THE RESTORATIVE EFFECTS OF A VACATION FROM WORK: THE ROLE OF NOVELTY, POSITIVE AFFECT, AND NATURE

by

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We accept this dissertation as conforming to the required standard

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ABSTRACT

The term restoration refers to situations that allow psychological and physiological recovery from sustained effort and over or under stimulation (Ulrich, 1993). The belief that vacations from work are restorative is prevalent but largely untested. Although paid time-off for vacations is costly to organizations and valued by employees there is very little research that empirically tests the beneficial outcomes of vacation experiences. Most previous research on restorative environments focuses on natural environments. Several studies have demonstrated that people react differently to natural environments than they do to urban environments but there is little available information to explain these different reactions.

The goals of this research were to (a) determine whether being away from everyday work environments restored urban office workers, (b) examine whether the restorative effects of natural environments are a direct result of being natural or attributable to their novelty or to positive affect, (c) determine whether pre-vacation levels of stress were important to the restorative effects of natural environments, and (d) test whether vacation environments that are compatible with the individual's environmental disposition result in more restorative outcomes.

Occupational strain, self-reported ability to concentrate, and subjective physical fatigue were measured in a group of sixty-seven office workers one and a half weeks before vacation leave and one and a half weeks after return to work (the vacation group). A group of thirty-two office workers who did not go on vacation completed the same measures (the control group). Restoration was expected to result in reduced occupational strain and physical fatigue and increased ability to concentrate. While at their vacation site the vacation group rated the vacation environment on a continuum of natural to built, a novelty scale, and how pleasant and aroused they felt in the vacation environment. Environmental disposition was measured in the vacation group with the Urbanism and Pastoralism scales of the Environmental Response Inventory.

Pearson correlations, a repeated measures multivariate analysis of variance, and multiple regression analyses were used to analyze the data. Change scores (post-minus pre-vacation), and analyses of partialled variance (Cohen & Cohen, 1975) were used to measure change between the pre- and post-vacation measures.

Results indicate that vacations from work were restorative. Occupational strain decreased and ability to concentrate increased in the vacation group. Counter to expectations, subjective physical fatigue increased in the vacation group but the change was not significant. The

findings provide some support for the claim that natural environments are more likely to be restorative than urban environments. Vacations in natural environments were associated with decreased occupational strain. The novelty and affect (pleasure and arousal) ratings were not significantly associated with restored outcomes. The study did not find an association between pre-vacation levels of strain, natural environments, and restoration. A significant interaction between the urbanism scale and the natural-built rating of the vacation environment suggests that differences in environmental disposition impact the restorative effects of environments. People who scored high on the urbanism scale did not experience decreased occupational strain after vacations in natural environments whereas people who scored in the middle or low ranges on the urbanism scale did. Results indicate that the "carry-over" or long-term effects of restoration and the role of individual differences should be examined in future research.

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Introduction

Contemporary jobs are frequently characterized as demanding and stressful. Jobs provide a standard for judging a person's worth, occupy a large proportion of waking hours, and are expected to fulfil many psychological needs (Watkins, 1973). Some people experience stress reactions to jobs severe enough to impair functioning and health (Adams, 1980). Most peoples' reactions are less intense and involve a wearing-down of mental and physical energies (Watkins, 1973). According to Robinson (1976), industrialization, urbanization, stressful jobs, and fast-paced lives create a need for a time of relaxation and refreshment for the body and the mind.

Conventional wisdom suggests that vacations from work are restorative. Vacations are expected to revitalize employees (Robinson, 1976), renew dedication to the job, and reduce job stress (Utecht & Aldag, 1989). Although several authors describe vacations as revitalizing, empirical research has not examined how vacations affect energy or stress levels. Furthermore, Holmes and Rahe (1967) included vacations in their scale of stress-inducing events.

Some research in the area of environmental psychology has examined whether certain physical environments support or hamper recovery from stress (e.g., Ulrich & Simons, 1986). Most of the research on restorative environments focuses on the effects of natural environments. Positive shifts in emotional states (Ulrich, 1979, 1981), positive

health related effects (Moore, 1981; Ulrich, 1984), reduced stress and increased attention capacity (Ulrich, 1981) occur while viewing natural environments. Usually these restorative effects were measured while, or shortly after viewing the environment. Research to date has not examined whether exposure to nature has long-term benefits or whether exposure to natural environments during a vacation translates into renewed energy upon return to the workplace. Another area that has not been addressed is individual differences and restorative environments.

The objective of the present study is to integrate the literature on vacation benefits with the research on the restorative effects of natural environments. Four questions are addressed: does a temporary leave from one's work environment reduce occupational strain and restore energy?, do natural environments uniquely contribute to restorative effects?, do pre-vacation stress levels influence restoration in natural environments?, and will the restorative effects be stronger if the vacation environment is compatible with the individual's environmental disposition?

Literature Review

Vacation Outcomes

Several indicators suggest that vacations are regarded as beneficial to employees and important to organizations. Some countries offer social programs that allow

disadvantaged members of society to enjoy the benefits of vacations (Murphy, 1985). Unions view vacation leave as an employee's basic right (Jones, 1986). Surveys indicate that workers would choose extra vacation time over a number of other benefits including compressed work weeks and pay increases of 2% (Nealey & Goodale, 1967) and 10% (Quinn & Staines, 1979).

Although paid time-off for vacations is costly to organizations and valued by employees there is very little research that empirically tests the beneficial outcomes of vacation experiences. Lounsbury and Hoopes (1986) express surprise that the vacation from work is "virtually ignored as a research topic" in the study of organizations (p. 392). The few studies that investigate the link between vacations and jobs suggest that vacations do provide positive benefits that carry over to the workplace. Rubenstein's survey (1980) of retrospective accounts of vacation outcomes reports that vacations lead to tension release, plans for personal improvement, and increased life satisfaction. Klausner (1968) surveyed steel workers and found that 25% of the survey participants felt that their "work efficiency" increased and 16% felt that their jobs were "more interesting" after their vacations.

Lounsbury and Hoopes (1986) collected pre-and post-vacation measures from office workers on job satisfaction, job involvement, organizational commitment, turnover

intention, and life satisfaction. Their results suggest that individuals are more likely to plan a career change and are more satisfied with their lives after vacation leave.

These few studies represent our current knowledge base for understanding the "carryover effects" of vacations. Although the literature (e.g., Robinson, 1976) focuses on the need to recover from the demands and stress of the workplace, the research has not examined how vacations affect energy or stress levels. Lounsbury and Hoopes' (1986) study was exploratory and was not intended to produce a complete understanding of vacation outcomes. Nevertheless, the rationale for choosing job satisfaction and job commitment as the job-related outcome measures was not clear. In fact, Lounsbury and Hoopes ask in their discussion why job satisfaction should change "since presumably an individual's job content, salary, supervisor, and job context do not change while he or she is away on vacation" (p. 399). A more appropriate question may be whether vacations reduce occupational strain and restore energies.

Vacations as Restorative Experiences

Occupational Strain and Novel Stimuli

Several surveys support the view that contemporary jobs are stressful. A survey conducted in the United States found that 5 out of every 6 workers report that "stress is a major factor in their work" (cited in Schultz & Schultz,

1990, p. 540); a survey of women employees found that 33% of respondents describe their work as "very stressful," and an additional 62% describe their work as "somewhat stressful" (Pelletier, 1984).

A vast amount of research has focused on occupational stress during the last decade. Unfortunately, there are so many different definitions of stress that theorists (e.g., Maslach, 1982) view "stress" as an umbrella term that encompasses many diverse phenomena. This study adopts Eden's (1982) distinction between the terms stress, stressor, and strain. The term "stressor" refers to objective environmental events, "stress" is the subjective experience of those events, and "strain" is the resulting psychological or physiological outcome of those events.

Both the physiological and psychological response to stress can be explained in terms of one's energy capacity diminishing over time. Selye's (1976) model proposes that a subjective appraisal of stress is accompanied by the release of adrenalin which increases heart rate and blood sugar levels in the bloodstream. This physiological response raises energy levels, but over time the available energy capacity diminishes. At this point, the individual experiences strain in the form of fatigue and perhaps health complaints.

The capacity to perform mental work also diminishes after a period of sustained effort. Kaplan and Kaplan

(1989) explain this process by drawing upon James' (1892) distinction between voluntary (requires effort) and involuntary (no effort involved) attention. Tasks involving exciting and novel stimuli are associated with involuntary or effortless attention. Because the stimuli that people are exposed to daily do not possess this quality of excitement, information processing usually requires some degree of effort (voluntary attention).

Attention is typically viewed as a limited energy resource that is necessary to carry out mental operations (e.g., Csikszentmihalyi & Csikszentmihalyi, 1988; Kahneman, 1973). Because people are exposed to so many sources of information at the same time, available attention capacities must be directed towards specific stimuli. James (1892) proposed that individuals are able to maintain a focus on a task by inhibiting all other stimuli. According to this perspective, voluntary attention places high demands upon mental capacities because it involves both focusing on the task and screening-out distractions. After sustained effort, the individual's capacity to focus on a task becomes fatigued. The proposed strains or consequences of sustained effort include an inability to concentrate and physical fatigue (Kaplan & Kaplan, 1989).

Two specific aspects of this view of stress make it a potentially useful concept for assessing the revitalizing potential of vacations. First, it leads to a clear

conception of what the expected outcomes would be after a restorative experience. Restored employees should find it easier to concentrate, report fewer occupational related strains, and feel less physically fatigued than they did prior to the vacation. Second, viewing reactions to stress as dynamic and changing over time provides a clear rationale for expecting changes after a vacation. Because the sustained effort is interrupted, the physical and mental energy capacities can be replenished. Furthermore, during vacations both the focus of voluntary attention, and the stimuli that were inhibited in order to avoid distraction, are changed. Since interesting and novel stimuli are believed to involve involuntary attention (i.e., require no effort) a change of venue allows voluntary attention capacities to recover.

Vacations Environments as Novel Stimuli

Involuntary or effortless attention is associated with, among other things, novel stimuli. Kaplan and Kaplan (1989) believe that attention capacity is restored more effectively when the individual experiences a change of venue because this change rests the overtaxed voluntary attention capacity. If the individual were to remain in the same location, the pattern of inhibiting surrounding stimuli would continue.

Vacations provide a change of venue from the daily work environments but in terms of environmental changes, what are

novel stimuli? If a Seattle resident vacations in Vancouver, is this a novel experience or do the similarities between two urban centres involve the same attention patterns? It may be that novel stimuli can only be found in environments that are completely different from the urban location of one's workplace. Natural environments may provide the completely different stimuli.

Natural Settings as Restorative Environments

Throughout history the view that the natural environment is a peaceful setting that restores energies has reverberated through philosophical essays (e.g., Thoreau, 1854), and historical accounts of attitudes towards nature (e.g., Nash, 1982). A few contrary views have been expressed. For example, the Judeo-Christian tradition sometimes described natural environments, specifically wilderness areas, as evil places where God banished people. However, most of the literature emphasized the positive value of natural environments.

Although the value of nature is a frequent and recurrent theme, most of the literature described personal experiences and observations. Recently, some theoretical perspectives have been suggested to explain the effect that natural environments has on humans.

Theories

The evolutionary view. Some theorists suggest that natural environments are beneficial to people because of our

evolutionary roots (e.g., Kaplan, 1976; Knopf, 1987; Wilson, 1984). According to this perspective, the process of natural selection eliminated those individuals who were unable to function in the natural environment. Evolutionists believe that modern humans are genetically programmed to operate in the natural world and although they function well in built environments, optimal functioning is most likely in natural settings (Knopf, 1987).

One variant of the evolutionary perspective suggests that part of our genetic programming involves a tendency to find natural stimuli inherently interesting and therefore suitable to involuntary (effortless) attention. Thus, experiences in natural environments allow for the restoration of voluntary attention capacities (Kaplan & Talbot, 1983; Kaplan & Kaplan, 1989). Another evolutionary perspective proposes that humans have an unlearned predisposition to like and pay attention to environments that can provide food, water, and shelter or other features necessary for survival (Orians, 1986). Yet another view suggests that natural environments are beneficial because the brain and nervous system developed in natural environments (Wohlwill, 1983). According to this perspective, since the central nervous system has not changed, modern humans still process information gained from natural environments more easily and efficiently than information gained from built environments. An implicit

assumption of the evolutionary perspective is that nature uniquely contributes to effective functioning.

The evolutionary view presents an explanation of why natural environments enhance functioning. Other theories attempt to describe the characteristics of natural environments as stimulus sources and to identify the process that directs reactions to the environment.

The attention and stress recovery theory. The attention and stress recovery theory (e.g., Kaplan & Kaplan, 1989) focuses on cognitive processes. Kaplan and Kaplan's view that restoration involves regaining voluntary attention capacity was discussed earlier (Kaplan & Talbot, 1983; Kaplan & Kaplan, 1989). Kaplan and Kaplan suggest that natural environments restore energies depleted by mental fatigue because they hold attention with less mental effort.

According to Kaplan and Kaplan (1989), restorative environments have four characteristics. Restorative environments hold attention (fascination), promote a sense of being away from the everyday environment, create a feeling that the place is part of a larger whole that invites exploration (extent), and are compatible with the individual's purposes and intentions (compatibility). Although these qualities can be found in a variety of environments, they are believed to be most prominent in natural environments.

The affective response and arousal theory. The affective response and arousal theory suggests that affect is central to the response to any environment (Ulrich, 1983). One important feature of the model is the belief that affect precedes cognition. Drawing upon Zajonc's concept of "preferenda" (1980), Ulrich suggests that the initial response to the environment is a global, generalized affect related to preferences. "Preferenda" are general classes of environmental content that elicit affect, but may not be a sufficient basis for cognitive judgements. Examples of "preferenda" are the presence of a focal area, visual patterns, and broad classes of content such as vegetation or water.

An important premise of this model is that affective responses result in adaptive behaviour that improves functioning in the environment. According to this perspective, the environment triggers an unconscious and immediate emotional response that allows the individual to respond appropriately. Ulrich (1983) uses the example of a hiker suddenly encountering the edge of a precipice. An initial affective reaction of fear allows the hiker to avoid the edge on the basis of only minimum cognitive activity (p. 90). This initial affective response to the environment produces arousal in the electrocortical and autonomic systems and allows the individual to react quickly.

After the initial affective and arousal response, the individual's response to the environment is cognitive. This process involves recognition, judgements of its significance for well-being, identification, and extensive processing of information (p. 92). If the initial affective response and arousal is strong, it may dominate the subsequent cognitive response to the environment. If the initial affective response and arousal level is weak, it may not significantly influence the subsequent cognition.

Although the example of a hiker narrowly avoiding a dangerous fall suggests fear and threat, responses to non-threatening natural environments elicit more positive affective states. Ulrich (1983) notes that natural scenes, even unspectacular views,"... elicit higher aesthetic preference or pleasantness than do all but a very small percentage of urban views" (p. 110).

Another important feature of Ulrich's (1983) model is the observer's affective state prior to the encounter with the natural environment. Ulrich proposes that natural environments are restorative, particularly for individuals initially experiencing stress, because "natural views may be more arousal reducing and tend to elicit more positively toned emotional reactions than the vast majority of urban scenes" (p. 116). Unstressed individuals in normal arousal states may find that natural environments hold interest and maintain normal and presumably optimal arousal levels.

Ulrich's (1983) model proposes a complex interaction between affect, cognitive response, initial arousal levels, and features of the environment. In general, Ulrich's model suggests that natural environments are restorative because they elicit positive affective states, reduce stressful levels of arousal, and increase attention capacities.

Alternate explanations for the restorative effects of natural environments. Some authors suggest that the positive effects associated with natural environments are not a direct result of being natural. One explanation for different responses to urban and natural environments is that natural stimuli provide a diversion from routine urban experiences (Knopf, 1987). In other words, the positive effects of nature scenes are due to the novelty they provide and not a result of natural properties.

Some researchers argue that emotions mediate the impact of the environment and are important determinants of behaviour (Hull & Harvey, 1989; Mehrabian & Russell, 1974). This view suggests that any source of positive affect leads to more effective functioning and nature as a stimulus source is functionally identical to other sources of positive affect such as music, art, and travel (Mehrabian, 1976). Research on "triggers" for peak experiences found that nature is one of many experiences that result in the same affective response (Laske, 1962; Privette, 1983).

Another view disputes the suggestion that the response to natural environments is universal. The evolutionary perspective implies that all humans are engineered to function most effectively in natural environments. Tuan (1974) suggests that culture, an individual's values, and past experiences shape how people respond to all environments. According to this perspective, different people will respond to different kinds of environments, including natural environments, in idiosyncratic ways.

Empirical Research

In spite of a quantity of literature that has been described as "massive - if not unwieldy" (Knopf, 1987, p. 783) our understanding of how nature affects people is remarkably incomplete. So far, most of the empirical research has focused on demonstrating that people do react differently to natural environments than they do to urban environments.

Preference and attitude research. One clear and consistent finding is that people prefer natural scenes, even unspectacular ones, over built scenes (R. Kaplan, 1975; Wohlwill, 1976). The degree of preference for natural scenes is so high that there is little overlap between the distribution of scores for natural versus urban environments (Ulrich, 1983). Most previous research focused on the issue of environmental preference in isolation without linking these preferences to other processes or behaviour (Ulrich,

1983). Hull and Harvey (1989) found that preference ratings for parks were associated with emotional responses measured by pleasure and arousal scales.

