Residence in the Social Ecology of Stress and Restoration

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We relate residence to health within a social ecological model of stress and restoration. As an isolated setting and in relation to other everyday settings, we discuss the residence in terms of demands, coping resources and responses, and opportunities for restoration. Our model indicates how processes operating above the household level can affect health by modifying the quantity, quality, and distribution of demands, resources, and restoration opportunities within and across the settings of everyday life, including the residence. We illustrate some of these social ecological dynamics with the case of home-based telework. Concluding, we discuss the utility of the model for environmental interventions intended to alleviate health-threatening chronic stress.

How does residence relate to health? Answers to this question reflect on the underlying conceptions. A conception of health that emphasizes physical, mental, and social well-being rather than the absence of disease and infirmity (World Health Organization, 1946) allows for a broader range of outcomes that we might link with residence. The same holds when we conceive of residence as more than the locational, physical, or economic aspects of a person’s housing or neighborhood.
(the facts of the residence). When we also take into account the activities which that person centers in his or her housing and neighborhood (the acts of residence; Hartig & Lawrence, this issue; cf. Hiscock, Macintyre, Kearns, & Ellaway, this issue; Kemeny, 1992), then we of course have more ways in which to associate residence with health.

Valid associations between residential and health variables imply processes that lead from residence to health and/or from health to residence. In this article we consider how residence relates to health by focusing on such processes, rather than on specific associations that they may engender. Given the number and variety of potential associations allowed by broad conceptions of residence and health, we would seem to have a bewildering tangle of processes to consider. Yet a model of how residence relates to health can build on an understanding of how a few general processes—stress, coping, and restoration—together subsume a variety of behavioral, psychological, and physiological processes that figure in diverse health outcomes, for ill or good.

We adopt a social ecological perspective in relating residence to health via stress, coping, and restoration. Researchers working from a social ecological perspective chart the exchange between people and environment across levels of analysis and over time (e.g., Catalano, 1979; Stokols, 1992). In applying this perspective here, we consider the facts and acts of residence as integral to the spatial, temporal, physical, and social arrangements that people make to manage change in themselves and their environments. People make or come into such arrangements not only as individuals, but also together with others, as in households, communities, and societies.

In the first of the following sections we set out some fundamentals of stress, coping, restoration, and their relation to health. Building on these, in the second section we sketch a social ecological model of stress and restoration, elaborating on basic assumptions concerning the spatial and temporal distribution of stress-evoking demands, coping resources and responses, and opportunities for restoration. In the third section, we discuss residence as a crucial setting in the ecology of stress and restoration for individuals and households, acknowledging in this the importance of social roles. In the fourth section, we use the case of telework to illustrate how processes operating above the level of individuals and households can modify demands, coping resources and responses, and restoration opportunities within and across the settings of everyday life, including the residence. In the final section, we discuss the model’s practical utility.

**Stress, Coping, Restoration, and Health**

Most readers will recognize the following fundamentals of stress, coping, and their relation to health. They will find the discussion of restoration a less-familiar though—we trust—helpful complement. In covering these conceptual
basics here, we make no pretense of exhaustiveness; we intend only to provide sufficient underpinnings for the assumptions of our ecological model and the ensuing discussion of stress, coping, and restoration in relation to residence.

**Stress**

We view stress as a process of responding to an imbalance between demands and resources available for meeting those demands (Appley & Trumbull, 1986). Whether an imbalance exists depends on appraisal of those demands and resources (Lazarus & Folkman, 1984). Although we usually observe stress reactions in individuals, and we may observe stressors in the sociophysical environment, the stress process lies in the transaction between person and environment.

Individuals face environmental demands of several broad types (Evans & Cohen, 1987). Some, such as daily hassles (Kanner, Coyne, Schaefer, & Lazarus, 1981), ambient stressors (Campbell, 1983), and role stressors (Eckenrode & Gore, 1990), may be encountered frequently, often at particular times and/or places, and for widely varying durations. Others, such as major life events, may occur rarely, but can retain potency across places and over extended durations. Whether particular demands arise rarely or all too commonly, in connection with a particular spatiotemporal location or not, people do not necessarily appraise and cope with them one by one. Rather, people frequently deal with multiple demands, which may have other than additive effects in eliciting stress (Lepore & Evans, 1996).

**Coping Resources and Responses**

To meet these potentially many and varied demands, individuals can normally draw on a variety of resources. These include good health and ample energy; positive beliefs and confidence that things will work out as well as possible (Antonovsky, 1979); competencies in gathering information, solving problems, and getting along with others (Lazarus & Folkman, 1984); emotional, informational, and tangible support from family, friends, and others (Cohen & Wills, 1985); and money and the goods and services it can buy.

The given context or situation influences choices among coping responses (Aldwin, 1994; Holahan, Moos, & Schaefer, 1996). One crucial determinant of the choice is the possibility for acting on the conditions eliciting stress. If the person has the possibility to take action to reduce the stressor exposure, then that person will more likely do so (instrumental, approach, or problem-focused coping). If action on a stressor is not possible, then the person may try to change the way he or she thinks or feels about the situation (emotional, avoidant, or emotion-focused coping). Yet control is not just an objective matter of whether any one person
can do anything to change an exposure. It is also a matter of whether a person believes that he or she has the competence needed to change the exposure or wants to exercise control. Thus, control has to do with both the person and the stressor (e.g., Shapiro, Schwartz, & Astin, 1996).

