

Is It the Place or the People? Disentangling the Effects of Hospitals' Physical and Social Environments on Well-Being

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Cláudia Campos Andrade¹, Maria Luísa Lima¹,
Ann Sloan Devlin², and Bernardo Hernández³

Abstract

Evidence points to the role of the physical environment on patient well-being, but its specific contribution is not clear. Two experimental studies were conducted. First, we investigated the inferences people make about the physical environment given information about the social environment, and vice versa. In six conditions, participants were exposed to information about an inadequate, neutral, or good hospital physical environment; or about a negative, neutral, or positive hospital social environment. Results showed that people associate the quality of hospitals' physical and social environments, and the corresponding expected well-being. Study 2 sought to disentangle the independent effect of the physical and social dimensions. Levels of quality of the physical and social environments were crossed in a 3 × 3 between-subjects design. Results showed that both dimensions have a specific significant effect. In particular, the physical environment seems

¹Instituto Universitário de Lisboa (ISCTE-IUL), CIS-IUL, Lisboa, Portugal

²Connecticut College, New London, CT, USA

³Universidad de La Laguna, Santa Cruz de Tenerife, Spain

Corresponding Author:

Cláudia Campos Andrade, Centro de Investigação e Intervenção Social (CIS-IUL), Instituto Universitário de Lisboa (ISCTE-IUL), Av. das Forças Armadas, 1649-026 Lisboa, Portugal.
Email: claudiarcandrade@gmail.com

unable to improve satisfaction when its quality is high but is able to reduce satisfaction when its quality is low.

Keywords

hospital, health care, care delivery, physical and social environments, patients' well-being

Patients value, need, and expect high-quality care. Increasingly, research indicates that positive relationships with health care providers and a good physical environment play a significant role in patients' well-being. However, how much do a supportive and appealing setting ("place") and friendly and warm professionals ("people") matter? Identifying the unique role of the physical environment is useful for planners because the physical environment can be modified to create a positive hospital image (Leather, Beale, Santos, Watts, & Lee, 2003), but correlational studies cannot disentangle the unique effect of the physical and social forces. In this article, two experimental studies examined the unique role of each of these dimensions.

Hospitals' Physical and Social Environments: Why Do They Matter?

The importance of the interaction between patients and health care professionals for effective health care is widely acknowledged. Hospital care includes very intense relationships, involving trust, intimacy, and empathy between the patients and the health care providers (Ancarani, Di Mauro, & Giammanco, 2009; Lin & Lin, 2011). The main reason patients go to the hospital is to get advice and receive treatment from health care professionals, so it is unsurprising that those interactions are an important predictor of patients' satisfaction with care (e.g., Harris, McBride, Ross, & Curtis, 2002), and that they have a direct influence on many other relevant health outcomes (e.g., Guldvog, 1999). Patients satisfied with their interactions with providers tend to follow medical regimens (e.g., Jin, Sklar, Oh, & Li, 2008) and are likely to return to that medical service (e.g., Marquis, Davies, & Ware, 1983); thus, treatment is likely to be more efficient and recovery more rapid.

Another aspect of the hospital experience that has been linked with patients' satisfaction, emotional well-being, and other relevant health outcomes is the quality of the health care physical environment (for a review, see Ulrich et al., 2008). When perceptions of the physical conditions of the health care setting are taken into account to predict patients' satisfaction, they often

appear as a weak but significant contributor (e.g., Gotlieb, 2000; Raposo, Alves, & Duarte, 2008). For example, Harris et al. (2002) interviewed 380 discharged inpatients to identify environmental sources of satisfaction with the hospital and, specifically, to determine the relative contribution of environmental satisfaction to overall satisfaction with the hospital experience. Environmental satisfaction, namely, satisfaction with interior design, architecture, housekeeping, privacy, and the ambient environment, was perceived as a source of the overall satisfaction, following nursing and clinical care.

This research on patients' satisfaction is, however, correlational, and, for that reason, there are limitations that prevent more definitive conclusions about the specific role of the quality of hospitals' physical and social environments: (a) the reverse effect from satisfaction to perceptions of physical and social environments is not excluded, (b) patients are exposed to both stimuli (social and physical) simultaneously, (c) the precise level of the quality of the physical and social environments is not under control, and (d) study samples are usually those of convenience; thus, extraneous variables can explain part of the variance of users' satisfaction. As a result, research to determine the relative importance of the quality of hospitals' physical and social environments to patients' satisfaction is needed.

The Effect of the Objective Quality of the Health Care Physical Environment

Several studies from environmental psychology have demonstrated the impact of the spatial and physical conditions of hospital settings on patients' subjective well-being. Typically, those studies describe the impact of the whole physical environment (before vs. after renovation; attractive vs. unattractive) on patients' outcomes, or show the effect of a specific attribute of the health care physical environment on patients. For example, a primary care environment was modified to reduce noise, improve lighting, add space and artwork, and update furnishings (Rice, Ingram, & Mizan, 2008). These changes yielded greater satisfaction of patients, lower anxiety of patients before and after consultation with the doctor, and more positive ratings by patients of their communications with the doctor.

Similarly, appealing rooms resulted in more favorable judgments of the hospital, stronger intentions to use the hospital again, and stronger intentions to recommend the hospital to others, than did typical rooms in the same hospital (Swan, Richardson, & Hutton, 2003). In addition, patients in appealing rooms also evaluated physicians more positively than was true for those in the typical rooms.

These and other studies (e.g., Becker, Sweeney, & Parsons, 2008; Leather et al., 2003) show that better health care physical environments are not only positively correlated with patients' satisfaction and improved affective state but also to more positive perceptions of health care providers. Focusing on the effect of a specific environmental attribute, Hagerman and colleagues (2005) studied the influence of room acoustics on patients with coronary artery disease. They compared patients who were in the unit with sound-reflecting ceiling tiles (bad acoustics) with patients who were there after the replacement with sound-absorbing tiles of similar appearance (good acoustics). Patients with acute myocardial infarction and unstable angina showed lower pulse amplitude during the night when good acoustics were installed. In addition, patients exposed to the good acoustics considered the staff attitude to be much better and had a lower incidence of re-hospitalization than did patients treated when the bad acoustics were present.

