

# Chapter 9. Environmental Psychology



- As Environmental Health (6) on 7 Nov. 2024
- Key Concepts
  - Environmental psychology marshals both theory and empirical evidence to understand human-environment relations.
  - Environmental psychologists recognize that behavior, like physical health, is affected by the immediate social and physical environment as well as by the broader sociocultural context in which daily life unfolds.
  - Environmental psychology focuses on a broad variety of environmental exposures and circumstances, such as features that encourage (or discourage) socializing, wayfinding cues, crowding, noise, light and color, and housing quality. Only some of these fall within the scope of traditional environmental health sciences, so the two fields are highly complementary.
  - Environmental psychology focuses on a broad variety of outcomes, including health, social interactions, stress, and happiness. Again, only some of these fall within the scope of traditional environmental health sciences, so the two fields are highly complementary.
  - Environmental psychology offers valuable insights into promoting attitudes and behaviors that are health promoting and environmentally friendly.

# Environmental Psychology and Toxicology



- Both focus on the influence of physical environment on human health and well-being
  - Minamata bay's methylmercury contamination by Chisso Corp. caused bioaccumulation of methylmercury in fish and shellfish, which resulted in mercury poisoning among people with neurological syndrome (Minamata disease)

(cited from Frumkin, Table 9.1)	Toxicology	Environmental Psychology
Ecological perspective	Direct relations	Broader, ecological context
Outcomes of interest	Singular focus, typically physiological	Broader focus, including mental health, social interaction, stress
Health promotion	Pathogenesis	Pathogenesis and salutogenesis
Exposure	Singular effects, ambient environmental exposure	Synergic effects, built environment, movement between settings
Humans as dynamic organisms	Biological effects on passive organisms	<b>Coping strategies used by humans</b>
Direct/indirect effects	Predominantly direct effects, few indirect path models or consideration of moderators	Predominantly indirect effects, consideration of moderator models

- Prolonged exposure to excessive noise (90 dB for 8 hrs or 105 dB for 1 hr) causes NITTS → NIPTS → **sensorineural hearing loss**.  
<https://www.mountsinai.org/health-library/symptoms/sensorineural-deafness>  
<https://doi.org/10.1097%2FMAO.0000000000001071>

# Field definition of environmental psychology

- Assuming that a dynamic and reciprocal relationship exists between individual and groups and the environment where they live
- Sociophysical contexts affect the behavior and health: eg. the kind of dwelling, social and physical aspects of **neighborhood (social capital)**.
  - "Sociophysical environment" means interdependent social and physical dimensions of settings jointly influencing an individual's psychological and physical well-being
- "Environment and behavior studies (EBS)" is alternative term.
- Direct/Indirect effects should be considered

# Neighborhood – basis of social capital



- Functions of both real and virtual neighborhood

- Affiliation
- Identity
- Social support
- Community
- Information
- Daily life
- Recreation



Neighborhood cooperates to prepare Christmas in Solomon Islands



Autumnal festival in Nagano

- Problems

- Conflict of real/virtual
- Stimulation overload
- Attentional fatigue
- Digital divide



(cited from:  
<https://www.realtor.com/advice/move/what-does-neighborhood-mean-anyway/> )

# Social Capital

## Among socioeconomic factors...

micro (individual, family): income, education, etc.

meso: social capital ( ~ social integration), etc.

macro (population): population density, income inequality (measured as Gini coefficient) etc.

## Social capital: focused as a multi-level factor

Example: confiding relationships with neighbors, social network, reciprocity

Umbrella term: Social cohesion, social support, social integration and/or participation, among other social determinants of health (Almedom AM, 2005).

# Findings related to social capital

Durkheim E: “Depression and suicide are linked to the weakening of social bonds” (1897) based on the macro-level observation, “The lowest rates of suicide occurred in societies with the highest degrees of social integration”. (In: Kawachi I, Kennedy BP “The health of nations”, The New Press, 2002, pp.122)

Spending time with our loved ones as well as being engaged in social activities are among the surest ways to prolong life and enhance the QOL (House JS, et al., 1988: cited in *ibid.*).