Restoration

Restoration involves the recovery of functional resources or capabilities diminished in efforts to meet demands. We may observe restorative processes in individuals, dyads, or larger groups, with a view to personal as well as social resources and functional capabilities. Although we may emphasize restoration here as the negation of stress, restoration is not limited to recovery from efforts to meet demands perceived as excessive. A potential for restoration is created whenever people mobilize adaptive resources that can be depleted, whether those resources are physical, psychological, or social. Different forms of restoration may proceed in tandem, some requiring more time, some less (e.g., Haynes, Gannon, Orimoto, O’Brien, & Brandt, 1991).

What does restoration require? Take sleep as a basic form of restorative activity, one through which people renew physical energy and a capacity to remain attentive, among other things. Although people may exercise some control over the onset, duration, and periodicity of their sleep, during each 24-hour light–dark cycle an evolved circadian timing system will initiate physiological changes that prepare them for a hard-to-resist period of quiescence (Lavie, 1996). Beyond those environmental conditions considered appropriate in terms of human evolutionary adaptedness, as darkness is for sleep, we can think of how well the immediate environment supports the activity, as with having a comfortable place to lie down, and whether sufficient time is available, as for passage through the several phases of sleep. As stress impedes restoration, stressors such as community noise need mitigation lest they disturb sleep (e.g., Carter, 1996). Insomnia frequently involves emotionally charged intrusive thoughts, worries, and an inability to turn off one’s mind (Espie, 2002); freedom from such internal conditions should also promote restorative sleep. Finally, for someone who sleeps in proximity to another person, the quality of sleep may depend on that other’s sleep behaviors (e.g., snoring).

As for restoration during waking hours, different accounts converge on two requirements, one permitting, the other promoting. First, the person is out of harm’s way and distanced from demands. This permits restoration. Second, the person becomes engaged by pleasing aspects of the environment or other positive distractions. This promotes restoration. For example, attention restoration theory (Kaplan, 1995) holds that we can replenish a capacity for directing attention in situations that involve psychological distance from aspects of one’s routines (being away) and effortless attention drawn by objects in the environment or engaged in the

**Stress, Coping, and Restoration Figure in Diverse Health Outcomes**

We indicated at the outset that stress, coping, and restoration can figure in associations between diverse residential and health variables. Chronic stress in particular will have negative impacts on health, more so than short-lived stress reactions to transient demands (e.g., Lepore, 1997). Research has described neuroendocrine, immune, cardiovascular, and musculoskeletal pathways through which chronic stress generates a multiplicity of physical outcomes (Melin & Lundberg, 1997; Steptoe, 1997). For example, studies have linked chronic stress with such disparate outcomes as upper respiratory infections (Cohen, Doyle, & Skoner, 1999), very low birth weight (Catalano, Hansen, & Hartig, 1999), and upper back pain (Lundberg et al., 1999).

Research has also described pathways that involve behaviors, such as smoking (e.g., Parrott, 1999) and alcohol consumption (e.g., Sayette, 1999), that appear to have some emotionally palliative effect in the face of demands, but which can put a person at greater risk for negative health consequences, not to mention exacerbate stress. In serving emotional coping, such behaviors contrast with instrumental coping behaviors that resolve demands generating stress. Instrumental coping involves the exercise of control, which research has linked with stress-related health outcomes in a variety of circumstances (e.g., Karasek & Theorell, 1990; Syme, 1990). Still, emotional coping behaviors like social withdrawal may enable restoration, so that a person can renew the resources needed to cope instrumentally (cf. Repetti, 1992).

Ultimately, stress has negative health effects when coping does not enable sufficient restoration (cf. McEwen, 1998). In coping, then, people must ensure opportunities for restoration. Yet many people choose to forego restoration in their efforts to cope with everyday demands, particularly related to work. For example, Heslop and colleagues (2002) found self-reported stress inversely associated with sleep duration. They found, also, that men and women who appeared to habitually sleep less than 7 hours each night had a greater risk of death from all causes during a 25-year follow-up than those who had reported sleeping between 7 and 8 hours.

Conceivably, many people who prioritize work demands over sleep also miss opportunities for restoration during waking hours. Research on the health consequences of foregoing waking restoration per se must face the challenge of disentangling beneficial effects of passive forms of leisure from those of physical activity and exercise (e.g., Lee, Paffenberger, & Hennekens, 1997; Scully, Kremer, Meade, Graham, & Dudgeon, 1998), which may include increased resistance to stress (e.g., Scully et al., 1998; Steptoe, Kimbell, & Basford, 1998).
The Social Ecology of Stress and Restoration

Stress-eliciting demands, coping resources and response options, restoration opportunities—these do not occur randomly, but to a substantial degree within a spatiotemporal pattern. In articulating a social ecological model of stress and restoration, we attend to what that pattern involves and how it can change. Attention to this pattern can aid evaluations of environmental interventions aimed at reducing chronic stress. It might also help in identifying measures that supplement those directed at one or another of the locations within it (e.g., the workplace).

We constitute our model here in terms of three assumptions. These situate stress arousal, coping responses, and restoration within the day-to-day flow of people’s activities and in turn within processes operating above the level of individuals and households.

Stress–Restoration Cycles

First, we assume that people cycle through stress arousal and restoration processes. Stress–restoration cycles involve departure from and return to some condition of adaptation. Terms such as “allostasis” (McEwen, 1998; Sterling & Eyer, 1988) and “homeostasis” (Cannon, 1932) have been used to describe this condition of adaptation with respect to physiology. The departure that occurs with the mobilization of physiological and other adaptive resources potentiates restoration. The magnitude and duration of such departures depend on the characteristics of the demand or demands (e.g., controllability; Johansson et al., 1978) and the person (e.g., repressive coping style; Weinberger, 1990). The speed and completeness of restoration depend on characteristics of the person, the demand (e.g., degree to which it arouses anger; see Linden, Earle, Gerin, & Christenfeld, 1997; controllability; see Frankenhaeuser & Johansson, 1986), and strategies for restoration, including entry into an environment with positive restorative value (e.g., presence of positive distractions). Given incomplete restoration and/or frequent stress reactions, the point of departure can shift toward a condition of relatively unsustainable or problematic adaptation (McEwen, 1998; Sterling & Eyer, 1988).