Evidence that patients' perceptions of the health care physical and social environments tend to co-vary is given by other kinds of correlational studies. That is, it has been systematically found that in hospital care units with better physical conditions, patients more positively perceive both the quality of the physical environment and the quality of the social and organizational relationships (e.g., Andrade, Lima, Fornara, & Bonaiuto, 2012; Andrade, Lima, Pereira, Fornara, & Bonaiuto, 2013; Fornara, Bonaiuto, & Bonnes, 2006).

Given this research, it is legitimate to question whether the quality of the physical environment has a unique direct effect on patients' subjective well-being, over and above the quality of the health care social environment. Without controlling for the quality of the social environment, the specific contribution of the physical environment cannot be determined.

The Effect of the Physical Environment and Its (In) Direct Paths

As some of the studies previously mentioned show, the characteristics of the hospital's physical context have an influence on the perceptions of staff. This kind of influence is also well documented in relation to other environments such as residential and working environments. This relationship occurs because, in general, the environments that people occupy are rich with information about their personalities, values, and attitudes (Smith & Mackie, 2007). The links between occupants and their personal environments, and between those environments and observers' perceptions of the occupants, can be conceptualized in terms of Brunswik's (1956, in Gosling, Ko, Mannarelli, & Morris, 2002) lens model. Personal living and working environments are places where individuals spend a great deal of time and tend to personalize.

Moreover, certain behaviors are so repeated in those environments that discernible cues are left behind. According to Brunswik, physical traces of activities conducted in the environment, decoration elements, or the level of organization and tidiness serve as a kind of lens through which observers can draw inferences about the occupants (see, for example, Zeisel's, 1981, chapter on physical traces).

Despite the fact that work environments permit fewer forms of self-expression compared with a place like one's home, the physical environment at work conveys information about its occupants. Hospital staff—in particular—may have limited control over the physical environment of the hospital rooms or waiting rooms. However, research suggests patients believe the hospital environment is at least partially the responsibility of health care providers, and that providers may be able to take some actions to help improve conditions in patients' hospital rooms (Gotlieb, 2002). If patients notice that health care providers (or someone connected to them) put time, thought, and care into the hospital environment, such actions may be interpreted to mean these providers care for patients' well-being and comfort. As a result, patients may expect those providers will put the same quality into the given "technical" care.

This theoretical lens model may explain why perceptions of physical and social environments tend to be correlated, which is also evident in laboratory studies (e.g., Devlin, 2008). For example, Arneill and Devlin (2002) showed that perceived quality of care was greater for attractive and comfortable waiting rooms, than for those outdated and cold in appearance. Using photographs of therapists' offices, Nasar and Devlin (2011) showed that increases in softness/personalization and orderliness improved judgments of the therapists' qualifications, boldness, and the likelihood that one would choose a therapist based on the office. Similarly, it was found that dim lighting in a counseling room not only yielded more pleasant and relaxed feelings but also yielded more favorable impressions of the interviewer and more self-disclosure than did bright lighting (Miwa & Hanyu, 2006).

Patients make judgments about the practitioners' technical competence. However, most people know so little about medicine and the standards of practice that they may evaluate care using the information they have, namely, whether the practitioner is warm, and what the physical environment communicates (Taylor, 2011). The ability of the physical environment to influence people's beliefs about the people and the service found in that place is apparent for other service businesses such as hotels, restaurants, and retail stores (for a comprehensive framework, see Bitner, 1992). For example, a study showed that a travel agent's office décor affected customer attributions of the travel agent's behavior (Bitner, 1990). When employees had clean and

organized desks, customers were less likely to attribute service failures to the company and to expect the failure to occur again in the future than when the desks were less clean and organized. In that sense, the environment can be viewed as a form of nonverbal communication (Bitner, 1992).

In short, one of the ways the health care physical environment has an influence on patients' subjective well-being is through its symbolic social meaning—the message it sends about how much staff care about patients. This hypothesis has been tested in a previous study (Andrade, Lima et al., 2013). Moreover, the quality and the attractiveness of the health care physical environment also positively affects the mood and behaviors of the health care providers (e.g., Andrade, Hernández-Fernaud, & Lima, 2013; Shepley, Harris, & White, 2008), which can, in turn, explain the corresponding patients' outcomes.

The health care physical environment may, thus, affect patients' subjective well-being through the perceived and the "objective" quality of the social environment. However, studies have neglected the unique role of the physical environment (Winkel, Saegert, & Evans, 2009). In other words, what is still to be addressed is the specific effect of the quality of the physical environment when controlling for the objective quality of the health care social environment, which can be a confounding variable. Therefore, the objective of this study is to identify the unique and direct effect of the health care physical environment over and above the quality of the social environment.

In addition, whereas research has shown that expected well-being and perceptions of hospital staff can be inferred through the quality of the physical environment (e.g., Arneill & Devlin, 2002), what has not yet been examined is whether perceptions of staff also lead patients to infer the quality of the health care physical environment and to expect a level of well-being consistent with the perceived quality of staff interactions. Therefore, this will be another of our objectives.

The Effect of the Physical Environment and Its Extent

Research has shown that compared with the perceptions of the health care social environment, patients' perceptions of the health care physical environment have a smaller influence on patients' satisfaction (e.g., Harris et al., 2002). In addition, some research suggests that the health care physical environment may be more capable of producing reactions of dissatisfaction than satisfaction (e.g., Arneill & Devlin, 2002; Devlin, 1995). For example, Arneill and Devlin (2002) found that in open-ended questions, participants had more to say and more specific comments about the aspects of waiting

rooms they disliked than about the aspects they liked. Devlin (1995) reported similar findings when an unrenovated and two renovated inpatient units were compared. When asked about what patients wanted to see changed on the unit, 46% of the patients' comments on the unrenovated unit were about needed improvements in the physical environment, whereas very few such comments about the physical environment were made on the two renovated units (20% and 0%). However, no differences were found regarding what patients liked best about the unit, with the vast majority of the comments for each unit dealing with the quality of care received. Thus, Devlin (1995) suggested that the environment tends to be more capable of producing reactions of dissatisfaction than satisfaction. Patients may expect a certain level of quality in the environment and therefore may only feel the need to comment about the environment when the quality is poor.

