Chapter 5
Restoration in Nature: Beyond the Conventional Narrative

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5.1 Introduction

Consider first a broad context for this work: Many people today express alarm at the loss of possibilities for experiencing nature. Their alarm reflects beliefs that the experiences they and their children have in nature contribute to their health. Yet, arguments based on such beliefs have often failed to stop the construction of housing, hospitals, streets, and other structures that serve wants and needs aside from contact with nature. Populations will continue to grow and concentrate in urban areas over the coming decades (United Nations, 2019), and this will drive further loss of possibilities for experiencing nature insofar as other wants and needs continue to receive higher priorities.[1]

As a counterweight to this trend, research has arguably made it more difficult to disregard arguments for protecting natural settings as public health resources. Many epidemiological studies have found more green space near an urban residence to be associated with societally significant outcomes like less psychological distress (Astell-Burt, Feng, & Kolt, 2013), better cognitive development (Dadvand et al., 2015), and lower risk of future psychiatric disorders (Engemann et al., 2019). Other studies have described similarly salutary values of living near and visiting seashores and other blue spaces (Wheeler, White, Stahl-Timmins, & Depledge, 2012; White et al., 2010, 2019; White, Alcock, Wheeler, & Depledge, 2013). Such findings encourage efforts to ensure ample possibilities for contact with nature while trying to satisfy other wants and needs (Coutts, 2016; Lee, Williams, Sargent, Williams, & Johnson, 2015; Lindal & Hartig, 2015). The epidemiological research thus supports an integrated approach to societal sustainability that addresses its psychological, social, and cultural aspects together with its ecological aspects (Griggs et al., 2013; United Nations, 2015).[2]

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Other research has shed light on the processes that could engender nature-health associations. In line with long-standing ideas in public health, early studies in environmental psychology (Kaplan, 1973; Ulrich, 1979), human geography (Appleton, 1975/1996), outdoor recreation (Driver & Knopf, 1976), and other fields helped to lay the foundations for understanding how nature experience can prove beneficial. Guided by the theories that subsequently coalesced, many experiments have shown that visits to parks and other seemingly natural settings can counter maladaptive rumination (Bratman, Hamilton, Hahn, Daily, & Gross, 2015), reduce anger and sadness (Bowler, Buyung-Ali, Knight, & Pullin, 2010), improve working memory and cognitive flexibility (Stevenson, Schilhab, & Bentsen, 2018), and produce other short-term benefits to a greater degree than ordinary outdoor built settings in an urban context. Such experimental evidence regarding the plausibility of causal mechanisms has encouraged the assumption that repeated contacts with nature cumulatively engender significant health benefits. That assumption motivates much of the research and practice in the area (cf. Hartig, 2007a).

In this chapter, I will build on traditions of inquiry within environmental psychology and allied disciplines to consider processes by which nature experience engenders health benefits. I start from a particular perspective on adaptation as a superordinate process joining people and the environment. This perspective focuses on one aspect of adaptation: the restoration of depleted adaptive resources. The restoration perspective is well represented in research on nature and health, and for good reason. Restoration has long stood out as an important theme in motives for visits to natural areas (Home, Hunziker, & Bauer, 2012; Knopf, 1983, 1987). In keeping with that motivational theme, forms of restoration are focal concerns for two seminal theories about psychological processes through which people benefit from nature experience (Kaplan & Kaplan, 1989; Ulrich, 1983). Ample evidence has affirmed that restoration constitutes a pathway from nature experience to health (Hartig, Mitchell, de Vries, & Frumkin, 2014; Health Council of the Netherlands, 2004). Accumulating evidence also points to ways in which expected and realized restoration work together with other pathways between nature and health, including physical activity (Mitchell, 2013; Pretty, Peacock, Sellens, & Griffin, 2005; Staats, Kieviet, & Hartig, 2003) and neighborhood social cohesion (Dzhambov, Hartig, Markevych, Tilov, & Dimitrova, 2018; Kuo, Sullivan, Coley, & Brunson, 1998). In brief, the restoration perspective has fundamental relevance for nature-and-health studies.

Yet, despite this fundamental relevance, much of the potential of the restoration perspective remains unrecognized. To help remedy this neglect, in this chapter I will indicate additional ways to draw from it as a source of insight for theory and empirical research. In the following, I first set out the basic premises of the restoration perspective and consider how it has come to have particular relevance for understanding the benefits of nature experience. I then consider research that has approached restoration as a set of processes through which nature experience can engender health benefits. In doing so, I focus on some of the main components of what has become a conventional theoretical narrative about restorative effects of nature experience, organized in a general framework for restorative environments

theory. Extending the general framework, I then put forward two additional theories. These call attention to the restoration of resources as held within closer relationships and as held collectively by members of a population. In closing, I consider ways to work with the general framework and further develop the narrative about nature, restoration, and health, with a view to implications for nature preservation efforts, urban planning, health promotion strategies, and ways of thinking about human–nature relations.

5.2 The Restoration Perspective: Basic Premises and Particular Relevance

The ability of individuals to successfully adapt in the face of environmental demands has long been a major concern in environmental psychology and allied disciplines. Grounded in evolutionary thought, this concern for behavior motivated by the goal of individual survival is central to those areas of research within what Saegert and Winkel (1990) refer to as the adaptive paradigm. Those research areas can be conveniently framed in terms of stress, coping, and restoration. They complement each other; they deal with necessarily related aspects of adaptation, but they differ in their focus. Research on stress has focused on the environmental demands that challenge adaptation and the physiological, psychological, and social consequences of efforts to face those demands (Evans & Cohen, 1987). Research on coping has focused on the physiological, psychological, and social resources people draw upon to meet environmental demands, and on the different strategies they apply when doing so (Lazarus & Folkman, 1984). Research on restoration has focused on processes by which people restore psychophysiological and cognitive resources that they have depleted while contending with demands, and on components of environmental experience that support the restoration of depleted resources (Kaplan & Kaplan, 1989; Ulrich, 1983).

Each of these three areas of inquiry builds on a distinctive set of theoretical and practical premises, and each set of premises constitutes a particular perspective on adaptation as a fundamental aspect of human–environment relations (cf. Hartig, 2001). The theoretical premise of the stress perspective is that when people face continuously heavy demands, adaptation can fail, as reflected in poor health (Cohen, Evans, Stokols, & Krantz, 1986; Evans, 1982). The practical premise then refers to ways to prevent that failure through interventions that reduce demands. In contrast, the theoretical premise of the coping perspective is that people can meet even heavy demands over long periods if they have sufficient physical, psychological, social, and material resources (Antonovsky, 1979; Lazarus & Folkman, 1984). The practical premise then refers to ways to help people more easily maintain adaptation by making resources more readily available to them or by helping them to make better use of those resources already available. In turn, the theoretical premise of the restoration perspective acknowledges that people can have ample protection from

unavoidable demands as well as ample coping resources, and yet still need periodic restoration, particularly insofar as the resources held by or between individuals commonly get depleted in the course of everyday activities (Hartig, 2004, 2017). The practical premise then refers to ways to enhance opportunities for people to restore depleted resources more easily, quickly, and completely. The different premises are summarized in Table 5.1 (cf. Hartig, 2008; Hartig, Bringslimark, & Patil, 2008; Von Lindern, Lymeus, & Hartig, 2017).

Human culture has deep roots in each of these three perspectives on adaptation, exemplified by the ways in which hominid apes organize their nest building activities to serve basic needs for sustenance, safety, sleep, social connection, and sanitation (James, 2010). These cultural roots have profound implications for the present discussion of restoration through nature experience; as part of human evolution, conceptions of "nature" and what is "natural" have evolved in relation to artificial features of the environment that resulted from efforts guided by one or more of the three perspectives (cf. Hartig & Evans, 1993). Across many millennia, people have taken myriad steps to protect themselves from environmental demands, to gain access to resources for coping, to better use available resources, to create new resources, and to preserve, create, and enhance opportunities for restoration. In doing so, they have developed increasingly complex technologies for housing, food production, sanitation, transportation, communication, recreation, health care, and so forth to serve their needs and wants. Those needs and wants have grown and complexified in tandem with growth in populations and the articulation of societies. In many societies, as more people could better satisfy their needs and wants in emerging urban contexts, and fewer stayed in rural contexts to secure food and materials for the population, much of what now gets viewed as "nature" came to be regarded less as the environmental settings in which to perform work and more as settings that support recreational and restorative activities (cf. Mercer, 1976). Within these long-running processes of population growth, socio-technical development, rural–urban migration, *et cetera*, popular conceptions of "nature" got shaped in opposition to conceptions of the "urban" that for more and more people encompassed conditions of everyday life that led them to need restoration, such as work in harsh settings and noise and crowding on busy streets (cf. Hartig, 1993).

With this coarse sketch, I do not mean to assert that such a conceptual opposition between the natural and the urban is somehow a complete description of actual circumstances, applicable to all areas identified as natural or urban across all scales

Table 5.1 Three complementary perspectives on adaptation as a superordinate process joining people and the environment

	Stress perspective	Coping perspective	Restoration perspective
Theoretical premise	Heavy demands can undermine adaptation	Readily available resources support adaptation	Adaptation requires periodic restoration
Practical premise	Interventions can eliminate or mitigate demands	Interventions can enhance the availability of resources	Interventions can enhance opportunities for restoration

and societal contexts. An urban area is after all situated within the natural environment considered on some scale, with sun above, sky around, soil below, water running through in various ways, and diverse non-human species going about their business, day and night. Moreover, humans in cities reproduce and perpetuate other natural processes as do other species in habitat they have selected and shaped.

Further, I do not mean to assert that a conceptual opposition of the natural and the urban maps perfectly onto experiences of restoration and stress. The natural environment continues to impose demands, some terrible, as with tornadoes and catastrophic earthquakes (that can reach into the largest urban areas), and some minor, as with irritating mosquitoes (that can disturb the peace found in an otherwise pleasant park). And for their part, towns and cities offer many possibilities for restorative experiences aside from those afforded by their green spaces, as in comfortable homes (Hartig, 2012), pleasant cafes (Staats, Jahncke, Herzog, & Hartig, 2016), and museums (Kaplan, Bardwell, & Slakter, 1993).

Rather, in sketching the evolution of this conceptual opposition of the natural and the urban, I want to shed light on reasons why the restoration perspective has come to have particular relevance for understanding salutary values attached to contemporary nature experience. Put simply, its relevance owes in large part to the probabilities of people having particular kinds of experiences in particular activities in particular settings at particular times. The "nature" of concern in such situations is not only some set of objectively measurable biological, physical, visual, or other attributes of the environment that might have effects on functioning and health understandable entirely in isolation from other aspects of the circumstances in which people live. Rather, the ways in which this "nature" figures in human functioning and health need consideration in light of the broader social ecology in which its various positively and negatively evaluated attributes contrast with those of other settings within and across which individuals, groups and populations have organized their activities and distribute their time (cf. Hartig, Johansson, & Kylin, 2003; Heft & Kyttä, 2006; von Lindern, 2015). The various settings in such a social ecological system are more or less likely to support particular activities and experiences, and they accordingly acquire meanings, individual and shared, that reflect on the activities and experiences they normally and predictably support. Differences in meanings emerge as people move among settings, in keeping with changing needs, imperatives, and goals. Patterns of movement and related meanings get reinforced and shaped, often intentionally, as through advertising for different recreational activities and the locations for them (e.g., Mercer, 1976). With the concentration of growing populations and their productive activity in urban areas, an increasingly prevalent pattern of movement involves leaving the built settings where the ordinary demands of life are situated for seemingly natural settings where people can gain distance from everyday tasks and worries, engage with positive aspects and affordances of the environment, and so satisfy needs for restoration. This pattern of movement can manifest on multiple spatial, temporal, and social scales, reflecting the restoration needs involved and the opportunities available, as with a solitary person walking in a near-home park after a trying day at work, or a couple spending a day at the beach after missing each other during the work week, or related families

regularly coming together from distant parts of a country to enjoy preferred activities in a national park during their annual summer vacations. As with meanings attached to "nature" and "urban" of themselves, labels and meanings get attached to the patterns of movement that link them and the time spent within them; witness expressions like "getting out of town for the weekend" and "going on vacation" (see Löfgren, 1999). Thus, as part of a sociocultural evolutionary process that has involved change in the likelihood of activities and experiences tied to particular settings and of movements between particular settings, conceptions of "nature" have increasingly become linked with restoration motives, memories, and meanings while conceptions of the "urban" have gotten grounded in the demands that increasing numbers of people face in their everyday lives.[3]

This account of the particular relevance of the restoration perspective for nature-and-health studies aligns the concerns of the adaptive paradigm with concerns of the two other research paradigms within which it is nested, as described by Saegert and Winkel (1990). Inquiry within the opportunity structure paradigm seeks to understand recurring patterns of behavior within and across settings that have spatio-physical, temporal, and social characteristics suited to programs of activities that serve the pursuit of particular needs and goals. Inquiry within the sociocultural paradigm addresses the individual as a social agent who can read, create, and contest meanings in the environment, and it approaches the challenge of survival "not as an individual concern [as in the adaptive paradigm], but as a problem for the social structure within which the individual is embedded, whether it be family, neighborhood, nation or even world society" (p. 457). Although Saegert and Winkel focus on environmental psychology in their account, they make clear that the three paradigms do not lie wholly within environmental psychology, but rather encompass areas of research activity that it shares with other disciplines, including anthropology, geography, gerontology, history, and sociology. Reaching across the different research paradigms and across disciplines, I assume that a person's or group's experience of some environmental feature or setting taken to be natural occurs within a particular historical, societal, and cultural context, as do the physiological, psychological, interpersonal, and social processes carried along in their experience and the various consequences generated by those processes, including cumulative health benefits. As knowledge of those processes and their consequences gets more widely disseminated, it shapes the expectations and behaviors of others in the same and subsequent generations, carrying the sociocultural evolutionary process further.[4]

5.3 Restorative Benefits of Nature Experience: The Conventional Theoretical Narrative

I have argued that the restoration perspective has particular relevance for understanding the salutary values of nature experience. This relevance increasingly gets "built in," as an emergent and still evolving conceptual distinction between built/urban and natural settings increasingly gets linked probabilistically with

experiences of depletion versus restoration, concomitant to the concentration of populations and productive activities in urban areas. For more and more people, "nature" has become an environmental setting or context into which they might move to restore resources after facing their ordinary demands in relatively built urban settings. However, although escape from mundane stressors in search of restoration has long been recognized as an important theme among motivations for visits to natural areas (e.g., Knopf, 1983, 1987; Mercer, 1976; Olmsted, 1870), the broader health implications of restoration through nature experience remained little studied until relatively recently.