Activity Cycles

Second, we assume that stress–restoration cycles are regulated by activity cycles, or regular patterns of activities performed within allocated periods of time. We emphasize daily and weekly activity cycles here. They are both routinized and planful; people proceed with some understanding about how time will be divided among different activities (e.g., Axhausen & Gärling, 1992; Gärling, Kalén, Romanus, Selart, & Vilhelmson, 1998). Factors such as gender and age shape the
activity cycles that individuals follow (e.g., Chapin, 1974), in part through their influence on the set of social roles that an individual can assume (Pearlin, 1989).

Activity cycles incorporate multiple settings, or places “characterized by recurring patterns of behavior and by widely recognized place meanings (e.g., functional orientation)” (Stokols & Shumaker, 1981, pp. 483–484; see also Schoggen, 1989). Settings are arranged and furnished in particular ways to support particular activities by particular people who interact in fulfilling particular roles. They also have temporal features; people occupy them at particular times for particular durations (cf. Hägerstrand, 1970).

Among meanings or values that people attach to a setting, some may reflect on its stressfulness or capacity for supporting restoration. Thus, settings may come to have stress or restoration valences (cf. Lewin, 1951). Such valences presumably have some grounding in a setting’s characteristic array of social and physical environmental demands and opportunities for restoration: deadlines at the workplace, and coffee breaks with colleagues; a leaky dishwasher at home, and a chat with a friendly neighbor. At some times and for some people, demands may predominate in a given setting, while at other times and/or for other people, one or more restoration possibilities may become open.

To the extent they incorporate multiple settings, activity cycles involve movements between settings. Movements are relevant in at least four ways. First, some movements, notably the commute, constitute a type of setting, with attendant stress or restoration valences that vary with such factors as distance, hassle, and predictability of the commute conditions (e.g., Kluger, 1998; Stokols & Novaco, 1981). Second, movements can take on an affective character that reflects the relative affective values assigned to the point of departure and the destination. Anticipating an angry encounter at the destination can make the trip less enjoyable than anticipating recreation in a pleasant place. Leaving a favorite recreation setting while thinking of the next day’s tension-filled meetings might also draw one’s feelings down (cf. Hammitt, 1980). Third, individuals’ activity cycles converge and diverge with movement. When people converge—at homes, workplaces, pubs, playing fields, and so forth—their stress—restoration cycles also converge, and in ways that color their interpersonal exchanges (e.g., Repetti, 1994). Those exchanges may be influenced by the conditions each has left behind as well as the circumstances that each anticipates entering as their respective activity cycles proceed. Fourth, some settings become linked through an opposition of stress and restoration valences that is reinforced with alternations between them (e.g., city vs. country; Hartig, 1993).

Higher-Level Processes

Third, we assume that social, economic, technological, and other higher-level processes influence individuals’ activity cycles. They affect, among other things,
the times of the day, days of the week, and weeks of the year allocated for work and rest; the constellations of settings that individuals move among and the distances between them; the stressfulness and restorativeness of those settings; the frequency and character of the individuals’ movements among those settings; choices among transportation modes for moving among settings; the average level of demands faced across settings; and the stress and restoration values assigned to particular settings. This influence may be mediated by social roles, urban planning and environmental protection measures, political measures that affect the distribution of wealth, technological innovations, and so forth. It follows that, by influencing activity cycles, processes above the individual and household level influence stress–restoration cycles.

Residence in the Social Ecology of Stress and Restoration: Individual and Household Aspects

Having overviewed some fundamental aspects of stress, coping, restoration, and their temporal and spatial distribution, we turn now to situate residence within the social ecology of stress and restoration. In this, and in line with our use of the term “setting,” we see the residence constituted not only of housing, location, and neighborhood attributes (the facts of the residence), but also of the activities that people perform in and around their housing—daily routines, social interactions with neighbors, expressions of attachment, and so forth (the acts of residence).

In the following, we indicate some of the reasons why the residence can assume a crucial status within a person’s ecology of stress and restoration. We elaborate on four aspects of the residence in this regard. The first three involve, respectively, adaptational demands, coping resources and responses, and restoration possibilities. The fourth has to do with the location of the residence relative to other settings in the activity cycles of household members.

We mentioned earlier that factors such as gender and age shape an individual’s activity cycles through their influence on the set of roles that person can assume. Because the set of roles influences the activities carried out in and around the residence (and other settings within activity cycles), factors such as gender and age have a bearing on stress, coping, and restoration in relation to residence. To acknowledge the influence of such factors and the importance of social roles, we end this section by commenting on working mothers in dual-income families.

Adaptational Demands in Residence

Demands faced in the residence differ from those faced in other settings in quantitative and qualitative respects. Because demands can disallow or undermine restoration, in the following we implicitly give an account of possible constraints on restoration.
People ordinarily and routinely perform basic, obligatory personal and household activities in and around the residence, including cooking, eating, cleaning, laundry, care for others, repairs, grooming, and waste disposal (Robinson & Godbey, 1997). They may enjoy some of these activities, or they may only endure them because they simply must be done (see, e.g., Michelson & Tepperman, this issue). Whether an activity offers enjoyment or evokes stress, planning and executing it requires coordination with other activities, which itself constitutes a demand.