Social isolated (network size measured by MSSSI  $\leq 3$ ) CAD patients are at elevated risk for mortality (Brummet BH, et al., 2001), where MSSSI is the abbreviation of Mannheim Social Support Interview and the network size is the total number of distinct individuals who are listed either of the following 6 types: (1) like to talk and do things with, (2) invited during last 4 weeks, (3) can borrow things from and ask favors of, (4) help them make a very important personal decision, (5) could talk with and who would understand if very close friend or relative was extremely ill or died, (6) would talk to, encourage, make them feel better about themselves when everything goes wrong and they feel down and discouraged and even doubt their own worth.

# Definitions of “social capital” summarized in Islam MK et al. 2006.

Bourdieu P (1980) defined social capital as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition.”

Coleman JS (1990) “consist of some aspect of social structure and they facilitate certain actions of individuals who are within the structure”

Putnam RD et al. (1993) “refers to features of social organization, such as trust, norms and networks that can improve the efficiency of society by facilitating coordinated actions”

Portes A (1998) “refers to the capacity of individuals to command scarce resources by virtue of their membership in networks or broader social structure”

Four (partly overlapping) main theoretical ingredients: [1] social trust/reciprocity, [2] collective efficacy, [3] participation in voluntary organizations, [4] social integration for mutual benefit.

# Biological background



- Social capital reduces psychological stress, subsequently strengthen immune system which keeps the individual healthy (the concept of psychosomatic medicine)
- Cohen S, et al. (1997): Healthy volunteers were more susceptible to experimental rhinovirus infection when they have less social relationships (social relationships were measured by the cumulative number of individuals who are categorized in one of 12 types of social relationships and speak with the subject at least once within 2 weeks)



# The way of social constructs influencing physical health (Cohen S, 2004)

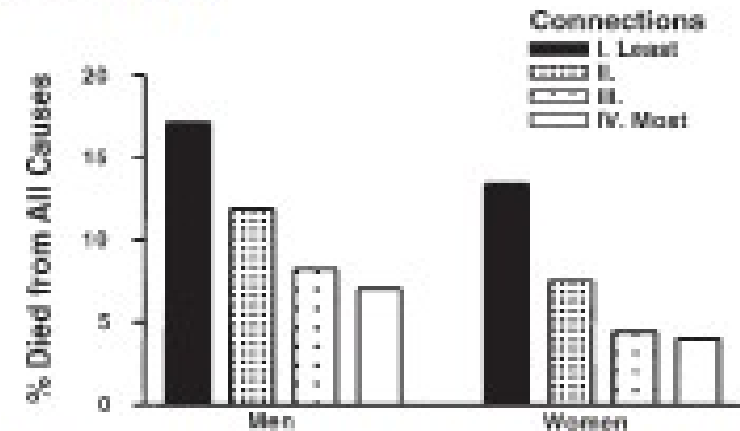


Social support [stress buffering]:  
eliminates or reduces effects of stressful experiences by promoting less threatening interpretations of adverse events and effective coping strategies

Social integration / Social capital [independent of stress]: promotes positive psychological states that include health-promoting physiological responses.

