(5), 549-555.	Exposure to daylight	Hours of exposure to direct daylight in a typical work day (less than 3 h vs. 3h or more) self-reported by a question asking about length of exposure collected together with demographic, socio-economic, personal and work-related issues in a personal data collection form.	Burnout Stress Job satisfaction	- Maslach Burnout Inventory (22 items in 3 subscales 'emotional exhaustion', 'depersonalization', 'personal accomplishment', 5-point scale 0 never to 4 always, [Maslach & Jackson, 1996], Turkey translation [Ergin, 1992), Cronbach alpha 0.89, 0.71, 0.72 for subscales) - Work Related Strain Inventory (18 items about work-related expectations, stress, interpersonal relations, productivity, working habits, interactions between work and family [Revicki et al., 1991], 4 point scale from 1 surely agree to 4 surely disagree, Cronbach alpha 0.74) - Work Satisfaction Questionnaire (14 items, 5-point scale from 1 never satisfies me to 5 highly satisfies me, [Hackman & Oldham, 1980], Cronbach alpha 0.82)	Correlation study	Longer exposure of natural daylight was associated with lower level of stress and higher level of job satisfaction, but was not related to the three subscales of burnout. Other factors contributing to stress included: suffering from sleep disorders and having night duties. Other factors associated with job satisfaction were: suffering from sleep disorders, working in inpatient services, and satisfaction with wages. Job satisfaction was negatively associated with emotional exhaustion and depersonalization, and positively related to personal accomplishment.	A university hospital in Turkey	141 nurses
Applebaum, D., Fowler, S., Fiedler, N., Osinubi, O., & Robson, M. (2010).The impact of environmental factors on nursing stress, job satisfaction, and turnover intention. *Journal of Nursing Administration, 40*(7-8), 323-328.	Perception of environmental elements (odor, color, light, noise)	- M. D. Anderson Patient Contact Survey (15 items for environmental factors (limited testing on validity and reliability, Cronbach alpha 0.7-0.8)	- Staff stress - Job satisfaction - Turnover intent	- 10-item Perceived Stress Scale (PSS-10) (all 10 items, validated) - Nurses' Intent to Stay Questionnaire (NISQ) (Job satisfaction 7 items, turnover intent 4 items, validated)	Correlation study	Significant relationships were found between perceived noise and stress, between stress and job satisfaction, between stress and turnover intent, and between job satisfaction and turnover intent.	Adult medical-surgical units at a 500-bed level I trauma center in northeastern NJ	116 full-time RNs
Berry, L. L., & Parish, J. T. (2008). The impact of facility improvements on hospital nurses. Health Environments Research and Design Journal, 1(2), 5-13.	Patient unit design	New units (all single rooms that are 20% to 50% larger than old rooms, with more natural light, more handwashing stations, and staff break rooms) vs. old units	- Nurse perception of physical environment - Job stress - Job satisfaction - Perceived service quality	Questionnaire - Perception of physical environment (quality of patient areas [4 items], safety [3 items], pleasantness [3 items], quality of workspace [6 items]) - Job stress (3 items) - Job satisfaction (1 item) - Perceived service quality (5 items)	Before-after comparison (6 month before and 6 month after the move)	Nurses working in the new building rated the physical environment more positively, reported higher job satisfaction, lower stress, and higher perceived quality of care than nurses staying in the old building and the pre-move sample.	A 210-bed community hospital in TX	Pre-move: 235 registered and licensed nurses , Post-move: 173 nurses stayed in the old building, 65 nurses moved to the new building
Cannon, G. W., Keitz, S. A., Holland, G. J., Chang, B. K., Byrne, J. M., Tomolo, A., . . . Kashner T.M. (2008). Factors determining medical students' and residents' satisfaction during VA-based training: Findings from the VA Learners' Perceptions Survey. *Academic Medicine, 83*(6), 611-620.	Perceptions of physical environment	12 items on 5-point scale: - Facility maintenance upkeep - Facility cleanliness/housekeeping - Call rooms - Availability of food at medical center when on call - Heating and air conditioning - Lighting - Availability of needed equipment - Maintenance of equipment - Convenience of facility location - Personal safety - Parking - Availability of phones	Overall satisfaction Other factors impacting satisfaction (learning environment, clinical faculty, working environment)	- Overall training satisfaction on a 100-point scale (1 item) - Learning environment (15 items) - Clinical faculty (13 items) - Working environment (13 items)	Correlational study	Physical environment factors (including facility maintenance/upkeep, facility cleanliness/housekeeping, call rooms, availability of food on call, availability of equipment) were significantly correlated with the overall satisfaction	VA teaching facilities	6,527 medical students and 16,583 physician residents