In conjunction with a person’s activities, the locational, physical, and social characteristics of the housing and/or its surroundings will influence the likelihood of frequent and severe daily hassles (e.g., troublesome neighbors, concerns about accidents, fears of confrontation); the intensity and duration of exposure to ambient stressors such as air pollution and noise (e.g., Evans, Jacobs, Dooley, & Catalano, 1987); and the likelihood of experiencing catastrophes such as floods, earthquakes, and toxic accidents (e.g., Margai, 2001).

Some stressful events acquire or gain potency because of a link to the residence. Some catastrophic events damage physical, psychological, social, and economic resource values that people attach to their homes. Thus, adaptational demands increase suddenly and dramatically just as important coping resources are undermined (cf. Brown & Perkins, 1992). Similarly, some events—a child leaving home, the death of one’s spouse—involves household members that one may depend on for support. Life events like relocation, separation, and divorce may involve changes both in the location of the residence and in the people associated with it.

Stokols’ (1976) distinction between primary and secondary environments also speaks to the added potency that stressors may acquire in the residential context. A person “spends much of his time, relates to others on a personal basis, and engages in a wide range of personally important activities” in primary environments, such as residential settings (p. 73). Secondary environments “are those in which one’s encounters with others are relatively transitory, anonymous, and inconsequential” (p. 73). Stokols proposed that people satisfy more of their basic needs (e.g., physical comfort, protection-dependency, love and affection, dominance) in primary environments. His analysis, which focuses on crowding, also hypothesizes stronger stress responses in primary environments. The loss of control that he views as a precipitant of crowding stress should typically not occur in a primary environment and can negatively affect the fulfillment of a greater variety of needs.

Coping Resources and Responses in Residence

We can also distinguish the residence from other everyday settings in terms of coping resources and responses. As just indicated, many people will hold relatively high control expectations with regard to residence. Possibilities for exercising control can enable instrumental coping measures directed at the residence itself. These can include, for example, modifications to reduce stressor exposures and/or
improve restoration possibilities (e.g., adding insulation to reduce sound intrusions) and community activism to prevent or reduce stressor exposures and/or preserve or improve restoration possibilities (e.g., Brown & Masterson-Allen, 1994).

If measures directed at the present residence do not suffice, then a household may have the option to relocate. Certainly, involuntary relocation can evoke deep and lasting strain (e.g., Brown & Perkins, 1992). Yet an inability to relocate can also impair well-being, as when residents cannot escape stressors, such as crowding, possibly brought on by changes in the household (e.g., Stokols & Shumaker, 1982; Wolpert, 1966). When searching for a new residence, people commonly base their evaluation of alternatives in part on attributes of the housing and neighborhood in and of themselves, aside from matters of relative location (cf. Lindberg, Hartig, Garvill, & Gärling, 1992; Gärling & Friman, 2002). Some of those attributes refer to ambient stressors and daily hassles. Are there enough rooms? Enough places for parking? What are the noise sources? In weighing such attributes when seeking a better alternative than the present one, people reveal not only an attempt to cope with present demands, but also an attempt to prevent future stressor exposures. Similarly, in evaluating alternatives, people will commonly consider some attributes that refer to future restoration possibilities. Do the windows afford pleasing views? Is it possible to have a garden?

The set of alternative residential locations depends on the material and personal resources available to the household. For some people, notably those who live in poverty, all available alternatives may involve significant exposures to stressors or hazards (e.g., Evans & Kantrowitz, 2002), and they may lack high-quality possibilities for restoration. Still, many households spend large proportions of their income on even poor-quality housing (Saegert & Evans, this issue). Clearly, we can view simply maintaining access to housing as a fundamental form of coping. Relocation into homelessness translates into increased exposure to environmental conditions that may directly and indirectly affect health in a variety of ways (e.g., Matte & Jacobs, 2000).

In a basic sense, “homelessness” means not having housing. Yet a common distinction drawn between “housing” as a physical construction and “home” as a social and psychological construct (Tognoli, 1987) encourages a deeper look when considering what the home means in coping beyond the provision of shelter. Meanings commonly attached to the home include security, control, permanence and continuity, relatedness, and refuge from the outside world (e.g., Després, 1991; Somerville, 1997), all of which have a plausible connection to coping resources or responses. For example, the “relatedness” meaning of the home seems to reflect the fact that many people center a substantial proportion of their significant relationships (and so their social resources) in the residence. To take another example, consider Saegert’s (1985) observation that the notion of home as refuge or haven implies a desire to escape from the outside world. In this, the home serves
emotional coping; it exists as a place to retreat to from things that one can’t do much about for the time being. Thus, various acts of residence confer upon housing coping values that become captured in the notion of “home.”

Restoration Opportunities in Residence

Of all settings organized in regular activity cycles, the residence normally provides the most significant opportunities for regular restoration. Sleep is an essential restorative activity, one sanctioned in the residence and for which the residence is usually best furnished relative to other settings. For U.S. census purposes, the definition of residence has since 1790 rested in part on the notion that a person sleeps there most of the time (U.S. Census Bureau, 2002).

People also typically spend the largest part of their leisure time in their residence (e.g., Glyptis & Chambers, 1982), and they frequently equip it to support leisure activities. However, while leisure activities in and around the residence may aid restoration (cf. Kelly & Kelly, 1994), those activities appear to vary considerably in restorativeness. It appears that the greatest part of leisure time spent at home is spent watching television, an activity that may yield relatively little enjoyment in comparison to other passive leisure activities (e.g., reading, conversing) or to more active leisure (Robinson & Godbey, 1997). However, the choice of an activity like watching TV may reflect on constraints imposed on other activities at a given time. For example, for people who return home from work in the evening, a lack of light (and with it increased concern for personal safety) may hinder outdoor activities in the neighborhood (e.g., Keane, 1998).