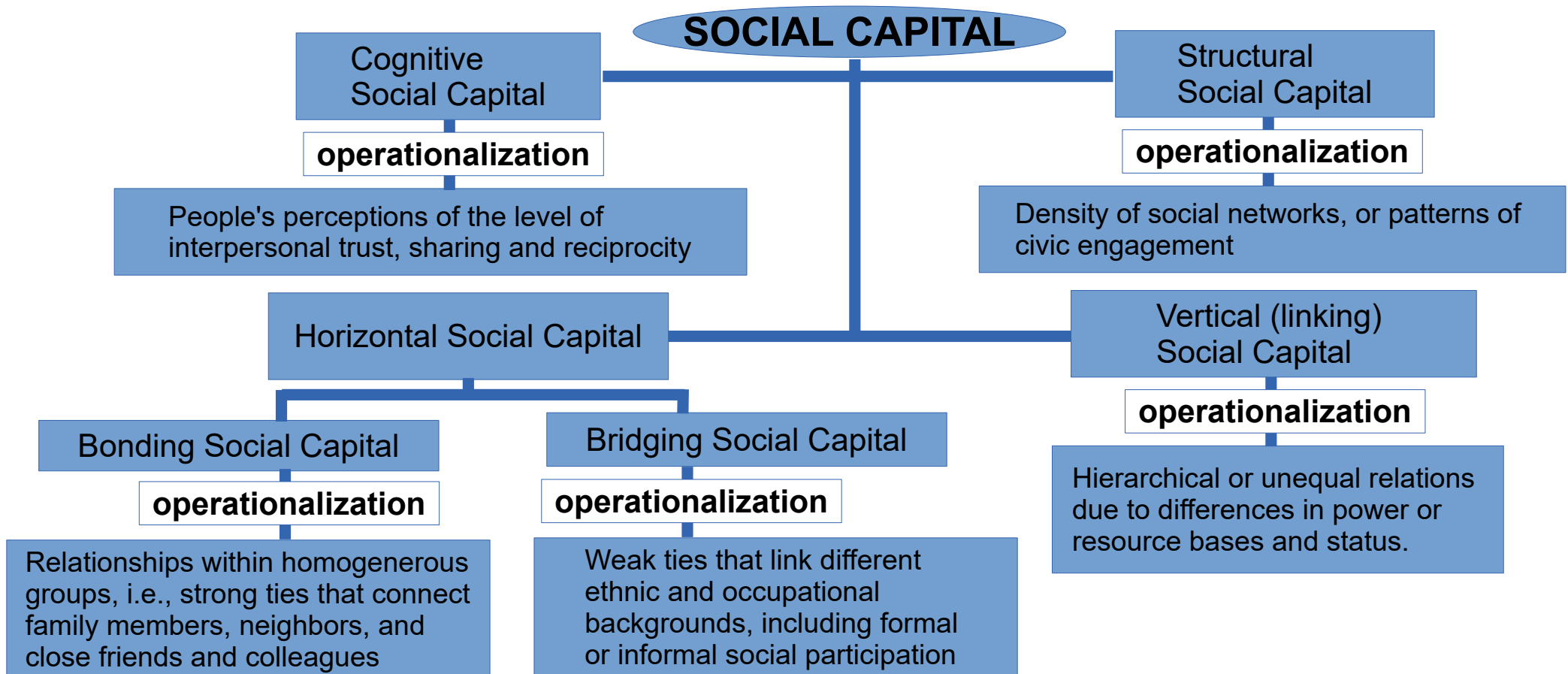
Negative interactions [relationships as a source of stress]: elicits psychological stress and in turn behavior and physiological concomitants that increase risk for disease.

**Figure 4**  
*Greater Social Integration Is Associated With Lower Rates of Mortality*



Note. From "Social Networks, Host Resistance, and Mortality: A Nine-Year Follow-Up Study of Alameda County Residents," by L. F. Berkman and L. Syme, 1979, *American Journal of Epidemiology*, 109, p. 190. Copyright 1979 by Oxford University Press. Adapted with permission.

# Framework for social capital study



Source: Fig.1, Islam MK et al., 2006.

# Components of “social capital” (in Islam MK et al., 2006)



**Cognitive:** norms, values, attitudes, beliefs (i.e., perceptions of the level of interpersonal trust, sharing, and reciprocity)

**Structural:** externally observable aspects of social organization (ex. density of social networks, patterns of civic engagement)

**Horizontal:** ties existing among individuals or groups of equals or near-equals / “bonding” within homogeneous, “bridging” in heterogeneous groups.

**Vertical (Linking):** stemming from hierarchical or unequal relations due to differences in power or resource bases and status.

# Measurement scales for social capitals (Almedom AM, 2005)

Informal social control (ISC)

Social cohesion and trust scales (SC&T)

Neighborhood social capital scale (NSC)

Kinship social support (KSS)

Fear of calamity scale (FOC)

Adapted social cohesion and trust scale (A-SCAT)

Interviews with youth, teachers and parents;

Psychological sense of community (PSOC)

Puttnam's community social capital benchmark survey

# Examples of questions

Lochner KA, et al. (2003): 3 indicators

Resident's perceptions of reciprocity: The proportion of residents in each Neighborhood Cluster (NC) answering strongly agree/agree to the question that “people around here are willing to help their neighbors”

Resident's perceptions of trust: The proportion of residents in each NC answering strongly agree/agree to the question that “people in this neighborhood can be trusted”

Associational membership: variety of voluntary associations, incl. religious organizations, neighborhood associations, business or civic groups, neighborhood ethnic or nationality clubs, local/political organizations.