Research on attitudes towards a variety of environments indicate that nature is often associated with tranquillity. For example, Rossman and Ulehla (1977) asked university students to assess the importance of 30 "rewards" (e.g., tranquillity, adventure, challenge to your strength), and to decide the likelihood of obtaining each of these rewards in several different environments. The benefits rated as most important reflect a desire for tranquillity, natural beauty, and escape from the pace of urban life. Expectations for obtaining these benefits were higher for outdoor than indoor settings and highest in the wilderness (p. 53).

Natural environments and therapeutic outcomes. A belief in the therapeutic benefits of natural environments is reflected in the philosophy underlying outdoor challenge programs (e.g., Kaplan, 1974) and many programs for the physically and mentally handicapped (e.g., Kessell, Resnick, & Blum, 1985) or juvenile offenders (see Basta & Davidson, 1988, for a review). The selection of a location for these programs is governed by the assumption that something in the natural environment contributes to positive treatment outcomes.

Several studies of special populations offer evidence that the natural environment provides psychological and

health-related benefits even when they are not part of a structured therapeutic program. Ulrich (1984) demonstrated that post-surgery patients who have a window view of a natural scene experience a shorter recovery period and fewer complications than matched patients who have a window view of a hospital wall. Moore (1981) and West (1986, unpublished master's thesis cited by Kaplan & Kaplan, 1989) found that prison inmates' use of health care facilities is related to the type of view available from their cell. Inmates who have views of areas of the prison, or of built environments outside the prison, use the health care facilities more often than inmates whose cells face farmland or vegetation. A study that used an actual experience in different environments reports that a nature walk increased the number of errors subjects could identify on a proof-reading task and their happiness scores more than an urban walk or a rest period in a laboratory (Hartig, Mang, & Evans, 1991).

Natural environments and attention capacity and stress reduction. Some studies have examined the effect of natural environments on attention capacity and stress levels. One study presented university students who were experiencing pre-exam anxiety with a series of slides of either natural or urban environments. Students exposed to natural environments reported a reduction in anxiety and an increase in attentiveness and interest; students exposed to urban

slides reported an increase in fear and sadness (Ulrich, 1981). Physiological measures (muscle tension [EMG] and skin conductance) indicate that subjects exposed to a stressor recover faster when they view a nature scene rather than a scene depicting either urban traffic of a pedestrian mall (Ulrich & Simons, 1986).

Kaplan, Talbot, and Kaplan (1988) report that office workers who can see some natural elements through windows report higher job satisfaction and lower levels of job stress than workers with no view or views of built environments.

Natural environments not only reduce stress; several sources suggest that natural environments attract people who are experiencing stress. For example, historical reviews of attitudes towards nature (e.g., Stillman, 1975) conclude that the significance of the natural environment rises with increased stress levels. Furthermore, Knopf (1976, cited in Knopf, 1983) found that neighbourhood stressors such as traffic noise and housing-unit density are associated with preferences for outdoor recreation. Another study found that fishermen who report that their trip was motivated by a need to escape distractions, fish for an average of 22 minutes longer each day that visitors who indicate that other factors motivated their trip (Wellman, 1979).

Natural environments and affective response. A few threads of evidence suggest that experiences in natural

environments are associated with shifts in mood. Content analyses of visitor diaries (S. Kaplan & Talbot, 1983) indicate that nature is linked to positive affective states. More and Payne (1978) found that people leaving a natural area have less negative moods than when they entered.

Outcomes of vacations in wilderness and non-wilderness environments. Two studies (Feingold, 1979; Hartig, Mang, & Evans, 1991) compared the outcomes of vacations in wilderness environments with alternative vacation experiences. Hartig et al. measured emotional states, happiness, and scores on a proof-reading task (number of errors identified) before and after a wilderness backpacking trip, a non-wilderness vacation, or no vacation. Affect was also measured 21 days later. The proof-reading scores and the happiness ratings in the follow-up increased for the wilderness group but not for the other two groups.

Feingold (1979) reports similar results for a number of outcomes categorized as health-related, social orientation, and aesthetic-transpersonal responses. The wilderness group demonstrated an increase in health-related experiences (mental relaxation and exercise), and increases in aesthetic-transpersonal experiences (e.g., perceptual alertness, personal insight, expanded identity). Both the wilderness and urban vacation groups report a decrease in awareness of social roles, feelings of competition, self-

criticalness, feeling dominant in the environment, and ego competency in intellectual and creative activities.

Subjects who choose wilderness experiences may differ in some ways from subjects who choose other types of vacations. Hartig et al. (1991), and Feingold (1979) used experienced backpackers in all groups to decrease problems associated with self-selection.

Questions Not Answered by Previous Research

The belief that vacations from work are restorative is prevalent but untested. Research on the "carry-over" effects of vacations is very limited and has not examined how vacations affect energy or occupational strain levels. Restoration is expected to involve psychological and physiological recovery (Ulrich, 1993) and restored attention capacity (Kaplan & Kaplan, 1989). The present study measures occupational strain, subjective physical fatigue, and self-reported ability to concentrate, before and after vacation leave.

Research on the effects of natural environments consistently support the view that natural environments are restorative. In most cases the research has not examined the "carry-over" potential of the restorative effects. Hartig, Mang, and Evans (1991) found that wilderness backpackers report more positive emotional affect three weeks after returning from their vacation, and R. Kaplan (1974) found that participants in a wilderness survival

program report more confidence and self-sufficiency five months after treatment. These are the only studies that measured the temporal aspect of restoration.

The few studies (Feingold, 1979; Hartig, Mang & Evans, 1991) that compared outcomes from vacations in natural and urban locations used wilderness backpackers as subjects in all vacation conditions. Restricting the subjects to experienced backpackers and people interested and actively involved in wilderness activities reduces the generalizability of the results. The findings suggest that backpackers are more likely restored after a backpacking holiday than backpackers who take an urban vacation or stay at home. One explanation for the restoration may be the effect of the natural environment, another explanation may be the benefits of the physical exercise, and another may be the fit between the backpackers' environmental preferences and the vacation environment. At this stage, the findings cannot be generalized beyond wilderness backpackers.

Research on tourism provides evidence that both vacation environments and the people who visit them are diverse and individualistic. Market research indicates that images of vacation destinations are idiosyncratic and personal (e.g., Mayo, 1973, cited in Knopf, 1987). Wahlers and Etzel (1985) found a relation between an individual's need for stimulation and expressed preference for different types of vacations. Not all people prefer the same types of

environments; thus it is possible that individuals will gain more benefits from environments that are compatible with their preferences. So far, we have little information on the link between environmental preferences and restorative outcomes. Some proponents of the evolutionary view would likely argue that natural environments enhance effective functioning regardless of the individual's environmental preferences.

Another question not answered by previous research is whether the positive effects associated with natural environments are a direct result of being natural. Knopf (1987) suggests that natural stimuli provide a diversion from routine urban experiences and the positive effects are due to the novelty they provide and are not a result of natural properties. The present study asks whether natural vacation environments are perceived as more novel than other types of vacation environments and whether novel environments, both natural and built, are more likely to result in positive post-vacation outcomes.

Some researchers (e.g., Hull & Harvey, 1989) suggest that emotions mediate the impact of the environment. If nature as a stimulus source is functionally identical to other sources of positive affect such as music, art, and travel then the positive affect elicited by natural environments may be a mechanism that leads to restoration. The present study attempts to determine whether natural

environments are linked to positive affect, other vacation environments provide similar affective responses, and affective responses to natural environments or other environments are linked to post-vacation restoration.

Measurement Issues

Defining natural environments. Measuring the concept of natural environments is very difficult, particularly in the context of vacations which include several locations or many aspects of one location. Wohlwill (1983) defines the natural environment as "...the vast domain of organic and inorganic matter that is not a product of human activity or intervention" (p. 7). Wohlwill points out that some environments are difficult to classify using this definition. For example, cultivated farmlands, planted forests and artificial lakes are created by humans but may be viewed as natural environments. Furthermore, most environments show some traces of human activity. Many parks and some wilderness areas have trails created by humans. Roads, power lines, and bridges may be found in remote areas.

The natural-built distinction is also blurred in urban areas. Urban gardens, although planted by humans, are created from organic elements. Large urban parks are frequently established to preserve nature, or to import elements of nature into urban areas.

Searching for other categories that explain different responses to natural and built environments. Some researchers do not believe that environments should be divided into natural and built categories. Gibson (1979) states that "it is a mistake to separate the natural from the artificial as if they were two environments" (p. 130) because all built objects are created from natural substances. Other researchers have attempted to link different responses to urban and natural environments with specific dimensions of the physical environment separate from naturalness or artificiality (e.g., complexity, variety of visual forms, etc.). One dimension believed to be important is the quantity of sensory input. Urban environments are described as providing too frequent and too numerous sensory input for the human processing system to handle (e.g., Milgram, 1970). However, even when environments were matched for complexity and information rate, exposure to natural environments led to a more relaxed state than exposure to urban scenes (Ulrich, 1981). These results suggest that factors other than those measured in the previous research influence the differences in response to urban and natural environments or the responses are a direct result of being natural.

Another way of categorizing the environment might be to focus on specific sensory modalities such as types of noise or air quality but this approach makes it difficult to

explain the consistent support for the benefits of natural environments obtained through investigations of window views (Kaplan, Talbot, & Kaplan, 1988; Ulrich, 1984), or slide presentations (e.g., Ulrich, 1981). Neither of these techniques address sensory information other than visual stimuli.

Measurement strategies used in previous research. Previous research used either slides of natural scenes (dominated by green vegetation) or urban scenes (buildings without any vegetation) (Ulrich, 1979), or wilderness backpacking vacations compared to other vacations (Feingold, 1979; Hartig, Mang, & Evans, 1991). The use of slides may eliminate many aspects of the natural and urban environments. Knopf (1987) notes that several features are missing from this form of presentation including biting insects and uncomfortable weather. The dichotomy of wilderness or not wilderness does not address the possibility the vacations taken in areas other than the wilderness may have included parks or scenic features that may be described as natural. A second study by Hartig et al. (1991) found that a walk in an urban park was more restorative than a walk in an urban area or relaxing in a laboratory. Their findings suggest that a variety of natural settings ranging from urban parks to the wilderness can have restorative effects. This view is supported by a study that compared the stress recovery period after viewing

scenes of urban environments without vegetation with scenes of urban environments with vegetation. Recovery time was faster after viewing the urban environments with vegetation [Honeyman (1990), cited in Ulrich, Simons, Losito, Fiorito, Miles, & Zelson (1991)].

The measurement strategy used in the present study. Investigations of how people organize environmental stimuli report that people consistently and spontaneously generate a 'natural' category (e.g., Ullrich & Ullrich, 1976; Ward, 1977). These results indicate that the natural-built dimension is an important determinant of how we organize our world (Wohlwill, 1983).

Nash (1982) suggested viewing the environment along a spectrum ranging from areas that have not been altered by human intervention to environments entirely created by humans. In Nash's terms this spectrum ranges from the "primeval to the paved" (1982, p. 6). The present study differentiates between natural and urban or built environments along the same spectrum.

The complex and dynamic nature of vacations further complicate measurement. The premise underlying this study is that individuals will be most influenced by the aspects of the environment they attend to, and these aspects will shape how they describe their vacation destination.

A seven-item Natural-Built environment scale was developed specifically for this study. The focus was on

visual stimuli and a continuum of natural to built. The questions tapped the participant's view of the most dominant feature of the vacation environment (e. g., deep wilderness, high rises), the proportion of the vacation spent in a natural environment, a rating along an eight point continuum between natural and man-made, and ratings along a 1 to 8 scale of how accurately four words described the vacation environment.

Hypotheses

Four hypotheses were tested:

1. Vacations restore the ability to concentrate and reduce physical fatigue and occupational strain.
2. Vacations in natural environments are more restorative than vacations in urban environments. The influence of the natural-built dimension is hypothesized to have a stronger association with restored concentration, reduced fatigue, and occupational strain than the novelty of environments or positive affect.
3. The pre-vacation level of stress will be associated with post-vacation outcomes. People who experience high levels of occupational strain before vacation leave are more likely to show more evidence of restored energies and reduced strain if they visit natural rather than urban environments.

4. Associations between positive post-vacation outcomes and the physical characteristics of the vacation destination will be stronger if the vacation environment is compatible with the individual's environmental disposition. Specifically, individuals who score high on the pastoralism scale will gain more benefits from the natural environment than individuals who score high on the urbanism scale. Individuals who score high on the urbanism scale will gain more benefits from vacations in urban environments.

Overview of the Study

One objective of this study is to determine whether people return from vacations refreshed and revitalized. Pre-and post-vacation data were collected from office workers on subjective physical fatigue, the ability to concentrate, and level of occupational strain. These measures are also administered to a control group of similar workers who did not go on vacation during the same period. The control group is used to reduce the chance that any observable changes in the vacation group's scores were associated with events other than the vacation. Presumably any influence of global historical events should affect both groups in similar ways.

The vacation group also completed a questionnaire during their vacation designed to measure whether their

vacation was in a natural or urban environment, their affective response to the vacation environment, and ratings of whether the vacation destination was perceived as novel. The data collection plan is shown in Figure 1.[1]

Method

Subjects

Volunteers were 99 full-time office workers recruited from 10 large public-sector organizations in Victoria, British Columbia. All participants worked in urban areas. Forty-six men and 53 women participated. Participants ranged in age from 22 years to 63 years with a mean age of 39.58 years. Eight participants had not graduated from high school, 18 had completed high school, 32 had completed some university, college or post-secondary training, and 41 had completed a university or college degree. Thirty of the participants held clerical positions, 47 worked in a professional/technical position, 12 were middle management

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[1] I originally planned to meet with participants at the last data collection period to administer a brief measure of helping behaviour (i.e.: subjects would be asked to participate in another psychology study at a later date) and to present scenarios of irritating situations and ask subjects to predict how they would react. Individuals with more energy reserves were expected to be more likely to agree to participate in a subsequent study and to be less likely to report that they would react in an extremely negative way to irritating situations. I also planned to collect information on the absentee rates of the participants before and after vacation (subjects were asked to sign a permission form allowing me access to employee records). The data for these measures were not collected because union officials did not agree to the interview, or using an employee's time to extract absenteeism information from employee records.

and 10 were upper management (Appendix A describes the jobs included in each category). All subjects had worked for their employer for at least six months prior to data collection.

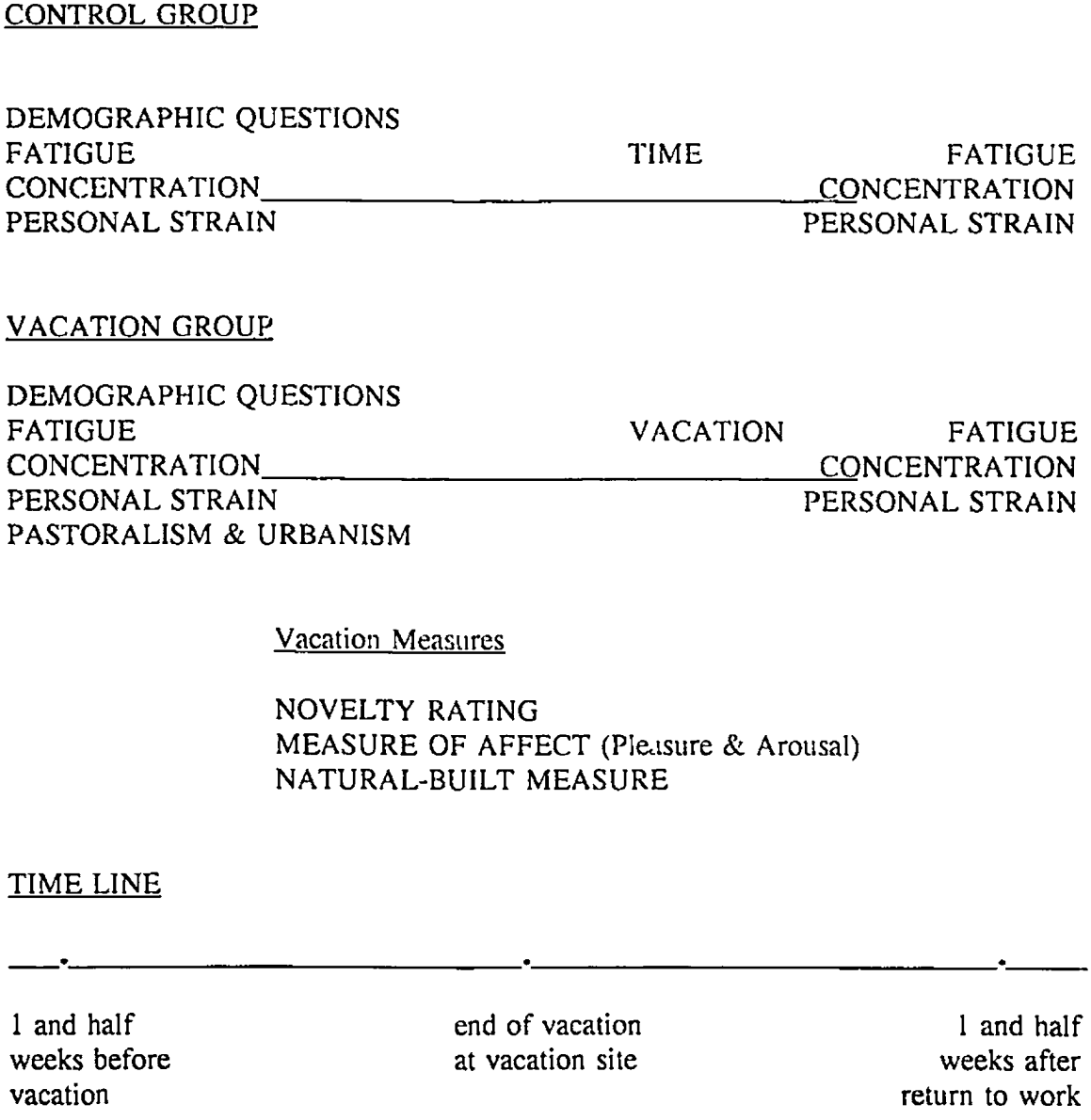

Figure 1 Data Collection Plan

Recruitment Procedures

The researcher approached either the head of the organization (n=2), or the head of the Human Resources Division's (n=10), of 12 public-sector organizations to request permission to recruit their employees for the study (See Appendix B for a list of the organizations). Two organizations declined to participate.

