

A Napping Soundtrack Can Enhance Well-being More than Traditional Relaxation Soundtracks

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Sleep deficits are common and dangerous, with negative consequences for cognitive ability, motor functioning and mental health. Although short daytime naps can attenuate these negative consequences, some people may have difficulty taking daytime naps and turn to relaxation soundtracks for assistance. Recently, software has been developed to generate soundtracks specifically designed to assist with napping. Many technology pundits have reviewed this product—called pzizz—positively, but there is no empirical evidence of its effectiveness. In this paper we describe a study investigating the efficacy of pzizz. In one condition, people listened to pzizz and took a 20-minute nap each working day for two weeks. In the other condition, people listened to traditional relaxation soundtracks and did the same thing. Both groups benefited from naps, reporting better well-being over time. However, these increases in well-being were higher among people who listened to pzizz than people who listened to other soundtracks, and were consistent with the hypothesis that pzizz generated a response expectancy. The results suggest that pzizz might be an effective tool for enhancing the benefits of daytime naps, however more research is needed to examine exactly how response expectancies contribute to the efficacy of pzizz.

Keywords: sleep, nap, response expectancy, pzizz, relaxation

Many of us suffer from a lack of sleep. Not only do we often report feeling sleepy, but—more than ever before—we persist in behaviors that maintain our lack of sleep (Mahowald & Schenck, 2005; Pilcher, Schoeling & Prosansky, 2000; Yoo, Hu, Gujar, Jolesz, & Walker, 2007). In the US, for example, approximately one quarter of adults surveyed reported that over the course of one month, they had gone without sufficient sleep for more than two weeks (Strine & Chapman, 2005).

Sleep is not merely something we do to restore energy; instead, sleep involves active processes that are essential to general health and mental functioning (Hobson, 2005). For instance, a lack of sleep—whether intentional or not—is linked to depression. A survey of almost 80 000 people found that those who reported at least 14 days of inadequate sleep in the previous month were more likely to report worse general health, and more symptoms of depression, anxiety, pain, physical and mental distress than people who reported fewer than 14 days of inadequate sleep in the same period (Strine & Chapman, 2005).

Napping

One way to catch up on sleep debt, avoid fatigue and improve well-being might be through napping; short daytime naps may help to reduce some of the problems associated with lack of sleep (Campbell, Murphy, & Stauble, 2005; Hayashi, Chikazawa, & Hori, 2004; Hayashi, Watanabe, & Hori, 1999; Takahashi, 2003; Takahashi, Nakata, Haratani, Ogawa, & Arito, 2004). For instance, naps as short as 20 min in duration have been shown to improve feelings of alertness as well as cognitive performance (Hayashi et al., 1999; Hayashi et al., 2004).

Although there are obvious benefits associated with napping, many people are not used to sleeping during the day, and may have difficulty in doing so. One way to promote daytime napping might be to ask people to listen to a guided relaxation soundtrack. Although these soundtracks are not designed to assist with napping per se, they feature techniques—such as guided imagery, breathing instructions, and narrated meditations—that are commonly used by clinicians to treat sleep difficulties and are promoted by sleep researchers in self-help books

(see, for example, Dement & Vaughan, 1999; Jacobs, 1999). There is some evidence that listening to these soundtracks confers benefits; cardiac patients who listened to a guided relaxation tape showed reduced anxiety and greater relaxation (Tsai, 2004).

None of these soundtracks, however, are designed to assist people with daytime napping; we wondered if a soundtrack designed specifically for that purpose could confer benefits beyond those associated with using a conventional relaxation soundtrack. We were aware of only one designed specifically for short naps: pzizz (Brainwave Enterprises). Rather than simply guide the listener into a state of relaxation, the pzizz narrator instructs the listener about how to take a nap—describing the purpose of the session, a sequence for relaxing, and—importantly—the expected outcomes of the session. For instance, the pzizz narration includes comments such as, “*the more deeply you relax the more energised you will feel*”, and, “*your body knows how to safely and quickly release stress and process your problems while you rest quietly.*” The software uses an algorithm to generate an infinite number of “napping scripts,” which follow the same basic pattern.

It is important that the narrator describes expected outcomes. When people anticipate that a treatment will produce a certain outcome, they often behave—without realizing it—in such a way as to produce that outcome. As a result, they attribute the outcome to the treatment instead of to themselves (Kirsch, 1997; 2004; Kirsch & Lynn, 1999; see also Stewart-Williams & Podd, 2004, for a review). More specifically, pzizz might produce what is called a “response expectancy” in the clinical literature; response expectancies themselves produce changes in mental and physiological experience (see Kirsch, 1997, p. 70). In concrete terms, pzizz might produce response expectancies about falling asleep and the benefits afterwards, such as feeling more refreshed.