# Personal On-Offline Social Capital Brief Scale (Menardo et al, 2022)

<https://doi.org/10.1371/journal.pone.0272454.s001>



The individual is asked to read each question and check the box that best represents their answer on a **5-point Likert scale (A few/None-A lot/All)**.

**1. Number of people in the individual's social network for each of the following three categories**

- 1). Friends
- 2). Work colleagues/fellow students
- 3). Online contacts (i.e., persons met and with whom interact only online)

**2. Number of people in each of the following three categories who the individual can trust**

- 1). Friends
- 2). Work colleagues/fellow students
- 3). Online contacts (i.e., persons met and with whom interact only online)

**3. Number of people in each of the following three categories who will definitely support the individual upon their request**

- 1). Friends
- 2). People in the neighborhood
- 3). Online contacts (i.e., persons met and with whom interact only online)

**4. Number of people in all the following categories – individual's friends, work colleagues/fellow students, people in the neighborhood, online contacts, and family members, relatives, fellow citizens or childhood friends/old classmates – who possess the following assets/resources**

- 1). Broad connections with others
- 2). High reputation/influence

**5. Number of the following two types of associations/groups in the individual's community**

- 1). Community service associations/groups (for example: groups, including youth organizations offering caregiving, assistance, shelter, soup kitchen, nursing home, environmental protection, trade union representation, cooperative associations, men's groups, women's groups, community committee/groups, local tourism promotion groups, student organizations)
- 2). Cultural associations/groups including those having only online activities (for example: theatre or dance groups, music bands, choirs or orchestras, arts and crafts groups, traditional folk groups, promotional associations for cultural events, senior citizens' study programs, youth-oriented cultural associations, Facebook/online discussion groups)

**6. Number of each of the two types of associations/groups in the individual's community that represent their rights and interests**

- 1). Community service associations/groups (for example: groups, including youth organizations offering caregiving, assistance, shelter, soup kitchen, nursing home, environmental protection, trade union representation, cooperative associations, men's groups, women's groups, community committee/groups, local tourism promotion groups, student organizations)
- 2). Cultural associations/groups including having only online activities (for example: theatre or dance groups, music bands, choirs or orchestras, arts and crafts groups, traditional folk groups, promotional associations for cultural events, senior citizens' study programs, youth-oriented cultural associations, Facebook/online discussion groups)

**7. Number of each of the two types of associations/groups in the individual's community that will support them upon their request?**

- 1). Community service associations/groups (for example: groups, including youth organizations offering caregiving, assistance, shelter, soup kitchen, nursing home, environmental protection, trade union representation, cooperative associations, men's groups, women's groups, community committee/groups, local tourism promotion groups, student organizations)
- 2). Religious or political associations/groups

**8. Number of associations/groups in the individual's community of the following categories– community service, cultural, religious, political, recreational, leisure, and economic and professional associations/groups (e.g., Chamber of Commerce) – that possess the following assets/resources**

- 1). Broad social connections
- 2). Extensive social influence

# Literatures cited for social capital



Berkman LF, Kawachi I: *Social Epidemiology*. Oxford Univ. Press, 2000.

Kawachi I, Kennedy BP: *The health of nations*. The New Press, 2002.

Cohen S: Social relationships and health. *American Psychologist*, 59: 676-684, 2004.

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Islam MK, : Social capital and health: Does egalitarianism matter? A literature review. *International Journal for Equity in Health*, 5(3), 2006.

Almedon AM: Social capital and mental health: An interdisciplinary review of primary evidence. *Social Science and Medicine*, 61: 943-964, 2005.

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Lochner KA, Kawachi I, Brennan RT, Buka SL: Social capital and neighborhood mortality rates in Chicago. *Social Science and Medicine*, 56: 1797-1805, 2003.