The idea that the physical environment has an effect especially when it is inadequate is consistent with Herzberg's motivation-hygiene theory of job satisfaction (Herzberg, 1987). According to Herzberg, the factors involved in producing job satisfaction (and motivation) are separate and distinct from the factors that lead to job dissatisfaction. In his work, he found that good environmental factors, as context factors, can at best create no dissatisfaction when they are present, or create dissatisfaction if they are inadequate or absent.

Overview of the Studies

Two laboratory studies were designed to address these issues by varying the levels of quality of the physical and social environments. Study 1 sought to describe and compare the inferences people make about the quality of the hospital environment and hypothetical patients' expected well-being based on partial information (only about the physical or only about the social environment). It was hypothesized that (a) there would be an effect of information about the health care social environment on inferences about the quality of the physical environment, as well as an effect of information about the health care physical environment on inferences about the quality of the social environment, and that (b) both the information about the health care social and physical environments would have an effect on expected well-being, but the effect of information about the health care social environment would be stronger. The objective of Study 2 was to disentangle the contribution of the quality of physical and social environments on well-being. It was hypothesized that (a) health care physical and social environments have an independent effect on well-being, (b) the effect of the health care social environment on well-being would be stronger than the effect of the physical environment,

and (c) the effect of the health care physical environment on well-being would be stronger when the physical environment is inadequate than when it is adequate.

Study I

Method

Participants and design. One hundred twenty-seven persons (79 women; M age = 28.45 years) participated in this study on a voluntary basis. Participants were obtained from the subject pool of students at the Lisbon University Institute or were recruited in different secondary schools (teachers, staff, parents) or adult learning centers. These participants were randomly assigned to one of six possible conditions: good, neutral, or inadequate hospital physical environment; or positive, neutral, or negative hospital social environment (18-23 participants per condition). Due to the diversity of ages in the sample (minimum = 18, maximum = 59), the effect of age was controlled.

Manipulation of the independent variables

Manipulation of the perception of quality of the physical environment. The quality of the physical environment was manipulated by presenting 35 photographs of an inadequate, neutral, or good hospital outpatient area (see Figure 1). The inadequate and neutral hospital areas were selected based on the evaluations made in loco by architects and users (cf. Andrade et al., 2012), and the good hospital area belonged to a private and modern hospital. The photographs were taken by the researcher in periods when the service was not open to the public. For the purpose of the study, the photographs were ordered in a way that reflected what patients would encounter as they entered the service until they left, following the appointment (i.e., general view of the waiting room, reception desk, seats in the waiting area, entrance to the medical offices area, corridor of the offices area, door of the doctor's office, door of the treatment office, exit).

To examine the effectiveness of the manipulation of the physical environment, the photographs were pre-tested through an online pilot study. As expected, the hospital area with the good physical environment was judged as having higher quality ($M = 2.87$, $SD = 0.48$, $n = 21$; on a scale where 0 = absence of quality, and 4 = maximum quality) than was the hospital area with the neutral physical environment ($M = 2.37$, $SD = 0.44$, $n = 21$); the latter was judged as having higher quality than was the inadequate physical environment ($M = 1.24$, $SD = 0.42$, $n = 26$), $F(2, 65) = 84.361$, $p < .001$, $\eta_p^2 = .72$.