Reference	Environmental feature		Outcome		Study design	Results	Setting	Sample
	Variable	Metric	Variable	Metric				
Cleary, M., Hunt, G., & Walter, G. (2009). A comparison of patient and staff satisfaction with services after relocating to a new purpose-built mental health facility. *Australasian Psychiatry, 17* (3), 212-217.	A new purpose-built mental health facility	New purpose-built mental health facility, 174 beds, a setting complementary to the therapeutic process, patients stay in private rooms within single story units and are allocated to wards based on their phase of illness and treatment requirements, smoke-free environment (vs. the old site).	Staff satisfaction Patient satisfaction	Survey with staff, interview with patients - Inpatient Evaluation of Services Questionnaire (5 dimensions: patient characteristics, service dimensions [22 items in 9 subscales: ward environment, food services, outcome, overall satisfaction, nursing services, staff/patient interaction, allied health services, doctor/medical services, patient information], patient expectations of treatment, patient intent to use services again, suggestions on improving the service; 5-point scale) Additional questions included general questions about the new facility and aspects at the new workplace.	Descriptive, POE	Staff and patients were highly satisfied with the new ward environment and food services but less satisfied with patient information and medical services. Most staff reported that services provided to patients were the same or better than their original expectations.	A new purpose-built mental health facility within the grounds of a general repatriation hospital in Australia.	123 clinical nursing, medical and allied health staff; 100 patients
Djukic, M., Kovner, C., Budin, W. C., & Norman, R. (2010). Physical work environment: testing an expanded model of job satisfaction in a sample of registered nurses. *Nursing Research, 59* (6), 441-451.	Physical work environment	Physical comfort subscale of the Work Environment Scale (WES), 9 items - one architectural feature (workspace size), 4 interior design features (e.g. furniture is usually well arranged), 4 ambient features (e.g. temperature, lighting, air flow), two point scale (yes/no), number of "yes" responses (0 9)	Job satisfaction	A five-item Likert type job satisfaction scale with response category varying among items and rescaled to a 7-point scale. (Quinn & Staines, 1979).	Correlation study	RN's had negative perception of physical work environment. Perception of physical environment was positively related to job satisfaction in bivariate analysis.	A large urban hospital in US with 32 inpatient units	362 RN's
Folkins, C., O'Reilly, C., 3rd, Roberts, K., & Miller, S. (1977). Physical environment and job satisfaction in a community mental health center. *Community Mental Health Journal, 13* (1), 24-30.	Building aesthetics	Old mental health facility (a cement building transferred from a juvenile hall, ugly and depressing, dimly lighted, glare, stuffy, noisy) New mental health facility (pleasant-looking wood-paneled cottages where staff felt freeer, lighter, and more positive; well lighted, adequate ventilation, quiet)	Staff satisfaction with physical environment Job satisfaction	Minnesota Satisfaction Questionnaire (Weiss, Dawis, England, & Lofquist, 1967) GM Faces Scale (Kunin, 1955), a simple, well-validated measure including seven drawings of faces with facial expressions ranging from a frown to a smile.	Quasi-experimental, control series, repeated measurements in three time points: 12 months, 2 months before move, and 4 months after the move	Staff members has significantly higher satisfaction with physical environment after they moved to the new facility. Staff who stayed in the old facility had similar environmental satisfaction ratings in all three time points. Satisfaction with physical environment influenced the overall job satisfaction.	A community mental health center	Three teams of staff, two (8, 13 staff members) moved to the new facilities, one (14 staff members stayed in the old facility)

Reference	Environmental feature		Outcome		Study design	Results	Setting	Sample
	Variable	Metric	Variable	Metric				