Institute of Social Capital > Measurement of Social Capital <https://www.socialcapitalresearch.com/category/measurement/>

Chen X et al.: Personal social capital scale: An instrument for health and behavioral research. *Health Education Research*, 24(2): 306-17, 2009. <https://doi.org/10.1093/her/cyn020>

Menardo E et al.: Adaptation of the personal social capital brief scale for the measurement of the offline and online social capital in Italy. *PLoS ONE*, 2022. <https://doi.org/10.1371/journal.pone.0272454>

# Typical approaches of environmental psychology

- Concerned with the behavioral, emotional, and health outcomes of people's transactions with everyday environments
- Naturalistic field studies, emphasizing multidisciplinary perspective (incl. psychology, environmental design, geography, sociology, **human ecology**, natural resource management, government, public health)
- Behavior and health outcomes in relation to objective and subjective meanings
- User-oriented studies
- Events naturally occur, conditions may change during the course of the events
- Holistic and longitudinal approach  
→ **Sharing the focus with human ecology!!**  
**(Only the nominal difference?)**



# Five underlying processes of environmental psychology (1) Physical layout



- Rearranging furniture → certain seating configurations facilitate social interaction (sociopetal), others impede it (sociofugal – eg, straight rows of seating) In church or library, designer uses sociofugal setting, but in cafes or meeting rooms, sociopetal setting is favorable.
- Social capital: community cohesion, informal social control, neighborhood interaction → supports physical and psychological well-being and buffers some of the adverse effects of risks
- Proxemics: the study of how people use space to communicate nonverbally
- Personal space: the area or bubble around our body to maintain between ourselves and others → Hall ET (1966) "The hidden dimension", Garden City: NY, Doubleday.  
[https://www.academia.edu/43785083/The\\_Hidden\\_Dimension\\_Edward\\_Hall](https://www.academia.edu/43785083/The_Hidden_Dimension_Edward_Hall)
  - Closely related with "social distance", which depends on cultural norm. In Asian culture, personal space is wider than Western culture, and thus natural social distance seems wider than Western culture. This difference may affect the difference of COVID-19 spread in Asia and in Europe/USA.
- Defensible space – Crime prevention through environmental design – Layout of interior and exterior of the complex contributes to resident's lack of territoriality (sense of spatial ownership and its nonverbal expression)
  - (cf) Broken window hypothesis: Once a place is slightly degraded, people will regard litter and disrepair as the norm and will further degrade the area
  - Principles: Enhance a sense of territoriality, Use environmental design elements to create a continuum of spaces from public to semipublic to semiprivate to private, Limit the scale of buildings to 3-5 floors, Increase visual surveillance, Foster an ambience of caring

# Five underlying processes of environmental psychology (2) Stress and coping

- Stress: Occurring when environmental demands exceed personal coping resources, transactional process between person and environment.
- Within body, stress response includes hypothalamic-pituitary-adrenal (HPA) axis, elevated sympathetic nervous system activity, behavioral response (anxiety, perceived distress, diminished ability to sustain task performance at high level)
- Examples of environmental stress
  - Crowding → Difficulty to complete complex tasks, Difficulty to maintain positive social relationships
  - Noise exposure → Lower auditory discrimination → Lower reading acquisition
  - Housing in bad neighborhood conditions



**Figure 9.1** Long Waits and Crowded Buses at a School in Singapore

Source: Tan, 2012.

## Measuring stress

- \* bio-monitoring of salivary amylase, cortisol, chromoglanin-A, etc.
- \* heart rate variability
- \* questionnaire

## Measuring stress-coping

- \* questionnaire

# Five underlying processes of environmental psychology (3) Diet and physical activity



- Obesity pandemic is related with dietary change and physical inactivity
- Child care outdoor learning environments
  - Behavior settings: Physical and social contexts where behavior occurs
  - Affordances: Possible uses or functions that the arrangement of physical features in the environment conveys to the user
- Commuting environment and physical activity – Active transport (walking or biking) contributes increased activity
- Neighborhood food environment
  - Presence of supermarkets increases intake of fruits and vegetables
- School cafeteria as food environments