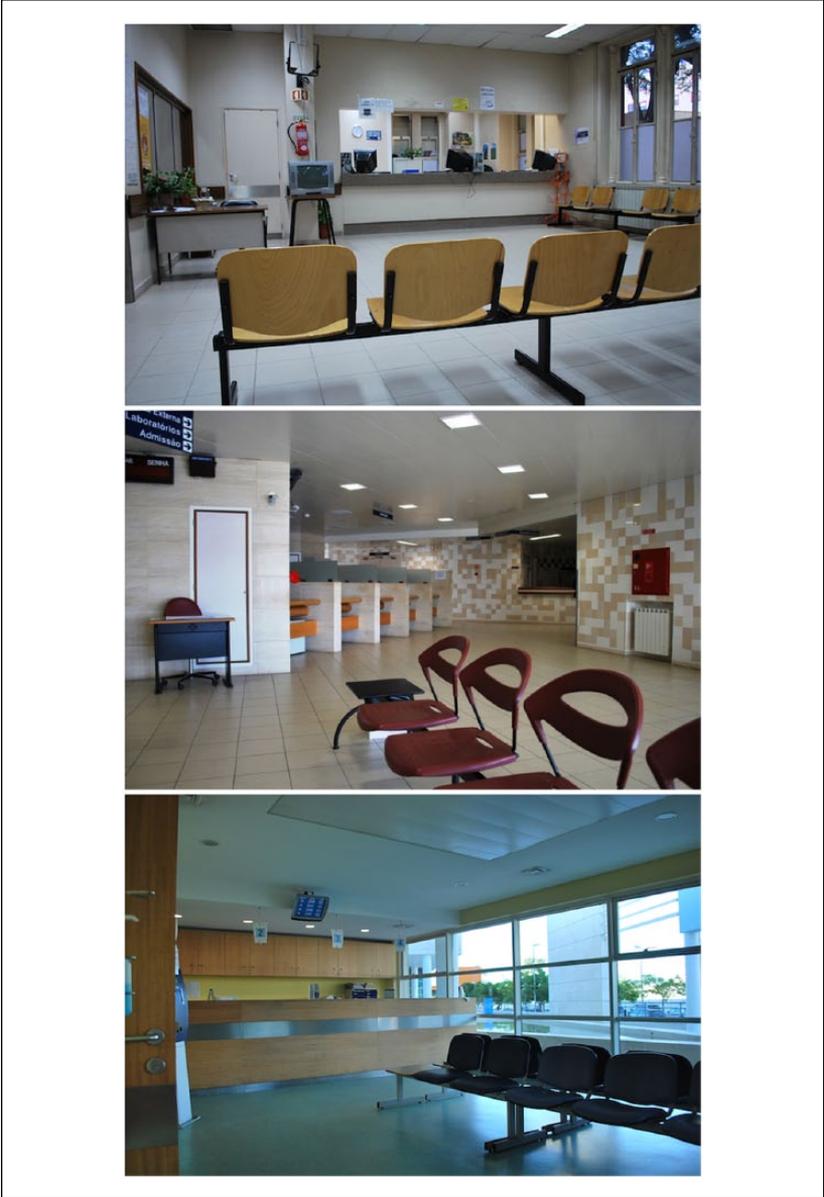


Figure 1. Photographs of the hospital areas used in the studies.
Note. The three hospital areas are, from top to bottom, inadequate, neutral, and good.

This evaluation was done using the Perceived Hospital Environment Quality Indicators (PHEQIs), a measure described in the following section.

Manipulation of the perception of quality of the social environment. The quality of the social environment was manipulated through a story about a positive, a neutral, or a negative health care experience. The three stories referred to the same sequence of events beginning as the patient arrives at an orthopedic care unit and continuing until he or she leaves (i.e., arriving, going to the reception desk, spending time in the waiting room, having the consultation, making an appointment for physiotherapy, and leaving). A visit to an orthopedic service was described because it is usually associated with acute but non-life threatening health problems. In the positive story, events were qualified positively in terms of the social-functional environment (e.g., few people in the room, receptionist cordially greets the patient and offers the patient something to drink while she or he waits for a few moments; a staff member greets the patient and accompanies her or him to the doctor's office; the first session of physiotherapy is scheduled for the next day). In the negative story, events were qualified negatively (e.g., many people in the waiting room, receptionist does not greet the patient, and tells the patient just to wait; a staff member points out the office down the hall, without greeting the patient; without eye contact, the doctor types on the computer while the patient talks; the patient must return to the clinic to schedule physiotherapy sessions). The neutral story only describes the steps the patient experiences during the health care visit without qualifying them. To facilitate the participant's identification with the story, male participants heard a story about "João" (hypothetical male patient) and female participants heard a story about "Maria" (hypothetical female patient). To reduce the influence of previous health care experiences, we chose not to ask participants to personally imagine themselves in the health care situation.

To examine the effectiveness of the manipulation of the social environment, the stories were pre-tested online with 64 university students. Through PHEQIs (Andrade et al., 2012), and as predicted, the positive story was judged as reflecting more social quality ($M = 3.46$, $SD = 0.58$, $n = 22$; on a scale where 0 = *absence of quality*, and 4 = *maximum quality*) than was the neutral story ($M = 2.25$, $SD = 0.59$, $n = 22$). The latter was judged as reflecting more social quality than was the negative story ($M = 1.02$, $SD = 0.47$, $n = 20$). All ps are significant, $F(2, 61) = 107.466$, $p < .001$, $\eta_p^2 = .78$.¹

Dependent variables. *Quality perception of the physical environment* was assessed by the Care Unit & In-/Out-Patient Area Scale; and *quality perception of the social environment* was assessed by the Social-Functional Features

Scale, both from PHEQIs (Andrade et al., 2012). The scale on Care Unit & In-/Out-Patient Area has four factors of environmental quality perception: Spatial-physical comfort (6 items), Orientation (4 items), Quietness (2 items), and Views and lighting (3 items). The scale on Social-Functional Features has two factors: Care for social and organizational relationships (6 items), and Privacy (3 items). Items are defined as sentences that express environmental evaluations (e.g., "In this outpatient area the quality of furnishings is good"), and responses are made on 5-point Likert-type rating scales (from 1 *totally disagree* to 5 *totally agree*; later recoded to the original range 0-4). Each scale contains positive and negative items, to control for response set; both scales are commonly treated as single scales. Responses to the 15 items used to assess perceived quality of the physical environment (Cronbach's $\alpha = .95$) and responses to the 9 items used to assess perceived quality of the social environment (Cronbach's $\alpha = .94$) were scaled with higher numbers reflecting higher perceived quality (PHEQIs items available in Andrade et al., 2012).

Expected well-being was measured using two indicators: satisfaction and affective state. *Satisfaction with the care unit* was measured through four questions (Andrade, Lima, et al., 2013; Raposo et al., 2008), for example, "Considering the global experience of [Maria/João] in this care unit, in general, how satisfied is she/he?" Responses to the items were recorded on 9-point bipolar scales ranging, for example, from 1 (*very unsatisfied*) to 9 (*very satisfied*). *Affective state* was measured through a semantic differential introduced by the following question: "How does [female/male name of the target patient] feel at the moment?" (Garcia-Marques, 2004). Responses were made on 9-point bipolar scales featuring the following adjectives: sad-happy, bad-good, and negative-positive; the respondent had to choose an answer from each adjective pair. The middle point meant "neither one thing nor the other." Satisfaction with the care unit and affective state had a high and significant correlation, $r(127) = .88, p < .001$. Thus, the two variables were collapsed into one single dependent variable called Well-Being, for which the Cronbach's alpha value is .97.

Procedure. Participants were asked to complete an informed consent document and were informed that the experiment intended to examine "how people evaluate hospital services through different types of information." They were told to imagine that a hypothetical person went to an orthopedic service for a consultation because of tendinitis in the right hand. Participants were asked to pay attention to the story about the hospital visit and were told that there would be questions later. They either heard the story over a headset ($n = 61, 48\%$) or saw the photographs of the hospital service projected on a

computer screen ($n = 66, 52\%$). After the 3-min 20-s story or photo sequence presentation, participants answered questions, one at a time, on a computer screen.

Results

Perceptions and inferences of the quality of the hospital environment. Sixty-six (52.0%) of the participants were only exposed to photographs of a hospital area, and 61 (48.0%) of the participants were only exposed to a story.