For one person, participation in and the restorative quality of a leisure activity may hinge on the activities of others in the residence. Repetti’s (1989) study of end-of-workday interactions between male air traffic controllers (ATCs) and their wives illustrates this point. Repetti found that support from the wives moderated the relationship between the husbands’ workload during the day and their social behavior at home; when support was high, the ATCs were more likely to withdraw after a heavy workday (see also Bolger, DeLongis, Kessler, & Wethington, 1989). Repetti viewed the ATCs’ withdrawal as an effective short-term strategy for reducing arousal; the ATCs could more freely engage in activities that drew their attention from the day’s work (see also Repetti, 1992; cf. Kaplan, 1995; Driver & Knopf, 1976; Saegert, 1985).

Some residential activities may bear on both future and present restoration. Household members and neighbors can improve their own and others’ future restoration possibilities by modifying their homes and common spaces in their neighborhood (cf. Cooper Marcus & Sarkissian, 1986). Whether alone or together, participation in such activities (e.g., interior decorating, gardening) may itself yield restorative benefits. However, we should not ignore the risk that an activity
may, over time, shift from pleasant diversion into obligatory undertaking (see, for example, the discussion of lawn care in the USA by Jenkins, 1994).

Residential Location in Relation to Other Settings

The residence can also assume a crucial status in a person’s ecology of stress and restoration because of its spatial and temporal location relative to other settings organized in the given set of activity cycles (for that person alone or for the multi-person household to which that person belongs). In choosing among residential alternatives, people may have latitude to consider how they are located relative to other settings encompassed by the given set of activity cycles—workplaces, schools, shopping, and so on. Their choice will have implications for the frequency, duration, length, and character (e.g., stressfulness) of movements among settings and the manner in which the activity cycles of household members (if more than one) converge and diverge. As with the weighting of attributes of the residential alternatives in and of themselves (e.g., of the extent to which they involve stressor exposures), the weighting of relative location attributes can in favorable circumstances represent instrumental coping that is both reactive (i.e., the household moves away from some undesirable constellation of locations) and preventive (i.e., the household moves to a constellation of locations that imposes fewer demands and/or offers better restoration opportunities (cf. Golledge & Stimson, 1997; Wolpert, 1966).

Another aspect of the location decision reflects, also, on the crucial status of the residence. Households can ordinarily exercise greater control in locating the residence relative to other settings in activity cycles than they can in locating those settings at convenient distances from the residence. Many households will find it easier, for example, to move the residence closer to the workplace or schools than to move those settings closer to the residence.

Similarly, members of households may have more control at the residence relative to other settings with respect to modifying furnishings, the structure, and perhaps some features of the immediate surroundings to reduce stressor exposures and enhance restoration possibilities (here, though, we must acknowledge the distinction between homeowners and renters, and its relation to socioeconomic status; see Hiscock et al., this issue). Further, members of households may have (and, at least with respect to adults, are expected to have) better possibilities for arranging schedules so they conform with the scheduling dictates of other settings, thus managing various capability, coupling, and authority constraints (cf. Hägerstrand, 1970). In short, as a setting, the residence has physical, social, spatial, and temporal features relatively amenable to manipulation by household members. As such, it serves as a setting on which household members can concentrate efforts to balance or coordinate demands, resources, and restoration possibilities across settings within one or more activity cycles.
The Influence of Social Roles: The Case of Working Mothers in Dual-Income Families

Just how crucial residence becomes in a person’s ecology of stress and restoration depends to a significant degree on characteristics of that person. Gender, age, and other characteristics are determinants of the social roles that a person assumes. As those roles are manifest in activity cycles, they are key determinants of stress, coping, and restoration in relation to residence.

Social roles shape activity cycles in numerous ways (cf. Pearlin, 1989). They specify activities and settings. They specify with whom certain activities will be carried out, when, how frequently, and for how long. They shape a person’s expectations regarding, for example, control and responsibility regarding given activities and settings. They shape the constellation of settings encompassed in an activity cycle, as well as characteristics of the convergences with other people in those settings. And so on.

We can use the case of working mothers in dual-income families to illustrate some of the ways in which social roles can, through their influence on activity cycles, affect stress, coping, and restoration in relation to residence. Over the past several decades, in Sweden, the United States, and elsewhere, the proportion of married or otherwise partnered women who work outside the home while their children are still young has increased tremendously (e.g., Barnett & Hyde, 2001; Matthews & Rodin, 1989). Yet neither the mother’s role as primary caregiver to children nor the division of domestic labor in two-parent households has changed as quickly. Women still assume more responsibility for domestic work, including child care (e.g., Lundberg, 1996). This cultural lag (Michelson, 1988) has had a variety of consequences.

One notable consequence is a gender differential in total workload. As the number of children in a household increases, the combined burden of paid and unpaid work also increases, and more so for mothers than for their partners (e.g., Lundberg, Mårdberg, & Frankenhaeuser, 1994). Consider what this means in terms of activities within the residence. Time-use studies provide details of how the spatial and temporal distribution of domestic demands and restoration possibilities can differ between working mothers and fathers. Ahrentzen, Levine, and Michelson (1989) examined the time that adult members of Canadian households spent in the kitchen, bathroom(s), bedroom(s), and living room, alone or with other family members, over a 24-hour period during the workweek. Patterns of activity and co-occupancy within rooms of the house varied with gender in those couples with both members employed full-time. During their time at home, full-time employed (FTE) married women in the sample spent twice as much time alone in the kitchen and more time with children in bedrooms and bathrooms than did the FTE married men. Looking to the combination of location and activity, the men spent more time in passive leisure in the living room than did the women. For their part, the women
spent more time working in the kitchen and more time caring for children in the bedrooms and bathrooms.