A major impetus to intensified study came with the development and dissemination of two theories that proposed psychological mechanisms by which nature experience can engender restorative benefits: Stephen and Rachel Kaplan's attention restoration theory and Roger Ulrich's psycho-evolutionary theory. Their development can be traced through publications by their respective authors from the 1970s onward (e.g., Kaplan, 1973, 1978, 1983, 1995; Kaplan & Kaplan, 1982, 1989; Ulrich, 1977, 1979, 1981, 1983, 1993; Ulrich et al., 1991). Psycho-evolutionary theory conventionally gets referred to as stress recovery theory or stress reduction theory, and I will use the acronym SRT to reflect these naming conventions, which identify the restorative process itself, as with attention restoration theory (ART). Separately or together, SRT and ART inspired early true and quasi-experimental studies which found that outdoor environments and environmental imagery with prominent trees, vegetation, and other seemingly natural features appeared to better serve restoration than outdoor environments and environmental imagery dominated by buildings, streets, car traffic, and other urban features. Some of the benefits, like better proofreading performance, better inhibition of Necker Cube pattern reversals, and better serial recall were taken as evidence of attention restoration (e.g., Hartig, Mang, & Evans, 1991; Kuo & Sullivan, 2001; Tennessen & Cimprich, 1995). Other benefits, like reduced fear, anger, and systolic blood pressure were taken as evidence of stress recovery (Ulrich, 1979, 1981; Ulrich et al., 1991). Findings regarding the emergence and then dissipation or persistence of such effects during and after time in a natural setting reflected on the possibility that stress recovery and attention restoration could run together (Hartig, Evans, Jamner, Davis, & Gärling, 2003; cf. Ulrich et al., 1991). Such early evidence regarding the operation of plausible causal mechanisms provided support for the first large-scale epidemiological studies to uncover associations between the amount of residential green space and health outcomes (de Vries, Verheij, Groenewegen, & Spreeuwenberg, 2003; Maas, Verheij, Groenewegen, de Vries, & Spreeuwenberg, 2006; Mitchell & Popham, 2007, 2008). These studies could take their findings to reflect, at least in part, on cumulative benefits of repeated restorative experiences.

Aside from this background, I do not intend to say more here about the historical development of research on nature and health (see Hartig et al., 2011) or the now extensive epidemiological literature on health values of urban green space and other settings for contact with nature (for reviews, see e.g., Frumkin et al., 2017; Gascon et al., 2016; Kabisch, van den Bosch, & Lafortezza, 2017; Markevych et al., 2017; Rojas-Rueda, Nieuwenhuijsen, Gascon, Perez-Leon, & Mudu, 2019; for reviews of

reviews, see Hartig et al., 2014; van den Bosch & Ode Sang, 2017). Instead, I will discuss the narrative about restorative effects of nature experience built around ART and SRT. I first explain why I refer to it as the conventional narrative, and why it has many variants. I then organize some of its components in a general framework for restorative environments theory. This will help to indicate some of the ways in which nature-and-health studies and research on restorative environments can look beyond the conventional narrative to realize more of the potential of the restoration perspective.

5.3.1 Why Refer to a "Conventional Theoretical Narrative"?

To begin with, consider what I mean by "theoretical narrative" here. Scientists can represent "theory" in quite different ways. Some may present a theory as "a comprehensive explanation of some aspect of nature that is supported by a vast body of evidence" (Institute of Medicine, 2008, p. 11). As an example, "the theory of evolution is supported by so many observations and confirming experiments that scientists are confident that the basic components of the theory will not be overturned by new evidence" (p. 11).

This characterization would distinguish a scientific theory as a reliable account of the real world. Not incidentally, reference to "the theory of evolution" in the quotation above could therefore give the impression that scientists have settled on a single formulation; however, many scientists would quickly disavow that impression (as the authors of the quotation above do later in their text). Although scientists agree on the "basic components" of evolutionary theory, like the significance of natural selection, that body of theory encompasses numerous complexities and contrasting formulations concerned with, for example, the sensitivity of different types of biological selective mechanisms to environmental change (e.g., Catalano et al., 2012, 2018; Catalano & Bruckner, 2006; Catalano, Saxton, Gemmill, & Hartig, 2016; Catalano, Zilko, Saxton, & Bruckner, 2010) and related questions about the time needed for populations to adapt biologically to environmental change (for a popular account, see Zuk, 2013). For such reasons, some scientists prefer a definition of theory that differs from the kind of characterization above. Consider the definition offered by the sociologist Hannu Ruonavaara (2018) for a similarly large body of theory also of relevance here:

> *Social theory*: A discourse that consists of a set of linked (a) concepts and (b) propositions to be used for hypothetical (i) redescription, (ii) explanation, and (iii) interpretation of some set of phenomena, relations, and processes (p. 181; italics in original).[5]

Ruonavaara's definition situates the contents of a body of theory within an ongoing discourse or exchange with particular types of actions: redescription, explanation, and interpretation. It thus acknowledges that theory remains fluid and "unsettled" as the discourse continues. It remains open, for example, to influences from other areas of research, and to the influence of observations of change in the phenomena of

interest. Such change can follow with change in the surrounding sociocultural circumstances, for example, those which influence the ways in which people encounter, engage with, understand and value "nature."

Implicitly, this definition allows for the emergence of particular ways of telling about the contents of theory, that is, a narrative about theory that applies some logical structure in presenting its different components and links among them. Whether it focuses on a single formulation (a theory) or multiple contrasting formulations (theories) within a body of theory (e.g., restorative environments theory), the narrative may also include an account of some problem in need of solution. This provides a context for the phenomena of interest and helps to establish the value of theorizing about those phenomena. For example, at the start of this Chapter, I explained that alarm at the loss of possibilities for experiencing nature reflects beliefs that nature experience contributes to health, and that such beliefs have been affirmed by research on health benefits of contact with nature. Many readers will have found this context-setting problem-description familiar; similar ones appear in many other texts on nature and health.

Within restorative environments research, some studies appear to have taken explicit guidance from only one theory. Why then refer to a narrative built around both ART and SRT as "conventional"? I see several reasons to do so. For one, a "two theories" narrative appears in one form or another in many peer-reviewed publications about benefits of nature experience. For example, at the time of writing, two articles, cornerstones of the narrative, have more than 1400 citations each in scientific publications listed in the Web of Science database. With this, they are the first and second most cited articles published in the *Journal of Environmental Psychology* in its now 40-year history (Kaplan, 1995, and Ulrich et al., 1991, respectively). Importantly, where one of the articles gets cited, the other often also gets cited.[6] And here I refer to only two publications; people who engage with the nature-and-restoration topic can base a version of the narrative on more than one publication from the authors of ART and SRT and from others.

Also importantly, many and diverse people convey and shape the conventional narrative. It gets carried along not only by researchers but also by people with whom they might interact within the different communities in which they work and live. Joint representation of the two theories has become a standard feature of textbooks in environmental psychology in multiple languages (e.g., Bell, Green, Fisher, & Baum, 2001; Devlin, 2018; Gifford, 1997; Johansson & Küller, 2005; Steg, van den Berg, & de Groot, 2013). Books in English for an international professional audience (e.g., Cooper Marcus & Barnes, 1999; Coutts, 2016; Nilsson et al., 2011; WHO, 2016) also directly or indirectly invoke ART and SRT in explaining how nature experience can serve health. So too do books for a broader public (e.g., Gerlach-Spriggs, Kaufman, & Warner, 1998; Logan & Selhub, 2012; Louv, 2008; Ottosson & Ottosson, 2006), news articles and opinion pieces that get published on the internet, and communication through other media that have a global reach, as with the film *Natura* by Pascale d'Erm and Bernard Guerrini (2018).

5.3.2 Variations in the Conventional Narrative

What then *is* this conventional narrative? The scientific, professional, and popular literatures include numerous variants. Variations in the presentation of the two theories have occurred and will continue to occur for readily understandable reasons. For one, Ulrich and the Kaplans gave somewhat different accounts of SRT and ART over the years, presumably reflecting new insights and how they read the work of others, reacted to reviewer comments, responded to inputs from students and other colleagues, grappled with their own observations, and so on.[7]

Variations in the conventional narrative have also arisen from the different ways in which other authors have represented ART and SRT. In deciding on what to include in an account and how to include it, authors could have based their choices on a number of considerations. Some would reflect their purposes; simply telling about the outcomes of main concern to the theories requires less elaboration than providing sufficient background to understand the hypotheses they base on the theories and the methods they use to address those hypotheses. Other considerations would include the author's understanding of what Ulrich, the Kaplans, and/or others wrote or said about ART, SRT, and perhaps other theories, as well as their own experiences and structured observations and matters such as the assumed expertise of the intended audience and limits on the amount of text they could write.

Although I see good reasons for variations in the conventional narrative, I do not mean to suggest that any particular variant is acceptable. Some may reflect misunderstandings about the theories. Consider for example an extension of the narrative implied in a report published by the World Health Organization (WHO, 2016). This report gives brief accounts of SRT and ART in setting out restoration as one among other pathways by which urban green space can serve health. It also states that both theories are "based on the biophilia hypothesis, which postulates that humans have an innate need to affiliate with the natural environment within which they have evolved (Wilson, 1984)" (p. 4). Here the report stands in error. Putting aside whether E. O. Wilson's writing on biophilia could have provided a substantive basis for ART and SRT, I note that none of his work was cited in the early articulations of those theories, which were published before his initial essay on biophilia (e.g., Kaplan & Talbot, 1983; Ulrich, 1983). The literature indicates that the authors of ART and SRT had already drawn on other sources in making the evolutionary assumptions underlying their theories (see, for example, the references to work by Ardrey in Kaplan, 1972). To verify this point, I wrote to Rachel Kaplan and Roger Ulrich to ask how much influence Wilson's thinking around biophilia had on the work they did over the years. Both replied that it did not have the influence implied in the WHO report (respective personal communications on January 23 and 27, 2020).

I have used one tiny part of a report to illustrate a problematic elaboration of the conventional narrative that does not correspond to the actual development of the underlying theories. I do not mean to discount the value of the report as a whole. Moreover, I can see how the error could enter. Discussions of the restorative benefits of nature experience now often occur in conjunction with discussions of biophilia,

and the two lines of thought can appear related in several ways. These include similarities in their assumptions about the slow pace of human evolution through natural selection; treatment of what now gets distinguished as the natural environment as the setting of human biological evolution; concomitant treatment of the urban environment as poorly suited for human habitation; links between natural settings and positive experience; and shared concerns for protecting good habitat for non-human species as well as for humans. The erroneous attribution to Wilson's work may simply have followed from the repeated pairing of discussions of biophilia and restorative effects of nature experience, much like the repetition that has made the SRT-ART narrative a conventional one. All of this said, the fact remains: Wilson's thinking on biophilia did not provide the basis for theorizing about restorative effects of nature experience in SRT and ART. Discourse should select against that notion and select for factually correct elaborations on the origins of the two theories. Those who really want to weave biophilia-thinking into the narrative can instead describe how Ulrich's work influenced Wilson's thinking.[8] More generally, as the discourse continues, it can select for or against aspects of the theories as articulated by their authors, and also for or against specifications, clarifications, extensions, and other elaborations offered by others, for the theories, and for the encompassing narrative.

5.3.3 Components of the Conventional Narrative

Where does the conventional narrative stand now? Instead of just presenting another textual account of SRT and ART, I will set some of the main components of ART and SRT into a general framework that supports comparisons between them. This will do more to show ways to extend the narrative with new lines of inquiry and so illuminate the further potential of the restoration perspective as a source of insight on nature-health relations. I will not give detailed accounts of ART and SRT, nor will I evaluate the evidence regarding the validity of claims based on those theories. For those who do not have a variant of the conventional narrative committed to memory, I suggest reading the texts by the authors of the theories (e.g., Kaplan, 1995; Kaplan & Kaplan, 1989; Kaplan & Talbot, 1983; Ulrich, 1983, 1993; Ulrich et al., 1991) as well as the early texts that contrasted the emerging theories (e.g., Hartig et al., 1991; Hartig & Evans, 1993).[9]

Theories encompassed by the restoration perspective have numerous components that can be included in a general framework to aid comparisons. For example, as theories rooted in the adaptive paradigm, they would represent views of the human condition and human–environment relations that emphasize basic matters of survival. They would accordingly make assumptions about human evolution, with regard, for example, to how natural selection works, its operation on particular aspects of human–environment relations (as in the shaping of habitat preferences), its sensitivity to environmental change, and the limits of adaptability to contemporary conditions. Variations in these components of theories about restorative

environments need further attention, but for present purposes I will focus on a smaller set of components, represented by the columns in Table 5.2. These will suffice as starting points for extensions beyond ART and SRT (Hartig, 2004, 2017).

Consider first the resources that could come into play, get depleted, and so need restoration. They take different forms. Psychophysiological resources enable mobilization for action aimed at some demand, whether acute, as when jumping back from a coiled snake, or prolonged, as when working hard to meet a deadline. Cognitive resources include the ability to willfully direct attention to some task at hand while filtering out distractions. These resources are focal concerns of SRT and ART, but they are not the only adaptive resources that might get depleted. Possible new theories about restorative environments could look to other forms of resources, such as the social support a person might receive from family, friends, and acquaintances at home, in the neighborhood, and elsewhere (e.g., Cohen & Syme, 1985).

Consider then the antecedent condition. Because a person depletes various resources in meeting everyday demands, a potential or need for restoration arises regularly. New demands will certainly come along, so the person must secure adequate possibilities for restoration or risk not being able to meet those demands. Insofar as a particular theory focuses on a specific resource or set of resources, it also focuses on the condition of a person who has depleted that resource or set of

Table 5.2 A general framework for theories about restorative environments. *SRT* stress recovery theory, *ART* attention restoration theory

Theory	Resource category	Antecedent condition	Features of P-E transactions that permit restoration	Features of P-E transactions that promote restoration	Outcomes that can reflect on restoration	Treatment of time
SRT	Ability to mobilize for action	Psychophysiological stress	Apparent absence of uncontrollable threat	Perception of natural contents; moderate levels of complexity, gross structure, and other visual stimulus attributes	More positive self-reported affects; lower blood pressure and cortisol levels	Focus on duration
ART	Ability to direct attention	Directed attention fatigue	Being away, compatibility	Fascination, extent, compatibility	Improved performance on standardized tests of cognitive abilities	Focus on duration
Possible	Ability to …	Depleted ability to …	?	?	?	?

resources. This could receive consideration as stress or mental fatigue, as in SRT and ART, or as some other form of depletion defined with regard to some other resource, such as a loss of access to instrumental and emotional forms of social support.