Posters, hand-outs, circulated notices, oral presentations, and a booth in a staff cafeteria were used to notify employees of the study. Each organization determined the specific procedure for contacting employees. All hand-outs and presentations stressed that participation was voluntary. The study was described as a research project on the "after-effects" of vacation leave. Participants were entered in a draw for one $150 prize.

The study required two groups of subjects, a vacation group who took vacation leave between the end of April and the end of September (n=67), and a control group who worked during this time (n=32).[2] Vacations were defined as more than three consecutive days off work, not including long weekends or time off due to illness, lay-offs, or strikes.

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[2] To make the vacation and control groups as equivalent as possible, volunteers in the vacation group were asked to identify a co-worker similar to themselves in terms of occupational position, years in the organization, sex, and age who was not going on vacation. Most volunteers hesitated to identify others as possible volunteers because of concern that the co-workers would feel pressured to participate. Only two subjects were recruited for the control group through a referral by a vacation group volunteer.

Participation in both the control and vacation group was restricted to people who had not taken a vacation in the previous three months.

Although the participating organizations were large, the volunteer rate was low. It is difficult to accurately estimate the participation rate because there is no way of knowing how many employees read the posters, or took coffee or lunch breaks in the cafeteria at the time the recruitment booth was set-up. Data were collected between August and October of 1990, and between May and October of 1991 to increase the sample size.

Drop-Out Rate

The total number of subjects who agreed to participate was 106. Three subjects did not complete the final set of questionnaires. The code name used to match the Post-vacation Questionnaires, with the Pre-vacation questionnaires was missing or did not match a code name provided on the first set of questionnaires for 4 subjects. The 99 participants who completed all questionnaires represent a completion rate of 93%.

Data Collection Procedures

Vacation group. The researcher delivered the Pre-vacation Questionnaire and the Vacation Questionnaire to the volunteer's office two weeks before the first vacation day. Instructions were given verbally during the telephone call arranging drop-off times, and by a cover sheet attached to

the questionnaires (see Appendix C for a copy of the written directions). Participants were instructed to complete the pre-vacation questions one and a half weeks before vacation leave, near or at the end of the work day, at their place of work. Questionnaires were either picked up by the researcher or returned by mail. A self-addressed envelope with postage attached was provided.

Participants completed the Vacation Questionnaire at the end of the vacation on the vacation site. A cover sheet on the questionnaire instructed participants not to read the questionnaire until they were ready to complete it. Participants who remained at home during vacation leave completed the questionnaire one or two days before returning to work.

The researcher picked up the Vacation Questionnaire and delivered the Post-vacation Questionnaire to the participant's office during the week the participant returned to work. Participants were instructed to complete the post-vacation questions one and a half weeks after their return to work. For example, if they returned to work on a Monday, they completed the questionnaire on Wednesday of the next week. The Post-vacation Questionnaires were completed under the same conditions as the Pre-vacation Questionnaires: near or at the end of the work-day, at the work place. Participants who worked a modified work week

completed the questionnaires on the same schedule as those working 5-day work weeks.

To ensure anonymity, subjects used code names known only to themselves and the researcher on all questionnaires. The participant's name and code name were sealed in an envelope and attached to the Pre-vacation Questionnaire.

A pilot test of the Pre- and Post-vacation Questionnaires (n=4) indicated that the Pre-vacation Questionnaire took between 20 and 35 minutes, and the Post-vacation Questionnaire took between 10 and 20 minutes. A slightly longer version of the Vacation Questionnaire took between 25 and 35 minutes to complete (n=2).

Control group. The control group followed the same data collection procedures as the vacation group. Questionnaires were delivered to the participants and either picked up by the researcher or returned by mail. The control group's questionnaires were identical to the Pre- and Post-vacation Questionnaires completed by the vacation group except the control group did not complete the Environmental Response Inventory. For simplicity, the questionnaires for both groups are referred to as the Pre- and Post-vacation Questionnaires. The control group completed the questionnaires three and one half to six weeks apart, mid-week, at or near the end of the working day at the work place. The data collection schedule was determined by the length of the participant's typical vacation leave.

For example, if a participant typically took three weeks leave, the two data collection times were six weeks apart (3 weeks 'vacation' plus one and a half weeks before and one and a half weeks after).

Demographic Information

Appendix C contains copies of all questionnaires used in the study. Demographic information was collected once at the pre-vacation data collection. The information included age, sex, level of education, number of years in the work force, and number of years in present job position. The demographic information was used to compare the vacation and control groups and the subjects participating in 1990 with participants in 1991 to ensure that they were similar.

Pre-and Post-Vacation Measures

Occupational strain. Participants completed the Personal Strain Questionnaire (PSQ) from the Occupational Stress Inventory (Osipow & Spokane, 1987). The PSQ is a 40-item self-administered paper and pencil test. Items are short sentences that contain statements about work situations, for example, "I am bored with my work". Participants indicate on a 1 (rarely or never true) to 5 (true most of the time) scale which number best describes their feelings at work during the previous work week. The PSQ is comprised of four ten-item sub-scales:

1. The Vocational Strain scale measures problems with the degree of effort required at work and attitudes towards the

job. High scorers on the Vocational Strain scale may report boredom and lack of interest in their job, make errors, and produce low quality work.

2. The Psychological Strain scale measures psychological and emotional problems. High scorers may report feeling depressed, anxious and irritable.

3. The Interpersonal Strain scale measures the level of disruption and irritation in interpersonal relationships. High scorers report frequent quarrels or excessive dependency on family members, spouses, and friends.

4. The Physical Strain scale measures complaints about physical illness, absence from work, or poor self-care habits. High scorers report worries about their health, unplanned weight changes, overuse of alcohol, and disturbed sleep patterns.

Osipow and Spokane (1987) report an internal consistency alpha of .94 for the Personal Strain Questionnaire with sub-scale coefficient alphas ranging from .71 to .94.

Physical fatigue. Self-reported fatigue was measured by a Fatigue Checklist developed by Yoshitake (1978). Participants checked either Yes or No to indicate whether they had experienced 25 physical symptoms of fatigue at work during the last five working days. The 25 items described aches or tiredness, for example, "feeling stiff in the shoulders."

Although the Personal Strain Questionnaire contains a Physical Strain sub-scale, it measures different types of physical symptoms than the Fatigue Checklist. The Physical Strain sub-scale asks questions about health concerns, poor health habits, disturbed sleep patterns, and overuse of alcohol. The Fatigue Checklist measures specific short-term symptoms such as eye strain, headaches, and back pain.

Ability to concentrate. Mayer's Flow Questionnaire was used to measure the ability to concentrate on the job. The scale consists of 8 items designed to measure experiences that are characterized by effortless and concentrated attention, and lack of distractions (Csikszentmihalyi & Csikszentmihalyi, 1988). Participants responded on a scale from 1 (not at all) to 9 (very) to questions such as "Did you feel distracted by things around you?"

Environmental disposition measures. Vacation group subjects completed the Pastoralism and Urbanism scales of the Environmental Response Inventory (ERI; McKechnie, 1974) as part of the pre-vacation questionnaire. The ERI is designed to measure relatively stable and enduring environmental dispositions. The dispositional measure is included to provide a means of assessing the degree of person-environment fit between individuals and their vacation environments.

The ERI manual indicates that the Pastoralism scale "represents an appreciation of the primitive natural

environment and a dislike of aspects of city life" (p. 8). The Urbanism scale "taps an appreciation for the man-made environment, especially the city with its attendant social environment" (p. 8).

The two scales demonstrate acceptable reliabilities. According to the ERI Manual the test/retest reliabilities are Pastoralism, .84, and Urbanism, .87; the split-half reliabilities are Pastoralism, .83, and Urbanism, .85.

Vacation Measures

Novelty. The novelty of the vacation environment was measured by the 6-item Novelty Scale of the Vacation Evaluation Scales (Bello & Etzel, 1985). Participants responded to statements, for example "This vacation was a unique experience for me" on a scale from 1 (completely agree) to 5 (completely disagree). Bello and Etzel report coefficient alphas of .82 and .79 over two samples.

Affect. Russell and Pratt's (1980) Scales of the Affective Quality Attributed to Places were used to measure the affective dimensions of arousal and pleasure. Russell and his colleagues (Russell & Pratt, 1980; Russell & Steiger, 1982) believe that these two dimensions accurately and parsimoniously describe emotional responses to the environment. Participants used a scale of 1 (extremely inaccurate) to 8 (extremely accurate) to indicate how well 20 adjectives described their vacation environment. Ten of

the adjectives represented the pleasure dimension and 10 represented the arousal dimension.

The natural-built dimension. The difficulties of measuring the concept of nature were discussed in the section on Measurement Issues. The term natural environment has been used to describe environments ranging from a vast wilderness (e.g., Young & Crandall, 1984; 1986) to a clump of trees (e.g., Ulrich, 1984). The tendency to include such a broad range of physical features in the category of natural environments creates some measurement problems. This study differentiated between natural and urban or man-made environments along a continuum of environments that have not been altered by humans to ones that have been created by humans.

The complex and dynamic nature of vacations further complicated measurement. The premise underlying this study is that individuals will be most influenced by the aspects of the environment they attend to, and these aspects will shape how they describe their vacation destination.

A seven-item Natural-Built environment scale was specifically developed for this study. The questions measured the participant's view of the most dominant feature of the vacation environment (e.g., deep wilderness, high rises), the proportion of the vacation spent in a natural environment, a rating along an eight-point continuum between natural and man-made, and ratings along a 1 to 8 scale of

how accurately four words described the vacation environment (Appendix D provides details of the Natural-Built scale).

Results

Outline of the Data Analyses

The results are presented in six sections. The first section compares the demographic characteristics for the vacation and control groups and the 1990 and 1991 samples, describes the demographic characteristics of the sample, and reports the descriptive statistics for the main variables.

The second section examines the possibility that the positive effects credited to natural environments are a result of the novelty they provide (Knopf, 1987) or the positive affect they elicit (Mehrabian, 1976). The next four sections report the results for each hypothesis.[3] A significance level of .05 was used for all analyses.

Comparison of the 1990 and 1991 Samples

The data were collected over two summers. T-tests and a chi-square analysis were conducted to ensure that there were no significant differences in the demographic characteristics of the subjects participating in the two different years. No significant differences were found on any of the demographic variables: number of males and females (χ^2 = .70, df=1, p = .40), number of subjects in the vacation and control groups (t = -.83, df = 97, p = .41), level of education (t = 1.80, df = 97, p = .08), age (t =

[3]Longer vacations may result in more restorative effects. The data were analyzed to see if the length of vacation was related to restorative outcomes. None of the Pearson correlations exceeded .28 (ns) and an analysis of partialled variance showed no effect.

1.39, df = 97, p = .17), years in present job (t = .61, df = 97, p = .54), or years in the workforce (t = 1.86, df = 97, p = .07).

Comparison of the Vacation and Control Groups

The design of this study was a quasi-experimental design using a non-equivalent control group. Unfortunately it was impossible to assign subjects to a vacation or no vacation condition. An important issue in this type of design is the similarity of the groups before vacation. T-tests and a chi-square analysis were conducted on the demographic variables to ensure that the vacation and control groups were similar. There were no significant differences between the vacation and control groups on level of education, age, job level, or the number of years in their present job. There was a significant difference between the number of women and men in the vacation and control groups; there were fewer men in the control group (χ^2 = 7.09, df=1, p < .01). There were 38 men and 29 women in the vacation group (n=67) and 9 men and 23 women in the control group (n=32). The number of years in the work force was also significantly different; the vacation group had worked longer than the control group [t = 3.07, p < .01]. Table 1 shows the descriptive statistics and the comparisons between the vacation and control groups for the demographic variables.

To examine whether these differences might affect further analyses, the relation between gender and the dependent variables and between the number of years in the workforce and the dependent variables were examined by Pearson correlations. Gender and the number of years in the workforce were not significantly related to personal strain, concentration, or physical fatigue before or after vacation for either the vacation or control groups. Table 2 shows the correlations between the demographic variables and the main variables in the study.

The vacation and control groups did not differ in the number of days between the completion of the pre- and post-vacation questionnaires: an average of 28.79 days for the vacation group and 26.53 days for the control group [F (1,97) = 2.11, ns].

Table 1

Univariate Descriptive Statistics and Results of Analyses to Compare Vacation and Control Groups on Demographic Variables

	Sex	Age	Educ.	Years Working	Years in Job
All Subjects N = 99					
M	1.53	39.58	3.11	17.53	9.83
SD	.50	9.83	.95	9.26	6.39
Minimum	1	22	0	2	0.50
Maximum	2	63	4	45	33
N	99	98	99	98	98
Vacation Group N=67					
M	1.42	41.40	3.00	19.52	10.29
SD	.49	8.86	.95	8.54	7.31
Minimum	1	23	0	5	.50
Maximum	2	61	4	43	33
Control Group N=32					
M	1.72	37.94	3.34	13.43	9.49
SD	.46	9.84	.94	9.47	5.56
Minimum	1	22	1	2	.75
Maximum	2	63	4	45	29
Comparison of Vacation and Control Groups	X sq 7.10 p<.01	t = 1.23 p ns	t = 1.69 p ns	t = 3.07 p<.01	t = .59 p= ns

Table 2

Correlations between the Demographic Variables and the Main Variables

	GROUP	SEX	AGE	EDUC.	YRS WORKED	YRS IN JOB
PRE-STRAIN	.13	.17	-.40**	.08	.21	-.22
POST-STRAIN	.39**	.16	-.26	.10	.15	-.18
STRAIN CHANGE	.32*	-.01	.29*	.03	.18	.07
PRE-CONCENTRATION	-.05	-.10	.30*	-.03	.13	.09
POST-CONCENTRATION	-.31*	-.11	.14	-.12	.12	.01
CONCENTRATION CHANGE	-.30*	-.02	-.20	-.10	-.19	-.08
PRE-FATIGUE	-.08	-.09	.21	-.01	.10	.12
POST-FATIGUE	-.19	-.15	.17	-.10	.17	.12
FATIGUE CHANGE	-.12	-.07	-.02	-.11	.08	.01
AROUSAL	-	-.21	.41**	-.15	.22	.24
PLEASURE	-	-.15	.26	.00	.12	.13
NATURE/BUILT	-	.05	-.19	.03	-.23	-.27
NOVELTY	-	.19	.06	-.27	-.05	-.08

Note: 2-tailed significance: * = .01, ** = .001
The means and standard deviations of the main variables are in Table 3.
The strain, concentration, and fatigue change scores are post- minus pre- vacation scores.

Descriptive Statistics

Descriptive statistics for the main variables are presented in Table 3. Included are sample sizes, means, standard deviations, observed ranges, possible ranges and scale reliabilities.

Sample sizes. Most of the subjects completed all of the scale items. The exception was the novelty scale where data for 5 out of 67 (7.5%) subjects were missing. The questionnaires for the five subjects were examined in an attempt to determine why the scale had not been completed. The pattern of missing data was not consistent across the 5 subjects. Two subjects did not complete any of the 6 items, two did not complete item 6, and one did not complete item 3. The novelty scale was at the bottom of the page but other items in a similar position on other pages were completed.

The demographic characteristics of the five subjects were visually examined to see if they differed in some way from the rest of the participants. The small number of subjects precluded statistical analysis. There were no obvious differences between these five subjects and the other participants: both sexes and three different education levels were involved, their ages ranged from 32 to 46, and the number of years worked and number of years in their present job were in the middle of the obtained range. It is not clear why the 5 subjects did not complete all items on this scale.

Observed ranges. The observed range for most of the variables covered almost the entire possible range. The exception was the personal strain measure (PSQ) where the highest score was 3.1 on a scale with a possible maximum score of 5. The low scores suggest that the participants in this study were not experiencing high levels of occupational strain.

Scale reliabilities. The scales showed acceptable to good reliability. The reliabilities for the pre-vacation measures (Cronbach's Alpha) were: strain .93, concentration .86, and fatigue .91. The reliabilites for the post-vacation measures were: strain .92, concentration .88, and fatigue .89. The reliability for the measures of the vacation environment were: natural-built .88, novelty .77, arousal .78, and pleasure 91. The reliability of the Pastoralism scale of the ERI was .74. and that of the Urbanism scale was .85.