First, we analyzed the perceptions and inferences about the quality of the physical environment. A 2 (Type of information presented: physical or social) \times 3 (Level of quality of information: negative [inadequate] vs. neutral vs. positive [good]) between-participants ANOVA was performed.

Results showed a main effect of the level of quality described in the information (inadequate; neutral; good), $F(2, 121) = 234.96, p < .001, \eta_p^2 = .80$. As expected, positive information resulted in significantly higher evaluations of the environment ($M = 2.79, SD = 0.54$) than did the neutral information ($M = 1.91, SD = 0.68, p < .001$), and the latter produced significantly higher evaluations of the environment than did the negative information ($M = 0.55, SD = 0.33, p < .001$). A significant main effect of the type of information was also obtained, $F(1, 121) = 5.67, p = .019, \eta_p^2 = .05$, indicating that overall, being exposed to information about the social environment produced slightly more positive inferences about the hospital physical environment ($M = 1.79, SD = 0.98$) than did being exposed to information about the physical environment ($M = 1.61, SD = 1.14, p = .019$).

As expected, there was also a significant interaction effect, $F(2, 121) = 13.78, p < .001, \eta_p^2 = .19$. Pairwise comparisons with Bonferroni's correction showed that participant groups that saw the higher quality photos gave higher quality ratings to the physical environments. The good physical environment produced significantly higher perceptions of quality ($M = 2.97, SD = 0.44$) than did the neutral physical environment ($M = 1.56, SD = 0.58$), and the latter produced significantly higher perceptions of quality than did the inadequate physical environment ($M = 0.41, SD = 0.31$); all $ps < .001$. However, participant groups that were only exposed to stories of care inferred that the quality of the physical environment would be good (and not significantly different; $p = .151$) when the stories were positive ($M = 2.59, SD = 0.58$) or neutral ($M = 2.28, SD = 0.59$), and only significantly lower (and negative) when the story was negative ($M = 0.68, SD = 0.30, p < .001$; see Figure 2).

Then we analyzed the perceptions and inferences about the quality of the social environment. Another 2 (Type of information: physical or social) \times 3 (Level of quality: negative [inadequate] vs. neutral vs. positive [good]) between-participants ANOVA was performed.

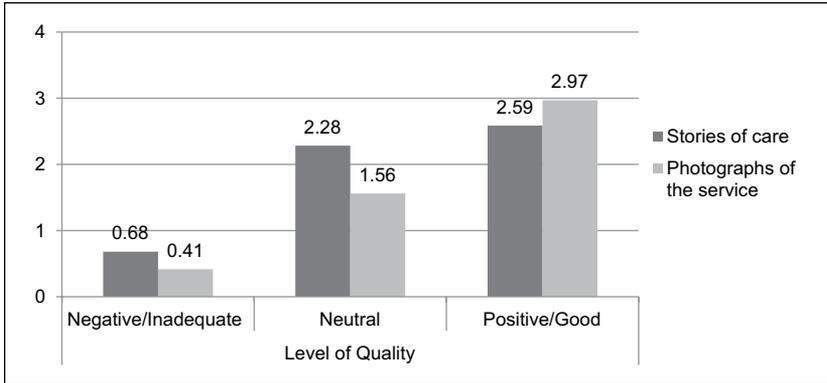


Figure 2. Perceptions/inferences on the quality of the hospital physical environment as a function of the type of information provided (stories or photographs) and the level of quality.

Results showed a main effect of the level of quality presented in the information, $F(2, 121) = 147.58, p < .001, \eta_p^2 = .71$. As expected, positive descriptions resulted in significantly higher evaluations of the social environment ($M = 2.66, SD = 0.74$) than did the neutral information ($M = 1.73, SD = 0.86, p < .001$), and the latter produced significantly higher evaluations of the social environment than did the negative information ($M = 0.69, SD = 0.74, p < .001$). A significant main effect of the type of information was also obtained, $F(1, 121) = 38.76, p < .001, \eta_p^2 = .24$, indicating that overall, being exposed to information about the social environment produced more positive inferences about the social hospital environment ($M = 1.92, SD = 1.30$) than did being exposed to information about the physical environment ($M = 1.39, SD = 0.73, p < .001$).

Again, there was also a significant interaction effect, $F(2, 121) = 35.02, p < .001, \eta_p^2 = .37$. Pairwise comparisons with Bonferroni's correction showed that participant groups who were only exposed to stories of care gave higher quality ratings to the social environment when given stories indicating a higher level of care. The positive social environment produced significantly higher perceptions of quality ($M = 3.19, SD = 0.62$) than did the neutral social environment ($M = 2.39, SD = 0.68$), and the latter produced significantly higher perceptions of quality than did the negative social environment ($M = 0.44, SD = 0.46$); all $ps < .001$. However, participants who were only exposed to photographs of the service inferred that the quality of the social environment would be negative when the photographs depicted an inadequate ($M = 0.94, SD = 0.50$) or neutral ($M = 1.10, SD = 0.44$) physical

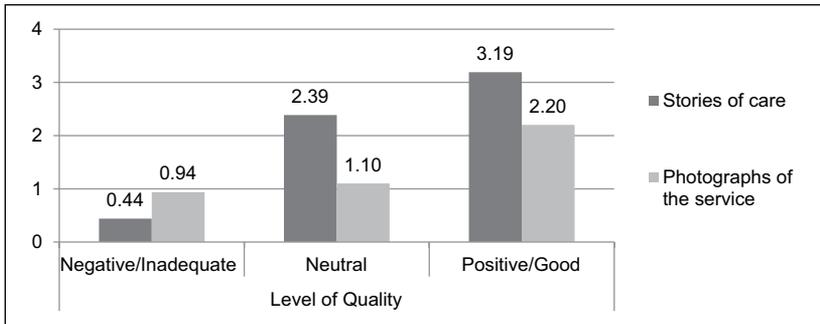


Figure 3. Perceptions/inferences on the quality of the hospital social environment as a function of the type of information provided (stories or photographs) and the level of quality.

environment ($p = .919$), and only significantly better when the photographs depicted a good physical environment ($M = 2.20$, $SD = 0.48$, $p < .001$; see Figure 3).