The anecdotal evidence for pzizz’s effectiveness is abundant among people sometimes described as the “digerati”—computer experts who spend significant time on the Internet sharing their views (see, for example, Mann, 2006; Petrie, 2007; Woods, 2001). These widely available endorsements might also work to create expectancies about pzizz’s effectiveness, in the same way that advertising might increase response to antidepressant medication (Walsh, Seidman, Sysko, & Gould, 2002). However there is no empirical evidence that pzizz confers any benefit at all, let alone more benefits than conventional relaxation soundtracks.

To examine this issue, we asked two groups of subjects to come to the laboratory and take a nap each working day for two weeks (ten days). We tested pzizz’s default “energizer nap,” which is designed to be 20 min in duration; thus each napping session was 20 min long.

Half of the subjects listened to a pzizz soundtrack, while the other half listened to one of a number of other commercially-available relaxation soundtracks. Our primary research question was whether listening to pzizz while trying to nap would cause more improvement in measures of well-being than listening to other relaxation soundtracks while trying to nap. If the pzizz soundtracks cultivated a response expectancy, people who listened to pzizz would experience enhanced benefits compared with people who listened to traditional relaxation soundtracks. We gathered measures of well-being before and after each session.

Method

Participants

Thirteen men and sixteen women were recruited through advertisements around the campus and in university publications. Subjects’ ages ranged from 19 to 55 years, with median age 27. The majority of the sample were students and the remainder had various occupations at the university.

Subjects came to ten half-hour sessions at the same time each day, from Monday to Friday, for two weeks. They were allowed to miss one of the ten sessions without jeopardizing their participation in the study. At the end of the study, each subject received a \$75 (NZ) grocery voucher. A maximum of five subjects took part in each napping session ($M = 2.89$, $SD = 1.52$).

Design

The study used a between subjects design with three conditions. In total, 16 subjects (10 female) were in the “pzizz” condition (age range 19 to 55 years, median = 27 years). These subjects listened to a different, randomly-generated pzizz nap soundtrack each session. We used traditional relaxation soundtracks in a second condition ($n = 13$), but further split those subjects into two groups. Half listened to the same relaxation track repeatedly, and half heard a different relaxation track each day. In the “other-repeat” condition, 7 subjects (4 female; age range 22 to 54 years, median = 27 years) listened to one of five other soundtracks in all 10 sessions. In the “other-rotate” condition, 6 subjects (4 female; age range 24 to 52 years, median = 32 years) listened to one of the other five soundtracks each day; the tracks were rotated so that each track was played once per week, and by the end of the study, subjects had listened to each track twice. The purpose of the “other-rotate” condition was to control for the fact that each pzizz soundtrack was unique.

Procedure

Traditional relaxation soundtracks. We selected five “other” soundtracks to compare with pzizz. Each track was available on the US version of the iTunes Store (Apple, Inc.), and was marketed as promoting deep relaxation. From shortest to longest, the duration of these

iTunes tracks was 13.52 min, 15.23 min, 17.59 min, 29.22 min and 31.18 min. Regardless of the duration of the assigned track, nap sessions were always 20 min long; thus, the first three iTunes soundtracks looped back around to the beginning to “fill in” the remaining time in each session.

Pzizz soundtrack. We used pzizz software to generate 10 random 20 min nap soundtracks, using the “energizer module” on its default settings: stereo output, narration all the way through the soundtrack, voice and music volume at half of maximum. All subjects in the pzizz condition listened to the same 10 pzizz soundtracks, in the same order.

Subjects chose a time that suited them to take part in the study. They were brought into the room, and were given an information sheet that described the study and what was required of them, and a consent form to sign before they could participate. The consent form required that subjects did not listen to any other relaxation soundtracks for the duration of the study.

The room had no windows and was set up with four partition boards to make five cubicles, three against one wall and two against another. The experimenter sat in the empty corner, away from the cubicles. Subjects sat in an armchair facing the wall; they could not see any one else while taking part in the study, and no one (other than the experimenter) could see them. An envelope was attached to each chair; in the envelope was an Apple, Inc. iPod nano with headphones.