Table 3

Sample Size, Means, Standard Deviations, Observed Ranges, Possible Ranges and Scale Reliabilities for the Main Variables

Variable	N	M	SD	Observed Range	Possible Range		Scale Reliability
Both Groups							
Pre-strain	99	2.02	.52	1.1-3.1	1-5	5=high	.93
Post-strain	99	1.93	.47	1.1-3.0	1-5		.92
Pre-concentrate	98	6.05	1.36	2.6-8.5	1-9	9=high	.86
Post-concentrate	99	6.39	1.38	3.1-9.0	1-9		.88
Pre-fatigue	99	1.56	.27	0.9-2.0	0-2	2=high	.91
Post-fatigue	98	1.62	.25	1.0-2.0	0-2		.89
Vacation Group							
Pre-strain	67	1.98	.51	1.1-3.1	1-5		
Post-strain	67	1.80	.36	1.1-2.6	1-5		
Pre-concentrate	66	6.10	1.31	3.3-8.5	1-9		
Post-concentrate	67	6.69	1.24	3.1-9.0	1-9		
Pre-fatigue	67	1.58	.20	1.0-2.0	0-2		
Post-fatigue	66	1.65	.19	1.0-2.0	0-2		
Control Group							
Pre-strain	32	2.12	.54	1.1-3.1	1-5		
Post-strain	32	2.17	.55	1.3-3.0	1-5		
Pre-concentrate	32	5.95	1.47	2.6-8.1	1-9		
Post-concentrate	32	5.78	1.46	3.6-8.1	1-9		
Pre-fatigue	32	1.55	.16	0.9-2.0	0-2		
Post-fatigue	32	1.57	.22	1.0-2.0	0-2		

Table 3 (Continued)

Sample Size, Means, Standard Deviations, Observed Ranges, Possible Ranges and Scale Reliabilities for the Main Variables

Variable	N	M	SD	Observed Range	Possible Range	Scale Reliability
Vacation Measures						
Natural-Built	67	4.09	1.41	1.1-7.2	high=natural	.88
Novelty	62	3.14	.99	1.3-5.0	1-5 1=novel	.77
Arousal	67	5.25	1.02	2.9-7.5	1-8 8=high	.78
Pleasure	67	6.46	1.19	1.7-8.0	1-8 8=high	.91
Pastoralism	67	68.13	7.86			.74
Urbanism	67	54.71	10.10			.85

Correlations Between Affect, Novelty, and Nature

Some authors question whether the effects of natural environments found in previous research are a direct result of being natural. Knopf (1987) suggests that the positive effects are due to the novelty they provide; another view suggests that nature is restorative in the same way as other sources of positive affect (i.e., music, art, and travel) (Knopf, 1987). The present study asked whether natural environments are perceived as more novel and are rated higher on positive affect than urban environments. If the positive effects of natural environments are due to their novelty or to positive affect, the natural-built measure should be significantly correlated to novelty and the measures of affect. Table 4 shows the correlations between natural-built, novelty, and the pleasure and arousal measures of affect.

The natural-built rating of the vacation environment was not related to the novelty rating (r = -.14, ns) or to the pleasure scale from Russell and Pratt's Affective Qualities Attributed to Places scales (1980) (r = .13, ns). The natural-built scale was significantly correlated with arousal (r = -.43**, p < .001). High scores on the natural-built scale represent more natural vacation environments; low scores on the arousal scale represent less arousal. The results indicate that people vacationing in natural environments report lower arousal levels. The question of

whether nature or arousal has a stronger association with reduced personal strain and fatigue, and increased concentration is examined in the analysis of hypothesis two.

Table 4

Correlation Matrix for Natural-built, Novelty, Pleasure and Arousal

	NOVELTY	NATURE	PLEASURE	AROUSAL
NOVELTY	1.00			
NATURE	-.14	1.00		
PLEASURE	-.03	.13	1.00	
AROUSAL	.04	-.43 **	.29	1.00

Two-tailed significance level ** = .001

Hypothesis 1: Vacations Restore Energies and Reduce Occupational Strain

The first hypothesis predicted that the vacation group would experience a decrease in occupational strain and physical fatigue and an increase in the ability to concentrate after returning to work from a vacation. In contrast, the control group was not expected to change between the first and second measurement periods.

The design requires that there were no significant differences between the vacation and control group prior to the vacation. A multivariate analysis of variance with Wilks' lambda criterion indicated that there were no differences in the control and vacation groups on the pre-

vacation measures [F (3,93) = .65, p = .59]. An examination of the univariate tests indicate that the groups did not differ on any of the three measures: strain (F = 1.43, p = .23), concentration (F = .18, p = .67), or fatigue (F = .47, p = .50. As predicted, the scores for the control group did not change significantly between the first and second measurement times [F (3,28) = 1.27, p = .30].

A repeated measures multivariate analysis of variance, with Wilks' lambda criterion was used to test for a significant overall change in the pre-and post-vacation measures. The repeated-measures within-subject variables were personal strain, concentration, and physical fatigue measured before and after the vacation for the vacation group and at two measurement times for the control group (Time main effect). The between-subject factor was membership in the vacation or control group (Group main effect).

The Group main effect [F(3,94) = 2.58, ns] and the Time main effect [F(3,94) = 2.58, ns] were not significant. The most important test for this type of design is the Time X Group Interaction (O'Brien & Kaiser, 1985). A significant group by time interaction [F (3,94) = 4.81. p >.01] was found which indicates that the mean amount of change over the two measurement times differed between the vacation and control groups.

Inspection of the univariate tests reveals that the vacation group demonstrated the predicted changes in personal strain, which decreased for the vacation group and increased for the control group [$F(1,97) = 11.48$, $p < .001$], and concentration, which increased for the vacation group, [$F(1,97 = 10.64$, $p < .002$]. Counter to the prediction, physical fatigue increased for the vacation group but the change was not significant [$F(1,97) = 1.67$, ns]. Figures 2, 3 and 4 show the means for each group pre-and post-vacation for personal strain, concentration, and physical fatigue.

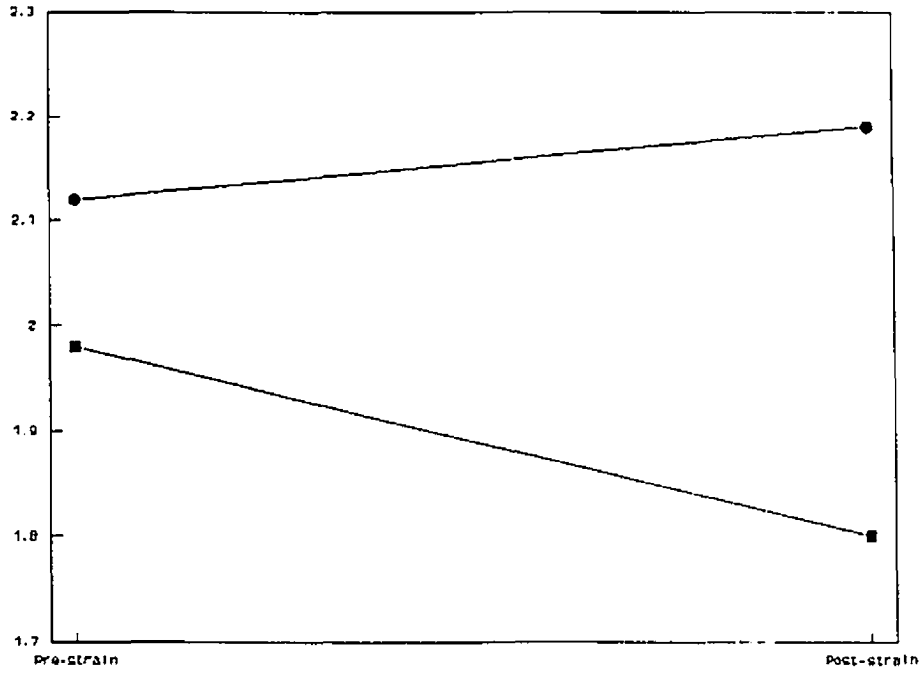
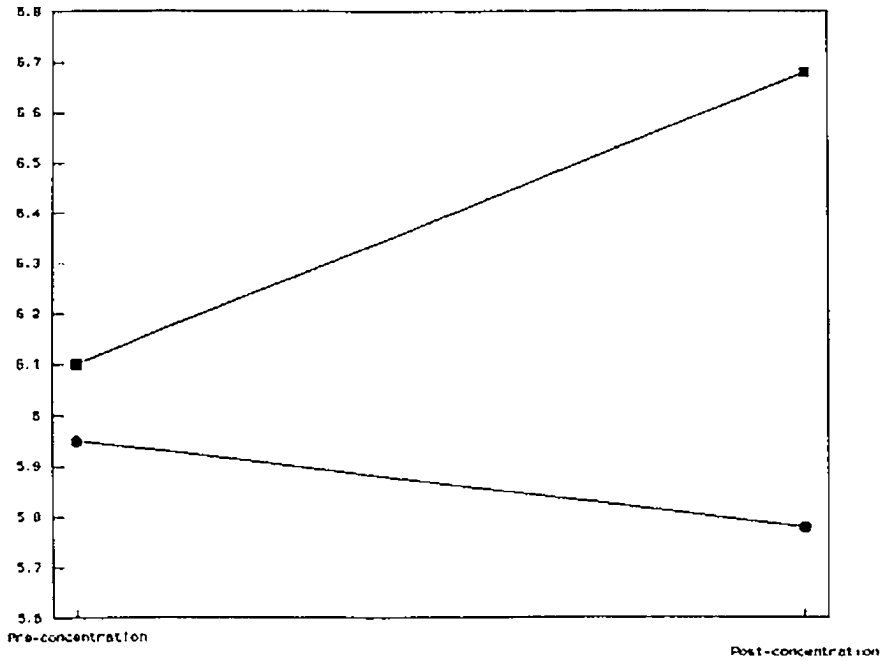


Figure 2. Mean pre- and post-vacation personal strain scores for vacation and control groups.

Personal Strain Questionnaire from the Occupational Stress Inventory (Osipow & Spokane, 1987)
Possible range of scale 1 to 5, 5 = high strain

Means and Standard Deviations for Vacation and Control Groups

		Pre-strain	Post-strain
Vacation Group	(Mean)	1.98	1.80
	(SD)	.51	.36
Control Group	(Mean)	2.12	2.17
	(SD)	.54	.55



■ Vacation Group ● Control Group

Figure 3. Mean pre- and post-vacation concentration scores for vacation and control groups.

Mayer's Flow Questionnaire

Possible range of scale 1 to 9, 9 = high concentration

Means and Standard Deviations for Vacation and Control Groups

		Pre-concentration	Post-concentration
Vacation Group	(Mean)	6.10	6.69
	(SD)	1.31	1.24
Control Group	(Mean)	5.95	5.78
	(SD)	1.47	1.46

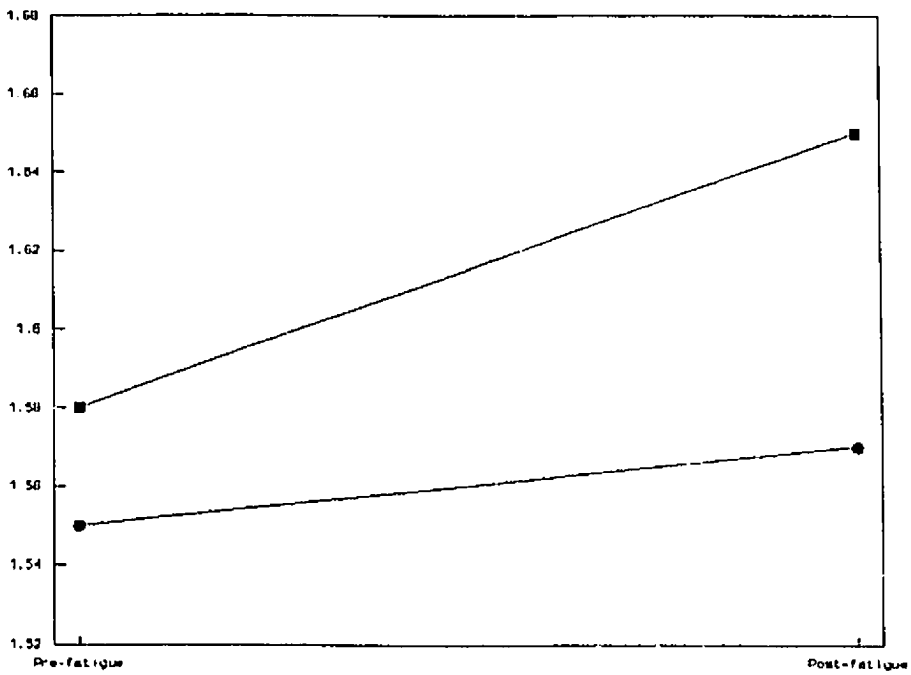


Figure 4. Mean pre- and post-vacation fatigue scores for vacation and control groups.

Fatigue Checklist (Yoshitake, 1978)

Index created by summing the number of yes answers and dividing by the number of items.

Means and Standard Deviations for Vacation and Control Groups

	Pre-fatigue	Post-fatigue
Vacation Group (Mean)	1.58	1.65
(SD)	.20	.19
Control Group (Mean)	1.55	1.57
(SD)	.16	.22

Hypothesis 2: Vacations in Natural Environments Will Result in More Therapeutic Outcomes Than Vacations in Urban Environments.

The second hypothesis predicted that the vacation environment (natural versus built) would affect post-vacation personal strain, concentration, and physical fatigue. A second part of this hypothesis predicted that the influence of the natural-built dimension would have a stronger association with restored concentration, and reduced fatigue and occupational strain than would the novelty of vacation environments, or the positive affect they elicit.

To evaluate the change in post-vacation scores, a change score was calculated by subtracting the pre-vacation score from the post-vacation score for the personal strain, concentration, and fatigue scales.[4] Table 5 shows the correlations between the main variables and the three change scores. One tailed significance levels were used because the hypothesis predicted that personal strain and fatigue would decrease and concentration would increase.

The hypothesis was supported for the personal strain measure. More natural vacation environments were associated

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[4] There is some controversy surrounding the use of change scores. The hypotheses were also analyzed by entering the pre-vacation score into regression analyses first and then entering all other predictors simultaneously. The dependent variables were the post-vacation measures. The results are reported in Appendix E.

with reduced personal strain ($r = -.38$, $p < .001$). Changes in fatigue and concentration scores were not significantly correlated with the natural-built dimension. Novelty and Affect (pleasure and arousal) were not significantly correlated with the three change scores.

Table 5

Correlations for Vacation Variables with Change Scores

	STRAIN CHANGE	CONCENTRATION CHANGE	FATIGUE CHANGE
NOVELTY	.25	-.24	-.21
NATURE	-.38**	.30	.09
PLEASURE	.04	.09	-.11
AROUSAL	.29	-.05	-.10

Note. All change scores are time 2 minus time 1.
One-tailed significance level ** = .001

Multiple regression analyses were used to see whether the natural-built rating was a more important predictor of the post-vacation changes than the novelty, and affect scales. The dependent variables were the change scores (post-vacation - pre-vacation) for personal strain, concentration, and physical fatigue. The predictors were the nature and novelty ratings and the pleasure and arousal scales. The regression results are presented in Table 6.

Personal strain. The four predictor variables (nature, novelty, arousal, and pleasure) explained 21% of the variance in the personal strain change score (adjusted R^2 =.15). The hypothesis was supported for personal strain: the nature-built rating was the only variable that entered the equation at a significant level.

Concentration and physical fatigue. The multiple regression analyses of the four predictor variables (nature, novelty, arousal, and pleasure) with concentration change scores and fatigue change scores as dependent variables were both non-significant (concentration [$F(4,61) = 2.25$, ns .075]; fatigue [$F(4,61) = 1.00$, ns].

Table 6

Results of Multiple Regressions of Nature, Novelty, Arousal, and Pleasure on Changes in Post-vacation Personal Strain, Concentration, and Fatigue Change scores

Personal Strain

Multiple *R*	R^2	Adjusted R^2	*F*	Significance *F*
.45	.21	.15	3.46	.01

	Beta	*T*	Significance of *T*
Nature	.30	2.10	.04
Novelty	.20	1.64	11
Arousal	.14	.92	.36
Pleasure	.04	.33	.75

Concentration

Multiple *R*	R^2	Adjusted R^2	*F*	Significance *F*
.37	.14	.08	2.25	.07

Physical Fatigue

Multiple *R*	R^2	Adjusted R^2	*F*	Significance *F*
.25	.07	.00	1.00	.41

The results of the correlation and multiple regression analyses suggest that more natural vacations were associated with a decrease in personal strain. The novelty of the vacation and the pleasure and arousal measures were not associated with restorative effects in the three measures (strain, concentration, fatigue).

Hypothesis 3: The pre-vacation level of stress will be associated with post-vacation outcomes.

The third hypothesis predicted that the pre-vacation level of stress would influence the post-vacation work outcomes. Individuals experiencing high levels of pre-vacation occupational strain were expected to be more likely to feel restored if they vacationed in natural rather than urban environments. This hypothesis was based on Ulrich's (1983) suggestion that the restorative effects of natural scenes "may be most pronounced when the observer's initial state is one of stress and excessive arousal" (p. 116).

The interpretation guidelines for the PSQ scales define high levels of personal strain as a T-score of 70 and above. T-scores of 70 and above occur approximately 2% of the time within normative samples. T-scores between 60 and 69 suggest mildly high levels of personal strain (information on normative samples not available).

The vacation group's pre-vacation personal strain scores were converted to T-scores following the guidelines provided with the Occupational Stress Inventory. The

inventory provides separate conversion guidelines for male and female respondents. Only 1 subject ($\underline{T}$ = 72) scored in the high strain category (1.5% of the vacation group). Eight subjects scored in the mildly high strain category.