Consider then the environmental requirements of the process through which the depleted resource(s) can be restored. Restoration has two basic requirements in this regard. First, the environment permits restoration. Going there, a person gains distance from the demands that caused the given need for restoration, and when there the person does not face new demands that further tax the same depleted resource. Second, the environment promotes restoration. Some demands are not tied to any one place; a person could feel troubled and ruminate over them almost anywhere, further depleting resources. Insofar as an environment has features and affords activities that draw a person's thoughts away from demands, attracting and holding their attention, the person can better engage with the environment and thus prolong the restorative process(es). This presence of positive features, and not only an absence of negative ones, underlies a basic definition of a "restorative environment" as an environment that promotes, not merely permits, restoration (Hartig, 2004, 2017). Both SRT and ART represent this distinction with their specifications of components of experience though in somewhat different ways. SRT refers to the absence of threat as a permitting feature, one that could also figure in experiences of being away and compatibility as set out in ART; however, the ART concepts encompass more than threats, also including, for example, distance from routine mental contents. With regard to the promotion of faster and more complete recovery, SRT refers to gross structure, moderate depth, moderate complexity, the presence of a focal point, and the survival-serving natural contents a person sees in the environment, which are thought to rapidly evoke positive affect and hold non-vigilant attention, thus blocking negative affect and negative thoughts and so allowing recovery from the physiological arousal characteristic of stress. Some of these features, like gross structure, have commonalities with the bases of the extent construct as defined in ART; greater coherence and scope experienced in the environment can serve to sustain the effortless soft fascination thought to promote rest of the directed attention mechanism. For other resources, and so for other forms of resource depletion, possible theories might augment the descriptions of restorative environments given in SRT and ART and/or specify other kinds of restoration permitting and promoting features. For example, in addition to visually appealing features that would support stress recovery and attention restoration in an individual, the environment might offer distance from the ordinary settings and demands of work and family for both people in a couple, as well as affordances for mutually appreciated activities, including not only the sharing of a restorative interlude while viewing the scenery but also opportunities to have fun, explore, and make discoveries together; to talk about life circumstances; and to share intimacy (for an anecdotal example with links to natural settings, see Pascal, 2016).

Consider then the outcomes. Those measured in experiments anticipate the operation of the presumed causal mechanism during contact with nature versus some comparison condition in a specific situation. For experiments informed by SRT, this

has meant expectations of more positively toned affect, as in increased self-reported happiness and reduced anger, as well as reduced activity in one or more of the bodily systems that had previously mobilized for action (e.g., cardiovascular, endocrine, muscular) (e.g., Ulrich et al., 1991; for reviews, see Bowler et al., 2010; Corazon, Sidenius, Poulsen, Gramkow, & Stigsdotter, 2019). For experiments informed by ART, researchers have expected improved performance on tasks that challenge directed attention and perhaps other aspects of executive cognitive functioning, such as working memory and inhibitory control (e.g., Berman, Jonides, & Kaplan, 2008; Schutte, Torquati, & Beattie, 2017; for reviews, see Ohly et al., 2016; Stevenson et al., 2018; Sullivan & Li, Chap. 2, this volume). Similar expectations hold when the same measures are used in quasi-experiments and observational studies to assess cumulative benefits, as with lower chronic stress seen in patterns of cortisol secretion (e.g., Ward Thompson et al., 2012) or better executive cognition seen in standardized tests (e.g., Taylor, Kuo, & Sullivan, 2002; Dadvand et al., 2015). Taking guidance from SRT and/or ART, clinical studies have tested therapeutic interventions in which patients repeatedly perform some activity in a natural setting, and they have reported outcomes such as improved attentional functioning in breast cancer patients (Cimprich & Ronis, 2003), reduced severity of depression (Gonzalez, Hartig, Patil, Martinsen, & Kirkevold, 2010), and the motivation to change a depleting lifestyle following burnout (Sonntag-Öström et al., 2015). The cumulative effects assumption has also guided large-scale epidemiological studies that have reported better health among those with relatively greater amounts of green space near the residence, as reflected in self-reported health (e.g., Astell-Burt, Mitchell, & Hartig, 2014; de Vries et al., 2003) and the incidence of diverse forms of ill health and causes of mortality (e.g., Engemann et al., 2019; Maas et al., 2009). Several studies have also found that greater self-reported being away and fascination appear to mediate between more greenery or green space in the residential environment and distal outcomes like better self-reported health (e.g., Dahlkvist et al., 2016; Dzhambov et al., 2019). Research guided by other possible theories could similarly look to proximal and distal outcomes and hypothesized mediators as fitting with their concerns for other resources, antecedent conditions, and processes. For example, a study concerned with the renewal of bases for sharing of social support could measure variations in mutual trust and appreciation in relationships with relevant others.

Consider then the matters of time. Of temporal parameters that could be used to characterize a potentially restorative exchange between person and environment, it appears that duration has received the most attention, often reflecting constraints imposed by an experimental research setting (i.e., briefer periods for viewing photographs or other simulations in a laboratory, after Ulrich, 1979, and longer periods for walking in some field setting, after Hartig et al., 1991). Related parameters include the time required for different kinds of effects to emerge, the time that different effects persist, and the time allowed for restoration in relation to the time spent in an activity or activities through which the resource(s) in question became depleted (e.g., Hartig, Evans et al., 2003). These parameters help to describe what happens on a single occasion, within a specific situation defined in terms of a person, activity,

setting, and time. As noted earlier, those working with ART and SRT have from an early stage also attended to the potential significance of cumulative effects of repeated contact with the natural environment, as through window views at home (e.g., Masoudinejad & Hartig, 2020; Tennessen & Cimprich, 1995), at work (e.g., Kaplan, 1993; Shin, 2007), and in health care settings (e.g., Raanaas, Patil, & Hartig, 2012; Ulrich, 1984); however, matters of frequency, periodicity, and the distribution of time across multiple occasions have not received systematic attention. Such matters would presumably also have significance for other possible theories.

For the theories encompassed by the general framework in Table 5.2, the sequence of columns starts from a particular resource, proceeds to depletion of that resource, and then continues on to an environmental experience that could generate outcomes that reflect on restoration as it may have occurred in a given amount of time. The table thus does more than simply outline components of existing and possible theories; it also represents a way of telling about them. The table shows a narrative structure in which the respective components of a theory and the links among them follow in a sequence revealing the particular process. In other words, for each theory the given row reveals a classic plot line, proceeding from equilibrium (resource availability) through imbalance (resource depletion) to a new equilibrium (through restoration) (Robertson, 2017; Todorov, 1969). By tracing a process across the columns, one can recognize how the concerns of the stress and coping perspectives are necessarily bound together with those of the restoration perspective. Thus, as represented in Table 5.2, the structure of the conventional narrative incorporates an inherent logic of the adaptive paradigm and its subordinate perspectives on the efforts of the individual to survive.

5.4 Restorative Benefits of Nature Experience: Extending the General Framework

To this point, I have argued that the restoration perspective has particular "built in" relevance for understanding the salutary values of nature experience, and I have highlighted some of the main components of a conventional theoretical narrative about restorative benefits of nature experience. I organized those components in a general framework, which I also used to point out the possibility of constructing theories concerned with adaptive resources and restorative processes other than those in focus with SRT and ART. To exemplify the utility of the framework in this respect, I began to sketch a theory concerned with the loss of access to social support as an antecedent condition from which an individual might need to restore.

Now, toward extending the conventional narrative, I will build on that example and further elaborate theory concerned with the availability of social support. To do so, I first extend the general framework by adding the level of analysis as a component. This extension enables me to consider two additional theories here, one concerned with restoration of relational resources held between people in closer

relationships and the other concerned with restoration of social resources held collectively in a population. Following the naming conventions applied with SRT and ART, I refer to these two theories as relational restoration theory (RRT) and collective restoration theory (CRT), respectively.

Some of the phenomena addressed by RRT and CRT have already drawn much attention from scholars. I note some of the areas of overlap as I proceed, but in this and other respects more detailed accounts lie outside the scope of this chapter. The accounts I give here nonetheless suffice to identify RRT and CRT as distinct theories and so provide bases for novel research questions and hypotheses not derivable from SRT or ART or from each other. This will help to propel discourse within restorative environments theory, and it can also encourage dialog between restorative environments theory and other bodies of theory. All of this should contribute to a more encompassing narrative about nature experience and health, one that realizes more of the potential of the restoration perspective.

5.4.1 Relational Restoration Theory: Focus on Resources Held Within a Dyad or Small Group

In the account of RRT that follows, I first specify the level of analysis. I then apply the narrative logic used with SRT and ART and treat its respective components in a sequence that represents a process (see Table 5.3).

5.4.1.1 Level of Analysis

In discussing the contents of the general theoretical framework, I have so far only referred to processes on the individual level. However, a theory about the role of the environment in restoration of access to social support cannot be fully articulated only with regard to the person deprived of support; it must also attend to the person or persons who do not provide support and to the circumstances around the failure of the supportive exchange between them. Description of the restorative process must therefore look beyond individuals. RRT focuses on the exchange of instrumental and emotional support in closer relationships, as between civil partners, in a larger family, and among friends, co-workers, and neighbors.

5.4.1.2 Resource

An ability to rely on some close other for some form of support rests on the resources of the person or persons who could provide instrumental and emotional support, including those resources in focus with SRT and ART; however, it cannot be reduced solely to the functional resources that the other person(s) might deploy to provide desired support.

Table 5.3 A general framework for theories about restorative environments, extended with a theory about the role of the environment in the restoration of relational resources. *SRT* stress recovery theory, *ART* attention restoration theory, *RRT* relational restoration theory

Theory	Level of analysis	Resource category	Antecedent condition	Features of P-E transactions that permit restoration	Features of P-E transactions that promote restoration	Outcomes that can reflect on restoration	Treatment of time
SRT	Individual	Ability to mobilize for action	Psychophysiological stress	Perceived absence of threat	Perception of natural contents; moderate levels of complexity, gross structure, and other visual stimulus attributes	More positive self-reported affects; lower blood pressure and cortisol levels	Focus on duration
ART	Individual	Ability to direct attention	Directed attention fatigue	Being away, compatibility	Fascination, extent, compatibility	Improved performance on standardized tests of cognitive abilities	Focus on duration
RRT	Dyad or small group	Ability to rely on each other for support	Strained or weakened relationship (singular)	Arrangements for supportive exchange that enable distancing from demands	Arrangements for supportive exchange that enhance engagement with the setting; amplification of engagement through sharing of experience	Greater marital stability or satisfaction; greater work group cohesion	Focus on duration of time spent together and apart across situations

An ability to rely on some close other for support also rests on the arrangements that enable them to exchange support. These often follow from deliberate and extensive measures, such as a choice of a residential location, made with the expectation that diverse forms of supportive exchange will continue over an indefinitely long period and across many situations requiring cooperation and coordination. I refer to these as standing arrangements.

Perhaps most fundamentally, though, an ability to rely on some close other for support rests on aspects of the relationship between them. RRT focuses on interpersonal aspects such as trust; love; respect; common interests; mutual understanding; tolerance of the other's peculiarities; shared goals, hopes, and mutually reinforced optimism about the future; a shared commitment to another significant person or to an ideal, group, or organization; and a positive valuation of a shared history and of rituals and traditions held within the relationship. Some of these interpersonal aspects, like love and shared goals, may characterize only a few close relationships, while others, like trust and common interest, will also figure to some degree in relationships in the public realm, as between people who frequently meet while walking their dogs in a local park (e.g., Foa, 1971; Henning & Lieberg, 1996; Lofland, 1998).

I refer to these interpersonal aspects of relationships as relational resources; they do not exist in one person alone, independent of the other(s) (cf., Cordelli, 2015; Hartig, Catalano, Ong, & Syme, 2013). As a constituent of any closer relationship, they provide a basis for action by those involved, enabling and motivating the exchange of individual resources, including material as well as personal functional resources. The relational resources also provide a basis for individual and joint action in the completion of their respective personal projects as well as their joint projects and in meeting the role obligations and other demands faced by one or more of them. People commonly establish relational resources progressively, with one, like love, following from the presence of others, such as attraction and trust (cf. Altman, Vinsel, & Brown, 1981). Sustained, reciprocal exchange of support can therefore progressively deepen a pool that comprises multiple relational resources. In a relationship or a set of relationships with a deep pool of relational resources, as in many families and long-established work teams, those involved can hold strong expectations about reliable and sustained provision of that support which the other(s) actually can provide within the available arrangements for exchange.[10]

5.4.1.3 Antecedent Condition of Resource Depletion

In a given situation, one person may fail to get support from another for reasons related to any of the constituents of the ability to rely on another for support. Stress or fatigue may have undermined the other's capacity to provide support. Their arrangements for supportive exchange may have weaknesses, perhaps related to problems in movement between the settings and social roles specific to their family, work, and other life domains (cf. Chatterjee et al., 2020; Novaco, Stokols, & Milanesi, 1990). One person may be unwilling to help because some key relational resource has become depleted, as with a loss of trust; a loss of love; recurrent

unjustified failures in reciprocity; a loss of mutual commitment; diminished tolerance of the other's peculiarities; and/or abandonment of shared goals (cf. Buunk & Schaufeli, 1999; Lewicki & Bunker, 1995).

Although the supportive exchange in a given situation might fail for reasons specific to any one of the constituents of the ability to rely on another for support, some people must contend with stable circumstances in which problems with all three of the constituents cascade across situations that recur regularly in their multiple life domains. They struggle to fit restoration pieces into their "life puzzle" as they try to cope with unrelenting and conflicting demands from their own and others' activities across the settings and social roles of their different life domains. Time pressure, stress, and fatigue become chronic; their emotional well-being suffers; and their relationships get neglected and possibly strained (cf. Schulte, 2014).

When stable circumstances regularly generate situations that wear on the people involved, their relational resources can come to have superordinate significance in their ability to rely on others for support. Those who share a deep pool of relational resources commonly work together to resolve problems related to their standing arrangements for exchange. If possible, they change those arrangements, even when difficult, for example, by moving their residence. If they cannot make better arrangements, they may accommodate the negative consequences as part of their ongoing coping process, even though doing so wears upon them (e.g., Repetti & Wood, 1997; cf. Whitchurch & Constantine, 1993). They may do so with tolerance and sympathy if they know that the problems faced reflect on stable circumstances beyond the control of the person or persons in question (e.g., systemic racism; socioeconomic disadvantage).

RRT thus recognizes that people develop, deploy, and deplete their individual and relational resources in a complex set of arrangements and stable circumstances that have interpersonal, spatio-physical, temporal, and social aspects. In this, RRT has particular concern for depleted relational resources, assuming they have superordinate significance for an ability to rely on some close other(s) for support across situations that arise within the arrangements made for supportive exchange. Looking to the possibility for restoration, RRT assumes that the pool of relational resources has become depleted but not emptied. Relations between those involved have become weakened or strained; they want to bolster them and ease the strain; and they can take action toward that end, including changing their arrangements for exchange.[11]

5.4.1.4 Features of Transactions with the Environment That Serve Restoration

RRT recognizes that much as the stress and mental fatigue of the individuals involved can play a role in depleting relational resources, so can restorative person–environment transactions like those described in SRT and ART also play a role in relational restoration. Conversely, it recognizes that much as weakened or strained relations can exacerbate stress and mental fatigue, so can transactions between

people that ease strain in their relations also play a role in their respective personal restorative processes. Accordingly, RRT complements the individual-level theories about restorative environments by situating restorative person–environment transactions within the ongoing supportive exchange between the people involved.