To control for expectancy effects and limit the likelihood that subjects would try to guess what condition they were in (see, for example, Desharnais, Jobin, Cote, Levesque, & Godin, 1993; Marlatt & Rohsenow, 1980), we told all subjects that we were evaluating “*new power napping software that is designed to help you relax, take a 20-minute ‘power nap,’ and awake feeling—in the company’s words—‘recharged, refreshed and rejuvenated.’*” We told all subjects that they would be listening to soundtracks produced by this new software, and we maintained that deception until the end of the study, when we told everyone what condition they had actually been in.

We randomly assigned subjects to conditions by their session time; we controlled for time-of-day effects by having approximately equal numbers of pzizz and traditional soundtrack sessions at the same times of day. In each nap session, subjects were reminded to turn off any beeping watches and cell phones; they were asked not to talk during the session, and not to talk to each other nor anyone else about the study outside of the session. There were three phases in each session: the first survey, the nap, and the second survey.

Phase 1. First, subjects completed a survey [see Table 1]. Except for the very first survey, all surveys

were identical. This first survey requested demographic information about the subjects including their sex, occupation and age. After the demographic questions, and in all remaining surveys, 19 items assessed subjects’ thoughts on various dimensions, which were selected from pzizz promotional material.

More specifically, the 19 items were a mix of general and specific appraisals of well-being. The first three items asked subjects how they felt, and they answered using a 5-point Likert-type scale. For example, one question read, “*How much energy do you have?*” where 1 = *very little energy*, and 5 = *a great deal of energy*. For the remaining 16 items, subjects read a statement and rated the extent to which they agreed with it on a 5-point Likert scale where 1 = *strongly disagree*, and 5 = *strongly agree*. For example, one statement read, “*I slept well last night*”.

Phase 2. After they completed the first survey, we gave subjects instructions for the nap phase. Specifically, we told them:

“Now you will listen to the power nap soundtrack. Please ensure that you are as comfortable as possible. This part of the experiment lasts for 20 minutes, and I will let you know when the 20 minutes is up. Please leave your headsets on for the full 20 minutes even if the audio finishes before that time.”

Subjects put the headphones on; the experimenter attached the headphones to the iPods, and started the soundtracks. During this phase, the experimenter dimmed the lights.

Phase 3. After 20 min had elapsed, the experimenter announced that the time was up, turned the lights back up and asked subjects to remove their headphones. Each subject completed another copy of the 19-item survey.

At the end of each session, the experimenter thanked everyone and reminded them to come back at the same time for the following sessions. At the end of the final session, subjects received a \$75 (NZ) grocery store voucher.

Results

There were no differences on any measures between the “other-repeat” condition and the “other-rotate” condition so we collapsed across these two “other” groups for all further comparisons. Recall our primary question of interest was whether listening to pzizz while trying to nap caused more improvement in measures of well-being than listening to other relaxation soundtracks while trying to nap.

To address this question, we first reduced variance across our sample by treating each of the 19 survey items as a case. We were interested in how subjects’ feelings changed after completing a relaxation session, and whether there were any cumulative effects of relaxation

sessions over time. In order to address these questions, we compared subjects' pre-session well-being ratings with their post-session well-being ratings; we collapsed subjects' responses across each week, so that we could compare the effect of relaxation sessions from week one with the effect of relaxation sessions from week two. In sum, we calculated four scores for each of the 19 survey items. First, we summed the pre-session responses across all subjects and all five sessions from the first week. Second, we calculated similar scores for the post-session responses from the first week. Finally, we repeated these two calculations for responses from the second week. We classified these responses according to whether they were produced in the pzizz condition or from an "other" condition, and display them in Figure 1 below. Mean responses for the 19 items ranged from 12.7 to 20.7 (on a possible range of 5 to 25). As the figure shows, well-being ratings increased over time—but more to the point, the type of soundtrack mattered—ratings were higher in the pzizz condition than in the other condition. In other words, a repeated measures ANOVA showed a main effect for both the type of soundtrack, $F(1, 36) = 4.24, p < .05$, and time, $F(3, 34) = 5.03, p < .01$. Follow-up analyses showed that the type of soundtrack did not influence ratings until the second week. That is, pzizz and traditional soundtracks showed similar ratings at week 1 pre-session and week 1 post-session, both $t_s < 1, ns$. At week 2, pzizz pre-session ratings were higher than traditional soundtrack pre-session ratings, $t(36) = 2.62, p < .01, Cohen's d = .85$; and pzizz post-session ratings were also higher $t(36) = 2.77, p < .01, Cohen's d = .90$. In addition, within the pzizz condition, well-being ratings at week 2 pre-session were higher than those at week 1 pre-session, $t(18) = 4.64, p < .01, Cohen's d = 1.07$, and ratings at week 2 post-session were higher than those at week 1 post-session, $t(18) = 3.97, p < .01, Cohen's d = .91$. This pattern of results was not found in the traditional soundtrack condition for either pre-session— $t(18) = 1.22, p = 0.24$ —or post-session ratings, $t < 1, ns$.