A proper test of the hypothesis is not possible because so few subjects had high strain scores. However, I decided to test a version of the hypothesis that subjects with higher strain scores would benefit more from more natural vacations. The hypothesis predicted an interaction between pre-vacation personal strain scores and the vacation environment. To examine this hypothesis a new variable was created by computing the product of the pre-vacation strain scores and the natural-built variable. A multiple regression analyses was performed entering the pre-vacation strain score, then the natural-built variable, and finally the product variable with the post-vacation strain scores as the dependent variable.

The rationale for this approach is explained in Cohen and Cohen (1975, p. 295). Cohen and Cohen suggest that the product variable "carries" but does not equal the interaction. Because the product variable will generally be linearly correlated with both main effects, the product variable only becomes the interaction when the constituent variables are partialled out. Cohen and Cohen depict this relationship as:

$$u \times v = uv \cdot u,v$$

where u X v equals the interaction and uv the product variable. Partialling out the main effects from the interaction is achieved by entering the main effects into the regression equation before the product variable.

The hypothesis was not supported. The product variable carrying the interaction between the pre-vacation stress levels and the natural-built dimension was not significant and explained only 1% of the variance.

Hypothesis 4: Associations between the vacation and post vacation outcomes will be stronger if the vacation environment is compatible with the individual's environmental disposition.

Hypothesis 4 predicted that individuals will gain more benefits from environments that are compatible with their environmental dispositions. The pastoralism, and urbanism scales of the Environmental Response Inventory (Mckechnie, 1974) were used to measure environmental disposition. The pastoralism and urbanism scales measure different aspects of preferences for natural or urban environments. High scores on the pastoralism scale indicate an acceptance of natural forces as shapers of human life, sensitivity to pure environmental experiences and a preference for open spaces. High scores on the urbanism scale indicate enjoyment of high-density living and appreciation of the varied stimulus patterns of the city.

This hypothesis predicted an interaction between environmental dispositions and type of vacation environment (natural or built). The approach described for Hypothesis 3 was used to test the interaction. Interaction variables were created from the product of each of the ERI scales and the nature rating. The ERI scales and the nature rating were entered into multiple regression analyses followed by the product variables. The dependent variables were the personal strain, concentration, and fatigue change scores.

Personal strain. The increment added by the pastoralism X nature product variable was not significant, adding less than 1% to the variance in the personal strain change scores. The interaction between the urbanism scale and the nature ratings of the vacation environment supported the hypothesis. The urbanism X nature product variable entered the equation at a significant level and explained an additional 21% of the variance (Table 7).

A significant interaction suggests that the slope of the regression varies for different levels of the Urbanism scale. Figure 5 shows the plot for the mean and one standard deviation above and below the mean on the urbanism scale with low to high ratings of the naturalness of the vacation (the X axis) and the personal strain change score (the Y axis) (Appendix F describes the procedures used to plot the interaction). Individuals who scored low or around the mean on the urbanism scale were more likely to

experience reduced strain if they vacationed in more natural environments whereas individuals who scored high on the Urbanism scale and vacationed in more natural vacation environments did not.

Table 7

Results of Multiple Regressions of ERI Scales, Nature, and Product Variables on Personal Strain Change scores

Pastoralism and Personal Strain

Variables Entered	Multiple R	R^2	Adjusted R^2
Nature and Pastoralism	.44	.19	.16
Nature X Pastoralism	.44	.19	.15

Urbanism and Personal Strain

Variables Entered	Multiple R	R^2	Adjusted R^2
Nature and Urbanism	.43	.18	.15
Nature X Urbanism	.63	.39	.36

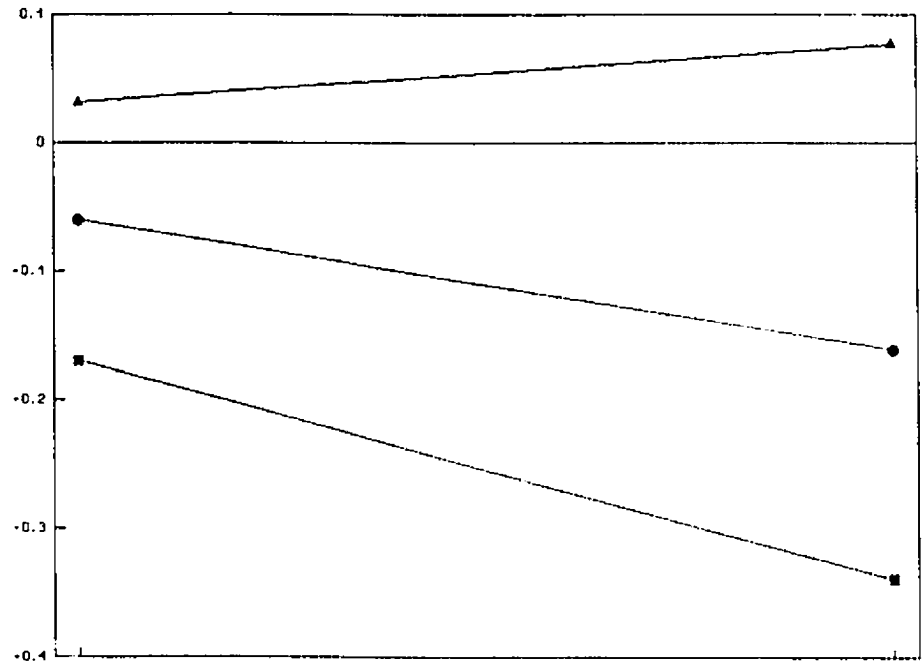

Figure 5. Plot of the interaction between natural rating of vacation environment and urbanism scale regressed on personal strain change score.

Concentration and fatigue. The interactions between the Pastoralism scale and the concentration and fatigue change scores and the Urbanism scale and the concentration and fatigue change scores were not significant.

Discussion

Summary of Findings

The term restoration refers to situations that allow psychological and physiological recovery from sustained effort, and over or under stimulation (Ulrich, 1993). The purpose of this study was to identify some experiences or environments that restore energies and enhance the ability to cope with the demands of urban lifestyles and contemporary jobs.

Vacations from work as restorative experiences. One goal of this study was to test the belief that a temporary leave from the workplace revitalizes workers. The findings support the prevalent belief that vacations are restorative. Vacations from work resulted in a decrease in occupational strain and an increase in self-reported ability to concentrate. Scores for the control group did not change over the two measurement periods indicating that the observed changes in the vacation group were likely due to the vacation.

A predicted decrease in subjective physical fatigue was not found. An unexpected tendency towards an increase in physical fatigue in the vacation group was not statistically

significant. The slight increase in physical fatigue after returning to work may be an outcome of dealing with a backlog of work and readjusting to work schedules.

The role of nature, affect and novelty in restoration. One goal of the study was to clarify the role of nature, positive affect, and novelty on restoration. Some writers suggest that nature uniquely contributes to restoration (e.g., Wilson, 1984). Others suggest that positive affect fosters restoration and nature may be just one type of stimulus that triggers positive affect (Knopf, 1987). Another view proposes that a feeling of being away from one's everyday environment contributes to restoration. Kaplan and Kaplan (1989) suggest that nature, even nearby nature, promotes a feeling of being away in a psychological sense. This study asked whether novelty or positive affect contributed to restoration directly or by mediating the impact of nature.

The findings provide some support for the claim that natural environments are more likely to be restorative than other environments. Vacations in more natural environments were associated with decreased occupational strain. Although the vacation group reported an increase in the ability to concentrate after the vacation, this restorative effect was not significantly related to the naturalness of the vacation environment.

This study failed to identify any features of the vacation environment that were associated with restoration, other than the natural-built rating. Positive affect was expected to be associated with natural environments and with restoration. According to Ulrich's (1983) model of responses to natural environments, emotional responses contribute to enhanced functioning. Natural environments were associated with reduced arousal levels, a finding that corresponds with research using physiological measures of arousal (Ulrich, 1983). However reduced arousal levels were not related to post-vacation changes in strain, concentration, and fatigue. The pleasure scale was not significantly related to natural environments or to post-vacation changes.

Novel stimuli are associated with involuntary attention (Kaplan & Kaplan, 1989). It was expected that the novelty ratings would reflect the degree to which participants experienced a sense of being away, one of Kaplan and Kaplan's elements of restoration. In this study vacation environments viewed as novel were not associated with restoration or with natural environments.

Pre-vacation levels of strain and restoration. Ulrich (1983) proposed that the restorative effects of natural scenes may be more pronounced if the initial level of stress and arousal is high. Since participants in this study did not display high levels of strain prior to vacations it was

difficult to test this hypothesis. This study did not find an association between pre-vacation levels of strain, natural environments, and restoration.

Perhaps the low levels of occupational strain reported by the participants should have been expected. Previous research indicates that the outcomes of strain and overtaxed directed attention include less helping behaviour (e.g., Cohen & Spacapan, 1978). Individuals experiencing high levels of strain may be less likely to volunteer for a psychology study.

Environmental disposition and the effects of natural environments. Individual differences have been largely ignored in the research on restorative environments. This may be due to the high consistency in preference ratings for natural environments (Kaplan, 1989). Previous research indicates that there is very little variation in the way people rate different environments even across demographic groups and cultures. Nevertheless, although ratings of environments may be consistent, people do have individual environmental preferences and respond to environments in different ways.

This study examined the hypothesis that restoration was more likely if people vacation in environments that were compatible with their environmental disposition. The pastoralism scale of the Environmental Response Inventory (McKechnie, 1974) was not related to any changes in the

post-vacation measures. However, people who enjoy and prefer urban environments did not experience decreased occupational strain after vacations in natural environments whereas people who scored in the middle or low ranges of the urbanism scale did. This finding suggests that restoration is influenced by the fit between the person and environment and the restorative effects of natural environments will be stronger for people who do not prefer urban living.

An examination of the content of the pastoralism scale may explain why the expected interaction was not found. People who score high on the scale are opposed to land development, concerned about population growth, and the preservation of natural resources including open space, they accept natural forces as shapers of human life, are sensitive to pure environmental experiences and are self-sufficient in the natural environment (McKechnie, 1974, p.2). Parts of this description reflect attitudes towards preservation and conservation and could be called an environmentalist scale. Individuals who support environmental causes will not necessarily prefer natural environments. The urbanism scale of the ERI more closely reflects a preference for urban environments. Individuals who score high on the urbanism scale enjoy high density living and interpersonal richness and diversity, appreciate the unusual and varied stimulus patterns of the city, and show an interest in cultural life (McKechnie, 1974, p.2).

Low scorers on this scale are likely to appreciate rural areas and nature.

Contributions of the Study

Most of the previous research used slides in a laboratory (e.g., Ulrich, 1981), wilderness backpackers' reactions to environments, or students assigned to an experience in a specific type of environment (Hartig, Mang, & Evans, 1991), These approaches provide control over the environment and an opportunity to isolate and identify important variables. The disadvantage of these approaches is their limited external and ecological validity. The present study used responses to vacation environments from government workers. This approach provides l ss control but it complements the laboratory and field experiments and provides more external validity. Taken together, the two approaches strengthen confidence in the findings.

This study focused on the "carry-over" or long term effects of restoration. Previous research measured restoration during, or immediately after exposure to the environment (e.g., Hartig et al., 1991; Ulrich, 198). For example, Ulrich operationalized restoration as an increase of positive emotional tone and a decrease in arousal while viewing slides of environments. The present study extended the concept of restoration to include enhanced functioning beyond the specific time of exposure to the restorative environment. This approach provides some evidence for

Hartig et al's. (1991) notion of the inoculation effects of natural and restorative environments. A further contribution of this study is the finding that individual differences in environmental disposition may affect the restorative effects of environments.

Limitations of the Study

The results of this study cannot be generalized to all workers or to all vacations. The volunteer rate was very low and included only public sector office employees working in urban areas. Participants had completed a higher level of education than the general public (forty-one percent had completed a university degree). Vacation experiences may have different outcomes for employees with different levels of education, or with different backgrounds or work environments.

The measure of the natural-built dimension was based on the participants' perceptions of their vacation environments. There is no way of determining whether others would agree with the rating or whether all types of natural and urban environments were included. Many of the vacations were in British Columbia (45%) or Washington and Oregon (27%). Only three participants left continental North America during their vacation. In most cases the natural and urban vacations included in this study are located on or near to the Pacific coast. Since this area is known for its

scenic beauty these findings may not be generalizable to other areas that are equally natural but less spectacular.

This study had limitations that may have biased results towards restorative responses. Participants were told that the study was about the "after-effects" of vacations. Since vacations are highly valued by employees they may have tried to answer in ways that reflected the positive aspects of vacations. The increase in physical fatigue suggests this may not be the case. It is less likely that subjects inferred the hypotheses about the effects of natural environments or the role of environmental dispositions. A replication of the study should include a check to determine whether the participants guessed the hypotheses. The study relied solely on self-report measures. A replication should include other measurement methods such as behaviourial measures.

Future Research

This study demonstrated that vacations and natural environments had restorative benefits that were evident one and a half weeks after returning to work. Future research could monitor the duration of the restorative effects and identify factors that affect their duration. An understanding of the duration of restorative effects could direct decisions on scheduling employee vacations and provide some important information on coping strategies.

This study found that an individual's environmental disposition influenced the restorative effects of natural environments. Future research could explore the impact of other individual differences. Perceived control may influence restoration in natural and urban environments (Ulrich et al., 1991). People classified as workaholics may not benefit from vacations from work in the same way or to the same degree as other workers.

Vacations are fairly infrequent and usually last a number of days. Kaplan and Kaplan (1989) point out that restoration can occur in many places at different levels. The present study did not consider different levels of restoration or the impact of living in rural areas. Future research could try and identify whether living and working in different types of environments influences the restorative effects of natural environments.

Conclusion

Contemporary urban lifestyles are characterized as stressful and fast-paced. If everyday urban environments negatively affect well-being then the search for restorative experiences and environments is important. The beneficial outcomes has been a major part of the rationale for the preservation of natural environments and the creation of urban parks. This study provides some support for the belief that nature plays an important role in human functioning.

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APPENDIX A

CLASSIFICATION SYSTEM FOR JOB LEVELS

The participant's job positions were classified under four job levels.

1. Clerical

The clerical category includes all clerks, receptionists and secretarial staff.

2. Professional/technical

The professional/technical category includes accountants, computer analysts, land appraisers, research officers, public health nurses, and city planners.

3. Middle Management

The middle management category includes supervisors, and any one who indicated they were an administrative assistant or manager up to level six under the provincial government's classification system.

4. Upper Management

This category includes Directors, and Executive Directors. Two lawyers were also included in this category.

APPENDIX B

PARTICIPATING ORGANIZATIONS

British Columbia Assessment Authority

British Columbia Building Corporation

British Columbia Systems Corporation

Capital Region District

Coast Guard

City of Victoria

Ministry of Solicitor General

Ministry of Labour and Consumer Services, Municipal Affairs, Recreation and Culture

Municipality of Saanich

University of Victoria, Records Services

Declined to Participate

British Columbia Ferry Corporation

Ministry of Health

APPENDIX C

QUESTIONNAIRES AND INSTRUCTIONS

Note: The test questions from the Personal Strain Questionnaire and the Environmental Response Inventory are not included in this dissertation because of copyright agreements.

(Circulated notice)

I NEED A VACATION!!

This notice is a request for volunteers to take part in a Ph.D. research project on the "after-effects" of vacation leave.

WHO? Full-time employees who have been employed in their present position for at least 6 months. The project requires:

1. A group with vacation leave falling between the end of April and the end of September.
2. A group that is not taking vacation leave during this time frame.
3. Participants in both groups will not have had a vacation in the three months prior to participation.

WHAT IS INVOLVED?

1. Filling out some questionnaires on your mood, your energy level, and your feelings toward your job.
2. These questionnaires are filled out twice - one week before vacation leave and one week after you return.
3. If you do not take a vacation during this time you will fill out the questionnaires approximately two to six weeks apart.
4. If you do take a vacation you will also be asked to fill out a short questionnaire on your vacation experience.
5. Information on absentee rate before and after vacation leave will also be requested.

HOW MUCH TIME IS INVOLVED?

Pre-vacation Approximately 25 minutes
Vacation 15-20 minutes
Post-vacation 20 minutes.

PLEASE HELP - the completion of degree relies on the willingness of people to give their time.

Participation is voluntary. All information that you provide is confidential.
If interested, please call Julie Macdonald

(Package 1 - Vacation Group)

DIRECTIONS

Enclosed are two sets of questionnaires.

PRE-VACATION

The pre-vacation questionnaire is in the envelope marked # 1

Fill out the questionnaire:

- one week and one half weeks before you take vacation leave,
- near or at the end of your work day,
- at your place of work.

Return the questionnaire to me in the self-addressed envelope provided or call me to pick it up.

VACATION

The vacation questionnaire is in the envelope marked # 2

- If you go on a trip during your vacation leave, take the questionnaire with you and fill it out at the end of your vacation at your vacation site.

- If you remain at home, fill out the questionnaire 1 or 2 days before you return to work.

PLEASE DO NOT OPEN THE ENVELOPE UNTIL YOU ARE READY TO FILL OUT THE QUESTIONNAIRES

Return the questionnaire to me in the self-addressed envelope provided or call me to pick it up.

ANY QUESTIONS? Please call me.

THANK YOU !!!