To do this, RRT first explains how arrangements for supportive exchange can work *across* situations to shape what happens *within* a specific situation in which restoration might occur. In outlining that explanation here, I will focus on standing arrangements, although the account also bears on *ad hoc* supportive exchange. Ideally, standing arrangements help those involved to reduce or prevent needs for restoration; they sensitively accommodate the functional resource limitations of each person involved, their unavoidable personal needs for restoration, and their shared desire to care for their relationship(s) (cf. Clark, 2001). Insofar as their standing arrangements anticipate and provide for their various restoration needs, many of the situations in which restoration occurs will have a routine character; they will occur in particular settings at particular times, as with workday lunches and family dinners, and with particular movements between settings, as with travel home after work, before re-engaging with family responsibilities. When relations between those involved become weakened or strained, one can therefore look to the standing arrangements to see how the routines can be changed to more successfully reduce or prevent personal depletion, provide for personal restoration, and/or support care for relationship(s).

RRT attends to the integral aspects of standing arrangements that bear on how well personal restoration and care for relationships can succeed across situations. One of these integral aspects involves the regulation of social interaction by which an individual, dyad, or small group opens or closes to others (i.e., privacy regulation; Altman, 1975). This process runs continuously, within and across domains, with each person wanting solitude on some occasions and company on others. Within a given domain, the standing arrangements will to varying degrees allow those involved to permit and promote each other's movement into the different settings that are available, alone on some occasions and together on others. Both kinds of movement can bring personal restoration and care for relationships into congruence. Yet, each of those involved may also well know that the satisfaction of personal needs for restoration will in some situations call for togetherness, as when one would not feel safe going alone for a preferred activity in a preferred setting (cf. Staats & Hartig, 2004), and/or when all know that they would enjoy the activity and setting far more with the other(s) present (cf. Caprariello & Reis, 2013; Staats et al., 2016). By enabling any one of them to spend time alone and by offering means to enhance that person's experience while away, or by enabling time together and enhancing each other's experience in that situation, those involved in the standing arrangements can bring satisfaction of their personal restoration needs and care for their relationships into congruence. Conversely, in the way each person gets time alone versus together across situations, satisfaction of personal and relational needs can come into conflict. The manner in which standing arrangements serve privacy regulation thus bears on their success in satisfying needs for personal restoration and care for relationships within the given domain.[12]

Reciprocity is a second integral aspect of standing arrangements that bears on the success or failure of personal restoration and care for relationships across situations. Standing arrangements rest on reciprocity; those involved will assume some responsibility to provide support just as they form expectations about receiving support (Gouldner, 1960). As indicated earlier, standing arrangements also assume that those involved will develop some sensitivity and responsiveness to the restoration needs of the other(s), so that over time they come to know about each other's ability or inability to provide support in particular situations. Accordingly, those involved presumably evaluate reciprocity looking to how it holds across multiple situations across time, and not only with a view to immediately successive situations across which one might give and then hope to receive support. Any of those involved could tolerate a failure of reciprocity in a specific situation when it stems from some justifiable inability to provide support (cf. Buunk & Schaufeli, 1999). Insofar as those involved meet reasonable expectations of reciprocity to the extent possible across situations, they can maintain and deepen the pool of relational resources. In contrast, routine unjustifiable failures to reciprocate support will erode the trust, mutual regard, and other relational resources on which those involved have predicated their supportive exchange, making their standing arrangements unstable (cf. Buunk & Schaufeli, 1999; Gouldner, 1960). A persistent lack of reciprocity may prove particularly potent in straining their relationship(s) insofar as it also exacerbates the need for restoration of one or more of the others involved, increasing the burden on the other(s) while also denying them anticipated opportunities for restoration or degrading their restorative quality (cf. Buunk & Schaufeli, 1999; Siegrist, 1996). Conversely, reciprocation of support that involves occasionally forgoing one's own needed restoration to enable that of another in greater need may well deepen the pool of relational resources within the given domain.[13]

A third integral aspect of standing arrangements to mention here involves interdependencies between experiences in different situations. Those interdependencies include far more than a link between some acute need for restoration that arises in one situation and then satisfaction of that need in an immediately following situation, as commonly represented in experimental tests of the restorative effects of different environments (Hartig, 2011). They also involve the dependence of the experience of the present situation on what happened in situations that lie farther back in the past as well as on what will happen in situations in the immediate and perhaps more distant future. Those interdependencies inhere to individual and shared memories of past situations, good or ill, and they inhere to individual and shared anticipation of situations to come, good or ill. They figure in the assessment of reciprocity, with regard to support one has provided and received in the past and support that one expects to give or receive in the future; however, the memories and anticipation that constitute experiential interdependencies between situations need not only concern matters of reciprocity. Memories may, for example, concern what those involved have done previously to create relational resources in a situation that resembles the present one, as with recall of a shared milestone event in a particular setting. Memories may also concern experiences through which a setting has acquired particular value for its service in personal restoration and care for

relationships over repeated situations, as with the home, a favorite pub, or a local park (cf. Cooper Marcus, 1992; Knez, 2014). The expectations grounded in those memories may concern the availability of similar experiences in that setting in the future, as with the use of favorite places for emotion and self-regulation (cf. Korpela, 1989; Korpela et al., 2018; Korpela & Hartig, 1996). These diverse interdependencies can color the experiences that a person, dyad, or small group has across situations encompassed by their standing arrangements in the given domain. Even when seemingly alone in some setting, a person may through their memories and anticipation remain engaged with other people, activities, and settings in ways that enhance or degrade the restorative quality of their experience.

Together, as integral aspects of standing arrangements that reach across situations, privacy regulation, reciprocation, and experiential interdependencies can powerfully shape the personal and relational outcomes that those involved will realize in a specific situation in which restoration might occur. RRT calls attention to the way that many of the situations in which restoration occurs fit within standing arrangements; it recognizes that those situations occur with some regularity, within a pattern that combines particular times, settings, and people who can refer to past and coming situations in ways that influence their present experience. And, of course, RRT recognizes that, across situations, those standing arrangements attend not only to the personal needs of those involved but also to care for relationship(s), including the renewal of relational resources when necessary. RRT thus complements the accounts of restorative individual–environment transactions given by theories like SRT and ART by setting the situations in which they occur into the stream of situations encompassed by standing arrangements.

RRT also complements the individual-level accounts of restorative person–environment transactions by looking at the transactions between people *within* a specific situation entered for restoration. It acknowledges that people often do not go alone to natural and other settings for restoration. Accordingly, it considers how the transactions between them can shape the transactions they have with the environment, and, at the same time, how the transactions they have with the environment can shape the transactions between them.

In this respect, RRT builds on a line of studies initiated by Henk Staats. He noted that, like the search for restoration, being in the company of one's family and friends has long stood out as an important motive for recreational visits to natural areas (e.g., Driver, 1976; Knopf, 1987). To test the joint influence of these two motives, we had participants in an experiment judge the likelihood of restoration with a walk outdoors in a forest of city center (shown in photographic slides), either when alone or with a close friend, and when either mentally fatigued or fresh and alert (as described with scenarios; Staats & Hartig, 2004). Note that although the experiment focused on a specific recreation situation, it assumed the participants' judgments of the likelihood of restoration in the given environment/company condition would reflect their prior experience with the selection of environments for meeting their needs for restoration. In general, the participants indicated they would appreciate having the company of a friend in either of the settings. Of particular interest here, though, are the results we obtained with the ratings of perceived safety also

collected for the four environment × company conditions. We found that greater safety mediated a positive effect of company on the likelihood of restoration, but only for the forest walk. The results also suggested that if safety were guaranteed in the forest, the participants saw a greater likelihood of restoration if alone. These results supported discussion of in situ transactions between two people in terms of what permits and promotes restoration: company may enable restoration in a setting, as by ensuring safety, and it may also enhance or degrade restoration in various ways (see also Johansson, Hartig, & Staats, 2011; Staats, 2012; Staats et al., 2016; Staats, van Gemerden, & Hartig, 2010).

I will not try here to give a systematic account of the different ways in which having company can combine with features of the environment to enable and enhance restorative experience, or conversely deny or degrade it. It will suffice to point out that the concern for the influence of company distinguishes RRT from the theories of the conventional narrative. SRT and ART focus on an individual's transactions with the environment. Those theories do not address transactions among people or their joint transactions with the environment as focal concerns. Yet, person–person transactions and their interplay with person–environment transactions in a given situation may be an important source of individual benefits as well as shared relational benefits. For example, studies of shared attention and shared experience suggest that when two people in a close relationship can enjoy a positively valenced stimulus together (say, eating chocolate or viewing pleasant images), it amplifies the intensity of the pleasure each receives, even in the absence of communication about it (e.g., Boothby, Clark, & Bargh, 2014; Boothby, Smith, Clark, & Bargh, 2017; see also Shteynberg, 2015).

How does this all bear on understanding restoration in nature within a specific situation? Consider a couple walking in an unfamiliar forest on an early summer day. Their experience reflects on interdependencies across many situations that have occurred within their standing arrangements for supportive exchange. For example, their walk there fits within a history of shared recreational activity, and they have memories of many earlier forest walks. They are visiting the specific forest because they both have long wanted to see a particular species of orchid that they have heard blooms in abundance there at that time. They have also heard that the terrain is difficult, but they trust in each other's abilities and know they will be able to manage when they go together. Focus now on the transactions between them and the forest that further permit the restoration they need. They have gotten away from heavy demands at work, and this opens for restoration of their personal resources, as described in SRT and ART. Each thus has more capacity to attend to the other than they would have otherwise. The distance from their paid work demands has additional significance in that those demands have weakened their relationship by preventing needed discussion of some important matters; they need to talk over the possibilities and make some plans. An absence of other people and social strictures in the forest makes it easier to open for their intimate sharing, self-disclosure, and emotional expression. With their energetic and cognitive resources freed up, social constraints relaxed and communication open, they are better able to listen to and understand each other's attempts to make sense of and otherwise reflect on their

shared circumstances. Given that relational restoration gets permitted in these various ways, consider how the transactions the two have with each other and with the forest might also work to promote their restoration. They enjoy the sight and sounds of the birds, the smell of moss and leaves on the forest floor, and finally the discovery of the orchid they had so long wanted to see in the wild. Their ongoing engagement with the forest setting sustains restoration as described in SRT and ART, but their sharing of the experience intensifies their engagement; they enhance each other's experience through expressing their curiosity during the search for the orchid and their delight when they finally can see it together. They renew and reinforce their relationship, resolving undiscussed matters, reaffirming trust in one another, creating some new positive memories, and perhaps seeing new ways to appreciate each other or seeing again sides of each other that they had appreciated before.

This scenario is of course just one out of many that could be used to illustrate how individual and relational restoration processes are intertwined, both through standing arrangements for supportive exchange that run across situations and through the transactions that take place between people while in a specific situation and between those people and the given setting. Speculative and uniformly positive in tone, the scenario is nonetheless plausible; it accords not only with anecdote (Pascal, 2016) but also with findings from different kinds of empirical studies.

5.4.1.5 Outcomes That Reflect on Restoration of Relational Resources

Literature in diverse areas can inform understanding of relational restoration, how it may be intertwined with the restoration of personal functional resources, and how that can occur in natural and other settings. I have already indicated that research has long affirmed that restoration and being together with close others are persistent and important motives for outdoor recreation (e.g., Home et al., 2012; Knopf, 1987), and that people often have company in their outdoor recreation (e.g., Knopf, 1983). Korpela and Staats (2020) reviewed numerous studies speaking to values of solitude versus company while in natural areas, and they relate findings to restorative experience and privacy regulation. Various studies have also shown that movement into a natural setting for recreation can serve family cohesiveness, as through the sharing of pleasant activities and enhanced communication (e.g., Ashbullby, Pahl, Webley, & White, 2013; West, 1986; West & Merriam, 1970). Similar observations have guided practical applications in nature-based therapies for couples (e.g., Burns, 2000) and outdoor program activities that promote the development of relational resources held by parents and children (Davidson & Ewert, 2012). Literature on wilderness programs indicates how they can serve the development of communication and cooperation within groups (Ewert & McAvoy, 2000), and how the experiences they provide can be designed to enlist personal restorative processes in the development of desired social outcomes (Ewert, Overholt, Voight, & Wang, 2011). Holland, Powell, Thomsen, and Monz (2018) reviewed 235 studies of the outcomes of wildland recreation activities such as canoeing, camping, hiking, and

backpacking. They found that large proportions of the studies reported on positive mental restoration outcomes and positive pro-social outcomes like increased family cohesion. Epidemiological studies suggest that a pathway from urban residential green space to mental health goes through the perceived restorative quality of the green space and then neighborhood social cohesion, in serial; treating them as independent mediators obscures the way in which they can work together to promote mental health (Dzhambov et al., 2018; Dzhambov, Browning, Markevych, Hartig, & Lercher, 2020; cf. Kuo et al., 1998).

Yet, research has yet to address the assumptions and claims of RRT as such. In general terms, studies inspired and guided by RRT as a theory about restorative environments can focus on the roles that specific physical and social setting characteristics play in relational restoration, as reflected in change in the pool of relational resources or in a particular relational resource. Much as with research informed by SRT and ART, studies can approach such effects as the proximal outcomes of experience in a specific situation or as distal outcomes of experiences across repeated situations. However, with research informed by RRT, a focus on proximal outcomes calls for consideration not only of the transactions that each individual has with the environment but also of the transactions between them, as well as their joint transactions with the environment. Research focused on distal outcomes calls additionally for consideration of the characteristics of the standing arrangements in which the repeated situations occur, with regard to the ways in which privacy regulation, reciprocation, memories, and expectations work together (cf. Ratcliffe & Korpela, 2016). The relevant outcomes and mediators—for example, qualities of the environment and qualities of the interpersonal transactions—may be observed on the individual level or on the level of the dyad or group. Use of measures on both levels can support examination of how personal and relational restoration intertwine.

The account of RRT given here indicates numerous more specific directions for research. For example, experiments can examine how the person–environment transactions that support restoration in one or more of those involved also ease strain in their relations. Experimenters might, for example, artificially induce tension between two friends recruited as participants while also inducing stress and mental fatigue in each of them (cf. Yang et al., 2020). The experimenters might also assess how sharing the experience of the setting subsequently available for restoration (say, a lush tropical greenhouse versus a windowless room lacking decoration) amplifies or attenuates the positive or negative changes that occur during the recovery period, as assessed with measures of affect, cognition, and physiology. They might further test the hypothesis that a mutually amplified beneficial change in the natural setting in turn evokes assessments of relationship quality showing greater forgiveness in relation to the artificially induced tension between them.

To take another example, intervention studies could compare the effects of changes made in standing arrangements to establish new routines that might better serve personal restoration and care for relationships. This kind of study could draw on behavioral observation methods like those used to study patterns of solo and shared restorative activities in the daily life of families (e.g., Saxbe, Graesch, & Alvik, 2011; Saxbe, Repetti, & Graesch, 2011) or daily diary or survey methods like

those used in studies of recovery from work (e.g., Sonnentag, 2001; Sonnentag & Bayer, 2005). As another example concerned with the standing arrangements, surveys could examine how the members of a family or other group reciprocate in permitting and promoting each other's periodic withdrawal into preferred activities and environments for restoration, and how this relates to their assessments of relational resources like trust, mutual appreciation, and mutual commitment, as well as to distal outcomes such as marital stability.