In line with this result, Rydenstam’s (1992) analyses of Swedish time-budget data revealed that women’s leisure time was divided into shorter periods than men’s, and their leisure activity episodes were more frequently broken off to do work in the home. As with Ahrentzen et al.’s (1989) results, these findings suggest that women in dual-income families with children at home have their attempts at restoration in the home frustrated more frequently than do their partners, just as they take on a greater burden of domestic work.

A relatively large burden of domestic work also affects the way in which some working mothers approach the convergence in the home after the workday. While men may prepare to unwind when heading home after work, some women gear up for the next “shift” (Hochschild, 1989). For example, Frankenhamer and colleagues (1989) reported that female managers in their Swedish sample did not unwind like the male managers or clerical workers of both genders; their systolic blood pressure after work was like that measured during work, and they secreted more norepinephrine, signaling preparation to deal with further demands (see also Lundberg & Frankenhamer, 1999). They also experienced greater conflict between demands from their paid jobs and demands from other duties.

Such conflicts exemplify the reach that role stressors can have across different settings. They often stem from constraints that role-related activities in one setting impose on activities related to some other role in some other setting (see, e.g., Eckenrode & Gore, 1990). Moreover, in that roles imply interactions with particular people in particular settings at particular times, the constraints that cause conflicts for one person can originate in an activity cycle of someone else. A working mother, for example, may have to leave work to pick up a child at day care by closing time, even though an important meeting at her workplace has not yet ended. In general, we would find it difficult to separate the daily activity cycle of a working mother in a dual-income family from the activity cycles of her young children and partner. Depending on its location relative to other major settings in the set of their activity cycles (her workplace, his workplace, their day care or schools, etc.), the residence can assume decisive importance for a working mother’s experience of role conflicts, and for her ecology of stress and restoration in general.

**Residence in the Social Ecology of Stress and Restoration:**
**The Interplay of Household and Higher-Order Processes**

To this point we have focused on individual and household aspects of residence, indicating a variety of reasons why that setting can attain crucial importance in a person’s ecology of stress and restoration. Those reasons involve distinctions between the residence and other settings in terms of, for example, demands from
obligatory activities; control expectations; access to social support; suitability for social withdrawal; opportunities for sleep and leisure; and possibilities for improving relative locations within a constellation of settings. We have also discussed how the social roles that different members of a household assume will help determine just how crucial the residence becomes as a setting in their respective ecologies of stress and restoration. Social roles weight the residence in importance by, for example, specifying activities performed, time spent, and social contacts made there, as well as relations between it and other settings.

What we have not done to this point is directly examine how social, economic, cultural, and other higher-order processes can affect residence through their influence on activity cycles. Mediated, for example, by social roles or technological innovations, such processes can modify the constellation of settings encompassed by the activity cycles of the one or more individuals comprising a household, as well as the quantity, quality, and distribution of demands, coping resources and responses, and restoration opportunities within and across those settings.

Although we have not yet directly examined the influence of processes operating above the household level, we have touched upon that influence. In discussing working mothers in dual-income families, we noted that a cultural lag between change in women’s work roles and change in their domestic roles is manifest in a gender difference in total workload in some households. However, rather than attending to how higher-order processes contributed to that cultural lag in the first place by opening up work roles for women, we simply took it as a given, and focused instead on what the greater total workload of working mothers means in terms of their stress, coping, and restoration in relation to residence.

In the following, we shift our perspective to how the operation of higher-order processes can translate into significant changes in activity cycles. Rather than focusing on how a given set of circumstances is expressed in activity cycles, we consider what happens when new means to manage those circumstances emerge from higher-order processes. In this, we do not give a detailed account of the processes generating those means. Instead, we look at how the adoption or rejection of those means reflects concerns about stress, coping, and restoration in existing versus potential activity cycles. We also consider how adoption of those means affects stress, coping, and restoration in the residence, and in turn feeds back into higher-order processes.

We use the case of telework as a window into these phenomena. In some countries, the shift from industrial production, increasing suburbanization, and the tightening congestion of urban transportation systems have over the past few decades generated both new allowances and new incentives for moving work from dedicated workplaces into residences. Over the same period, advances in information and communication technologies (ICT) have provided some workers with the means to perform a significant fraction of their paid work in locations outside the employer’s main facilities. These technological innovations thus give
some individuals and households the means to redistribute work and nonwork activities across times and settings within one or more activity cycles.

We define “telework” as ICT-supported paid work in the residence, a satellite office, or a neighborhood center. Some researchers equate telework with telecommuting (for a review, see Ellison, 1999). Others assign a narrower meaning to telecommuting, specifying the substitution of ICT-supported remote work for commuting (see Shin, Sheng, & Higa, 2000). Still others further specify that the work be performed during normal office hours (e.g., Bélanger, 1999). In referring to telework rather than telecommuting, we explicitly acknowledge motivations aside from reduced commuting, as well as paid ICT-supported remote work that occurs both within and outside of normal office hours. We do, however, draw on studies of telecommuting narrowly defined, including some by transportation researchers and geographers whose interest in activity spaces matches our interest in activity cycles and the settings they encompass.

In line with transportation research on telecommuting, we expect that a worker’s decision to telework rests in part on possibilities for reducing demands, maintaining or improving access to coping resources, and/or maintaining or improving opportunities for restoration. In deciding, the worker considers the relative locations of the residence, other available workplaces, other settings in the activity cycle, and, possibly, settings in the activity cycles of others, such as a spouse and/or children. In view of the potentially greater salience and/or potency of stressors encountered in the residence and the relative importance of the home in restoration, we also expect that some people will resist the entry of paid work into the home. Furthermore, we recognize that those who do choose to telework risk not only new demands at home, but also quantitatively and qualitatively diminished opportunities for restoration. As an adaptive strategy, then, telework itself may require further adaptations, and not only on the individual and household levels. We take each of these points in turn in the following.