**Table 9.2** Examples of Convenience, Attractiveness, and Normativeness Applied to a School Cafeteria

Convenience	Improve the convenience of fruits and vegetables: <ul style="list-style-type: none"> <li>• Provide a “healthy convenience line,” with only submarine sandwiches and healthy sides.</li> <li>• Locate fruit next to cash register.</li> <li>• Provide salad in see-through takeout containers.</li> <li>• Place juice boxes near ice cream.</li> </ul>
Attractiveness	Improve the attractiveness of fruits and vegetables: <ul style="list-style-type: none"> <li>• Post lunch menu with color photos of fruits and vegetables served.</li> <li>• Label vegetables with descriptive names.</li> <li>• Display fruit in nice bowls or on tiered stands.</li> </ul>
Normativeness	Make the selection of fruits and vegetables seem <b>normative</b> : <ul style="list-style-type: none"> <li>• Use verbal prompts from cafeteria staff: “Would you like to try...?”; “No veggie? How about...?”; “You can have another side...how about a piece of fruit?”</li> <li>• Use visual prompts: “Last chance for fruit” displayed next to fruit basket at cash register.</li> </ul>

# Five underlying processes of environmental psychology (4) Pro-environment behavior

- Growing concerns about finite natural resources, environmental degradation, impact of climate change on human health → Interest in how to encourage people to engage in pro-environment behaviors
- Various behaviors can help to alleviate environmental problems
- Strategies to induce pro-environment behavior
  - Changing personal and social norms
  - Altering environmental cues or on the nature of reinforcements (reward and punishment)
- No one strategy is singularly effective



**Figure 9.4** A Waste Setup That Provides a Physical Cue to Encourage Recycling

*Source:* UW Recycling, University of Washington, n.d.

# Five underlying processes of environmental psychology (5) Light and color



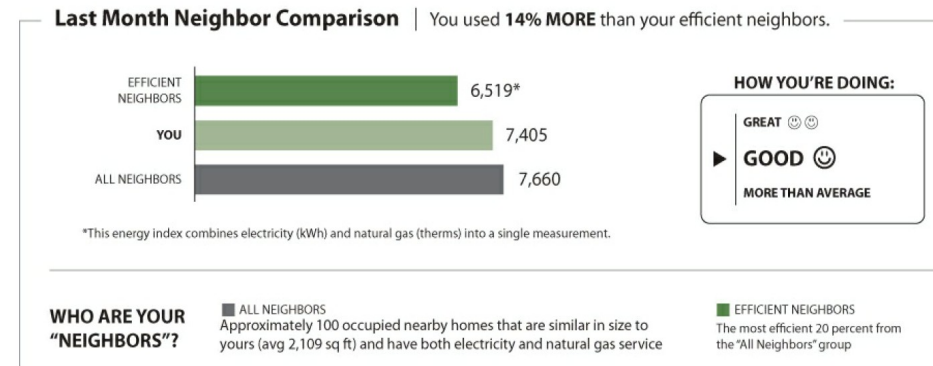
- Aesthetic preference
  - People universally prefer natural light, most people dislike fluorescent light
  - For color, preferences of people vary more, but with some evidence of preference for the blue-green
  - For facial color, people universally prefer redder skin hues (probably looks healthy)
  - For object color, blue attracts attention, but cross-culturally diversified
- Health and behavior
  - Light affects comfort, health, well-being
    - Eye strain results from fluorescent lights' flickering at a slow rate, glare is a reliable cause of physical discomfort
    - Text legibility is a function of luminance (brightness), contrast, font size and the age of the viewer
    - Insufficient daylight causes feelings of negative affect, low energy, anxiety, worry: Seasonal affective disorder (SAD)
  - The effects of colors are less known
    - Red increases brain activity
    - Blue facilitates performance on tasks requiring cognitive flexibility
    - For colorblind people, some kinds of color combination are difficult to distinguish. Thus, Color Universal Design (CUD) is proposed ([https://www2.cudo.jp/wp/?page\\_id=1936](https://www2.cudo.jp/wp/?page_id=1936)), which is developed in Japan (See, <https://jfly.uni-koeln.de/color/> for additional information).

# Possible interventions by environmental psychology

- Environmental psychology reduces crime: Creation of mini-neighborhoods in Five Oaks
- Environmental psychology reduces infections in hospitals: Design and hospital hand washing
- Environmental psychology saves energy



**Figure 9.5** The Five Oaks Neighborhood Following the Defensible Space Intervention  
 Source: Newman, 1999–2009.



**Figure 9.7** A Utility Bill Employing Social Norms to Encourage Energy Conservation

Source: Xcel Energy, 2015.