5.4.1.6 Matters of Time

The shift from the individual to the dyad and small group level of analysis has important implications for the handling of matters of time in RRT. The duration of the encounter with the environment, the time required for effects to emerge, the period over which effects persist, and so forth, remain relevant for studies of what happens in specific situations. However, in that RRT encourages consideration of the specific situation as it occurs within arrangements for supportive exchange, it directs attention to some additional matters. One set of these has to do with the way in which past experience and the anticipated future shape the present experience of those in the specific situation. Another set of matters bears on how much time two or more people can spend together in a given restorative activity in a given setting, or how much time they can spend apart in separate restorative activities in separate settings, before they must go on to other activities and settings, together or alone. When people meet for some restorative activity, their convergence ordinarily implies that they have identified a suitable starting time and a suitable location where they can stay for some period (though not necessarily long enough to do what they want to do). As incorporated in their arrangements for exchange, this kind of convergence bears on the frequency, periodicity, distribution, and duration of restorative interludes within different social constellations and settings, and in turn on the distal personal and relational outcomes that research can assess. Here, then, the concerns of the adaptive paradigm, including the restoration perspective, can again be seen to align with the concerns of the opportunity structure paradigm for patterns of behavior that recur within and across settings with spatio-physical, social, and temporal characteristics.

In extending the scope of concern from restorative processes in individuals to the restoration of depleted relational resources held between people in closer relationships, RRT addresses additional layers of complexity, including the arrangements made for supportive exchange as they shape experience across situations and the transactions between people as they shape experience within situations. The present account of RRT does not address all of this complexity, but it suffices to distinguish RRT from SRT and ART and to provide bases for research questions and hypotheses not derivable from those theories. In doing so, it also identifies a significant limitation of those theories. The account makes apparent that restoration of personal functional resources does not occur in a social vacuum, even when a person is alone in a given setting. And insofar as people do go with others to natural settings for

restoration, theory should try to address the implications of having company for the restoration that they experience (cf. Korpela & Staats, 2020).

I began this account of RRT by adding the level of analysis to the general framework as a component of theories about restorative environments. That addition directed attention to the adaptive resources that people hold within closer relationships, and in turn the consequences of depletion of those resources and the environmental requirements of their restoration, including matters of time. This account of RRT has thus done more than move the theoretical discourse about restorative environments beyond the conventional narrative; it has also served to demonstrate the utility of the general theoretical framework in identifying possibilities for new theory. I will now demonstrate that utility again, moving up another level of analysis.

5.4.2 Collective Restoration Theory: Focus on Social Resources Held Collectively in Communities

Some aspects of relational restoration theory were first presented in a paper that also presented collective restoration theory in embryonic form (Hartig et al., 2013). That account of CRT referred to relational restoration in much the same way that the account of RRT here has referred to stress recovery and attention restoration; it assumed reciprocal influence between resource depletion and restoration processes across the different levels of analysis. I will not attempt a thorough account of CRT here, but I will give enough detail to identify CRT as a distinct theory, concerned with a resource, an antecedent condition of depletion, a restorative process, outcomes and matters of time that cannot be reduced to those described in SRT, ART, and RRT. The theory as sketched thus opens for another set of novel research questions and hypotheses. I again start with the level of analysis and then treat the other components in a sequence that represents a process (see Table 5.4).

5.4.2.1 Level of Analysis

Like individuals, dyads and small groups do not ordinarily exist in isolation. Just as stress or mental fatigue experienced by one person can cause problems for others, as through a diminished capacity to provide expected help, so can weakening of a relationship between two people impose demands on others around them. Conversely, just as benefits from one person's restoration can spread to others, as through a renewed capacity to provide support, so can benefits of relational restoration spread to others around those in the dyad or small group. Given that consequences of individual and relational depletion and restoration can spread to others, an understanding of the implications of that spread calls for research on a broader population level. As units of analysis, populations comprise sets of individuals and groups as well as the many relationships among them. Although their boundaries

Table 5.4 A general framework for theories about restorative environments, further extended with a theory of collective restoration. The framework represents both the necessary relatedness of the stress, coping, and restoration perspectives within the adaptive paradigm (across the columns) as well as the nesting of the adaptive paradigm within the opportunity structure and sociocultural paradigms (down the rows). *SRT* stress recovery theory, *ART* attention restoration theory, *RRT* relational restoration theory, *CRT* collective restoration theory

Theory	Level of analysis	Resource category	Antecedent condition	Features of P-E transactions that permit restoration	Features of P-E transactions that promote restoration	Outcomes that can reflect on restoration	Treatment of time
SRT	Individual	Ability to mobilize for action	Psychophysiological stress	Perceived absence of threat	Perception of natural contents; moderate levels of complexity, gross structure, and other visual stimulus attributes	More positive self-reported affects; lower blood pressure and cortisol levels	Focus on duration
ART	Individual	Ability to direct attention	Directed attention fatigue	Being away, compatibility	Fascination, extent, compatibility	Improved performance on standardized tests of cognitive abilities	Focus on duration
RRT	Dyad or small group	Ability to rely on each other for support	Strained or weakened relationship (singular)	Arrangements for exchange that enable distancing from demands	Arrangements for exchange that enhance engagement with the setting; etc.	Greater marital satisfaction; greater work group cohesion	Focus on duration of time spent together and apart
CRT	Community or population	Ability to rely on (possibly unknown) others for support	Aggregated depletion of individual and shared relational resources	Institutional arrangements that allow relaxation of demands on a large proportion of the community or population	Institutional arrangements for engagement in shared activities; conviviality among those present in public places	Positive emotional contagion and other spread of benefits; greater collective optimism	Focus on social regulation of time for others in diverse social constellations and locations

may be difficult to define, they do have internal coherence. Notably here, the standing arrangements that people in closer relationships can make for their supportive exchange are constrained and facilitated in various ways by the stable circumstances established through customs and laws that regulate the activities of individuals, groups, and organizations within the population. The standing arrangements made by the different groups in that population will therefore show similarities that reflect on the common constraints and possibilities that constitute the stable circumstances under which they live.

5.4.2.2 Resource

Like RRT, CRT refers to the support that people can provide to one another as a resource, and it assumes that the availability of support is predicated in part on relational resources that can become weakened or depleted, such as trust, respect, and optimism about the future. Unlike RRT, CRT extends consideration beyond relational resources held among people in closer relationships. It does not ignore them, but it also looks to resources that can inhere to relationships among people who do not know one another yet still have some common bonds, even if weak, for example, from living in the same community and following similar customs there, reacting to the events that take place there, and performing the duties expected of citizens, such as paying taxes for public services that benefit unknown others in addition to themselves. They may also participate more deliberately with unknown others in activities with some common civic purpose. The social resources to which I refer have been discussed widely, represented with terms like social capital (cf. Coleman, 1988; Putnam, 2000). Their development, deployment, depletion, and maintenance are influenced by social institutions, including mass media (Silverblatt, 2004). In brief, these resources underlie the implicit and explicit cooperation of people known and unknown to one another toward ends thought to serve the population or some substantial segment of it.

5.4.2.3 Antecedent Condition of Resource Depletion

Social resources held broadly or diffusely within a population can get weakened or depleted for various reasons. For example, Putnam (2000) has attributed a weakening of social capital to declining engagement in civic organizations. By his thesis, put simply, civic engagement fosters norms of reciprocity and helps to build trust within a society, so a decline in civic engagement translates into a decline in social trust and a weakening of norms of reciprocity. The reasons he sees for decline in civic engagement resonate in some respects with a concern acknowledged in RRT: stable circumstances on the population level can make it difficult or impossible for some people to establish satisfactory standing arrangements for supportive exchange, thus entailing chronic difficulties in resolving conflicts between demands in different life domains and in getting sufficient time to meet needs for personal

and relational restoration, potentially including time for involvement with activities in the community domain. Another possible reason for weakening or depletion of social resources involves destruction of a shared environment, or features of it, perhaps in connection with displacement, insofar as it undermines important bases for shared place- and community-attachments and identity (cf. Fried, 1963; Hull, Lam, & Vigo, 1994; Knez et al., 2018). One final cause of resource depletion to mention here involves the circumstances and events that shake the public's trust in institutions that they count on to fairly represent public interests and ensure their safety. Murders of political figures, terrorist attacks, and a case of massive loss of life due to a preventable accident have been approached as instances of communal bereavement and found to be associated with adverse population health outcomes, speaking to the way that distress can spread in the population beyond people directly impacted by the events (e.g., Catalano et al., 2016; Catalano & Hartig, 2001; Tsai & Venkataramani, 2015). While writing this chapter, I have witnessed a flood of commentary in the media on how governmental response to the COVID-19 pandemic has boosted or undermined the public's trust in institutions and the political leadership. This kind of commentary makes evident the vital importance of trust in institutions and leaders and the risks to society when that trust weakens.

5.4.2.4 Features of Transactions with the Environment That Serve Restoration

Given depletion of such widely held social resources, CRT takes interest in the process of their restoration. Here, I will focus on the process as it involves the stable circumstances on the population level. Again, these influence the standing arrangements for exchange and so the possibilities that members of the population have for entering settings that support restoration, of their personal and relational resources and of social resources held widely within the population.[14]

CRT takes particular interest in the ways in which the maintenance of these different kinds of resources is permitted and promoted through the provisions made by institutional actors for population access to suitable restorative settings. Those provisions bear on time away from some kinds of work and striving; social norms regarding taking that time; the availability of the settings where people can gather or to which they can disperse during the time available; and the restorative quality of those settings.

Provisions for time away from work have ancient provenance, as with religious holidays like the Judeo-Christian Sabbath. Such holidays may involve proscriptions on particular depleting activities together with prescriptions for activities expected to serve personal, relational, and collective restoration functions, such as sleep, special festive meals, and observance of rituals known to all who practice the religion (e.g., Shulevitz, 2011). When the time away from work gets embedded in a religious practice, social norms of participation may be particularly strong. Weaker norms of taking time off may follow when there is no overarching authority that permits such behavior broadly in a population. For example, Altonji and Oldham (2003) found

that having national vacation legislation did translate into a substantially lower average number of annual hours worked in several European countries when compared to the USA, where national vacation legislation does not exist. Moreover, the quality of the time away may be improved with a social norm that affirms the practice. When away from work, one need not worry that those who remain will express resentment. Lack of such a norm may be one among other possible causes of the nonuse of vacation days (cf. Fakih, 2018; Kuykendall, Craig, Stiksma, & Guarino, 2020).

Religious practices and legislation that bear on working hours, work days per week, public holidays, and vacation practices are of interest in CRT in that they permit large numbers of people within the population to simultaneously take time away from the demands of paid work and other obligations. The duration of the periods opened up by institutional actors for periods of leisure have particular significance. Unless other constraints apply, when greater numbers of people can spend longer periods away from their ordinary individual and shared demands, the number and variety of social constellations in which they might participate will increase, as will the range of depleted resources that might be restored (Hartig et al., 2013).

The provisions for time can better serve a broad range of restoration needs when provisions also have been made for access to a variety of different and yet suitable settings within reach during the time available. Governments and organizations on different levels have long made a variety of settings available for such public use, as through provisions for public parks (e.g., Grundsten, 2009; Muir, 1901/1981; Olmsted, 1870) and road systems that enable people to easily travel to distant parks from their homes in or near cities (Hartig, 2007b). Those provisions have also attended to issues related to the restorative and other qualities of the park experience, as with regard to the control of noise, conflicts between different kinds of recreational activities, the ease of orientation and movement (as with well-marked trails), and safety from dangerous animals (e.g., Johansson et al., 2019; Roggenbuck, Williams, & Watson, 1993). Some of the provisions for restorative quality address problems that arise when provisions for time enable many people to visit a particular setting simultaneously; they restrict access and prevent degradation of the visitor experience by crowding. This recreational carrying capacity issue has long been of particular concern with natural settings, for which people typically show strong preferences for relative solitude (Catton Jr., 1983).

Yet, in some circumstances, the restorative quality of the setting depends heavily on its being populated with people who, freed from some everyday demands, can relax and enjoy being with others to celebrate some event; conviviality and contagion of mood become more likely, spreading among those known and unknown to one another. I can mention many examples: New Year's Eve celebrations in Times Square, New York; the cheering crowds at Memorial Stadium in Lincoln, Nebraska while the Cornhuskers play well against a rival; the Papal blessing offered on Easter to the masses gathered in St. Peter's Square in Vatican City; and, once upon a time, Grateful Dead concerts in large indoor and outdoor venues in many American cities. In addition to opening for contagion of valued emotions, such events may work to

renew and reinforce a communal identity held by those attending (cf. Ehrenreich, 2007; Etzioni, 2000).

Even then, though, carrying capacity issues can be anticipated, and space limits will require that constraints are imposed on attendance to ensure public safety and the comfort of participants. And, of course, institutional provisions have their limits. Getting the time needed to travel as a family to some distant national park does not guarantee an excellent outcome; poor summer weather, for example, may dampen the enjoyment of all, potentially with negative consequences discernible in population health indicators (cf. Hartig & Catalano, 2013; Hartig, Catalano, & Ong, 2007).

5.4.2.5 Outcomes That Reflect on Restoration of Collective Resources

Amplification of benefits with shared experience constitutes a mechanism of collective restoration that might be studied as described earlier in the account of RRT. Population averages for some of the outcomes indicated by SRT, ART, and RRT may also help to address phenomena of collective restoration. Yet, other outcomes of interest cannot be discerned with such data and need assessment on the population level. For example, one recent study addressed collective optimism as a social resource, viewing it as a form of informal insurance on which members of a population could draw to sustain effort in their ongoing enterprises (Catalano et al., 2020). We assumed that parties to the myriad relationships among members of a population share expectations with their family, friends, and others, both known and unknown, regarding the circumstances they can realize together in the future, and that the optimism of any one of them could affect expectations of the others (p. 45). Reports from individuals and small groups cannot capture the aggregate effect of this spread of benefits. To observe collective optimism on the population level, we looked at variation over time in two seemingly disparate population-level variables that nonetheless reflect on willingness to invest in the future. One, the monthly number of suicides among women of reproductive age, reflected on conscious decisions to no longer invest in one's own life; in other words, a lack of optimism about a future worth living. The other variable was the monthly incidence of male twin births, which reflects on the spontaneous abortion of particularly vulnerable fetuses, which itself reflects on non-conscious biological decision processes regarding the continued investment of reproductive capability in the particular gestation (see also Catalano et al., 2014, 2018). With data aggregated for the Swedish population, the study found these seemingly disparate measures to nonetheless covary reliably during the period January 1973 through December 2016, in a manner consistent with expectations. What the study did not address is what caused collective optimism to go down in particular periods and to recover afterward.