Deciding to Telework

A worker’s decision to telecommute has been framed by Mokhtarian and Salomon (1994) as an outcome of the interplay of facilitators, constraints, and drives. Facilitators include employer support and independence of job tasks from location. Conversely, external and internal constraints in their model include a lack of employer support, the location dependency of job tasks, and needs for social and/or professional interactions at the workplace. For a variety of reasons, then, not all workers have the conditions in place to make telework a viable option.

Among drives Mokhtarian and Salomon (1994) include the desire to get more work done, to reduce stress associated with the social environment at the main workplace, to gain greater control over the physical work environment, to satisfy personal orientations toward independence or withdrawal from other people, to
have more time with the family or more flexibility in managing family duties (and so reduce role conflicts), to have more flexibility in arranging time so that one can more easily accommodate preferred leisure activities, and to avoid a long or stressful or expensive commute. Clearly, then, reducing stress and facilitating restoration figure in their model (see also Salomon & Mokhtarian, 1997).

As the reasons for teleworking vary across people, so also does the representation of the home and household and issues of stress and restoration in the decision process. For example, Mokhtarian, Bagley, and Salomon (1998) report variations in drives across gender and household type (i.e., presence of children). Among the San Diego municipal employees in their sample, women with children gave substantially higher importance ratings to family benefits (e.g., taking care of a dependent, spending time with family) as motivations for telecommuting than did men with children, whereas women and men alike gave relatively low importance ratings to family benefits when no children were present in the household. These results speak to how working mothers use telework to resolve role conflicts like those discussed earlier.

Travel diary data provide evidence of just how consideration of the relative locations of the residence, workplace, and other settings in activity cycles might figure in the decision to telework. The State of California Telecommuting Pilot Project involved waves of data collection before and after a group of state employees began to telecommute (JALA Associates, cited in Saxena & Mokhtarian, 1997). In each data collection wave the telecommuters completed a travel diary on three successive days, at least one of which was a telecommuting day. Using data on all trips aside from those between residence and work, Saxena and Mokhtarian (1997) studied the impact of telecommuting on the telecommuters’ activity spaces, or the set of locations traveled to in day-to-day activities. They found that trips clustered more tightly around the residence on telecommuting days; trip ends were closer to the residence and more evenly distributed around it (rather than being disproportionately oriented toward the work location, indicating activities performed between home and work). These results inform previously published project results (summarized by Saxena & Mokhtarian, 1997) showing a reduction in trips due to telecommuting. They illustrate how a decision to telework might aim to reduce everyday demands not only by reducing commuting, but also by reducing distances traversed on other household trips.

Resistance to Telework

Again, though, not all people have the option to telework. And of those who do have the option, not all decide to do so. We can now look back on enthusiastic but unfulfilled projections of widespread teleworking as a substitute for commuting (Salomon, 1998). In Sweden, relatively few gainfully employed people regularly work at a location other than the ordinary workplace during regularly scheduled
working hours; surveys give an estimate of 8\% or less for the years 1997, 1998, and 1999 (Vilhelmson & Thulin, 2001). Of the 8\% who reported working remotely, not all made use of computers and Internet links in their work, despite a high degree of access to and experience with computers in the population.

Why the gap between projections and reality? Among other factors, Salomon (1998) points to a lack of sensitivity to the social complexities surrounding the adoption of telework. Modeling telework adoption as an alternative to commuting requires specifying the person or people whose behavior is being modeled. Adoption of telework is, as we alluded to earlier, the joint decision of at least two actors, the employer and employee. We have already mentioned lack of employer support as a constraint on telework adoption. Other constraints may be imposed by the employee and/or other household members, with a view to resisting the entry of paid work practices into the home and in doing so preserving coping and restoration functions. Among constraints on teleworking in their model, Mokhtarian and Salomon (1994) list some related to the unsuitability of the residence as a workplace (e.g., lack of appropriate space, conflicts with household members), as well as a loss of benefits from the commute. For example, the commute may help some people accomplish the transition between work and family roles (see Ellison, 1999).

Telework as a Stimulus to Further Adaptations on Multiple Levels

Although telework may afford individuals and households new means to address everyday demands, in practice it imposes demands of its own. Certainly, some people appreciate the added scheduling flexibility and closer integration of work and home life, as seen, for example, in the use of household tasks as restorative interludes in concentration-intensive work (Hyttner, 1995). Yet others are troubled by blurred work–home boundaries (e.g., Hill, Hawkins, & Miller, 1996). With work close at hand, the home may lose value as a place of refuge (Ahrentzen, 1989).

This blurring of boundaries between work and family can be seen in the amount of time spent working and its disposition over the day (Allvin et al., 1998). Analyses of time-use data from Sweden and Canada (Michelson, 2000) are informative here, even though they focus on home-based work in general, and not only telework. A key finding is that those who worked from home intensively (≥ 4 hr/day) spent more time on paid work than those who did not work from home so intensively, a result that contrasts with the notion that teleworking frees up time by eliminating commutes. Moreover, the home-based workers had a greater number of distinct work episodes than those not working at home on the day of the survey. An evening work episode also distinguished the home-based workers.

