

A Good Study Break: Effects of Nature versus TV on Attention

Hilary Berigan, Nicole Pielage

Faculty Sponsor: Dr. Katherine Kortenkamp, Department of Psychology

ABSTRACT

Recent research has found fascinating connections between nature exposure and human well-being. In particular, previous research suggests that nature is a restorative environment for attention once an individual experiences mental fatigue. This study investigates whether the viewing of natural environments on television allows for regeneration of attention as well. Participants were assigned to one of four 20 minute study breaks: viewing either a completely natural setting in a park near campus, a semi-built environment on campus, nature TV, or a popular sitcom. Their attention was tested before and after the treatments using a backwards digit-span test. While no significant results were found, a trend suggested that nature was the most restorative of the four treatments. This tells us that nature on TV cannot replace the real experience.

INTRODUCTION

The wonders of nature never cease to amaze us. Everyday it seems we are finding more aspects of nature that are truly incredible. Recent research has found fascinating connections between nature and human well-being (e.g., Kaplan, 1995; Kaplan & Berman, 2010; Tennessen, 1995; Hartig, 2003). Because of this research, we turned to nature to find a solution to a common problem faced by college students: How to restore attention after experiencing mental fatigue. After hours of studying, many cope with this feeling in a variety of ways such as watching television, going for a walk, or listening to music. The question is, which activity best helps students restore their attention following mental fatigue?

To begin to solve the problem of maintaining attention, it is necessary to understand the best way to restore it when it is fatigued. Extensive research on mental fatigue led to Kaplan's (1995) theory known as attention restoration theory (ART). ART explains mental fatigue as a result of the depletion of voluntary, directed attention, or in other words, the attention we actively and effortfully use while focusing on a specific task. Although this type of attention is voluntary, it is still susceptible to fatigue and must be restored through the use of involuntary attention. When involuntary attention is engaged, voluntary attention is at rest. Restorative environments evoke involuntary attention. According to ART, for an environment to be considered restorative, it must have four components: (1) ability to provide feelings of being away (from the fatiguing environment), (2) extent (a rich environment), (3) compatibility (feeling that it is easy and enjoyable), and (4) fascination (naturally holding your interest). Kaplan identified two different forms of fascination--hard and soft. Hard fascination involves stimuli that capture all of your attention with no room for mental reflection (e.g., bright lights, loud noises). While soft fascination captures your attention but allows for mental reflection (e.g., quiet music).

Natural settings can act as restorative environments (Kaplan & Berman, 2010; Tennessen, 1995). A natural environment intervention has shown to have psychological benefits not only in terms of attention restoration but also in decreasing blood pressure, increasing positive emotions, and decreasing anger and aggression (Hartig, 2003). Furthermore, studies have found this type of natural environment treatment to help with information processing limitations and the cognitive side effects of living with cancer (Kaplan & Berman, 2010). This may be because natural environments possess all four components of restorative environments. Berman, Jonides, and Kaplan (2008) looked at the cognitive attentional benefits gained from being in a natural environment. They found that those who walked in a park did significantly better on an attention test than participants who walked downtown. The implications of this study are important in terms of showing nature's restorative effects on attention; however, it does not address the effects in terms of different intensities of nature exposure.

Berto (2005) examined a lower level of intensity of nature exposure that involved viewing pictures of nature instead of experiencing it directly by going on a walk. Participants who viewed pictures of nature scenes did better on the attention test than those who viewed pictures of urban scenes. Thus previous research shows that both spending time in nature and viewing nature photographs are restorative activities that improve directed, focused attention. Felsten (2009) also looked into different intensities of nature exposure. College students' preferences for places to take study breaks on campus were examined. Results showed that students preferred murals of beautiful nature as more restorative than actual views of mundane nature and views without nature. So we know that murals

of nature are perceived as beneficial for study breaks, but how does this compare to other ways that students relax when they are fatigued?