Harris, D., Shepley, M. M., & White, R. (2006). *The impact of single family NICU rooms*. San Francisco, CA: Coalition for Health Environments Research. **Shepley, M.M., Harris, D.D., & White, R.D. (2008). Open-bay and single-family room neonatal intensive care units. *Environment & Behavior, 40* (2), 249-268.**	Patient room occupancy type	Single family room vs. open bay (single rooms from a all single room NICU, single rooms and open bays from another NICU)	Staff satisfaction with the physical environment; Staff perception of the physical environment; Staff perceived stress; Job satisfaction.	- Degree of satisfaction with the physical environment, 10 questions, 5-point scale, average score (overall physical environment, windows views, natural light, light level, noise level, atmosphere and decor, waiting and resting space, corridors and signage for wayfinding, place for food and nourishment) - Level of agreement with statement regarding the physical environment, 12 questions, 5-point scale, average score (e.g. quiet, private space for family to be alone, atmosphere tense and stressful for staff/family) - Expanded Nurse Stress Scale (ENSS) by French, Lenton, Walters, and Eyles (2000), 59 items in 9 subscales, scoring by summation of items - Job Satisfaction Scale (JSS), a 5-item subscale from the Nurse Stress Index by Harris, Hingley, and Cooper (1988), scoring by summation of items	Comparison between three types of patient spaces in two units	Staff in the all single room unit were more satisfied with the physical environment than staff in the unit with a combination of single rooms and open bays. Single rooms were perceived to be superior in providing privacy to families and infants and to be less stressful for both family and staff members. Both groups of staff in single rooms reported lower stress level and higher job satisfaction level than the group with the open bays.	Two level III NICUs in US	75 respondents (21 from the all single room NICU, 27 and 21 respectively from open bays and single rooms in another NICU)
Janssen, P. A., Harris, S. J., Soolsma, J., Klein, M. C., & Seymour, L. C. (2001). Single room maternity care: The nursing response. *Birth, 28* (3), 173-179.	Maternity care patient room	- Single room maternity care unit in which patients stay in one room throughout the intra- and post-partum periods, large enough for staff and family, sofa for the support person to sleep on, windows, modern fabrics maple furniture, bathrooms with showers/bathtubs - Delivery suite, smaller rooms, no windows, one chair, a shower - Postpartum ward, small rooms, with showers, bathtubs, windows, patios, 14% of rooms are shared.	Job satisfaction	Survey based on literature review, staff feedbacks, and tools developed at other hospitals, divided into several sections: - perception of physical setting (room spacious, setup similar, lights adequate, supplies accessible, resuscitation equipment available, privacy easily maintained, noise acceptable, water therapy choices easily accommodated, family centered care), - quality of care (opportunity to teach partners, respond to needs of physical, emotional, and spiritual care, teach family , comfortable with family making choices, overall quality of care, continuity of care), - perceived competence and nursing practice environment (autonomous nursing decisions, accountable for decisions, promotes clinical competence, opportunity for collaboration and teamwork, staffing ratio sufficient, support and assistance for nursing decisions, medical staff readily available, feel competent caring for family, areas in which not competent, overall job satisfaction). - Items were scored on scale of 1-5, statistical analyses on individual items	Before-after, repeated measurements (comparison of survey responses from same group of nurses 6 months before and 3 months after the move to single room unit), concurrent comparisons (comparisons between the above group after move with other two groups in multi-bed units)	The nurses in single room maternity care were significantly more satisfied that nurses in traditional delivery and postpartum settings. Their satisfaction significantly increased after the move to single room maternity care in the following areas: the physical environment, their ability to respond to patients' needs, their opportunity for teaching families, nursing practice environment, peer support, perceived competence.	Maternity care units in an obstetric hospital in Canada	20 nurses in the single room maternity care, 26 nurses in the delivery suite, 26 nurses in the postpartum ward

Reference	Environmental feature		Outcome		Study design	Results	Setting	Sample
	Variable	Metric	Variable	Metric				
Jason, D. A., Clayton, W. F., & Charles, D. P. (2002). The relationship between counselor satisfaction and extrinsic job factors in state rehabilitation agencies. *Rehabilitation Counseling Bulletin, 45* (4), 223.	Satisfaction with physical environmental factors	Self-developed survey instrument--Environment of Job Satisfaction Survey, 20 items, agreement with the statement on a 5-point scale, importance rating on a 3-point scale. Items include: conveniently located for access us, conveniently located to access rehabilitation resources, in a geographic area suited to me, safe, sufficient space, attractive, clean, well maintained, too cold, too hot, accessible to people with impairments, reflects the professional nature, adequate sound privacy, adequate visual privacy). The items were clustered into six groups labeled Location, Safety, Healthy Environment, Facility Space, Comfort, and Professional Nature.	