**Figure 9.6** Location of Hand Cleaner Dispenser in Patient Room: In Line of Sight (left) and Inside the Door (right)

Source: Left-hand photo appears courtesy of D. J. Birnbach et al., used with permission. Right-hand photo is from Munro, 2013.

# Related issues



- Universal design and barrier-free design
  - Important research topic in ergonomics
  - Fail-safe / Fool-proof consider the human nature of unintentionally making mistakes
  - It considers human diversity
- "Affordance" concept by Gibson JJ (1979) *The ecological approach to visual perception*. Houghton, Mifflin and Company.
  - Defined as "The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill"
  - Related with cognitive ability
  - Scarantino A (2003) "Affordance explained" *Philosophy of Sciences*, 70: 949-61. <https://www.journals.uchicago.edu/doi/full/10.1086/377380>
  - Heft H (1989). Affordances and the body: An intentional analysis of Gibson's ecological approach to visual perception. *Journal for the Theory of Social Behaviour*, 19: 1-30. <https://doi.org/10.1111/j.1468-5914.1989.tb00133.x>

# Levels of environmental analysis in sociophysical context



- **Elemental:** natural scents and natural objects (eg, water, air, soil)
- **Individual:** an individual's (1) body and physical, perceptual and cognitive abilities, (2) intellectual abilities, personal beliefs, values, attitudes, emotions, memories and experiences (eg, clothing choices, eating choices)
- **Stimuli:** recognizable features of an environment that cause a personal perception or physical and/or psychological reaction (eg, natural sounds like bird songs, natural surfaces such as wood or rock, natural colors and textures, views of nature through windows)
- **Situation:** sequences of individual or group activities and events occurring at a particular time and place (eg, outdoor meetings, meals, entertainment, gardening)
- **Settings:** socially structured and geographically bounded locations where certain kinds of activities and events regularly recur (eg, college classroom, recreation)
- **Life domain:** spheres of a person's life that encompass multiple situations and settings; occupations or location (eg. home, workplace, school, ...)
- **Societal:** overarching systems of beliefs and values, social and cultural norms, and social, political, and economic institutions that integrate life domains for large groups of people (eg, natural preserves, wilderness areas)



# Four different "world views" (Altman and Rogoff, 1987)

- **Trait** worldview tries to understand and predict the enduring, consistent features of physical settings and people as individual factors
- **Interactional** worldview posits stable relationships among traits and proposes basic "laws" that describe these relationships
- **Organismic** worldview tries to understand larger, more complete, more complex aggregates of factors, acknowledging that these factors may change or evolve over time
- **Transactional** worldview proposes that the factors that affect behavioral phenomena are part of a constant, dynamic, reciprocal milieu

# Hurricane "Katrina" example



- Three parts of the event
    - awareness and preparation
    - immediate response ~ focusing on the use of common setting features as "affordances" (possibilities for action that are latent in an environment)
    - aftermath
  - Environmental psychology's comprehensive approach
    - sense of place
    - place attachment
    - contextual transformation (sudden and dramatic context changes, resulting in fundamental behavior modification)
- \* Please consider any other example you are familiar with.

# Three principles of contextual analysis



- 1. The relationship between environment and health is influenced by interdependencies among immediate situations, immediate settings, and more remote environmental conditions
- 2. The different environments in which an individual participants exert a cumulative, synergistic effect on his or her health
- 3. Health is the result of an interaction among the objective features of the environments in which individuals participate, individual's perceptions of those features, and individuals' personal attributes

# Behavioral impacts of displacement due to climate change



- Global: Massive population dislocation
- National: Changes to and disruption in food production and distribution
- Regional: Increased cardiovascular and respiratory disease
- Community: Functional disruption leading to scarcity of necessary resources (portable water, electricity, gas, sanitation), damage to and inaccessibility of health care facilities
- Neighborhood: Inability of neighborhood to recover, neighborhood decay, disruption of social networks
- Residential (family): Family separation, conflict, deprivation, long-term negative economic impact, educational disruption
- Individual: Dramatic increase in environmental (psychological) stress, malnutrition, loss of income, poverty, inadequate medical care