(Package 2- Vacation Group)

DIRECTIONS

This is the third and final questionnaire.

Please put the same code name you used for the first two questionnaires in the space provided and fill in the date on the day you complete the questions.

Fill out the questionnaire:

- one week and one half weeks after you return to work. For example, if you return to work on a Monday, work Monday to Friday and fill out the questionnaire on the next Wednesday.

- near or at the end of your work day,

- at your place of work.

Return the questionnaire to me in the self-addressed envelope provided or call me to pick it up.

ANY QUESTIONS? Please call me.

THANK YOU FOR THE TIME YOU HAVE TAKEN
AND FOR THE INFORMATION !!!

(Package 1 - Control Group)

DIRECTIONS

The first questionnaire is enclosed.

Fill out the questionnaire:

- mid-week,
- near or at the end of your work day,
- at your place of work.

PLEASE DO NOT OPEN THE ENVELOPE UNTIL YOU ARE READY TO FILL OUT THE QUESTIONNAIRE

Return the questionnaire to me in the self-addressed envelope provided or call me to pick it up.

ANY QUESTIONS? Please call me.

THANK YOU !!!

(Package 2 - Control Group)

DIRECTIONS

This is the second and final questionnaire.

Fill out the questionnaire:

- mid-week,
- near or at the end of your work day,
- at your place of work.

PLEASE DO NOT OPEN THE ENVELOPE UNTIL YOU ARE READY TO FILL OUT THE QUESTIONNAIRE

Return the questionnaire to me in the self-addressed envelope provided or call me to pick it up.

ANY QUESTIONS? Please call me.

THANK YOU FOR THE TIME YOU HAVE TAKEN
AND FOR THE INFORMATION !!!

CONSENT FORM

I authorize Julia Macdonald of the University of Victoria, and any research assistants designated by her, to gather information from me on my perceptions of my work and vacation experiences.

I understand that my participation is voluntary and that I may terminate my participation at any time.

I also understand that my employer is not involved in anyway with this research project and that the confidentiality of information collected from me will be assured through the use of a code name known only to myself and the researcher.

_____

Signature and date

BACKGROUND INFORMATION

Sex: Male ___ Female ___

Age: ___

Highest level of education:

University degree or
Completed Post Secondary Training ___

Some University ___

High School Graduation ___

Less than High School Graduation ___

Other (What?) _____

Number of years work experience _____

Number of years in current organization _____

Job position _____

Please provide a "code name". This name is the only way we will have to match the questionnaires you fill out for us. Think of a name that you will not forget. to ensure complete anonymity provide a name that no-one will link to you (e.e., not a widely known nickname). Please do not choose a name of a famous person in case other also choose that name. Some suggestions for sources are your mother's maiden name, or your best friend in high school.

CODE NAME _____

Write this name on the space above and on the attached slip of paper. On the attached slip, please also write your actual name - place the slip of paper in the envelope provided and seal. Return this envelope to the researcher with your questionnaire.

ANSWER SHEET FOR SECTION TWO (PSQ)

Section two (PSQ) contains statement about work situations and individual habits. Use this sheet to record your answers. Read each statement carefully. Focus on the previous working week (5 days). For each statement use the following scale and circle the number which fits you best.

1 = Rarely or never true
2 = Occasionally true
3 = Often true
4 = Usually true
5 = True most of the time

1.	1	2	3	4	5	21.	1	2	3	4	5
2.	1	2	3	4	5	22.	1	2	3	4	5
3.	1	2	3	4	5	23.	1	2	3	4	5
4.	1	2	3	4	5	24.	1	2	3	4	5
5.	1	2	3	4	5	25.	1	2	3	4	5
6.	1	2	3	4	5	26.	1	2	3	4	5
7.	1	2	3	4	5	27.	1	2	3	4	5
8.	1	2	3	4	5	28.	1	2	3	4	5
9.	1	2	3	4	5	29.	1	2	3	4	5
10.	1	2	3	4	5	30.	1	2	3	4	5
11.	1	2	3	4	5	31.	1	2	3	4	5
12.	1	2	3	4	5	32.	1	2	3	4	5
13.	1	2	3	4	5	33.	1	2	3	4	5
14.	1	2	3	4	5	34.	1	2	3	4	5
15.	1	2	3	4	5	35.	1	2	3	4	5
16.	1	2	3	4	5	36.	1	2	3	4	5
17.	1	2	3	4	5	37.	1	2	3	4	5
18.	1	2	3	4	5	38.	1	2	3	4	5
19.	1	2	3	4	5	39.	1	2	3	4	5
20.	1	2	3	4	5	40.	1	2	3	4	5

(CONCENTRATION SCALE)

OVER THE LAST WORKING WEEK:

	not at all		some what			quite			very
How well were you concentrating?	1	2	3	4	5	6	7	8	9
Was it hard to concentrate?	1	2	3	4	5	6	7	8	9
Did you feel good about yourself?	1	2	3	4	5	6	7	8	9
Were you living up to your own expectations?	1	2	3	4	5	6	7	8	9
Were you living up to the expectations of others?	1	2	3	4	5	6	7	8	9
Were you enjoying work?	1	2	3	4	5	6	7	8	9
Did you feel distracted by things around you?	1	2	3	4	5	6	7	8	9
Time passed quickly?	1	2	3	4	5	6	7	8	9

DESCRIBING YOUR WORKPLACE

Below is a list of words that can be used to describe places. Rate how accurately each word below describes your work setting. Some of the words may seem odd but please try to give an answer for each word. Use the following 1-8 rating scale for your answer.

1 = extremely inaccurate	5 = slightly accurate
2 = very inaccurate	6 = quite accurate
3 = quite inaccurate	7 = very accurate
4 = slightly inaccurate	8 = extremely accurate

Pleasant	1	2	3	4	5	6	7	8
Alive	1	2	3	4	5	6	7	8
Uncomfortable	1	2	3	4	5	6	7	8
Slow	1	2	3	4	5	6	7	8
Familiar	1	2	3	4	5	6	7	8
Beautiful	1	2	3	4	5	6	7	8
Dissatisfying	1	2	3	4	5	6	7	8
Pretty	1	2	3	4	5	6	7	8
Lazy	1	2	3	4	5	6	7	8
Drowsy	1	2	3	4	5	6	7	8
Repulsive	1	2	3	4	5	6	7	8
Intense	1	2	3	4	5	6	7	8
Rushed	1	2	3	4	5	6	7	8
Calm	1	2	3	4	5	6	7	8
Unpleasant	1	2	3	4	5	6	7	8
Tranquil	1	2	3	4	5	6	7	8
Serene	1	2	3	4	5	6	7	8
Usual	1	2	3	4	5	6	7	8
Active	1	2	3	4	5	6	7	8
Sensational	1	2	3	4	5	6	7	8
Dull	1	2	3	4	5	6	7	8
Dreary	1	2	3	4	5	6	7	8

Question continued...

1 = extremely inaccurate	5 = slightly accurate
2 = very inaccurate	6 = quite accurate
3 = quite inaccurate	7 = very accurate
4 = slightly inaccurate	8 = extremely accurate

Nice	1	2	3	4	5	6	7	8
Restful	1	2	3	4	5	6	7	8
Boring	1	2	3	4	5	6	7	8
Arousing	1	2	3	4	5	6	7	8
Idle	1	2	3	4	5	6	7	8
Inactive	1	2	3	4	5	6	7	8
Common	1	2	3	4	5	6	7	8
Exciting	1	2	3	4	5	6	7	8
Pleasing	1	2	3	4	5	6	7	8
Hectic	1	2	3	4	5	6	7	8
Displeasing	1	2	3	4	5	6	7	8
Exhilarating	1	2	3	4	5	6	7	8
Interesting	1	2	3	4	5	6	7	8
Monotonous	1	2	3	4	5	6	7	8
Rare	1	2	3	4	5	6	7	8
Unstimulating	1	2	3	4	5	6	7	8
Surprising	1	2	3	4	5	6	7	8
Frenzied	1	2	3	4	5	6	7	8
Tense	1	2	3	4	5	6	7	8
Peaceful	1	2	3	4	5	6	7	8
Natural	1	2	3	4	5	6	7	8
Panicky	1	2	3	4	5	6	7	8
Forceful	1	2	3	4	5	6	7	8

(FATIGUE SCALE) HOW ARE YOU FEELING?

Please indicate if you have had any of the following experiences at work within the last five working days. If you have, circle the word "YES", if you have not, circle "NO".

1.	Feeling physically exhausted	NO	YES
2.	Feeling emotionally exhausted	NO	YES
3.	Yawning frequently	NO	YES
4.	Having an especially good day	NO	YES
5.	Feeling run-down	NO	YES
6.	Being drowsy	NO	YES
7.	Feeling eye-strain	NO	YES
8.	Finding it difficult to think	NO	YES
9.	Feeling optimistic	NO	YES
10.	Becoming nervous	NO	YES
11.	Feeling brilliant	NO	YES
12.	Unable to concentrate attention	NO	YES
13.	Unable to take interest in things	NO	YES
14.	Being apt to forget things	NO	YES
15.	Being extremely happy	NO	YES
16.	Lack of self-confidence	NO	YES
17.	Anxious about things	NO	YES
18.	Lack of patience	NO	YES
19.	Having a headache	NO	YES
20.	Feeling stiff in the shoulders	NO	YES
21.	Feeling a pain in the back	NO	YES
22.	Feeling especially energetic	NO	YES
23.	Having difficulty breathing	NO	YES
24.	Feeling ill	NO	YES
25.	Feeling bored	NO	YES

VACATION QUESTIONNAIRE

Take this questionnaire with you on your vacation
and complete at your vacation site the day before returning home.

If you are spending your entire vacation at home,
complete the questionnaire one or two days
before returning to work.

Please do not read the questionnaire until
you are ready to fill it out.

THANK YOU!!

VACATION QUESTIONNAIRE

CODE NAME _____ DATE _____

1. Where are you spending your vacation? Provide a location, a list of locations, and a brief description of the type of environment it is (e.g., deep wilderness, forests, big city, your own home, etc.).

_____
_____
_____

2. How long will your vacation be? _____ days

3. What are you doing on your vacation? Mark as many as apply and add any important activities that are missing from the list.

   a. Shopping
   b. Hiking
   c. Sunbathing on the beach
   d. Relaxing around a pool
   e. Enjoying nature
   f. Enjoying the nightlife
   g. Boating
   h. Visiting museums and art galleries
   i. Water skiing
   j. Theme park (Disneyland)

   and others?

   k. _____
   l. _____

4. The following line represents a continuum ranging between two extremes. Place an X on the line (Example _ _ _ X _ _) closer to the work that best describes the outdoor physical environment where you spent your vacation. If your vacation included a number of different environments please do you best to average across those different settings.

NATURAL _ _ _ _ _ _ _ _ _ MAN-MADE

5. Indicate in which type of environment(s) you stayed during your vacation, and how many days you stayed there. If your vacation covered a number of different types of environment indicates how many days you stayed in each one. Use fractions for parts of days if you wish.

	# of Days
Wilderness	_____
Camp Grounds	_____
Mountains	_____
Isolated Beach	_____
Farm	_____
Resort	_____
Busy Beach	_____
Small Town	_____
Small City	_____
Suburbs	_____
Big City	_____
Other (what?) _____	# of days _____

6. What type (or types) of accommodations did you stay in? Mark all that apply.

	# of Nights
Sleeping bag/ No tent	_____
Tent	_____
Rustic cabin	_____
Well equipped cabin or cottage	_____
Friends or relatives's home	_____
Hotel/Motel	_____
Motor Home	_____
Resort	_____
Cruise Ship	_____
Private Boat	_____
Other (what?) _____	# of Nights _____

7. Which of the following categories best describes the most dominant feature of your vacation environment?

a. Deep wilderness
b. Forested areas
c. Woods plus ocean, lakes, or streams
d. Sand and water
e. Cultivated fields
f. Landscaped gardens
g. Small town buildings
h. Suburbs
i. High rises
j. Shopping mall
l. Other (What?) _____

8. Use the following adjective pairs to describe <u>how you felt most of the time</u> during this vacation. Put a X on the line to indicate what you think is an appropriate description.

Excited	_ _ _ _ _ _ _ _ _	Calm
Satisfied	_ _ _ _ _ _ _ _ _	Unsatisfied
Sluggish	_ _ _ _ _ _ _ _ _	Frenzied
Unhappy	_ _ _ _ _ _ _ _ _	Happy
Guided	_ _ _ _ _ _ _ _ _	Autonomous
Relaxed	_ _ _ _ _ _ _ _ _	Bored
Pleased	_ _ _ _ _ _ _ _ _	Annoyed
Dominant	_ _ _ _ _ _ _ _ _	Submissive
Sleepy	_ _ _ _ _ _ _ _ _	Wide-awake
Stimulated	_ _ _ _ _ _ _ _ _	Relaxed
Melancholic	_ _ _ _ _ _ _ _ _	Contented

9. Below are some statements that can apply to vacation experiences. Read each one and indicate on the following scale whether this statement describes your vacation.

1 = Completely Agree
2 = Somewhat Agree
3 = Neither Agree or Disagree
4 = Somewhat Disagree
5 = Completely Disagree

a	This vacation was an unique experience for me.	1 2 3 4 5
b	On this vacation I did new and unfamiliar things.	1 2 3 4 5
c	This vacation was an adventure.	1 2 3 4 5
d	My activities on this vacation were different from those I usually engage in.	1 2 3 4 5
e	I went to a new, unfamiliar place.	1 2 3 4 5
f	Most people would describe this vacation as different.	1 2 3 4 5

10. Below is a list of words that can be used to describe places. Rate how accurately each work below describes you vacation setting. Some of the words may seem odd but please try to give an answer for each work. Use the following 1-8 rating scale for your answer. If you visited a number of places, try to rate your vacation setting on average.

1 = extremely inaccurate
2 = very inaccurate
3 = quite inaccurate
4 = slightly inaccurate
5 = slightly accurate
6 = quite accurate
7 = very accurate
8 = extremely accurate

Novel	1	2	3	4	5	6	7	8
Pleasant	1	2	3	4	5	6	7	8
Alive	1	2	3	4	5	6	7	8
Uncomfortable	1	2	3	4	5	6	7	8
Slow	1	2	3	4	5	6	7	8
Familiar	1	2	3	4	5	6	7	8
Beautiful	1	2	3	4	5	6	7	8
Dissatisfying	1	2	3	4	5	6	7	8
Pretty	1	2	3	4	5	6	7	8
Lazy	1	2	3	4	5	6	7	8
Drowsy	1	2	3	4	5	6	7	8
Repulsive	1	2	3	4	5	6	7	8
Intense	1	2	3	4	5	6	7	8
Rushed	1	2	3	4	5	6	7	8
Calm	1	2	3	4	5	6	7	8
Unpleasant	1	2	3	4	5	6	7	8
Tranquil	1	2	3	4	5	6	7	8
Serene	1	2	3	4	5	6	7	8
Usual	1	2	3	4	5	6	7	8
Active	1	2	3	4	5	6	7	8
Sensational	1	2	3	4	5	6	7	8
Dull	1	2	3	4	5	6	7	8

Question 10 continued. . . .

1 = extremely inaccurate
2 = very inaccurate
3 = quite inaccurate
4 = slightly inaccurate
5 = slightly accurate
6 = quite accurate
7 = very accurate
8 = extremely accurate

Dreary	1	2	3	4	5	6	7	8
Nice	1	2	3	4	5	6	7	8
Restful	1	2	3	4	5	6	7	8
Boring	1	2	3	4	5	6	7	8
Arousing	1	2	3	4	5	6	7	8
Idle	1	2	3	4	5	6	7	8
Inactive	1	2	3	4	5	6	7	8
Common	1	2	3	4	5	6	7	8
Exciting	1	2	3	4	5	6	7	8
Pleasing	1	2	3	4	5	6	7	8
Hectic	1	2	3	4	5	6	7	8
Displeasing	1	2	3	4	5	6	7	8
Exhilarating	1	2	3	4	5	6	7	8
Artificial	1	2	3	4	5	6	7	8
Interesting	1	2	3	4	5	6	7	8
Monotonous	1	2	3	4	5	6	7	8
Manmade	1	2	3	4	5	6	7	8
Rare	1	2	3	4	5	6	7	8
Unstimulating	1	2	3	4	5	6	7	8
Surprising	1	2	3	4	5	6	7	8
Frenzied	1	2	3	4	5	6	7	8
Tense	1	2	3	4	5	6	7	8
Peaceful	1	2	3	4	5	6	7	8
Natural	1	2	3	4	5	6	7	8
Crowded	1	2	3	4	5	6	7	8
Panicky	1	2	3	4	5	6	7	8

Question 10 continued. . . .

1 = extremely inaccurate
2 = very inaccurate
3 = quite inaccurate
4 = slightly inaccurate
5 = slightly accurate
6 = quite accurate
7 = very accurate
8 = extremely accurate

Forceful	1	2	3	4	5	6	7	8
Vegetated	1	2	3	4	5	6	7	8
Unspoiled	1	2	3	4	5	6	7	8
Inhabited	1	2	3	4	5	6	7	8
Isolated	1	2	3	4	5	6	7	8

11. How similar is the place where you are vacationing to your home environment? (Check one)

Very similar ____
Somewhat similar ____
Neither similar nor dissimilar ____
Somewhat dissimilar ____
Very dissimilar ____

12. How similar is the place where you are vacationing to your work environment? (Check one)

Very similar ____
Somewhat similar ____
Neither similar nor dissimilar ____
Somewhat dissimilar ____
Very dissimilar ____

13. How satisfied are in general with your vacation? (Check one)

Very satisfied ____
Somewhat satisfied ____
Neither satisfied nor dissatisfied ____
Somewhat dissatisfied ____
Very dissatisfied ____

THANK YOU FOR YOUR TIME AND INFORMATION !!!