One study that did look at causes of collective restoration considered the mental health consequences of national vacation legislation (Hartig et al., 2013). It used aggregate data on vacation-taking in Sweden, where legislation in place since 1977 makes generous provisions for paid vacation time and also ensures that workers can take up to four consecutive weeks of that time during the summer months (Ericson

& Gustaffson, 1977). As shown in Fig. 5.1, the legislation has enabled a distinct and regularly recurring pattern of collective behavior: during the 12+ years covered by the study, millions of workers concentrated their annual vacation time in June, July, and August. The total population of Sweden during the period ranged from ca. 8.7 to ca. 9.0 million people (Statistics Sweden, 2020), so the legislation has evidently served well to relax demands on a very large proportion of the working population at the same time.

Of interest to us in our test was whether mental health would improve during periods of relatively intensive vacationing, as reflected in the dispensation of anti-depressants to the population through the pharmacy system allied with the national health care system. Using nationally aggregated monthly data, time-series modeling uncovered negative associations between vacationing and aggregate dispensation of anti-depressants to adult women and men. As an indication that benefits spread among people, we found that the association held for dispensation to men and women of retirement age as well as to men and women of working age. Thus, it appeared that vacation-taking by people still in the work force had implications for the mental health of older people outside of the work force. Further analyses indicated the results could not simply be attributed to prescribing physicians also being away on vacation, but given the data available for the analysis, we could not address other alternative explanations, such as mental health benefits of travel by retired persons that did not involve meeting with relatives and friends who were on paid vacation.

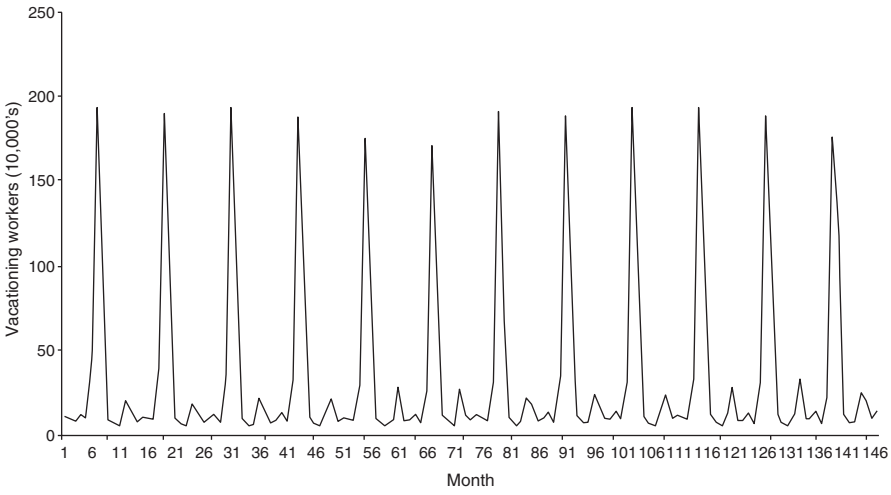

Fig. 5.1 Variation in the number of vacationing Swedish workers (in 10,000s) over the 147 months from January, 1993 to March, 2005. From Hartig et al. (2013)

5.4.2.6 Matters of Time

Unlike the other theories of the general framework, CRT takes particular interest in the social regulation of time. It recognizes that by regulating time for different activities, laws, and customs affect the ability of people to converge in particular settings and social constellations for activities that support restoration of individual, relational, and more diffuse social resources.

Further, and of particular importance here, CRT recognizes that the social regulation of time attends to well-known and highly predictable variations in the natural environment that have implications for visiting and enjoying outdoor settings. This is well exemplified by the circumstances addressed in the study of vacationing in Sweden. That initial test of CRT treated socially structured variation in time as a potential determinant of mental health; it did not directly address the matter of where people spend their vacations. It nonetheless bears on the support provided by the natural environment for collective restoration. Characteristic of higher latitudes, Sweden has dark and difficult winters, and those who live there place a high value on the summer as a season for outdoor leisure activities. This appreciation of summer conditions helped to shape the evolution of the vacation legislation, such that it eventually became possible to concentrate a large amount of vacation time in the summer months. That disposition of time was justified in statements about the superiority of summer conditions for recreation and restoration, made over a span of decades in legislative proposals [e.g., Kunglig Majestäts propositionen no. 286 (1938), cited in Andra Lagutskottet, 1953], inquiries commissioned by the government (Statens Offentliga Utredningar, 1944, 1967, 1975), and reports from legislative committees (Andra Lagutskottet, 1951). Those who developed the vacation legislation thus sought to ensure conditions for restoration not only in terms of time, but also in terms of the possibilities for performing particular activities outdoors in relatively warm and sunny conditions. In keeping with the preferences acknowledged in the legislation, and in keeping with the pattern of vacation-taking shown in Fig. 5.1, population surveys have found that people in Sweden generally do engage in more outdoor activity during the summer months than during cooler months (Statens Offentliga Utredningar, 1964; Statistiska Centralbyrån, 2004). In sum, by focusing on vacation as one manifestation of the social regulation of time, the initial test of CRT indirectly represented variation in restorative characteristics of the physical environment and movement into more restorative settings; the theory assumes that settings which support restoration are located not only in space but also in time, and that the social regulation of time addresses, among other concerns, the alignment between people's various needs for restoration and their possibilities for entering settings that well serve those needs at the given time, for the necessary duration.

This sketch of CRT has provided enough detail to distinguish it from SRT, ART, and RRT. It has also shown how CRT complements those theories in important ways. Its concern for the ways in which people are located in a socially regulated structure of time complements the approach characteristic of research guided by SRT and ART, which ordinarily focuses on what happens during the time a person spends in an environment but leaves implicit matters such as when they happen to be in the

given setting, how long it took them to get there, when and why they must leave, and how long it will take them to reach their next destination. CRT also helps to relate the theories of the conventional narrative to RRT by addressing processes that establish some of the stable circumstances to which people in closer relationships must adapt and to which they must orient their arrangements for supportive exchange. The theory as sketched thus does more than provide bases for novel research questions and hypotheses about restoration phenomena in populations; it also suggests new questions and hypotheses for research otherwise informed by SRT, ART, and RRT.

5.5 Toward a More Encompassing Narrative

I began this chapter by setting a context: urbanization reduces possibilities for experiencing nature, which provokes alarm and motivates research on the value of nature experience for health. I then argued that, as a necessary complement to the stress and coping perspectives on human adaptation, the restoration perspective has particular relevance for understanding how nature experience promotes health. This relevance has become more pronounced as the conceptual distinction between built/urban and natural environments has increasingly gotten linked with experiences of depletion versus restoration, concomitant to the concentration of populations, and productive activities in urban areas. Yet, despite this "built in" relevance, the restoration perspective has been underutilized as a basis for understanding nature-and-health relations. At present, the representation of the restoration perspective in nature-and-health studies follows a conventional narrative about stress recovery and attention restoration in individuals, to the neglect of restorative processes that involve multiple people. To remedy this neglect, I set out a general framework for restorative environments theory, into which I organized some of the main components of stress recovery theory and attention restoration theory. To extend the narrative, I then added the level of analysis as another component to the general framework, and I sketched some of the main components of two additional theories, one concerned with restoration of relational resources held by dyads and small groups and one concerned with restoration of social resources held collectively by members of a population. Now, in closing here, I will comment on further work with the extended framework as a whole and the need for attention to matters of the narrative as such. In doing so, I will raise some important considerations for nature preservation efforts, urban planning, health promotion strategies, and ways of thinking about human–nature relations.

5.5.1 Further Work with the Extended Framework

First, a caveat: In calling for a more expansive theoretical narrative, I have not meant to discount the seminal contributions of Stephen and Rachel Kaplan and Roger Ulrich nor the efforts of so many others to elaborate, test, and apply SRT and

ART. That work has played a crucial role in research and practice concerned with nature experience and health. Moreover, SRT and ART still have ample heuristic value, and I expect that they will inspire research and practice for years to come.

Some of that further effort will be directed toward needed critical assessments, of the empirical evidence that bears on one or both of the theories (cf. Ohly et al., 2016; Stevenson et al., 2018) and of the ways in which the assumptions and claims of the two theories have gotten represented in empirical research and the conventional narrative. I anticipate that other work will center on alternative accounts of restoration in nature that challenge SRT and ART, such as the perceptual fluency account put forward by Yannick Joye (2007) and colleagues (Joye, Steg, Unal, & Pals, 2016; Joye & van den Berg, 2011; see also Hagerhall et al., 2008). Such efforts should help to advance the theoretical discourse about restorative environments and dialog with other bodies of theory and practice.[15]

Further work with RRT and CRT will also serve those ends, and I have already indicated how each of the theories can guide research. What needs further discussion here is how, with the addition of RRT and CRT, the general framework, taken as a whole, can inform further work, whether it focuses primarily on individual behavior, the behavior of dyads and small groups, or collective behavior. I have already given some broad suggestions in that regard. I will now focus on how work with the extended framework can address two particular needs: for treatment of restoration in nature as a social ecological phenomenon and for further consideration of evolutionary assumptions invoked in discussions of restoration in nature.[16]

5.5.1.1 The Need to Treat Restoration in Nature as a Social Ecological Phenomenon

Recall that the columns of the general framework as represented in Tables 5.2, 5.3, and 5.4 reflect on the necessary relatedness of the stress, coping, and restoration perspectives within the adaptive paradigm. In a similar way, the successive rows of the extended framework reflect on the necessary relatedness of the three paradigms for research described by Saegert and Winkel (1990). The extension of the framework made here with RRT nests the concerns of the adaptive paradigm for individual survival within the concerns of the opportunity structure paradigm, for example, with regard to the spatial and temporal constraints on action that people must overcome in the pursuit of their personal and shared goals and projects. The further extension made with CRT in turn nests those concerns within the concerns of the sociocultural paradigm, which approaches the challenge of survival "not as an individual concern, but as a problem for the social structure within which the individual is embedded, whether it be family, neighborhood, nation or even world society" (Saegert & Winkel, 1990, p. 457).

The basic organization of the extended framework thus aligns with the assumptions of a social ecological model of stress, coping, and restoration: people normally cycle through processes of depletion and restoration as they confront and cope with demands from the environment; their stress–restoration cycles

correspond to a substantial degree with cycles of activity organized within arrangements for supportive exchange; and those arrangements show sensitivity to the stable circumstances in which members of a population live, as shaped by economic, political, social, technological, and other higher level processes (cf. Hartig, Johansson, & Kylin, 2003). Further, as I have shown in the accounts of RRT and CRT, influence can also flow in the other direction: excessive demands on individuals can engender problems with their standing arrangements (like a shortage of shared leisure time) which in turn can feed into collective efforts to identify and implement collective solutions, as with the institution of a national park system (Olmsted, 1865/1952) and the production of national vacation legislation (Hartig et al., 2013). With this representation of bidirectional influence and feedback between processes on multiple levels within an open system, the extended framework addresses a desideratum of further research that I mentioned earlier: the ways in which natural settings figure in health need consideration in light of the social ecology in which their various attributes contrast with those of the other settings within and across which individuals and groups distribute their time (cf. Hartig, Johansson, & Kylin, 2003).

Research that neglects this social ecology runs some significant risks. One involves treating psychological restoration as a pathway from nature to health that works independently of pathways that involve social resources, even though the pathways often work together (see Dzhambov et al., 2018, 2019). Another involves blindness to the tradeoffs that people may make in choosing between activities that serve only some individual restoration need (say, a solitary walk in the park) and activities that serve both individual restoration and care for relationships (say, watching television with family).[17] Still other risks involve failure to recognize the ways in which standing arrangements for supportive exchange and stable societal circumstances can prevent people from engaging with nature. Lack of attention to such matters can entail misunderstandings and misestimates that in turn risk shortcomings in practical application, with misguided interventions and missed opportunities. For example, more and better urban parks and green spaces may be greatly appreciated by the people who can look out on or visit them, but they may only provoke frustration among those who already stagger under an excess of demands and a shortage of time, and indeed they may have the undesirable consequence of driving up property prices so that people already in difficult circumstances may have to move away from the one favorite park or green space they can manage to visit on occasion. Those who want to preserve nature and ensure opportunities for all urban residents to engage with nature might therefore complement physical design and planning strategies by strengthening alliances with actors indicated by the analysis here, such as those trying to ensure access to affordable housing in city centers (e.g., Wolch, Byrne, & Newell, 2014) and those who would help people to "take back their time," as with passage of vacation legislation where it does not exist (e.g., de Graaf, 2003).

5.5.1.2 The Need for Further Consideration of Evolutionary Assumptions Regarding Restoration in Nature

When I first introduced the general framework (referring to Table 5.2), I mentioned that other components could be added to further aid comparisons among theories, taking their set of assumptions about human evolution as an example of such a component. As with the addition of the level of analysis to the general framework, addition of the set of evolutionary assumptions reinforces its representation of the social ecology of stress, coping, and restoration. Consideration of the evolutionary assumptions also indicates ways to revise the narrative about restoration in nature.

Put simply, SRT and ART assume that natural selection has made *Homo sapiens* well adapted to some features of the (natural) environment that had particular importance for survival in early hominin evolution but maladapted to some prevalent features of contemporary (urban) environments and related lifestyles. Those assumptions figure more or less prominently and with more or less detail in many variants of the conventional narrative. Portrayals of urban environments tend toward the malign: they lack perceptual features of habitability to which an evolved system of affective responding is attuned, thus engendering an ongoing low-level stress response (Parsons, 1991); and evolved cognitive capabilities cannot sustain the effortful processing of the large amounts of complex and uninteresting information to which one must attend while trying to act effectively in them, thus engendering mental fatigue (Kaplan, 1995). In contrast, natural environments are usually portrayed as benign: they have more of the survival-relevant icons that evoke biologically prepared positive affective responding (Ulrich, 1983); and processing of the intrinsically interesting (visual) stimuli that they present requires less cognitive effort (Kaplan & Kaplan, 1989). If one accepts the further assumption that natural selection works too slowly to have enabled biological adaptation to urban conditions that emerged over only a few millenia, then it might seem reasonable to expect that problems of stress and mental fatigue will become still more prevalent as populations continue to concentrate in urban areas. It follows that evolutionary assumptions like those in SRT and ART do more than simply align with the "built in" relevance of the restoration perspective for understanding why natural environments better support restoration than urban ones; they appear to reinforce that built-in relevance insofar as they are taken to mean that all those new urban residents would do well to turn for their recreation back to the natural settings they remain adapted to in some evolutionary sense.