Older participants gave more negative ratings of the hospital environment, $r(127) = -.42$, $p < .001$. Thus, the same ANOVA was conducted, now controlling for the effect of age. Results showed that the effect of age was not significant, and the effects of level of quality, type of information, and interaction remained virtually the same.

Overall, as predicted, our results indicate that people infer the quality of the physical environment from information about the social environment; similarly, they infer the quality of the social environment when they have information about the physical environment.

Expected well-being. The same ANOVA was repeated to analyze expected well-being when patients were exposed to information about the hospital physical or social environment. Results showed a significant main effect of the level of quality described in the information, $F(2, 121) = 73.55$, $p < .001$, $\eta_p^2 = .55$. As expected, positive information resulted in significantly higher expected well-being ($M = 6.80$, $SD = 1.73$) than did the neutral information ($M = 5.59$, $SD = 1.52$, $p = .001$), and the latter produced significantly higher expected well-being than did the negative information ($M = 3.05$, $SD = 1.85$, $p < .001$). Moreover, a significant interaction between the effects of type of information and level of quality of the information was also obtained, $F(2, 121) = 19.86$, $p < .001$, $\eta_p^2 = .25$. Participants who were only exposed to stories of care expected significantly more well-being as the quality of the

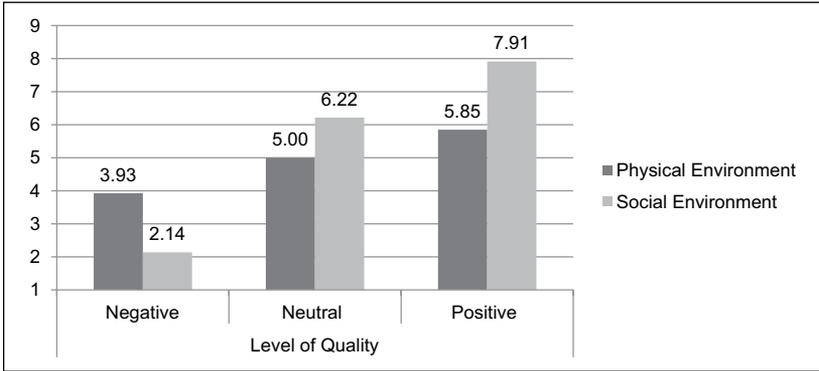


Figure 4. Level of expected well-being based on information about the hospital physical environment or hospital social environment.

stories increased from negative ($M = 2.14, SD = 1.18$) to neutral ($M = 6.22, SD = 1.21, p < .001$), and from neutral to positive ($M = 7.91, SD = 0.90, p = .002$); this effect was more modest for participants who were only exposed to photographs of the service. Specifically, a neutral physical environment ($M = 5.00, SD = 1.58$) produced significantly more expectations of well-being than did an inadequate physical environment ($M = 3.93, SD = 1.97, p = .052$), but the differences between the expected well-being produced by the neutral physical environment and the good physical environment ($M = 5.85, SD = 1.70$) were not significant. The main effect of the type of information was not significant, $F(1, 121) = 3.53, ns, \eta_p^2 = .03$ (see Figure 4).

Analyses were performed separately for satisfaction and affective state as dependent variables, and we found that results were virtually the same. Older participants expected less well-being for the hypothetical patients, $r(127) = -.38, p < .001$. Again, age was entered as a covariate but its effect was not significant; the results did not change.

In sum, these results suggest that, as predicted, information about the physical and social environments affect expected well-being but that information about the social environment seems to have a stronger effect.

Study 2

Method

Participants. One hundred ninety-four individuals (107 women; M age = 25.20 years) participated in this study; they were selected as were the

participants of Study 1. Due to the diversity of ages in the sample (minimum = 17, maximum = 69), the effect of age was controlled in the analyses.

Design, independent variables, and dependent variables. The study had a 3×3 experimental between-subjects design, with two manipulated variables: quality of the physical environment (good vs. neutral vs. inadequate) and quality of the social environment (positive vs. neutral vs. negative). In sum, participants were randomly assigned to one of nine possible conditions in which they were exposed simultaneously to photographs of a hospital outpatient area and to a story of care (18-24 participants per condition). Dependent variables were, as for Study 1, as follows: *Quality perception of the physical environment*, *Quality perception of the social environment*, and *Expected well-being*. Satisfaction with the care unit and Affective state again had a high and significant correlation, $r(194) = .86, p < .001$, and the Cronbach's alpha value for the composite variable *Expected well-being* was .97.

Procedure. The procedure was similar to Study 1. However, these participants were asked to pay attention to the story about the hospital visit and to the photographs of the hospital service in which it took place, which were presented simultaneously. The presentation of the photographs and story was synchronized.

Results

Perceptions of the quality of the hospital environment. Regarding the quality of the health care physical environment depicted, as expected, participants judged the hospital area with the good physical environment as having more quality ($M = 2.93, SD = 0.57, n = 62$) than the hospital area with the neutral physical environment ($M = 2.29, SD = 0.90, n = 64$). The latter was judged as having more quality than the hospital area with the inadequate physical environment ($M = 1.17, SD = 0.73, n = 68$); $F(2, 191) = 92.92, p < .001, \eta_p^2 = .49$; all $ps < .001$, according to pairwise comparisons with Bonferroni's correction.

In terms of the quality of the social environment, participants judged the events in the positive story ($M = 3.19, SD = 0.62, n = 62$) as reflecting more quality than those in the neutral story ($M = 2.38, SD = 0.82, n = 66$). The latter was judged as revealing more quality than was the story of a negative health care experience ($M = 0.53, SD = 0.51, n = 66$), $F(2, 191) = 269.90, p < .001, \eta_p^2 = .74$. Pairwise comparisons with Bonferroni's correction show that all means were significantly different (all $ps < .001$). These results confirm the previous finding (Study 1) that "objectively" better physical and social

environments produce more positive perceptions of the hospital than do environments of lower quality.