APPENDIX D

DETAILS ON THE NATURAL-BUILT SCALE

A seven-item Natural-Built environment scale was developed for use in this study. The scale was created from different questions on the vacation questionnaire:

- The first item was a rating on an eight-point continuum between natural and man-made (question #4). The continuum was reversed when coded so 8 equalled natural.
- Participants indicated how many days they stayed in eleven types of environments ranging from wilderness to big city (question #5). The number of days spent in wilderness, camp grounds, mountains, isolated beach, farm, or busy beach was divided by the total number of vacation days. None of the subjects added any types of environments in the 'other' category provided.
- The participants indicated which of 10 categories best described the most dominant feature of the vacation environment (question 7). The ten items were coded from 1 to 8. Items 'j' (shopping mall) and 'i' (high rises) were combined for a rating of 1; items 'b' (forested areas) and 'c'(woods plus ocean, lakes or streams) were combined and coded as 7. Item 'a' (deep wilderness) was coded as 8. Three subjects added a golf course in the 'other' category. Golf courses were coded in the same category as a cultivated field.

- The participants rated four words on a one to eight scale of how accurately they described the vacation environment; artificial, manmade, vegetated, natural, (question 10).

The items were summed and the total was divided by seven. The reliability of the scale (Cronbach's Alpha) was .88.

APPENDIX E

ANALYSES USING HIERARCHIAL MULTIPLE REGRESSION TO PARTIAL OUT THE EFFECT OF THE PRE-VACATION MEASURE

Some controversy (e.g., Cronbach & Furby, 1970) surrounds the use of change scores. Change scores subtract the initial score from the second score with the intent of producing a measure that only reflects the change in the variable over the two measurement periods. Change in the physical sciences and in everyday life is measured in this way. For example, a weight change is calculated by subtracting the weight at the first measurement time from the second (140 - 150 = - 10 pounds).

Cohen and Cohen (1975, p. 379) point out that in the behavioral sciences the correlation between the change score and the initial score is not usually equal to zero and therefore the change score contains some variance attributable to the initial score. Both individual differences in true change and measurement error mean the change scores may reflect some variance that is not due to true change. According to Cohen and Cohen, this variance can contaminate the relation of the change scores to other variables (p. 381). This contamination can either enhance or reduce the relation between other variables and the measure of change.

Cohen and Cohen (1975) suggest using hierarchial multiple regressions to partial out the influence of the

initial measure from the second measure (analyses of partialled variance). This is achieved by entering the initial score into the regression first using the second measure as the dependent variable.

To increase confidence in the findings this study used both change-score analyses (reported in the results section) and analyses of partialled variance to test hypotheses two and four[5].

Hypothesis 2: Vacations in Natural Environments Will Result in More Therapeutic Outcomes Than Vacations in Urban Environments.

Hypothesis 2 predicted that the natural environment rating would be a stronger predictor of post-vacation changes than the novelty of the vacation or the positive affect they elicit. The post-vacation scores were the dependent variables in multiple regression analyses. The pre-vacation scores were entered in the regression equations first followed by nature, novel, arousal, and pleasure which were entered simultaneously. Table 8 shows the results of the regression analysis for this hypothesis.

Personal strain. The results support the hypothesis that the natural-built rating would be a stronger predictor of changes in personal strain than the novelty of the

---

[5] Change scores were not used to analyze hypothesis one and the analysis of hypothesis three in the results section partialled out the influence of the pre-vacation scores by entering them into the regression equation first.

vacation, or the ratings of affect. As in the change-score analysis, the natural-built rating was the only variable, other than the pre-vacation measure of personal strain, to enter the regression equation at a significant level (p = .04).

Concentration and fatigue. The hypothesis was not supported for post-vacation changes in concentration and fatigue. None of the variables other than the pre-vacation measures entered the regression equation at a significant level. These findings are the same as the change-score analysis.

Table 8

Results of Multiple Regressions of the Pre-vacation Personal Strain, Concentration, Fatigue, Nature, Novelty, Arousal, and Pleasure on Post-vacation Personal Strain, Concentration, and Fatigue Scores

Personal Strain

Step 1, enter pre-vacation personal strain

Multiple R	R^2	Adjusted R^2	F	Significance F
.74	.55	.54	67.24	.0001

Step 2, enter novelty, the nature-built, pleasure and arousal measures simultaneously.

Multiple R	R^2	Adjusted R^2	F	Significance F
.79	.63	.59	17.35	.0001

Variables in the equation

	Beta	T	Significance of T
Pre-Strain	.77	8.36	.0001
Nature-built	.18	2.04	.04
Novelty	.12	1.37	.18
Arousal	.12	1.15	.26
Pleasure	.13	1.38	.17

Concentration

Step 1, enter pre-vacation concentration

Multiple R	R^2	Adjusted R^2	F	Significance F
.53	.28	.27	22.70	.0001

Step 2, enter novelty, the nature-built, pleasure and arousal measures simultaneously.

Multiple R	R^2	Adjusted R^2	F	Significance F
.60	.36	.60	6.15	.0001

Variables in the equation

	Beta	T	Significance of T
Pre-concentrate	.53	4.43	.0001
Nature-built	.19	.86	.40
Novelty	.10	.91	.36
Arousal	.04	.34	.74
Pleasure	.21	1.68	.10

Physical Fatigue

Multiple R	R^2	Adjusted R^2	F	Significance F
.53	.28	.27	23.33	.0001

Step 2, enter novelty, the nature-built, pleasure and arousal measures simultaneously.

Multiple R	R^2	Adjusted R^2	F	Significance F
.54	.29	.23	4.65	.001

Variables in the equation

	Beta	T	Significance of T
Pre-Fatigue	.55	4.66	.0001
Nature-built	.07	.49	.62
Novelty	.10	.83	.41
Arousal	.05	.37	.71
Pleasure	.01	.07	.94

Hypothesis 4: Associations between the vacation and post vacation outcomes will be stronger if the vacation environment is compatible with the individual's environmental disposition.

Hypothesis four predicted that there would be an interaction between the individual's environmental disposition and the strength of the post-vacation outcomes. Multiple regression analyses were used to test this hypothesis. A total of six regression analyses were performed: one for each of the three post-vacation measures with the pastoralism scale, and one for each of the three post-vacation measures with the urbanism scale. The post-vacation measures (strain, concentration, and fatigue) were the dependent variables. For each regression analysis, the pre-vacation measure was entered first, then the natural-built and ERI scale (pastoralism or urbanism), and finally the product variable created by multiplying the natural-

built variable and the ERI scales variable. Table 9 shows the results from the multiple regression. Similar to the change score analysis, the only significant interaction was between the Urbanism and natural-built scales on personal strain.

Table 9

Results of Multiple Regressions of the Pre-vacation Measures,ERI Scales, Nature, and Product Variables on the Post-vacation Measures

Pastoralism and Personal Strain

Variables Entered	Multiple R	R^2	Adjusted R^2
Pre-personal strain	.74	.55	.54
Nature and Pastoralism	.78	.61	.59
Nature X Pastoralism	.79	.62	.59

Urbanism and Personal Strain

Variables Entered	Multiple R	R^2	Adjusted R^2
Pre-personal strain	.73	.55	.54
Nature and Urbanism	.79	.63	.60
Nature X Urbanism	.81	.66	.63*

* significance = .03.

APPENDIX F

PROCEDURES USED TO PLOT THE INTERACTION

Procedures outlined by Aiken and West (1991) were used to plot the significant interaction. The regression equation containing the interaction is expressed as:

$$y = b_1X + b_2Z + b_3XZ + b_0$$

where b represents the regression coefficients, X and Z are the predictor variables, XZ is the product variable of the two predictors, and b_0 is the regression constant or intercept. Plotting the interaction involves restructuring the regression equation to represent the regression of the criterion on one predictor at different levels of the other predictor (Aiken & West, p. 12). Expressed algebraically, the restructured equation is:

$$y = (b_1 + b_3Z)X + (b_2Z + b_0)$$

The slope of the line depends on the particular value of Z used in the equation.

Three separate equations were calculated for different values of the ERI urbanism scale (the Z variable), a high, medium, and low value. Aiken and West (1991, p.12) indicate that any values of Z can be chosen. In some cases theory, or previous research may suggest appropriate values. The mean and one standard deviation below and above the mean were used in the plot of the interaction (Figure 5). The natural-built scale and the urbanism scale were centered by

subtracting the mean from the score (deviation score form).

APPENDIX G

RAW DATA -CODING SYSTEM

RECORD	VARIABLE	FIELD	ABBREVIATION
1	Group	1	GRP
	Identification Number	2-4	ID
	Year	5	YR
	Organization	6	ORG
	Sex	7	SEX
	Age	8-9	AGE
	Education	10	ED
	Years Work Experience	11-14(2)	WRKEXP
	Years in Present Job	15-18(2)	JOBNOW
	Job Category	19-20	JOB
2	First Personal Strain	5-44	FPSQ1-FPSQ40
3	First Concentration	5-12	FCON1-FCON8
	First Mood	14-26	FMOOD1-FMOOD13
4	First Affect (Work)	5-51	FAW1-FAW47
5	First Fatigue Checklist	5-29	FFEEL1-FEEL25
6	Second Personal Strain	5-44	SPSQ1-SPSQ40
7	Second Concentration	5-12	SCON1-SCON8
	Second Mood	14-26	SMOOD1-SMOOD13
8	Second Affect (Work)	5-51	SAW1-SAW47
9	Second Fatigue Checklist	5-29	SFEEL1-SFEEL25
10	Affect Vacation	5-60	AV1-AV56
11	Nat-Built Items	5-7	Q1, CONT, PRO
	Vacation Mood	8-18	VMOOD
	Novelty Scale	19-24	N1-N6
	Similarity/Satisfaction Questions	25-27	SH, SW, SAT
12	Environmental Response Inventory	5-51	ERI1-ERI47

Directions for recoding and computing scales

First and Second Personal Strain

Recode
FPSQ6 FPSQ8 FPSQ9 FPSQ14 FPSQ19 FPSQ20 FPSQ24 FPSQ27
SPSQ6 SPSQ8 SPSQ9 SPSQ14 SPSQ19 SPSQ20 SPSQ24 SPSQ27

1=5, 2=4, 3=3, 4=2, 5=1

Recode
FCON2 FCON7 SCON2 SCON7

1=9, 2=8, 3=7, 4=6, 5=5, 6=4, 7=3, 8=2, 9=1

Recode
First and Second Fatigue

FFEEL1 FFEEL9 FFEEL11 FFEEL15 FFEEL22
SFEEL1 SFEEL9 SFEEL11 SFEEL15 SFEEL22 (Multiply by -1)

Recode Continuum item of Nat-built scale
1=8, 2=7, 3=6, 4=5, 5=4, 6=3, 7=2, 8=1

Compute

```
STRAIN1 = Sum (FPSQ1 to FPSQ40)/40
STRAIN2 = Sum (SPSQ1 to FPSQ40)/40
FLOW1   = Sum (FCON1 to FCON8)/8
FLOW2   = Sum (SCON1 to SCON8)/8
FATIGUE1= Sum (FFEEL1 TO FFEEL25)/25
FATIGUE2= Sum (SFEEL1 TO SFEEL25)/26
NATBUILT= Sum (Q1, CONT, PRO, AV36, AV39, AV46, AV50)/7
NOVEL   = Sum (N1 TO N6)/6
AROUSE  = Sum (AV13, AV27, AV20, AV3, AV52, (AV29 X -1),
          (AV11 X -1),(AV28 X -1),(AV10 X -1),(AV5 X -1))/10
PLEASANT= Sum (AV2, AV24, AV9, AV7, (AV8 X -1),(AV35 X -1),
          (AV12 X -1), (AV16 X -1), (AV4 X -1))/10
```

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APPENDIX H
INDEX OF SPSS-PC PRINT-OUTS

```
GET /FILE 'HYP1'.

The SPSS/PC+ system file contains
     99 cases, each consisting of
    372 variables (including system variables).
    372 variables will be used in this session.

1.   MANOVA STRAIN1 FLOW1 FATIGUE1 BY GRP (1,2).

* * ANALYSIS  OF  VARIANCE -- DESIGN   1 * *

EFFECT .. GRP
Multivariate Tests of Significance (S=1, M=1/2, N=45 1/2)

Test Name   Value  Approx. F Hypoth. DF   Error DF  Sig. of F

Pillais         .02041     .64589     3.00 93.00      .587
Hotellings      .02084     .64589     3.00 93.00      .587
Wilks           .97959     .64589     3.00 93.00      .587
Roys            .02041

- - - - - - - - - -
Univariate F-tests with (1,95) D. F.

Variable   Hypoth. SS   Error SS Hypoth. MS   Error MS    F  Sig. of F

STRAIN1    .38119      25.28090 .38119     .26611 1.43243   .234
FLOW1      .33958     175.27834 .33958    1.84504  .18405   .669
FATIGUE1   .01663       3.37930 .01663     .03557  .46743   .496

* * ANALYSIS  OF  VARIANCE -- DESIGN   1 * *

2.   PROCESS IF (grp=2). (NOTE - GROUP 2 = CONTROL GROUP)
     MANOVA STRAIN1 STRAIN2 FLOW1 FLOW2 FATIGUE1 FATIGUE2
     /WSFACTORS time (2) /PRINT SIGNIF (UNIV MULTIV).

32 cases accepted.
0 cases rejected because of out-of-range factor values.
0 cases rejected because of missing data.
1 non-empty cells.

* * ANALYSIS  OF  VARIANCE -- DESIGN   1 * *

Tests involving 'TIME' Within-Subject Effect.


Mauchly sphericity test, W =       .05351
Chi-square approx. =             87.02405 with 5 D. F.
Significance =                      .000

Greenhouse-Geisser Epsilon =       .40755
Huynh-Feldt Epsilon =              .41558
```

Lower-bound Epsilon = .33333

AVERAGED Tests of Significance that follow multivariate tests are equivalent to univariate or split-plot or mixed-model approach to repeated measures. Epsilons may be used to adjust d.f. for the AVERAGED results.

EFFECT .. TIME

Multivariate Tests of Significance (S=1, M=1/2, N=13 1/2)

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.11626	1.27168	3.00	29.00	.303
Hotellings	.13155	1.27168	3.00	29.00	.303
Wilks	.88374	1.27168	3.00	29.00	.303
Roys	.11626				

- - - - - - - - - - -

Univariate F-tests with (1,31) D. F.

Variable	Hypoth. SS	Error SS	Hypoth. MS	Error MS	F	Sig. of F
T2	.07910	.88027	.07910	.02840	2.78567	.105
T4	.43066	9.56934	.43066	.30869	1.39514	.247
T6	.00596	.39416	.00596	.01271	.46841	.499

15360 BYTES OF WORKSPACE NEEDED FOR MANOVA EXECUTION.

```
3.   MANOVA STRAIN1 STRAIN2 FLOW1 FLOW2 FATIGUE1 FATIGUE2 BY
     GRP (1,2) /WSFACTORS time (2) /MEASURE STRAIN CON
     FATIGUE /PRINT SIGNIF (UNIV MULTIV).
```

* * ANALYSIS OF VARIANCE -- DESIGN 1 * *

Tests involving Between-Subjects Effects.

EFFECT .. GRP

Multivariate Tests of Significance (S=1, M=1/2, N=44)

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.07930	2.58407	3.00	94.00	.058
Hotellings	.08614	2.58407	3.00	94.00	.058
Wilks	.92070	2.58407	3.00	94.00	.058
Roys	.07930				

- - - - - - - - - - -

Univariate F-tests with (1,97) D. F.

Variable	Hypoth. SS	Error SS	Hypoth. MS	Error MS	F	Sig. of F
T1	3.10287	36.90336	3.10287	.40112	7.73545	.007
T3	10.66519	278.73882	10.66519	3.02977	3.52013	.064
T5	.14254	5.21218	.14254	.05665	2.51595	.116

* * ANALYSIS OF VARIANCE -- DESIGN 1 * *

Tests involving 'TIME' Within-Subject Effect.

Mauchly sphericity test, W = .02762
Chi-square approx. = 325.63377 with 5 D. F.
Significance = .000

Greenhouse-Geisser Epsilon = .38432
Huynh-Feldt Epsilon = .39032
Lower-bound Epsilon = .33333

AVERAGED Tests of Significance that follow multivariate tests are equivalent to univariate or split-plot or mixed-model approach to repeated measures.
Epsilons may be used to adjust d.f. for the AVERAGED results.

* * ANALYSIS OF VARIANCE -- DESIGN 1 * *

EFFECT .. GRP BY TIME
Multivariate Tests of Significance (S = 1, M = 1/2, N = 44)

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.13829	4.81464	3.00	94.00	.004
Hotellings	.16049	4.81464	3.00	94.00	.004
Wilks	.86171	4.81464	3.00	94.00	.004
Roys	.13829				

Univariate F-tests with (1,97) D. F.