Yet, theories that build on such evolutionary assumptions have long drawn criticism for their claims about prehistoric environmental features to which humans supposedly remain biologically adapted (e.g., Foley, 1995; Gould, 1978; Gould & Lewontin, 1979; Zuk, 2013). What such criticism means for restorative environments theory can become clearer by comparing the evolutionary assumptions of the different theories within the extended framework. One major difference quickly becomes apparent: the assumptions of RRT and CRT put more emphasis on selection for cooperation, acknowledging that individuals formed groups and helped each other survive in prehistoric environments, which they manipulated to serve

their individual and common needs using tools they created and refined, guided by knowledge they acquired and passed on with increasingly powerful language and learning capabilities. Those assumptions build on knowledge of the roots of language, sociality, social learning, and culture more generally; they recognize that humans have adapted biologically and culturally to a very broad range of environmental conditions; and they recognize that evolution has continued, with social and cultural selection still working together with natural selection to shape the genotype and phenotype, sometimes quickly, within relatively few generations (e.g., Runciman, 2009; Zuk, 2013). I will not elaborate this point here, though I can note that much other research in psychology and allied disciplines refers to similar assumptions when addressing topics like the need to belong as a pervasive behavioral motive (Baumeister & Leary, 1995); reciprocity as a basis for social exchange (Buunk & Schaufeli, 1999); tending and befriending as a biobehavioral response to stressors (Taylor et al., 2000); cooperation in the absence of egoistic incentives (Caporael, Dawes, Orbell, & van de Kragt, 1989); and the adaptiveness of emotional contagion (Hatfield, Cacioppo, & Rapson, 1994).

Because the evolutionary assumptions of RRT and CRT refer to characteristics of living conditions relevant to the survival of people in groups, they encourage a view of the urban environment within the social ecology of stress, coping, and restoration that differs from the view seemingly encouraged by the assumptions of SRT and ART. This alternative view does not focus narrowly on those urban conditions that do actually threaten the biological and psychological survival of the individual, and to which humans cannot readily adapt. Also, and importantly, it does not treat such conditions, for example, heavy air pollution, as necessary features of the urban environment, but rather as the consequences of particular approaches to serving particular wants and needs, like the use of private cars instead of bicycles and trams or the use of coal to generate electricity instead of solar- and wind-based technologies. This alternative view of the urban environment puts more emphasis on those of its features that might be considered necessary: many people living together, some unknown to others, cooperating in various ways, including in reproduction (sociocultural as well as biological) and the promotion of social learning.

Thus, while evolutionary assumptions of RRT and CRT may currently align with the "built in" relevance of the restoration perspective for understanding why natural environments better support restoration than urban ones, they challenge the necessity of that relevance rather than reinforce it; the urban environment need not be the source of stress and cause of depletion in relation to which the natural environment has special restorative value. By recognizing the adaptedness of humans to necessary features of urban environments, especially people living and cooperating with one another, and by recognizing the possibilities for adapting to urban living conditions, including elimination of harmful conditions, the promotion of more salutary conditions, and the integration of natural and artificial features and processes within urban areas, the evolutionary assumptions of RRT and CRT allow for the possibility that future generations will weaken the conceptual distinction between the urban and the natural as it is grounded in experiences of stress and restoration (cf. Hartig & Kahn, 2016).

Use of the framework to support comparisons of the evolutionary assumptions of different theories will thus help to clarify not only the differences between them, but also matters of some consequence for thinking about human–nature relations and the encompassing narrative about nature, restoration, and health. Neglect of urban conditions to which humans are persistently and necessarily adapted is just one side of the issue. One can also ask about neglected features of the natural environment to which humans obviously are adapted. One set of these in particular—the passage of days and seasons with the movement of the Earth in relation to the sun—further challenges the distinction between the urban and natural; it calls attention to the ubiquity of features of the natural environment with fundamental relevance for stress, coping, and restoration (cf. Hartig & Beute, 2017). I will however leave that topic for another occasion, and instead turn to further work with the narrative as such.

5.5.2 Attention to Matters of the Narrative as Such

Evolutionary theorists have long debated the relative significance for natural selection of cooperation versus competition between conspecific individuals. The choice of emphasis on one over the other has in some cases reflected on the theorist's own sociocultural position and the political-economic narrative in which they situated their evolutionary thought (see Todes, 1987). Speaking to this difference in emphasis on cooperation versus competition and the way it figures in narratives about nature and society, Gould (1988) explained his own approach to such matters:

> … I like to apply a somewhat cynical rule of thumb in judging arguments about nature that also have overt social implications: When such claims imbue nature with just those properties that make us feel good or fuel our prejudices, be doubly suspicious. I am especially wary of arguments that find kindness, mutuality, synergism, harmony – the very elements that we strive mightily, and so often unsuccessfully, to put into our own lives – intrinsically in nature (p. 21).

Whether cynical or suitably skeptical, I think Gould's rule of thumb warrants application in the further development of the narrative about nature, restoration, and health. The assumptions made about our evolutionary past have a bearing on our evolutionary present and future.

Recall that just before introducing the narrative concept in this chapter, I gave a definition of theory as discourse. As such, theory remains open to the influence of observations of change in the phenomena of interest, which can reflect on change in the surrounding sociocultural circumstances. I then observed that the definition of theory admits the emergence of a particular way of telling about the contents of theory—a narrative—that may also include an account of a problem. As part of the narrative, the statement of the problem provides a context for the phenomena of interest and helps to establish the value of theorizing about those phenomena.

What I left implicit then is that development of a narrative around some body of theory can be part of the change in sociocultural circumstances that shape the

phenomena of interest to it. Yet, I had already given an example of how that can happen. Recall, once again, that at the start of this chapter I asked you to consider "a broad context for this work." Note: not "the" broad context, but one possible context among others. In those opening paragraphs, I did what many other authors in the nature-and-health field have done and implicated urbanization as a driver of the loss of opportunities to experience nature, with attendant threats to human health. I then explained how research guided by restorative environments theory countered this trend by making it more difficult to disregard arguments for protecting natural settings as public health resources. I indicated that research guided and informed by the two theories of the conventional narrative has supported practical measures for the preservation of nature and the promotion of health through nature experience. I might have gone on to explain that knowledge of the science of restorative benefits of nature experience has become widespread, and that it has shaped how people encounter, engage with, understand and value "nature," as reflected for example in newly popular cultural practices like "forest bathing" (after the Japanese term, *shinrin-yoku*; Park, Tsunetsugu, Kasetani, Kagawa, & Miyazaki, 2010).

Well and good of itself it would seem, but a context-setting problem formulation that establishes the value of theorizing about restorative experiences in nature can have unintended and undesirable consequences if it rests on evolutionary assumptions that reinforce a conceptual opposition between the natural and urban environment and the "built-in" relevance of the restoration perspective. With the addition of RRT and CRT to the general framework, and the re-consideration of evolutionary assumptions that their addition encourages, I have laid foundations here for an alternative narrative that addresses problems with that conceptual opposition.

This set of problems is old, both in kind and content. With regard to its kind, I can first note that evolutionary explanations for many behavioral phenomena apparently appeal to many people. Perhaps it is because they seem to speak to how we *really* are as humans. Perhaps it is because the logic of natural selection seems so intuitively plausible and unassailable, lending credence to accounts of how natural selection shaped the capabilities reflected in patterns of present behavior. But, as Gould (1978) argued, some such accounts are "just-so stories," problematic because "all bits of morphology and behaviour" do not "arise as direct results of natural selection," and there may be more than one selective explanation for each bit (p. 530). Without discounting the potential value of story-telling as a step in the scientific process (Gardner, Marsack, Trueman, Calcott, & Heinsohn, 2007), further work with the narrative as such will gain from applying Gould's (1988) rule of thumb, scrutinizing what may be just-so stories and considering how their evolutionary assumptions might be challenged and falsified. Ulrich's (1993) discussion of biophilia versus biophobia offers one example with its reference to carefully designed experiments on biologically prepared responses to fear-relevant natural stimuli (see endnote 8). Joye and colleagues also helpfully demonstrate a critical stance toward evolutionary assumptions in their commentaries on SRT, ART, and the biophilia hypothesis (Joye & De Block, 2011; Joye & Dewitte, 2018; Joye & van den Berg, 2011). The evolutionary assumptions of the perceptual fluency account, RRT, CRT, and other theories that can fit in an extended framework and a more

encompassing narrative will also require ongoing critical assessment. That work will do well to also consider how human evolution has continued since those earliest millennia of our prehistory.

With regard to how work with an alternative narrative can address the problem of content—the conceptual opposition between natural and built/urban environments and the "built-in" relevance of the restoration perspective for a narrative about nature, restoration, and health—I can turn to another suitably skeptical scholar for some help. In a history of exhaustion, Schaffner (2016a) writes:

> There is much we can learn from past theories of exhaustion that can help us make sense of our own experience of exhaustion today. Almost by default, historical analyses render apparent the relativity of our own attitudes and values, which we often tend to experience as absolute truths (p. 12).

And:

> Rather than perpetuating the myth that our own is the most exhausting age and lamenting the vampirically depleting horrors of modernity, perhaps we should acknowledge that exhaustion is simply an essential part of human experience. … What changes throughout history is not the experience of exhaustion as such, but rather the labels we invent to describe it, the causes we mobilize to explain it and, of course, the specific cultural discontents that we tend so readily to map onto the condition. (Schaffner, 2016b, p. 339):

With regard to the recruitment of evolutionary assumptions in explanations for exhaustion, and by implication processes of restoration, she provides an example that also illustrates a point I want to make here. Discussing a past theory of exhaustion and its cultural context, she cites Richard von Krafft-Ebing's (1898) argument for why the emancipation of women underlied common forms of psychopathology then diagnosed among them:

> Only over the course of many generations can the capacity of the brain that is necessary for succeeding in formerly exclusively male scientific or artistic professions be acquired by a woman (pp. 57–58; cited in Schaffner, 2016a, p. 141, with her translation from the original German).

Therapeutic recommendations that followed with this kind of thinking would have women abstaining from those forms of artistic and intellectual activity then reserved as the province of men. "Rest" meant returning to a focus on childcare and other domestic activities.

In the present case, I call attention to the "relativity of our own attitudes and values" with regard to cities and urban life versus the natural environment and nature experience. The ways in which these attitudes and values have been expressed in research on nature, restoration, and health have emphasized negative aspects of unnecessary features of cities and urban life and discounted positive qualities of their presumably necessary features. It concerns me that the way in which evolutionary arguments get recruited in narratives around nature, restoration, and health reinforces this negative bias, despite abundant and obvious evidence that humans are well-adapted to the necessary features of urban environments and urban living. This neglect of evidence that runs counter to the conventional evolutionary arguments aligns with the defense of particular cultural biases like those that have

aroused Gould's cynicism, and which in their practical effects of maintaining a harmful status quo resemble those which von Krafft-Ebing packaged in arguments about the roots of psychopathology in women.

A more skeptical stance toward assumptions about our evolutionary past might open for a more optimistic view of our evolutionary present and future. This stance would align with scholarly challenges to anti-urban bias (e.g., Lofland, 1998) and recurrent practical efforts to bring natural and artificial features of human environments together in more beneficial ways, as with the garden city movement (Howard, 1902), green infrastructure (Coutts, 2016), and various architectural programs, such as biophilic design (Kellert, Heerwagen, & Mador, 2008). As it stands, though, research has done little to reconcile the narrative about nature as an antidote to urban pathologies with understandings of how urban living does in fact promote public health (cf. Hartig et al., 2020; Hartig & Kahn Jr., 2016). A more encompassing and in my view more accurate narrative would have a context-setting problem-description that does not force urbanization and nature preservation into some necessary opposition but rather emphasizes how further development of urban environments can proceed as a component of human evolution in which we coordinate our needs with those of other forms of life.

5.6 Concluding Comments

A conventional narrative reflects measures of agreement and trust among members of a community, and it can provide important benefits. It can aid communication about a body of theory and the activities guided by that theory. It can support the dissemination and assimilation of new knowledge relevant to those activities. It can thus promote community-building efforts; it can provide a locus around which a growing number of people with similar scholarly interests and practical concerns can gather to more effectively and efficiently coordinate research, teaching and practical efforts.

Yet, a conventional narrative also entails risks. The advantages it confers may get offset by, for example, a lack of critical self-reflection, and perhaps blind loyalty to one particular theory and a biased or lack of due regard for others. A conventional narrative may perpetuate misunderstandings and flawed reasoning and biased representations of the state-of-knowledge. It can undermine community-building efforts and practical efforts around which people might gather as a community; it can alienate some who would offer critical perspectives, turn away others who might otherwise want to do so, and have undesirable practical consequences.

As in other fields of activity in which people can become invested in particular approaches and positions, path dependencies in a field of science can maintain the stability of a narrative despite recognition of a need for change in its fundaments (cf. Thelen, 1999). The community gathered around a narrative can gain by acknowledging this possibility; its members perform a service when they offer reasoned criticism, new claims, and new observations bearing on the body of theory and the

narrative built around it. Fortunately, the community gathered in the study of restorative environments and restorative benefits of nature experience has a wealth of members who want to provide this service. The discourse within the community can refine or reject existing assumptions and theoretical claims, select for or against new claims, and in other ways drive the further evolution of restorative environments theory and a narrative built around its constituent accounts. It can thus better serve understanding and practical applications.

The conventional narrative about restorative effects of nature experience became conventional for good reasons, and it has served research and practice well in many ways. This said, I see good reasons to move toward a more encompassing narrative, one that respects the historical and lasting values of SRT and ART and honors the efforts of their authors while also acknowledging the limitations of those theories and calling attention to a broader range of phenomena, problems, and possible solutions. This will make more of the potential of the restoration perspective.

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Notes

1. The “nature” considered here primarily comprises environmental features, settings, and processes not apparently created or influenced by humans and which humans ordinarily can perceive without special instruments or sensory aids. Its representations include trees and other vegetation; the forests, grasslands, and other areas where vegetation dominates; wild-

life; clouds and other meteorological phenomena; bodies of water and movements of water; seasonal variations in all the foregoing; and much more. This meaning of "nature" overlaps substantially with the meaning of "natural environment" as a large outdoor area with little or no apparent evidence of human presence or intervention (Pitt & Zube, 1987), the visible aspect of which is commonly referred to as the "natural landscape" (Daniel, 2001). Consequently, "nature," "natural environment," "natural landscape," or simply "landscape" and terms like "green space" and "blue space" get used somewhat interchangeably in this research area. This said, settings such as botanical gardens, golf courses, and urban parks may be artificial in many respects and yet be seen as natural because they mainly consist of vegetation and other natural-appearing features. Further, a person might enjoy some representation of nature while situated in what objectively could be described as an artificial environment, as when viewing natural scenery displayed in photos, films, or virtual reality setups. In light of these often-considered definitional issues, psychological research in the area assumes the relevance of biophysical or ecological or other attributes of environments as they might be objectively measured; however, it also assumes the importance of subjective and intersubjective aspects of the experience of the environment, as reflected in the widespread use of terms like "nature experience" and "contact with nature" (e.g., Bratman et al., 2019; Hartig et al., 2011; Hartig & Evans, 1993; Mausner, 1996; Wohlwill, 1983).