Expected well-being. The level of expected well-being was analyzed in a 3 (Quality of physical environment: good vs. neutral vs. inadequate) \times 3 (Quality of social environment: positive vs. neutral vs. negative) ANOVA with all factors varying between participants.

As predicted, a main effect of the physical environment, $F(2, 185) = 14.23$, $p < .001$, $\eta_p^2 = .133$, and a main effect of the social environment, $F(2, 185) = 386.51$, $p < .001$, $\eta_p^2 = .807$, were obtained. This outcome means that physical and social environments have an independent influence on expectations of well-being, which supports the first hypothesis. Moreover, as predicted in the second hypothesis, the main effect of the quality of the social environment accounts for a higher proportion of variance in expected well-being than does the quality of the physical environment.

Pairwise comparisons with Bonferroni's correction showed that the inadequate physical environment ($M = 4.78$, $SD = 2.35$) produced significantly lower expected well-being than did the neutral ($M = 5.62$, $SD = 2.49$, $p < .001$) and the good ($M = 5.69$, $SD = 2.31$, $p < .001$) physical environments, but the neutral and the good physical environments did not differ from one another. In other words, and using the neutral physical environment as a reference, results indicated that expected well-being was impaired by the inadequate physical environment but was not improved by the good physical environment, in line with what was hypothesized. However, the positive social environment ($M = 7.49$, $SD = 1.15$) resulted in significantly higher evaluations of expected well-being than did the neutral social environment ($M = 6.19$, $SD = 1.19$), and the latter produced significantly more expected well-being than did the negative social environment ($M = 2.49$, $SD = 1.10$, all $ps < .001$). Thus, settings that offer better quality are perceived to provide more patient well-being (see Figure 5).

Results also showed that there is no significant interaction between the quality of the physical and social environments, $F(4, 185) = 2.17$, *ns*, $\eta_p^2 = .045$; the model explains 80.6% of the variance in expected well-being. Analyses were performed separately for satisfaction and affective state as dependent variables, and we found that results were virtually the same.

Older participants reported lower perceptions of quality of the physical environment, $r(194) = -.26$, $p < .001$; perceptions of quality of the social environment, $r(194) = -.29$, $p < .001$; and expected well-being, $r(194) = -.30$, $p < .001$. Thus, the same ANOVA was conducted, now controlling for the effect of age. Results showed that the effect of age was not significant, and the effects of hospital, story, and interaction remained virtually the same.

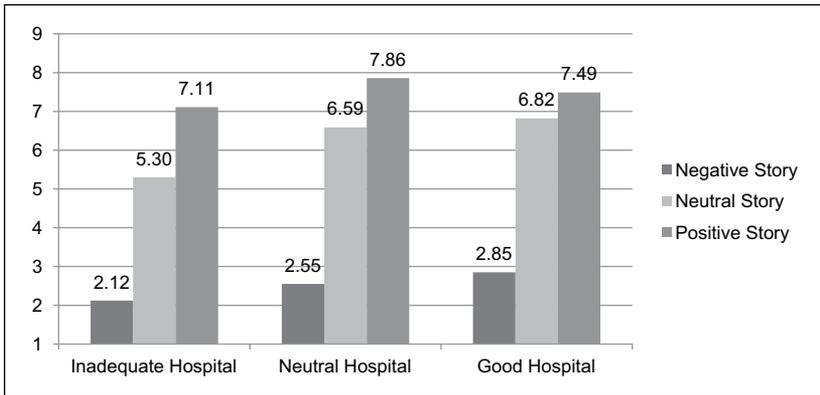


Figure 5. Level of expected well-being as a function of the quality of the hospital social and physical environments.

General Discussion

The relationship with health care providers is a key aspect of the treatment, as research in health psychology has demonstrated. A less studied aspect in terms of treatment success is the role of the health care physical environment where the care takes place. The impact of the health care physical environment on well-being has emerged from studies in environmental psychology (e.g., Arneill & Devlin, 2002; Leather et al., 2003). The experimental laboratory studies presented in this article were designed to overcome some of the limitations of correlational studies in which the effect of hospitals' physical and social environments on patients' well-being is impossible to separate, and the mutual influence of these dimensions is difficult to examine. Thus, the first study examined how each of these dimensions alone affects inferences about the other, and how they produce inferences about well-being; and the second study tested the relative effect of the social and physical environments on expected well-being.

With the aim of a separate assessment of impact, participants in Study 1 only received information about the quality of the hospital physical or social environment (good, neutral, or inadequate hospital area; or positive, neutral, or negative story of care), and were asked to infer qualities of the other dimension and of expected well-being. Results clearly showed that these three dimensions are associated in people's minds. In particular, it was demonstrated that the physical environment communicates a message about the expectations one can have about the hospital staff and global social environment, and that the opposite is also true: The level of social environment

encountered provides a promise of a corresponding level of quality of the physical environment. Moreover, it was found that expected well-being also varied accordingly, depending on the information provided about the quality of the social environment in isolation, or the physical environment in isolation, but the impact of the social information seems to be stronger. These results are in line with the view that hospital buildings concretize prevalent assumptions about patients, illness, care, and healing environments, as well as medical providers' roles (Bromley, 2012), and that users interpret and internalize that information.

We may look at the implications of these results in terms of the expectations people have about the environments they encounter. We know from research in social cognition that prior expectations guide our judgments of new information. When going to a new hospital, patients expect to find competent health care providers and a nice physical environment. Our results showed that if people have information that a hospital has competent professionals, they may infer that the physical environment will be pleasant as well. Thus, if the quality of the hospital physical environment is poor, people may need to adjust their previous positive expectations to include this new negative information and create a coherent judgment of the health care providers and the quality of care in general. However, if people do not have information about the health care providers and they enter an appealing and supportive hospital facility, that encounter will establish expectations about the quality of the social environment that they will seek to confirm.