Many college students in fact do not spend their study breaks looking at natural pictures or taking a nature walk. Instead, many choose to watch TV, YouTube videos, or movies. However, recent research has challenged the idea that these activities have restorative effects. Swing (2010) studied the effects of television on attention. This study found time spent watching television negatively affected performance on attention tests.

The current study hopes to fill a gap in the existing literature by further investigating the connection between TV viewing and attention, including the potential effects of nature TV (e.g., the film series Planet Earth) on attention restoration. Although there are several studies that support the use of nature in attention restoration, none have looked into the use of nature videos. Research has also not compared the effects of nature exposure to TV exposure. Additionally, no studies look at the question of how long these attentional benefits can last, which is an important aspect to consider when applying these practices to real life situations. If the restorative effects of viewing nature only last for a few minutes, students will lose focus quickly and researchers may want to begin looking into different ways to restore attention.

Based on previous research we hypothesize that experiencing actual nature will result in significantly better attention scores than watching nature shows, watching popular programs on television, and experiencing semi-built environments that include green space as well as buildings (e.g., a college campus). In addition, we hypothesize that watching nature TV and experiencing a semi-built environment will result in a significantly better performance on the attention test than watching popular TV. Because there is no previous research on the duration of restorative benefits, the current study will also explore how long these attentional benefits last.

Method

Participants

In this study there were 70 participants recruited from the University of Wisconsin-La Crosse through a website that enables them to sign up online. Participants consisted of students from a variety of majors who signed up for the study with a mean age of 19.37 years ($SD = 1.55$). However 7 participants had to be removed from the study due to cheating on the attention test so only 63 participants were used to conduct the results of this study. Participants were compensated by having their name entered into a drawing to win one of four \$25 gift cards to the Three River Outdoors sporting shop.

Materials and Procedure

The design for this study was a single factor between-subjects design. The experimental variable was participants' restorative activity (viewing actual nature, viewing a semi-built environment, viewing nature TV, and viewing popular TV). The dependent variables included initial attention and longer term attention. Attention was measured using an assessment known as the Backwards Digit Span Test (Wechsler, 1955) taken before and after each restorative activity and repeated 10 minutes after the activity ended. This test has been successfully used in many attention restoration studies (e.g., Berman et al., 2008; Taylor & Kuo, 2009). We used an oral version of this test that involved reading off digit sequences (e.g., 7-3-5) and having participants write down the numbers backwards. The participants heard previously recorded sequences of numbers that increased by number of digits every two sequences. To further explain, the first two sequences only had two digits (7-5, 6-4) while the third and fourth had three (8-4-5; 7-9-1). Every two sequences served as one level. Therefore, every participant heard fourteen sequences that equaled seven levels. If the participant got the first sequence of the level right, then they passed that level. If they got the first sequence wrong, but the second sequence right, then they passed that level as well. If both sequences were wrong then they did not pass, the scorer looked at no more sequences, and the score (1-7) reflected the furthest level the participant successfully passed. (Berman et al., 2008).

Before the study, all participants signed the informed consent waiver, filled out a demographic survey and listened to an introduction to the study in a classroom close to where their treatment took place. After this, every participant performed an attention-fatiguing task for 10 minutes. The task was a syllogisms test that was designed to force participants to use logical deductive reasoning to answer questions (Holmquist, 1974). We chose to use this task since it was successfully used in another study that looked at the restorative effects of nature (Kjellgren, 2010). There were 15 multiple-choice questions that participants had to answer on a sheet of paper in order to fatigue their directed attention. Next, participants took the first digit span test (pretest).

Following this, each participant was randomly assigned into one of the three restorative conditions (semi-built, popular TV, nature TV) or they were assigned to the nature condition based on the session they signed up for. This modification was made because the first three conditions could be experienced on campus while the fourth needed to

be conducted off campus. This made it impossible for all four conditions to be conducted on the same day and completely random assignment could not take place.