2. As this paragraph illustrates, those working with nature-and-health questions ordinarily assume an expansive definition of "health" like that offered by the World Health Organization (1948): "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." By calling attention to a person's physical, mental, and social condition, it affirms a view of health as multidimensional and invites consideration of how health arises from the interplay of multiple factors. By referring to well-being, it invites consideration of how health rests on subjective experience. By downplaying the absence of disease and infirmity as the main criteria for health, it emphasizes the importance of diverse health promotion and disease prevention efforts, including those to be discussed in this chapter. For further details, see Hartig et al. (2011).
3. For additional discussion of changing conceptions of nature and human–nature relations, see for example Glacken (1967), Huth (1957), Macfarlane (2007), Marx (1964), Nash (1982), Schama (1995), Thomas (1983), and Tuan (1974). For the sake of simplicity here, I refer to this kind of change as part of a "sociocultural" evolutionary process; however, I note Runciman's (2009) objection to this usage:

   > No less important than the recognition that natural selection cannot by itself account for the diversity of collective human behavior-patterns is the recognition that cultural and social selection, which have too often been assimilated … under the rubric of 'sociocultural evolution', are… not at all the same thing. There are not two but three levels at which evolution drives human populations down the open-ended, path dependent trajectories which continue to generate new patterns of collective behavior out of old (p. 3).

4. Like other efforts involving cross-paradigm synthesis, this one reflects recognition of the limits of the different paradigms and their allied disciplines. Commenting on contributions from environmental psychology to the different paradigms, Saegert and Winkel note that "the psychological heritage of most researchers leads to a focus on the characteristics and dynamics of persons; and although the field has always offered a contextual critique of psychology (Little, 1987), the call for interdisciplinary, systems-oriented, and problem-centered research has not been easy to answer (Proshansky, 1987)" (p. 442). They accordingly express concern for "the extent to which advances in environmental psychology confront the fact that many of our experiences in and uses of environments must be understood in the context of broader physical, economic, historical, and political forces" (p. 442). Engaging with the multidisciplinary character of the broad field in which environmental psychology is situated, they nonetheless point to the particular contributions it can offer as a discipline: "While environmental psychologists often give too short shrift to context, scholars from other disciplines who work on an articula-

tion between the individual and broader economic, social, and political structures often skip lightly over the acting, experiencing person" (p. 443). In attending to the different paradigms and with them to the reality of processes that work across different levels of analysis, Saegert and Winkel state a position also assumed here:

> Historically developed conditions (including ecological conditions) and the social structural forces of any particular period form the preconditions for individual and group action. Because they precede individual activity and are organized beyond the reach of most individual actions, they have greater weight in maintaining conditions and directing change (p. 445).

The present cross-paradigm synthesis builds on an earlier one that also acknowledged the interdependence of processes working across levels of analysis. In that earlier account, I described general (population) and specific (individual) transactions with the environment that occur within and shape nature experience, and how those transactions relate across the different levels of analysis within sociocultural evolution (Hartig, 1993).

5. This definition does not refer explicitly to a predictive function of theory, but neither does it exclude the use of theory for prediction. Similarly, it does not refer explicitly to qualities of theories often held up as desirable, such as parsimony and falsifiability. Yet, the discourse to which it refers would address such theoretical desiderata insofar as they are relevant to the subject of the theory. For example, a theorist offering an account for how some political-economic structure became established in a society may have little interest in prediction. Note that social theory comprises diverse specific formulations, or theories; one can similarly speak of restorative environments theory as a body of theory with multiple formulations, including but not limited to SRT and ART.

6. *Nota bene*: I cannot offer a specific number for the incidence of such conjoint representation of SRT and ART, only an impression based on my reading over the years.

7. One can find this kind of development described in their texts. For example, in the chapter on "The Restorative Environment" in their 1989 book, the Kaplans wrote as follows:

> The wilderness research (discussed in chapter 4) played a particularly important role in the development of the ideas about what constitutes a restorative environment. In the context of that research we also began to examine the puzzles of mental fatigue more closely. As a framework emerged, it became apparent that the results of many of the other studies (particularly the gardening satisfaction research discussed in chapter 5) were equally applicable (p. 177).

8. Subsequent to his 1984 essay, Wilson's thinking drew on Ulrich's research on positive affective responses to natural environments. Ulrich approached such responses as positive or restorative analogs to very rapid, biologically prepared phobic responses, such as uncovered by Arne Öhman, Ulf Dimberg and others at Uppsala University in experiments with snakes and spiders as fear-relevant stimuli. Ulrich described that research in his chapter for the book that Wilson co-edited with Stephen Kellert, *The Biophilia Hypothesis* (Kellert & Wilson, 1993), and Wilson acknowledges that work in his own chapter. On August 26, 1992, during a meeting at Woods Hole, Massachusetts held in conjunction with the development of that book, Wilson gave Ulrich a copy of his book, *The Diversity of Life* (Wilson, 1992), on the title page of which he inscribed a gracious acknowledgement of Ulrich's influence (personal communications from Roger Ulrich, May 18 and 20, 2020, the latter with a scanned copy of Wilson's inscription).
9. The 1991 article in *Environment and Behavior* presented results from two studies, one the basis for Marlis Mang's doctoral dissertation (*The restorative effects of wilderness backpacking*; Program in Social Ecology, University of California, Irvine; 1984) and the other the basis for my master's thesis (*Testing the theory of restorative environments*; Program in Social Ecology,

University of California, Irvine; 1990). Both of these studies were completed with primary supervision from Gary Evans and oriented primarily to Kaplan and Talbot's (1983) formulation of what became attention restoration theory. Both were also informed by Ulrich's work, as reflected in the measures they used, but they engaged with his theorizing to different degrees. For example, Mang did not cite the 1983 chapter in which Ulrich first elaborated his theory, even though it was published in the same volume as the Kaplan and Talbot chapter. The master's thesis study was designed as a companion to Mang's dissertation study, and it drew on Ulrich's work to a greater degree theoretically and methodologically. I completed data collection for that study during the Spring of 1987, and later that year, at the 4th World Wilderness Congress, I presented a paper with results from both of the studies. That conference paper served as the basis for the 1991 article, in which we clearly juxtaposed the programs of research by the Kaplans and Ulrich to enable a discussion of results in terms of "different theoretical models of restorative experience" (p. 23). I subsequently gave further thought to the complementarity of the two theories, in a chapter written with Gary Evans (Hartig & Evans, 1993) and in my doctoral dissertation, the title of which acknowledges not one theory but rather a body of theory (*Testing restorative environments theory*; School of Social Ecology, University of California, Irvine; 1993). The main results from the dissertation study got published as a journal article only much later (Hartig, Evans, et al., 2003), for reasons that could also be considered within discourse extending into the conventional narrative.

10. Note the reference to "the pool of relational resources." In the following, I will continue to use this encompassing concept rather than go into the details of specific relational resources. To help keep an already complicated discussion relatively simple, I will set aside matters of how, across relationships or within relationships across time, the pool in question comprises trust, mutual respect, mutual understanding, and other possible relational resources to varying degrees. I also set aside their relative importance as a basis for supportive exchange, as well as matters of their substitutability, susceptibility to depletion, dependence on some individual resource, amenability to restoration, necessary conditions for restoration, *et cetera*.
11. Although I have to this point indicated diverse interpersonal, spatio-physical, temporal and social aspects of the arrangements and stable circumstances in which people develop, deploy, deplete, and potentially restore relational resources, I have also glossed over numerous complexities. Although the discussion can apply for diverse people, it assumes a relatively high functional capability of those involved. I do not engage with the additional complications that could follow when one or more of them struggle with, for example, addiction, chronic mental illness, or irreversible cognitive or physical limitations. Neither do I engage with complications around relationships that persist although negative interactions predominate over positive ones (e.g., House, Umberson, & Landis, 1988; Rook, 1984); the discussion here assumes that particularly the adults involved have a measure of control and the ability to choose whether or not to continue a relationship. Further, I do not engage fully with various aspects of the development, deployment and depletion of relational resources. These include, for example, how a person's ability to deploy functional resources in providing support will normally vary across the life course, and how expectations about and arrangements for supportive exchange will vary accordingly; how relational resources commonly develop in the performance of social roles, and how the deployment and depletion of those resources often occur while fulfilling role obligations; and how anticipation of reciprocity can span widely different time frames, from the momentary to the life course, as when a helpless baby grows to become an adult child that a parent looks to for help. Despite their relevance, I must set aside a deeper treatment of such matters for the sake of simplicity.
12. RRT also accommodates cases in which a person feels isolated and lonely, as may happen when a retired person lives alone (cf. Perissonotto & Covinsky, 2014). Such a person may have family and friends that they value deeply, but they may only seldom meet them because of age, infirmity, and/or the geographical distance between them. In that privacy regulation involves opening and closing to others to achieve a desired level of social interaction, the relevant arrangements for supportive exchange would be those that extend across domains, as when a retired widow

regularly goes for a walk in a nearby park with her unthreatening dog, where she can enjoy interactions with others that start from comments of the type, "Oh, what a cute little dog!" Such interactions may continue over years of meeting again in that setting, and even if those involved never interact outside that setting, they may nonetheless value their routine pleasant exchanges (cf. Lofland, 1998). Similar kinds of friendly relations can develop with people in other public places where people can easily go to be around others (i.e., the "third places" discussed by Oldenburg & Brissett, 1982). Thus, the person, whether of their own initiative or with assistance, enters arrangements to ensure more or less routine social contacts across domains, thereby preventing some feelings of isolation and loneliness or reducing them when they do occur. Parks and other natural settings with relatively high levels of visitation may serve in reducing and preventing loneliness insofar as the people there have gotten away from daily demands elsewhere, can slow down and relax, and so may present a happier and possibly more open social partner (Astell-Burt et al., in press); however, they address intimate, relational and collective dimensions of loneliness to widely varying degrees (cf. Cacioppo, Grippo, London, Goosens, & Cacioppo, 2015; Perissonotto, Holt-Lundstad, Periyakoil, & Covinsky, 2019).

13. Here, too, I set aside numerous complexities, acknowledging that a person's or group's expectations regarding reciprocity and fair treatment may depend on diverse personal and contextual characteristics, such as personality characteristics, social roles, gender, ethnicity, and so forth.
14. Here I perhaps unfairly set aside a relevant topic. Insofar as the lost social resources had inhered to features of the physical environment that got damaged or destroyed, restoration of those resources may follow from the efforts of those affected to recreate the environment, which in some cases would have involved settings within their standing arrangements. Such a restorative process is illustrated by efforts to restore urban forests in cities that had sustained heavy damage during wars, which involved private as well as institutional actors of different kinds (see Cheng & McBride, 2006, writing of Tokyo and Hiroshima; Lacan & McBride, 2009, writing of Sarajevo; and Stilgenbauer & McBride, 2010, writing of Hamburg and Dresden).
15. The further discourse within restorative environments theory can now build on a voluminous body of empirical findings, critical commentary, and other forms of experience concerning validity and utility issues related to the two theories. These include, for example, the validity of their evolutionary assumptions (e.g., Haga, Halin, Holmgren, & Sörqvist, 2016; Joye & Dewitte, 2018; Joye & van den Berg, 2011); the representation of their core constructs, with related issues of research design, measurement, and analysis (e.g., Basu, Duvall, & Kaplan, 2019; Berto, Massaccesi, & Pasini, 2008; Beute, Kaiser, Haans, & de Kort, 2017; Chang, Hammitt, Chen, Machnik, & Sua, 2008; Han, 2018; Hartig & Jahncke, 2017; Hartig, Korpela, Evans, & Gärling, 1997; Herzog, Maguire, & Nebel, 2003; Laumann, Gärling, & Stormark, 2001; von Lindern, 2015); the representation of particular settings in environmental sampling, from beaches, botanical gardens, cafes, and cemeteries to monasteries, museums, town squares, and zoos (e.g., Carrus et al., 2017; Colléony et al., 2017; Hidalgo, Berto, Galindo, & Getrevi, 2006; Kaplan et al., 1993; Nordh, Evensen, & Skår, 2017; Oullette, Kaplan, & Kaplan, 2005; Scopelliti, Carrus, & Bonaiuto, 2019; Staats et al., 2016; Thwaites, Helleur, & Simkins, 2005; White & Gatersleben, 2011; Wyles et al., 2019); the representation of multiple sensory dimensions, as with soundscape (e.g., Benfield, Taff, Newman, & Smyth, 2014; Jahncke, Eriksson, & Naula, 2015; Ratcliffe, Gatersleben, & Sowden, 2013); and the need for sampling of people that addresses particularities of different groups, for example, as related to occupations (e.g., Betrabet Gulwadi, 2006; Cordoza et al., 2018) or life cycle stages (e.g., Collado, Staats, & Corraliza, 2013; Larson et al., 2018; Schutte et al., 2017; Scopelliti & Giuliani, 2004). As for opening for further dialog with other areas of theoretical and practical endeavor, the further work with SRT and ART can build on examples that have addressed phenomena such as creativity (Atchley, Strayer, & Atchley, 2012; Williams et al., 2018); emotion-regulation and self-regulation (e.g., Beute & de Kort, 2014; Korpela, 1992; Korpela, Hartig, Kaiser, & Fuhrer, 2001; Scopelliti & Giuliani, 2004; Taylor et al., 2002); place attachment and place identity (e.g., Knez & Eliasson,

2017; Korpela & Hartig, 1996; Ratcliffe & Korpela, 2016); pro-environmental behavior (e.g., Collado & Corraliza, 2015; Hartig, Kaiser & Strumse, 2007); and salutogenesis (Von Lindern et al., 2017). Similar dialog also shows in many practical arguments for using natural elements and settings to promote effective functioning and health, as with acquisition of mindfulness meditation techniques (Lymeus, Lindberg, & Hartig, 2018, 2019; cf. S. Kaplan, 2001); the treatment of depression (e.g., Berman et al., 2012; Bratman et al., 2015; Gonzalez et al., 2010; Stigsdotter et al., 2011); and prevention and reduction of stress and mental fatigue in classrooms (e.g., Li & Sullivan, 2016; van den Berg, Wesselius, Maas, & Tanja-Dijkstra, 2017), offices (e.g., Evensen, Raanaas, Hagerhall, Johansson, & Patil, 2015; Jahncke, Hygge, Halin, Green, & Dimberg, 2011; Kaplan, 1993), factory canteens (Bellini, Hartig, & Bonaiuto, 2019), diverse health care settings (e.g., Dijkstra, Pieterse, & Pruyn, 2006; Raanaas et al., 2012; Ulrich, Bogren, Gardiner, & Lundin, 2018), and the residential context (e.g., R. Kaplan, 2001; Kuo & Sullivan, 2001; Wells & Evans, 2003).

16. It perhaps goes without saying, but in speaking of the extended framework here, I am not only referring to the contents of Table 5.4 but also the accounts of the respective theories given in the text here and elsewhere.
17. I am probably not the only person of my generation who still enjoys pleasant childhood memories of joining my parents and siblings on Sunday evenings to watch Mutual of Omaha's Wild Kingdom, following zoologists Marlin Perkins and Jim Fowler as they engaged with exotic nature we wouldn't otherwise ever see together, and during time we could all relax after sharing a good meal. Such experiences stand in stark contrast to discussions of effects of television watching by Herzog, Black, Fountaine, and Knotts (1997) and Kaplan and Berman (2010).

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