DISCUSSION

Taken together, these data suggest that short naps can produce higher ratings of well-being no matter whether subjects listen to a soundtrack specifically designed to aid napping, or a soundtrack merely designed to aid in relaxation. However, the data also suggest that the pzizz napping soundtrack produced an additional increment in well-being, both prior to and immediately after sessions. Why this additional benefit occurs is not entirely clear, although the clinical literature on response expectancies suggests a plausible mechanism (see, for example, Kirsch & Lynn, 1999). Research shows that—when paired with the right response expectancy—otherwise inert substances can produce outcomes in line

with people's expectations. For instance, people who were told they had taken a "cognitive-enhancing" drug became less susceptible to memory distortion and people who were told they had taken alcohol became more susceptible to memory distortion (Assefi & Garry, 2003; Clifasefi, Garry, Harper, Sharman, & Sutherland, 2007; Parker, Garry, Engle, Harper, & Clifasefi, in press). But expectancy effects do not always require people to take an inert substance. For example, people who were told that they satisfied standard exercise requirements simply by doing their normal jobs experienced improvements on a number of health related dimensions—including weight loss and decreased blood pressure—even though their work activity did not change (Crum & Langer, 2007).

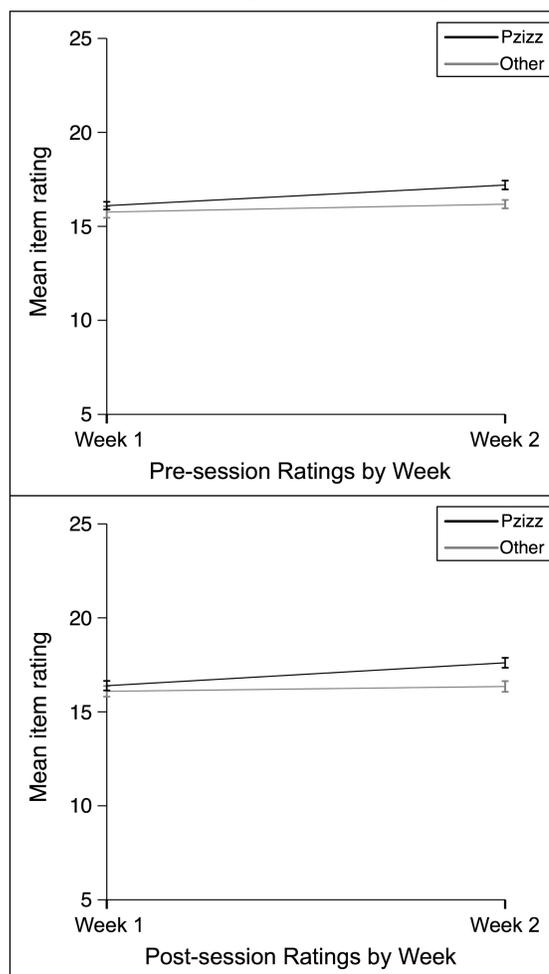


Figure 1. Mean pre-session (top panel) and post-session (bottom panel) well-being ratings by week.

Perhaps pzizz works like the expectancies in these studies: the pzizz narrator tells listeners that they will feel better, and as a result they do. In order to see if the same kinds of response expectancies might benefit other relaxation aids, future research should examine the placement of the expectancy statements. By removing all the expectancy statements from the pzizz soundtrack, and instead telling people what outcomes to expect before

they listened to the track, it would be possible to see what role the distribution of the statements throughout the pzizz track plays. If subjects experienced the same benefits when their expectations were created before—rather than during—the track, perhaps the same types of expectancy statements could be provided before people listen to more traditional relaxation soundtracks to boost the improvements that they experience as well. Future research could also examine how response expectancies might contribute to the efficacy of other types of sleeping aids, such as melatonin supplements.