The second study used an experimental between-subjects design in which one of three levels of quality of the physical environment (good, neutral, and inadequate hospital areas) and one of three levels of social environment (positive, neutral, and negative stories of care) were crossed yielding nine conditions. As predicted, both physical and social environments have a significant and independent contribution to expected subjective well-being in a potential health care situation. Overall, expected well-being is enhanced as the quality of the physical and social environments increases. This result is reinforced by the results from Study 1, which showed that perceived well-being tends to vary in the expected direction even when only the physical or the social environment is manipulated. Although the effect of the social environment is stronger, the effect of the quality of the physical environment is not irrelevant or unimportant—it has a particular and cumulative presence in addition to the impact of the social environment. These results give stronger support to the accumulating evidence of the benefits of good health care physical design (Ulrich et al., 2008). In addition, the absence of an interaction shows that, although the effect of the physical environment is weaker than the effect of the social environment, the effect of the physical environment tends to be constant whether the social environment is positive, neutral, or negative.

But how does that consistent impact of the physical environment operate? This study showed that expected well-being tends to increase when the physical environment improves from “inadequate” to “neutral,” and to become stable when the physical environment improves from “neutral” to “good.” In other words, although people notice there are differences between an inadequate, neutral, and better health care physical environment (as demonstrated by the manipulation checks), only an inadequate physical environment affects expected well-being negatively. This inability of the physical environment to improve satisfaction when the environment is better than “good enough” was predicted based on literature (e.g., Arneill & Devlin, 2002; Devlin, 1995; Herzberg, 1987). The results of this study challenge the idea that the effect of the physical environment on well-being is linear, by indicating that it probably reaches a ceiling effect, at least in a short visit to a hospital for a consultation. This statement is reminiscent of an assessment from Proshansky, Fabian, and Kaminoff (1983):

It is, generally speaking, only when a physical setting becomes dysfunctional that a person becomes aware of his or her expectations for that setting. What was routine and in the background suddenly becomes the “figure” in the thinking of those using the setting. (p. 75)

This result needs further exploration, for example, with inpatients in real settings.

Some conclusions can be drawn from this study. First, it is both the “place” and the “people” in the hospital that contribute to well-being, but in this study, “people” contribute to a greater extent than does “place.” Patients in a health care service want to feel cared for; the hospital social environment constitutes a fundamental aspect of care. Other evidence pointing to the larger role of the social environment comes from research in other kind of settings, such as residential environments (e.g., Amérigo & Aragonés, 1990, 1997; Hidalgo & Hernández, 2001; Taberner, Briones, & Cuadrado, 2010).

Second, this study gives further support to the significant and independent influence of the hospital physical environment on users’ well-being. Beyond the fact that the quality of the health care physical environment enables people to infer the quality of the social environment of an unknown care unit, an inadequate physical environment has a significant and consistent negative impact on expected well-being. In particular, the physical environment does not cause expected well-being enhancement (when it is “good”) but causes expected well-being reduction (when it is “inadequate”). Therefore, this study suggests that health care units should have providers who are not only technically competent, emphatic, and effective communicators but also

guarantee that the physical context does not frustrate patients' expectations of what is perceived to be a minimum standard. However, an extremely attractive physical environment does not seem to make a significant difference on expected well-being, at least on the basis of this research.

Nevertheless, available evidence suggests that other relevant outcomes justify the creation of enhanced hospital physical environments (e.g., pain, Malenbaum, Keefe, Williams, Ulrich, & Somers, 2008; physiological state, Hagerman et al., 2005; recovery time, Ulrich, 1984). For example, the previously described study of Rice et al. (2008) found that a more attractive primary care environment resulted in a reduction of patient anxiety. Some specific environmental features such as plants can also promote those stress-reducing effects (Dijkstra, Pieterse, & Pruyn, 2008).

The present studies have some limitations. First of all, participants were not patients, which reduces ecological validity. Being ill produces physiological and psychological conditions that may have an important impact on patients' needs and perceptions. Moreover, although college students constituted part of our samples, and may have relatively little hospital experience, age, once it was controlled, did not affect our results. However, in future studies, hospital experience should be controlled and tested as a potential moderator. Second, participants were exposed to the visual image of a health care service, but the physical environment involves other sensory experiences, such as what patients smell and hear. Likewise, they were exposed to a story, but in real settings, the patient-provider communication is dynamic and bidirectional. Last, it is important to acknowledge that the quality of the social and physical dimensions is difficult to equate exactly, and that other studies might yield different relative strengths for the effects of people and place.

Despite the limitations, these studies provide answers to important questions not yet addressed in the literature and that field studies would be unable to answer. Our results show that the physical and social characteristics of the hospital environments (both the *place* and the *people*) play a distinct and complementary role in satisfaction, and future studies should continue to investigate how the two work together. Because the quality of the physical environment is easier to control and improve, its effect should not be ignored but rather intentionally used to improve patients' well-being or, at least, not impair it. At a time when patients are becoming more knowledgeable, and increasingly adopt consumer attitudes toward their health care, their expectations about quality may also grow (Taylor, 2011). The manner in which care is delivered is under patients' closer scrutiny, which plays a significant role in their levels of satisfaction. For these reasons, hospital environments as a whole should serve and reflect the needs and expectations of users.

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Note

1. All the materials used in this study (photographs and stories) can be requested from the corresponding author.

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Author Biographies

Cláudia Campos Andrade has a PhD in psychology and is a researcher at the Lisbon University Institute (ISCTE-IUL), Portugal. Her research interests include the relationship between the physical environments and human well-being, in particular, health care environments.

Maria Luísa Lima is a full professor of social and environmental psychology in the Department of Social and Organizational Psychology of the University Institute of Lisbon (ISCTE-IUL), Portugal. Her main current research interests include the perception of environmental and health risks and the social factors that promote their relation to safety behaviors.

Ann Sloan Devlin is a professor of psychology at Connecticut College, the United States. Her recent research focuses on health care environments, including psychotherapists' offices, and the relationship between environmental design and health outcomes.

Bernardo Hernández is currently a professor of social psychology in the Department of Cognitive, Social, and Organizational Psychology at University of La Laguna, Spain. His research interests include place attachment and place identity, ecological beliefs, proenvironmental behaviors, and environmental crime.