Variable	Hypoth. SS	Error SS	Hypoth. MS	Error MS	F	Sig. of F
T2	.53689	4.30348	.53689	.04678	11.47768	.001
T4	6.73958	58.23025	6.73958	.63294	10.64810	.002
T6	.02892	1.59252	.02892	.01731	1.67062	.199

* * ANALYSIS OF VARIANCE -- DESIGN 1 * *

EFFECT .. TIME
Multivariate Tests of Significance (S = 1, M = 1/2, N = 44)

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	.07913	2.57772	3.00	94.00	.059
Hotellings	.08592	2.57772	3.00	94.00	.059
Wilks	.92087	2.57772	3.00	94.00	.059
Roys	.07913				

Univariate F-tests with (1,97) D. F.

Variable	Hypoth. SS	Error SS	Hypoth. MS	Error MS	F	Sig. of F
T2	.07612	4.30348	.07612	.04678	1.62730	.205
T4	2.34131	58.23025	2.34131	.63294	3.69912	.058
T6	.08727	1.59252	.08727	.01731	5.04132	.027

15520 BYTES OF WORKSPACE NEEDED FOR MANOVA EXECUTION.

```
GET /FILE 'HYP2.SYS'.
The SPSS/PC+ system file contains
     67 cases, each consisting of
    389 variables (including system variables).
    389 variables will be used in this session.

4.   REGRESSION /VARIABLES STCHANGE NATBUILT NOVELTY
     PLEASANT AROUSE /DEPENDENT STCHANGE /METHOD ENTER.

* * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Equation Number 1    Dependent Variable..   STCHANGE

Variable(s) Entered on Step Number
   1..     AROUSE
   2..     NOVELTY
   3..     PLEASANT
   4..     NATBUILT

* * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Equation Number 1    Dependent Variable..   STCHANGE

Multiple R            .45500
R Square              .20702
Adjusted R Square     .14718
Standard Error        .31093

Analysis of Variance
                    DF        Sum of Squares        Mean Square
Regression           4              1.33774              .33444
Residual            53              5.12403              .09668

F =       3.45921       Signif F =  .0139
```

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STCHANGE

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
AROUSE	.044533	.048449	.135362	.919	.3622
NOVELTY	.068101	.041651	.202095	1.635	.1080
PLEASANT	.012282	.037794	.043520	.325	.7465
NATBUILT	-.072382	.034361	-.302183	-2.107	.0399
(Constant)	-.123737	.216401		-.572	.5699

End Block Number 1 All requested variables entered.

```
5.    REGRESSION /VARIABLES FLCHANGE NATBUILT NOVELTY
      PLEASANT AROUSE /DEPENDENT FLCHANGE /METHOD ENTER.
```

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. FLCHANGE

Block Number 1. Method: Enter

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. FLCHANGE

Variable(s) Entered on Step Number
1.. AROUSE
2.. NOVELTY
3.. PLEASANT
4.. NATBUILT

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. FLCHANGE

Multiple R	.37229
R Square	.13860
Adjusted R Square	.07707
Standard Error	1.21078

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	4	13.20896	3.30224
Residual	56	82.09523	1.46599

F = 2.25257 Signif F = .0749

```
6.   REGRESSION /VARIABLES FTCHANGE NATBUILT NOVELTY
     PLEASANT AROUSE /DEPENDENT FTCHANGE /METHOD ENTER.

* * * *  M U L T I P L E  R E G R E S S I O N  * * * *


Equation Number 1    Dependent Variable..   FTCHANGE

Block Number  1.  Method:  Enter

* * * *  M U L T I P L E  R E G R E S S I O N  * * * *

Equation Number 1    Dependent Variable..   FTCHANGE

Variable(s) Entered on Step Number
   1..     AROUSE
   2..     NOVELTY
   3..     PLEASANT
   4..     NATBUILT

  * * *  M U L T I P L E  R E G R E S S I O N  * * * *

Equation Number 1    Dependent Variable..   FTCHANGE

Multiple R            .25656
R Square              .06582
Adjusted R Square     .00027
Standard Error        .19515

Analysis of Variance
                    DF        Sum of Squares      Mean Square
Regression           4               .15296             .03824
Residual            57              2.17085             .03809

F =       1.00405       Signif F =  .4131

GET /FILE 'HYP3.SYS'.

The SPSS/PC+ system file contains
     67 cases, each consisting of
    379 variables (including system variables).
    379 variables will be used in this session.

7.   REGRESSION /VARIABLES STRAIN1 STRAIN2 NATBUILT H3
     /DEPENDENT STRAIN2 /METHOD ENTER STRAIN1 /METHOD ENTER
     NATBUILT /METHOD ENTER H3. NOTE - H3 = (STRAIN1 x
     NATBUILT)

* * * *  M U L T I P L E  R E G R E S S I O N  * * * *


Equation Number 1    Dependent Variable..   STRAIN2
```

Block Number 1. Method: Enter STRAIN1

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variable(s) Entered on Step Number
1.. STRAIN1

Multiple R	.73038
R Square	.53346
Adjusted R Square	.52581
Standard Error	.24909

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	4.32762	4.32762
Residual	61	3.78473	.06204

F = 69.74999 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
STRAIN1	.535969	.064175	.730384	8.352	.0000
(Constant	.756447	.129017		5.863	.0000

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
NATBUILT	-.237727	-.340671	.958079	-2.807	.0067
H3	-.352678	-.368239	.508617	-3.068	.0032

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Block Number 2. Method: Enter NATBUILT

Variable(s) Entered on Step Number
2.. NATBUILT

Multiple R .76655
R Square .58761
Adjusted R Square .57386
Standard Error .23613

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	2	4.76686	2.38343
Residual	60	3.34548	.05576

F = 42.74594 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
STRAIN1	.571687	.062154	.779057	9.198	.0000
NATBUILT	-.060654	.021610	-.237727	-2.807	.0067
(Constant)	.936702	.138142		6.781	.0000

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
H3	-.549670	-.160145	.035005	-1.246	.2176

End Block Number 2 All requested variables entered.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Block Number 3. Method: Enter H3

Variable(s) Entered on Step Number
3.. H3

Multiple R .77342
R Square .59818
Adjusted R Square .57775
Standard Error .23505

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	3	4.85266	1.61755

```
Residual              59              3.25968              .05525

F =      29.27758       Signif F =  .0000

* * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Equation Number 1    Dependent Variable..   STRAIN2


------------------ Variables in the Equation
Variable        B         SE B       Beta          T  Sig T

STRAIN1      .796371      .190618   1.085242      4.178  .0001
NATBUILT     .037949      .081996    .148740       .463  .6452
H3          -.051029      .040948   -.549670     -1.246  .2176
(Constant    .509474      .369381                 1.379  .1730

End Block Number   3   All requested variables entered.

GET /FILE 'HYP4.SYS'.

The SPSS/PC+ system file contains
     67 cases, each consisting of
    389 variables (including system variables).
    389 variables will be used in this session.

8.   REGRESSION /VARIABLES STRAINCH NATCENT PCENT INTP
     /DEPENDENT STRAINCH /METHOD ENTER NATCENT PCENT /METHOD
     ENTER INTP.  NOTE - NATCENT AND PCENT ARE CENTERED (PUT
     IN DEVIATION SCORE FORM) INTP = NATCENT x PCENT


* * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..   STRAINCH

Block Number  1.  Method:  Enter      NATCENT2 PCENT

* * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Equation Number 1    Dependent Variable..   STRAINCH


Variable(s) Entered on Step Number
   1..     PCENT
   2..     NATCENT
```

Multiple R .43792
R Square .19177
Adjusted R Square .16184
Standard Error .30987

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	2	1.23030	.61515
Residual	54	5.18511	.09602

F = 6.40645 Signif F = .0032

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAINCH

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
PCENT	-.001955	.005993	-.041992	-.326	.7455
NATCENT	-.098709	.030033	-.423046	-3.287	.0018
(Constant)	-.130145	.041192		-3.159	.0026

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
INTP	-.007564	-.008225	.869364	-.060	.9525

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAINCH

Block Number 2. Method: Enter INTP

Variable(s) Entered on Step Number
3.. INTP

Multiple R .43798
R Square .19183
Adjusted R Square .14608
Standard Error .31277

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	3	1.23065	.41022
Residual	53	5.18476	.09783

F = 4.19336 Signif F = .0098

**** MULTIPLE REGRESSION ****

Equation Number 1 Dependent Variable.. STRAINCH

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
PCENT	-.001962	.006050	-.042141	-.324	.7470
NATCENT	-.099069	.030902	-.424586	-3.206	.0023
INTP	-2.51337E-04	.004197	-.007564	-.060	.9525
(Constant)	-.129322	.043794		-2.953	.0047

End Block Number 2 All requested variables entered.

```
9.   REGRESSION /VARIABLES STRAINCH NATCENT UCENT INTU
     /DEPENDENT STRAINCH /METHOD ENTER NATCENT UCENT /METHOD
     ENTER INTU.
```

**** MULTIPLE REGRESSION ****

Listwise Deletion of Missing Data

Equation Number 1 Dependent Variable.. STRAINCH

Block Number 1. Method: Enter NATCENT UCENT

**** MULTIPLE REGRESSION ****

Equation Number 1 Dependent Variable.. STRAINCH

Variable(s) Entered on Step Number
1.. UCENT
2.. NATCENT

Multiple R	.42580
R Square	.18131
Adjusted R Square	.15154
Standard Error	.31040

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	2	1.17358	.58679
Residual	55	5.29924	.09635

F = 6.09019 Signif F = .0041

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAINCH

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
UCENT	.003660	.004273	.106304	.857	.3954
NATCENT	-.090940	.028688	-.393366	-3.170	.0025
(Constant)	-.136991	.040801		-3.358	.0014

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
INTU	.467219	.506426	.940198	4.316	.0001

End Block Number 1 All requested variables entered.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAINCH

Block Number 2. Method: Enter INTU

Variable(s) Entered on Step Number
  3.. INTU

Multiple R	.62552
R Square	.39128
Adjusted R Square	.35746
Standard Error	.27012

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	3	2.53266	.84422
Residual	54	3.94016	.07297

F = 11.57006 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAINCH

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
UCENT	.005845	.003752	.169746	1.558	.1252
NATCENT	-.072865	.025314	-.315181	-2.878	.0057
INTU	.011272	.002612	.467219	4.316	.0001
(Constant)	-.107074	.036176		-2.960	.0046

End Block Number 2 All requested variables entered.

```
GET /FILE 'APP.SYS'.

10.  REGRESSION /VARIABLES STRAIN1 STRAIN2 AROUSE PLEASANT
     NATBUILT NOVELTY/DEPENDENT STRAIN2 /METHOD ENTER
     STRAIN1 /METHOD ENTER.
```

* * * * M U L T I P L E R E G R E S S I O N * * * *

Listwise Deletion of Missing Data

Equation Number 1 Dependent Variable.. STRAIN2

Block Number 1. Method: Enter STRAIN1

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variable(s) Entered on Step Number
1.. STRAIN1

Multiple R	.73866
R Square	.54562
Adjusted R Square	.53750
Standard Error	.25444

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	4.35330	4.35330
Residual	56	3.62538	.06474

F = 67.24387 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
STRAIN1	.540186	.065874	.738658	8.200	.0000
(Constant)	.756085	.132784		5.694	.0000

Variables not in the Equation

Variable	Beta In	Partial	Min Toler	T	Sig T
AROUSE	.144984	.209568	.949371	1.589	.1177
PLEASANT	-.150583	-.213973	.917468	-1.624	.1100
NATBUILT	-.229495	-.333495	.959528	-2.623	.0112
NOVELTY	.140709	.206461	.978259	1.565	.1233

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

End Block Number 1 All requested variables entered.

Block Number 2. Method: Enter

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variable(s) Entered on Step Number

2.. NOVELTY
3.. NATBUILT
4.. PLEASANT
5.. AROUSE

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Multiple R	.79194
R Square	.62717
Adjusted R Square	.59132
Standard Error	.23918

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	5	5.00397	1.00079
Residual	52	2.97470	.05721

F = 17.354464 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
STRAIN1	.565476	.067659	.773240	8.358	.0000
NOVELTY	.044421	.032515	.119304	1.366	.1778
NATBUILT	-.091683	.044871	-.175229	-2.043	.0431
PLEASANT	-.040352	.029269	-.131233	-1.379	.1739
AROUSE	.046413	.040397	.118415	1.149	.2559
(Constant)	.754108	.230085		3.278	.0019

```
11.  REGRESSION /VARIABLES STRAIN1 STRAIN2 NATURE P PRODP
     /DEPENDENT STRAIN2/METHOD ENTER STRAIN1 /METHOD ENTER
     NATURE P /METHOD ENTER PRODP.
```

* * * * M U L T I P L E R E G R E S S I O N * * * *

Listwise Deletion of Missing Data

Equation Number 1 Dependent Variable.. STRAIN2

Block Number 1. Method: Enter STRAIN1

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variable(s) Entered on Step Number
1.. STRAIN1

Multiple R	.74030
R Square	.54804
Adjusted R Square	.53983
Standard Error	.25345

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	4.28417	4.28417
Residual	55	3.53302	.06424

F = 66.69338 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
STRAIN1	.549377	.067271	.740300	8.167	.0000
(Constant)	.741034	.134777		5.498	.0000

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
NATURE	-.267262	-.383927	.932650	-3.055	.0035
P	-.036986	-.053902	.959871	-.397	.6932
PRODP	-.275882	-.398723	.944047	-3.195	.0023

End Block Number 1 All requested variables entered.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Block Number 2. Method: Enter NATURE P

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variable(s) Entered on Step Number
2.. P
3.. NATURE

Multiple R	.78463
R Square	.61564
Adjusted R Square	.59389
Standard Error	.23810

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	3	4.81259	1.60420
Residual	53	3.00460	.05669

F = 28.29740 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
STRAIN1	.597598	.066034	.805280	9.050	.0000
P	.001699	.004624	.033052	.367	.7148
NATURE	-.138342	.045759	-.275897	-3.023	.0038
(Constant)	.531428	.327796		1.621	.1109

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
PRODP	-1.056127	-.173085	.010166	-1.267	.2107

End Block Number 2 All requested variables entered.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Block Number 3. Method: Enter PRODP

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variable(s) Entered on Step Number
4.. PRODP

Multiple R	.79193
R Square	.62716
Adjusted R Square	.59848
Standard Error	.23675

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	4	4.90260	1.22565
Residual	52	2.91459	.05605

F = 21.86719 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
STRAIN1	.579966	.067117	.781520	8.641	.0000
P	.001443	.004602	.028080	.314	.7551
NATURE	.392178	.421099	.782125	.931	.3560
PRODP	-.007880	.006218	-1.056127	-1.267	.2107
(Constant)	.595662	.329855		1.806	.0767

End Block Number 3 All requested variables entered.

12. REGRESSION /VARIABLES STRAIN1 STRAIN2 NATURE U PRODU /DEPENDENT STRAIN2/METHOD ENTER STRAIN1 /METHOD ENTER NATURE U /METHOD ENTER PRODU.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Listwise Deletion of Missing Data

Equation Number 1 Dependent Variable.. STRAIN2

Block Number 1. Method: Enter STRAIN1

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variable(s) Entered on Step Number
1.. STRAIN1

Multiple R	.73830
R Square	.54508
Adjusted R Square	.53696
Standard Error	.25205

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	4.26275	4.26275
Residual	56	3.55764	.06353

F = 67.09886 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
STRAIN1	.547356	.066821	.738296	8.191	.0000
(Constant	.742230	.134019		5.538	.0000

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
NATURE	-.251161	-.360787	.938708	-2.869	.0058
U	-.143014	-.189156	.795834	-1.429	.1588
PRODU	-.210660	-.306645	.963921	-2.389	.0203

End Block Number 1 All requested variables entered.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Block Number 2. Method: Enter NATURE U

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variable(s) Entered on Step Number
2.. NATURE
3.. U

Multiple R	.79172
R Square	.62682
Adjusted R Square	.60609
Standard Error	.23247

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	3	4.90199	1.63400
Residual	54	2.91840	.05404

F = 30.23427 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T
STRAIN1	.539437	.070297	.727614	7.674	.0000
NATURE	-.131140	.042609	-.265154	-3.078	.0033
U	-.006393	.003541	-.168921	-1.805	.0766
(Constant)	1.103267	.280941		3.927	.0002

---------- Variables not in the Equation ----------

Variable	Beta In	Partial	Min Toler	T	Sig T
PRODU	1.112627	.253619	.023120	1.909	.0417

End Block Number 2 All requested variables entered.

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Block Number 3. Method: Enter PRODU

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variable(s) Entered on Step Number
4.. PRODU

Multiple R	.80674
R Square	.65083
Adjusted R Square	.62447
Standard Error	.22699

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	4	5.08971	1.27243
Residual	53	2.73068	.05152

F = 24.69661 Signif F = .0000

* * * * M U L T I P L E R E G R E S S I O N * * * *

Equation Number 1 Dependent Variable.. STRAIN2

Variables in the Equation

Variable	B	SE B	Beta	T	Sig T

STRAIN1	.603904	.076497	.814571	7.895	.0000
NATURE	-.628794	.264016	-1.271366	-2.382	.0209
U	-.003864	.003703	-.102111	-1.044	.3013
PRODU	.019291	.004867	1.112627	1.909	.0417
(Constant	.853460	.303928		2.808	.0070

End Block Number 3 All requested variables entered.

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Title of Dissertation:

The Restorative Effects of a Vacation from Work: The Role of Novelty, Positive Affect, and Nature

Author: _____
(Signature)

Julia Emerald Macdonald
(Name)

_____
(Date)