Recall that we found no differences between our “other-repeat” and “other-rotate” conditions. This result suggests that it cannot be simply the novelty of the pzizz tracks that afforded pzizz subjects a better outcome—there must be something extra involved in pzizz that contributed to the more positive result. To gauge what contribution the novelty of the pzizz tracks makes, future research could compare the effects of listening to the same pzizz track repeatedly, with the effect of listening to novel pzizz tracks. Even if the novelty of the tracks does not produce additional benefits in measures of well-being, it may contribute to maintaining users’ listening behavior. In retrospect, because we asked subjects to come to the lab and listen to the tracks each day, we could not assess whether they would be more likely to continue listening to a novel track or a repeated track in everyday life. If people did become bored with the repeated tracks, they might stop using the soundtracks altogether. It may be fruitful to compare the effects of repeated or novel tracks when subjects are responsible for their own listening behaviour, rather than being required to come to the lab each day to ensure they do listen to the tracks. Although we did not specifically address this question, we do have some data that speak to the issue of what subjects thought of pzizz. Following the study, subjects were offered a free copy of the pzizz software normally priced at \$29.95 (US). Of the 29 subjects, 11 requested a copy of the software. In total, 6 of the 11 subjects were in the traditional relaxation soundtrack condition, suggesting that they were simply interested in experiencing what pzizz was like. However, 5 subjects from the pzizz condition also requested the software, suggesting that they must have perceived

enough benefit from pzizz that they wanted to continue using it.

One obvious criticism of our design is that we did not actually measure whether people succeeded in napping. There are at least three reasons we do not view this criticism as seriously undermining our conclusions. First, because the sessions were small we can say that subjects appeared to be at least trying to sleep, and in fact many subjects showed obvious signs of sleeping. Second, at least one other study has foregone gathering independent measures of sleep onset or duration, yet still found benefits consistent with the napping literature (Takahashi et al., 2004). Third, although we could have gathered self-report measures, retrospective reports are notoriously unreliable, even in the short term (for example see Loftus, Miller & Burns, 1978). These reasons aside, we still did not gather objective measures of sleep and thus we do not know if pzizz’s benefits are due to its ability to generate a superior state of rest, or if it specifically promoted sleep-induced improvements to well-being. Considered as a whole, our findings suggest that pzizz can be a useful aid to napping, although additional research using objective measures of sleep onset, duration and quality are warranted.

More research is also needed in this area to ascertain just how helpful napping software might be, and under what circumstances it offers the most benefit. Our study suggests that napping software, such as pzizz, may provide an effective means to improve well-being. Additionally, the results show that—at least with the soundtracks used in our study—the effect of listening to pzizz may be even greater than the effect of listening to conventional relaxation soundtracks

AUTHOR NOTES

Brainwave Enterprises, the developers and producers of pzizz software, supported some of the costs associated with the research reported in this paper. The views, opinions, and findings contained in this article are the author’s and should not be construed as official or as reflecting the views of the authors’ institutions. Address all correspondence to Dr. Maryanne Garry, School of Psychology, Victoria University of Wellington, PO Box 600, Wellington, New Zealand, maryanne.garry@vuw.ac.nz.

Table 1. Survey Questions - Questions asked of participants pre and post nap

Consider how you feel right now, and use the scale to answer the following questions.

How much energy do you have? (1 = very little energy, 5 = a great deal of energy)	1	2	3	4	5
How refreshed do you feel? (1 = not at all, 5 = very refreshed)	1	2	3	4	5
How stressed do you feel? (1 = not at all, 5 = very stressed)	1	2	3	4	5

Consider your experiences since your last session [or: at the beginning of this session] and please rate the extent to which you agree with each of the following statements, 1 = strongly disagree; 5 = agree.

I slept well last night.	1	2	3	4	5
When I woke up in the morning, I felt refreshed.	1	2	3	4	5
My energy levels have increased.	1	2	3	4	5
It is easy for me not to indulge in bad habits.	1	2	3	4	5
I am bored.	1	2	3	4	5
I am more tolerant of difficult situations.	1	2	3	4	5
I feel more optimistic.	1	2	3	4	5
Some people are getting on my nerves.	1	2	3	4	5
I have less energy.	1	2	3	4	5
I feel stuck in a bad habit.	1	2	3	4	5
My skin looks better.	1	2	3	4	5
I am more irritable.	1	2	3	4	5
Work is more enjoyable.	1	2	3	4	5
Life is more fun.	1	2	3	4	5
I am more creative.	1	2	3	4	5
A difficult situation is annoying me.	1	2	3	4	5

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