Job satisfaction	Items adapted from Rehabilitation Job Satisfaction Inventory (Wright & Terrian, 1987) including 15 items, agreement with the statement on a 5-point scale, importance rating on a 3-point scale, the final score of job satisfaction was calculated from 4 items (satisfied with job, plan on staying, the best compared to past jobs, look forward to going to work); additional items: clients appreciate what I do, my decision to accept employment was affected by this agency's appearance and location, significant health problem in the past year, attempted to change job within the past year.	Correlational study	All six environmental factors were significantly correlated with the job satisfaction. Stepwise regression analysis revealed that healthy environment and safety are the two significant predictors of job satisfaction.	State rehabilitation agencies in 16 states in U.S.	315 counselors
Judkins S. (2003). Paediatric emergency department design: Does it affect staff, patient and community satisfaction? *Emergency Medicine, 15* (1), 63-67.	ED design	ED waiting and treatment areas dedicated to pediatrics, physical separation between pediatrics and adult ED, décor and entertainment facilities appropriate for children	Staff, physician satisfaction	- Questionnaire (individualized for each group, 5 for physician, 4 for inpatient staff, and 5 for ED staff), 5 point rating from 1 poor to 5 excellent, number and percentage of responses in each category	Before-after comparison (the month before and 6 moth after the move)	ED staff reported that the pediatric ED functioned better in the new area. General practitioners referred more patients to the new ED and expressed higher satisfaction level with the services. No effects were found in inpatient staff.	A major metropolitan teaching hospital in Australia	148 general practitioners, 38 inpatient staff, 67 ED staff
Lin, B. Y., Leu, W. J., Breen, G. M., & Lin, W. H. (2008). Servicescape: physical environment of hospital pharmacies and hospital pharmacists' work outcomes. *Health Care Management Review, 33* (2), 156-168.	Pharmacy environment	Perceptions of the ambient conditions and space/function of pharmacists' work environment Questionnaire developed from literature and focus groups with pharmacists, 45 items on dispensing areas [outpatient, emergency, inpatient], 16 items on pharmaceutical, 14 items on storage, and 12 items on administrative areas), items focused on ambient conditions (e.g. temperature, air quality, music, odor, lighting, texture) and space/function (e.g. crowding, equipment, furnishings, layout), 5-point scale, Cronbach's alpha .94 -.98	Job satisfaction Intention to leave Intention to reduce working hours Job-related stress	Four variables measured on a 0-100 scale	Correlational study, cross-sectional	Favorable perceptions of pharmacy physical environment were positively related to overall job satisfaction and negatively related to the intention to leave or reducing working hours. There was no relationship between perceptions of physical environment and job-related stress.	Hospital pharmacies in Taiwan	182 pharmacists

Reference	Environmental feature		Outcome		Study design	Results	Setting	Sample
	Variable	Metric	Variable	Metric				
Morrison, W. E., Haas, E. C., Shaffner, D. H., Garrett, E. H., & Fackler, J. C. (2003). Noise stress and annoyance in a pediatric intensive care unit. *Critical Care Medicine, 31* (1), 113-119.	Noise	Sound pressure levels recorded continuously by a Quest Advanced 1900 precision integrating logging sound level meter, weighted average sound pressure level (Leq in dBA), minimum and maximum sound level, auditory events (alarm, telephone, etc.)	Staff stress	Physiology measures - Heart rate (average HR [bpm], minimum, maximum HR for every half-hour period, percent of time in tachycardia [HR>100], # of episodes of ectopy [disturbance of the cardiac rhythm]), a portable cassette battery-driven Holter monitor (GE Marquette 8500 series, Milwaukee, WI) - Salivary amylase concentration, a citric acid impregnated cellulose sponge, salivary amylase field test kits. Psychology measures - Self-reported stress and annoyance, Specific Rating of Events Scale, nurses rated how stressed or annoyed "right now" on a scale -- 0 for "not at all stressful" or "not at all annoyed" to 100 for "most stress possible" or "most annoyance possible"	Correlational study, regressional analysis	Higher Leq was a significant predictor of higher heart rate and greater percentage of time spent in tachycardia. Higher Leq was associated with higher stress and annoyance levels self-reported by nurses.	A PICU in a major US hospital	11 nurses