Such a work pattern may engender chronic stress arousal. In a recent study reported by Lundberg and Lindfors (2002), the psychophysiological arousal of teleworkers was studied during office work, during telework at home, and on a
work-free day at home. Physiological arousal was higher during telework and office work than during relaxation in the home. Yet telework was associated with lower cardiovascular arousal than work at the office, perhaps because the workers could choose to perform fewer and different work tasks than they would in the office. However, an elevated level of epinephrine secretion was observed among males in the evening after teleworking as compared to the evening after work at the office. Daily diary entries suggest that the elevation resulted from continued work after normal working hours.

Individuals and households make various temporal, spatial, and interpersonal adaptations to address the problem of blurred work–family boundaries and otherwise improve the viability of telework. Needs for a suitable place and uninterrupted time to carry out the work underlie the adaptations that households make. These involve, for example, physical changes or arrangements in the residence, scheduling, the restriction of the teleworker’s accessibility to other household members, and modification of interpersonal behavior norms (e.g., Ahrentzen, 1989, 1990; see also Gurstein, 1991). A separate room appears to have particular value. For example, in a study of Swedish teleworkers, those who could use a separate room for work at home perceived less spatial overlap between work and nonwork life and evaluated that overlap more positively than those who used only part of a room for their telework (Hartig, Kylin, & Johansson, 2002).

The adaptations required by telework extend beyond the household level. As an example of feedback from households to employers regarding difficulties with telework, another alternative has emerged: telecommuting centers located closer to the residence than to the employer’s main facilities. Preference for home-based versus center-based commuting appears to reflect on how telework is combined with family life; some evidence suggests that teleworkers with very young children (less than 2 years old) will prefer working at home, while those with somewhat older children will prefer the opportunity afforded by a center for ready escape from (and return to) household distractions (Stanek & Mokhtarian, 1998).

We might project other ways in which increasing rates of home-based teleworking would feed back into high-order processes. Consider the impacts on housing markets and the provision of housing (e.g., Handy & Mokhtarian, 1995). For example, people who currently telework or who intend to telework may, in planning a residential relocation or remodel, prioritize spatial and technological requirements for work at home. The marketing of new and remodeled homes in Sweden already calls attention to provisions made for high-speed Internet access, though not necessarily for home-based telework in particular.

To take another example, increasing rates of home-based teleworking could translate into greater spatial dispersion of residences (e.g., Helling & Mokhtarian, 2001). Swedish families with young children have expressed a greater preference for housing at a greater distance from the city center than other life cycle groups (Lindberg et al., 1992), and telework may support such a preference. Although
such dispersion might satisfy people’s desires to escape urban stressors or threats to the safety of their children, the commutes to work they would then make, though fewer, would involve longer distances, as would other household trips.

In closing this illustration of the interplay between household and higher-order processes, we note that telework adoption has a paradoxical connection with the cultural lag that generates role conflicts for working mothers in dual-income families. Those women may telework to resolve work-family conflicts, as suggested by Mokhtarian et al.’s (1998) results. Yet, in doing so, they may help perpetuate a gendered division of labor in which women continue to shoulder primary responsibility for child care and domestic work (Ellison, 1999; Michelson, 2000).

**Practical Implications**

At the outset of this article, we described the facts and acts of residence as integral to the arrangements that people make to manage change in themselves and their environments. As our discussion of telework illustrates, those adaptive arrangements can undergo revision with new opportunities for ameliorating existing demands and reducing their negative consequences, not least chronic stress. Such opportunities can be created or capitalized upon by individuals and households, or by others acting on their behalf, such as employers, planners, and politicians.

We see at least four ways in which our social ecological model can help guide a search for opportunities for ameliorating chronic stress. First, it encourages a search that goes beyond new means for reducing particular demands themselves to include new means for increasing access to coping resources or better promoting restoration (which in turn means increased availability of coping resources; Hartig, 2001). Second, it directs attention to settings other than that in which the person encounters the demands of focal concern. So, for example, a person may seek to offset the impact of intractable demands in one setting by enhancing the restorativeness of another setting. Third, the model encourages a search for ways to intervene on activity cycles considered as a whole. For example, this could involve changing the constellation of settings and/or the relative spatial and temporal locations of those settings, as we saw in the case of telework. It could also involve suspending some subset of demanding daily activities, as with an annual vacation taken away from home (cf. Westman & Eden, 1997). Fourth, the model makes clear that opportunities for ameliorating chronic stress can be sought in the ways just mentioned not only on the individual or household level, but also on higher spatial and social or organizational levels (cf. Stokols, 1996). As a historic example, Frederick Law Olmsted (1870) viewed parks and tree-lined promenades as planning provisions that placed opportunities for restorative interludes in the paths of harried city dwellers. Similarly, vacation legislation in Sweden and other Western European countries exemplifies a population intervention that allows many
people an extended respite from demanding daily routines (Statens Offentliga Utredningar, 1988; Westman & Eden, 1997).

In conjunction with its utility for identifying intervention alternatives, our social ecological model can aid in evaluating stress interventions that involve the residence. For one, it encourages comparisons of the effectiveness of measures outside the residence (e.g., to reduce demands in the workplace) and measures within the residence (e.g., to enhance its restorative quality). For another, it encourages questions about potential negative consequences of interventions. In the case of telework, innovations in ICT opened up new possibilities for people to coordinate demands, resources, and restoration possibilities across settings within their activity cycles. Yet, for some people, telework has had the unanticipated effect of diminishing the value of the residence as a place for restoration. Such an effect may translate into greater mobility during leisure time (cf. Fuhrer, Kaiser, & Hartig, 1993). Anticipating negative effects on home life, other people have chosen to not telework, thereby also weakening the hopes of governmental entities who saw in telework a way to ease the load borne by transportation systems.

References


Stress and Restoration


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