For the condition of viewing nature, participants sat outside in a park with views of only natural settings. In this case they could see trees, a marsh, grass and some wildlife. To view a semi-built environment, participants were asked to sit on the grass on the university's campus, which has both natural structures (trees and grass) and built structures (buildings, sidewalks) in view. Both television conditions took place inside in separate rooms using computers to deliver the stimuli. The nature TV condition involved viewing a segment of Planet Earth with environmental settings similar to Midwest environments (forests, lakes, rivers, etc.). The popular TV condition involved participants viewing "How I met your Mother", which is a sitcom that includes fast paced scenes, an urban environment, and hyper verbal characters.

After participating in the conditions for 20 minutes, participants then took the backwards digit span test again (posttest 1) and then repeated this test again 10 minutes later to look at the lasting effects of attention restoration (posttest 2). In between these two attention tests, participants were required to read a segment of text and answer 10 questions in order to induce the voluntary directed attention used when naturally studying. When finished, participants were debriefed and then free to leave.

RESULTS

A one-way between-groups ANOVA revealed no significant difference between study break conditions on pretest attention scores, $F(3, 59) = 0.88, p = .46$. Thus, the four groups' pretest attention scores were equivalent.

A one-way between-groups ANOVA examining the change in attention directly after the study break (posttest 1) compared to pretest attention scores, revealed no significant effect of study breaks on change in attention, $F(3, 59) = 0.24, p = .87$. See Figure 1 below for the trend in the group means.

Another ANOVA examining the change in attention after the second fatiguing task (posttest 2) compared to pretest attention also revealed no significant effect of study break on long term changes in attention, $F(3, 59) = 2.60, p = .06$.