Rice, G., Ingram, J., & Mizan, J. (2008). Enhancing a primary care environment: A case study of effects on patients and staff in a single general practice. British *Journal of General Practice, 58* (552), 465-470.	Primary care facility	Purpose-built facility vs. converted Victorian house (the old Victorian house was cramped and noisy, lacked privacy, had only basic level of comfort and decoration; the new purpose-built facility was more spacious, had more light, more modern appearance, and greater comfort and novel art works)	Staff satisfaction; Staff psychological symptoms	- Staff questionnaire Staff satisfaction score (summation of 12 items, range from 0 to 60); - General Health Questionnaire (GHQ-12)	Before and after comparison; repeated measurements	A total of 19 staff members completed all three surveys. Staff workplace satisfaction in the new building was higher for administrative and professionals staff, and the two groups combined. There was no notable difference in psychological health indicated by GHQ-12.	An urban primary care facility in UK	27, 24, and 23 staff members completed questionnaires two month before move, 4 months after move, and 11 months after move

Reference	Environmental feature		Outcome		Study design	Results	Setting	Sample
	Variable	Metric	Variable	Metric				
Tyson, G. A., Lambert, G., & Beattie, L. (2002). The impact of ward design on the behavior, occupational satisfaction and well-being of psychiatric nurses. *International Journal of Mental Health Nursing, 11* (2), 94-102.	Nursing ward design	Old ward design (two-story constructed in 1920s, rectangular plainness, orange brickwork, terracotta roofs, living areas on ground floor, sleeping accommodation above, open unit) New ward design (two wards--one ward, 16-bed unit, 4 self-contained sleeping areas each including 4 single bed rooms with toilet, bathroom and sitting area; another ward, two single rooms, two double rooms, 4 four-bed rooms)	Job burnout Job satisfaction Staff behavior	Questionnaire - Maslach Burnout Inventory (MRI) (Maslach & Jackson, 1986) (level of burnout and personal accomplishment, emotional exhaustion, depersonalization towards patients, 22 items, 6-point scale - Job Satisfaction (Warr et al, 1979), satisfaction with extrinsic and intrinsic features of the job as well as overall job satisfaction, 16 items, 7-point scale Interview - Open-ended questions of advantages and disadvantages of the new wards and a rating on 7-point scale (whether new wards were an improvement on the old wards) Observation - Observation in 5-min intervals; behaviors in four categories: interaction with patients, interaction with staff, engaged in solitary task-orientated behavior, other duties, percentage of behaviors in one category divided total number of behaviors.	Before-after study	The mean percentages of the interactions with patients that were positive increased in the new wards. Staff perceived that the new ward environment was better than the old environment. However staff burnout levels were increased in the new wards. It appeared that ill fit of organizational climate and physical environment could contribute to the increased burnout levels. The changes in job satisfaction were not significant.	A rural psychiatric hospital in Australia	Questionnaire: 37 nurses in old wards, 34 in new wards; Observation: 40 nurses in the old facility, 40 in the new facility
Varni, J., Burwinkle, T., Dickinson, P., Sherman, S., Dixon, P., Ervice, J.,...Sadler, B.L. (2004). Evaluation of the build environment at a children's convalescent hospital: Development of the Pediatric Quality of Life Inventory parent and staff satisfaction measure for pediatric health care facilities. Journal of Developmental and Behavioral Pediatrics, 25(1), 10-20.	Staff satisfaction with physical environment	Pediatric Quality of Life Inventory (PedQL) Built Environment Staff Module - three scales, 50 items: structure (18 items), facility aesthetics (11 items), work environment (21 items), answer keys from 0 "never happy" to 4 "always happy" converted to 0-100; scale score was the average of the items in the scale	Staff satisfaction with coworker relationship	PedQL Staff Satisfaction Coworker Module (4 items), answer keys from 0 "never happy" to 4 "always happy" converted to 0-100; scale score was the average of the items in the scale	Correlational study	Staff were not satisfied with the existing 30-year-old facility. Higher staff satisfaction with the built environment structure and aesthetics was associated with higher coworker relationship satisfaction.	A 30-year-old, 59-bed, long-term, skilled nursing facility dedicated to the care of medically fragile children with complex chronic conditions	72 staff members

Matrix of relationships

		Outcome				
	Variable	Job satisfaction	Burnout	Staff stress	Turnover intent	Perception of physical
Environmental feature	Physical environment attractiveness (aesthetics)	■	■		■	
	Daylight	■		■		
	Noise			■		
	Patient room occupancy	■	■	■		■
	Acuity-adaptable room (single room maternity care)	■				

■ Note: Cells shaded in gray indicate the existence of evidence supporting relationships between environmental features and outcomes