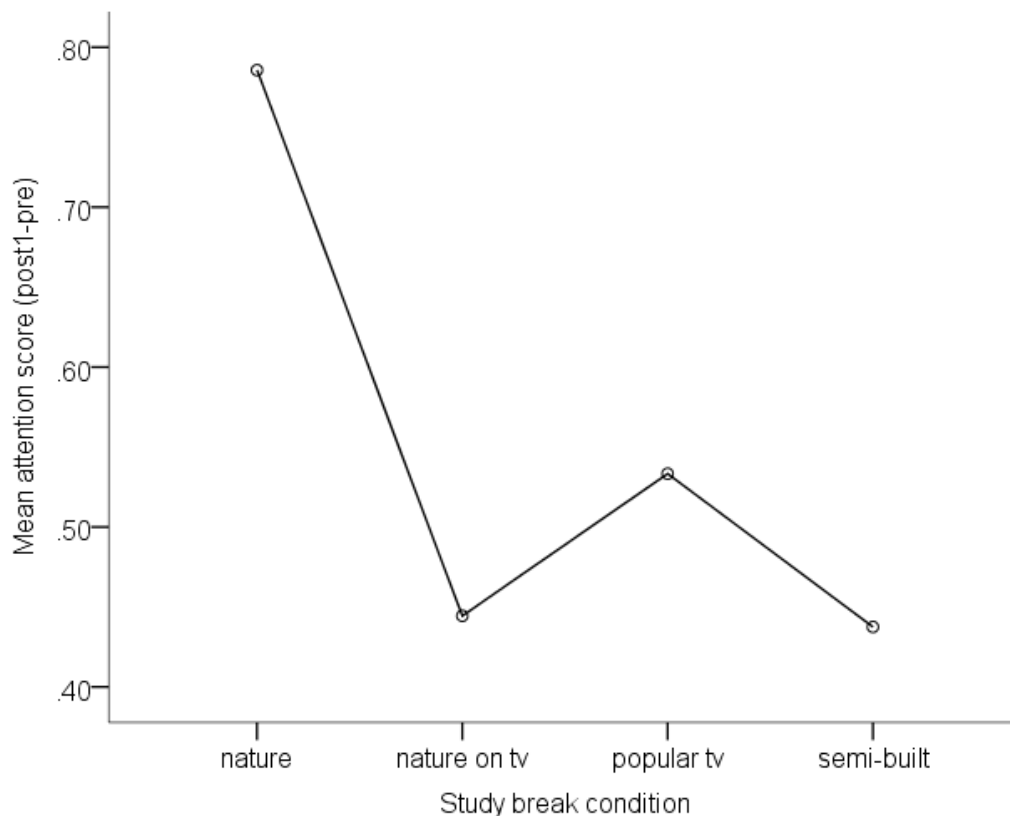


Figure 1. The effects of study break condition on mean attention score difference (posttest 1- pretest)

DISCUSSION

The results did not support our hypothesis that experiencing actual nature would result in significantly better attention scores than watching nature shows, popular television, and experiencing semi-built environments. However, there was a non-significant trend showing that those who viewed nature had a higher mean change in attention than the other three conditions (see Figure 1). This trend is supported by past research finding that exposure to nature increases attention compared to exposure to urban spaces (e.g., Kaplan, 1995; Kaplan & Berman, 2010; Tennessen, 1995; Hartig, 2003). This trend might not have been significant due to a lack of participants or possible weather factors such as cold weather as the study was performed outside in the fall. If we had been able to run this study in the spring, we potentially would have had better weather conditions for sitting idle outside and more green space to view the budding of trees and flowers. We also might have had more participants since many of the people who signed up also received extra credit in their class. Past experience has taught us that students generally sign up for such extra credit opportunities towards the end of the semester as opposed to the beginning of semester when we were running this study. We could not run it at the end because the trees would have been bare and the water would have been frozen, creating a less restorative visual environment.

The hypothesis that watching nature TV and semi-built nature would lead to a greater improvement in attention than popular TV was also not supported by the data. However, in the semi-built condition, many distractions occurred on campus that could have diminished the restorative effects of the study break such as friends walking by and people yelling. The semi-built condition was also the only condition that participants had to walk down three flights of stairs to reach their study break destination and therefore could have been distracted on the way up or down. Also, the nature TV condition of Planet Earth may not have been as restorative due to difficulties in finding a segment of nature on TV that did not change scenes quickly. According to the attention restoration theory (Kaplan, 1995), soft fascination allows for mental relaxation but still stimulates the mind enough to evoke involuntary (effortless) attention. Nature allows for this because it provides us with visual and auditory stimuli that catch our attention such as bird songs and beautiful sights, but do not require us to use directed voluntary attention, which can be fatigued, or in other words, used up. The Planet Earth segment may not have been restorative because of the quickly changing scenes and lighting. The condition may not have allowed the participants' minds to process on their own through involuntary attention, instead it may have evoked voluntary attention that became fatigued.

When looking at the data on long-term benefits of nature we again found no significant results or trends. Therefore, it is unlikely that the benefits of nature on attention last very long. We are unable to compare this result to other studies since none have yet to look at the lasting effects. A general lack of significant results might also be due to a failure in the attention fatiguing tasks. If the participants were not fatigued in the first place then there is little room for restorative benefits to take an effect. While we pilot tested the attention-fatiguing task, its effectiveness mostly depends on the participants' desire to work hard on the task. Attention fatiguing tasks must involve active use of working memory and be difficult to focus on for an extended period of time. It is likely that our participants were not motivated enough to put in this kind of work and thus were not fatigued enough to take part in a truly restorative activity.

In future studies, the participants' motivation to do well on the fatiguing tasks could be increased by offering incentives for good performance or making it a competition. Future research should also allow more time for both fatiguing exercises and restorative activity length to improve the chances of finding significant results. Given the success of other research on this topic, follow-up studies correcting these limitations would be worthwhile to help determine the most effective study breaks for students and the duration of any attention restoration effects of nature.

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