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Wake up for the environment: An association between sleepiness and pro-environmental behavior

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ABSTRACT

This study was designed to identify the relationships between sleepiness, pro-environmental behaviors and the balance between optimism and pessimism (O/P ratio). Two questionnaire surveys were conducted to collect data from randomly sampled residents in Japan (n = 382 and n = 1200), in order to compare behavioral and psychological factors as a function of sleepiness. Both surveys consistently indicated that respondents with low sleepiness were less pessimistic, and engaged in pro-environmental behaviors more frequently compared to those with high sleepiness, and that sleepiness is negatively associated with the O/P ratio and pro-environmental behaviors, implying that sleepiness might hinder pro-environmental behaviors in daily life. The association also implies that psychological factors such as sleepiness, optimism and pessimism are important for facilitating behaviors favorable to society.

1. Introduction

Sleepy individuals tend to feel more anger, confusion, and fatigue and can become less enthusiastic about daily life activities (Kaida & Niki, 2014). This is because their sensitivity to positive life events becomes blunted, compared to individuals that are fully awake (Zohar, Tzischinsky, Epstein, & Lavie, 2005). As a result, sleepiness amplifies negative moods and attenuates positive ones, and influences human behavior through its effects on motivation (Dinges et al., 1997; Kaida & Niki, 2014; Zohar et al., 2005). It could therefore be expected that sleepy individuals would be reluctant to engage in activities, such as pro-social behaviors, which would optimally enhance their engagement with society. From this perspective, identifying psychological factors that influence pro-social behavior, including sleepiness, optimism, and pessimism, is becoming increasingly important in the fields of behavioral research such as behavioral economics and environmental psychology, because human behaviors are not only influenced by rational reasoning, but also by emotions and mood (Kahneman, 2011; Lindenberg & Steg, 2007).

Pro-social behavior refers to individual actions that are intended to improve social conditions and help other individuals (Eisenberg & Miller, 1987). It is known that engaging in pro-social behaviors can enhance mood, through positive feedback from performing 'good' actions (Penner, Dovidio, Piliavin, & Schroeder, 2005; Wallach & Wallach, 1983). Therefore, if the motivation for pro-social behaviors and engagements were to be hindered for some reason, people would be deprived of this type of positive mood enhancement.

Previous studies have identified associations between sleepiness and positive affect (Steptoe, O'Donnell, Marmot, & Wardle, 2008), suggesting that reducing sleepiness could be one approach to facilitating pro-social behaviors in everyday life. Sleepiness is a fundamental aspect of human existence that is known to influence everyday human behaviors. Nevertheless, surprisingly little is known about the relationship between sleepiness and pro-social behaviors, and therefore, we investigated this unique relationship.

Among various pro-social behaviors, pro-environmental behavior is a relatively new concept that is becoming increasingly important in the contemporary world that demands sustainable environmental management. Pro-environmental behaviors are generally defined as behaviors that reduce the environmental impact caused by human beings, and behaviors that improve environmental quality (Stern, 2000). They cover behaviors such as saving energy and reduced consumption of resources, the moderate use of motor vehicles, and nature conservation (Steg & Vlek, 2009). Although an individual's pro-environmental behavior might make only a minor impact on easing environmental pressures, society-wide and long-term accumulation of such behaviors can lead to major environmental impacts such as mass CO_2 emission reduction to ease global warming (Stern, 2000). In this study, we focused on the relationship between pro-environmental behaviors and sleepiness.

Managing psychological factors such as sleepiness and mood is important for facilitating pro-environmental behaviors, because it could maximize the impact of policies designed to promote such behaviors.

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It is known that engaging in pro-environmental behaviors make people feel more positive, and more satisfied, by allowing them to derive pleasure and satisfaction through contributing to society (Bolderdijk, Steg, Geller, Lehman, & Postmes, 2013; Steg, Perlaviciute, & van der Werff, 2015; Taufik, Bolderdijk, & Steg, 2015; Venhoeven, Bolderdijk, & Steg, 2013). Similarly, an optimistic way of thinking in an alert, less sleepy state might contribute to behaviors that are useful to society.

Previous surveys conducted in Sweden (Kaida & Kaida, 2016b) and Japan (Kaida & Kaida, 2016a) by the authors have indicated that pro-environmental behaviors, such as switching off lights, were positively related to subjective well-being, perhaps because it created positive feelings. Also, increased positive feelings caused by performing pro-environmental behaviors were related to individual dispositional traits, such as optimism and pessimism (Kaida & Kaida, 2016a). Thus, optimism and pessimism might play an important role in pro-social behaviors, including pro-environmental behaviors. An optimistic viewpoint seemingly allows people to generally maintain pro-environmental and pro-social behaviors. It is therefore important to understand sleepiness, optimism and pessimism, and pro-environmental behaviors and their associations to exert these relationships for promoting pro-social behaviors.

The present study was designed to investigate the relationships between sleepiness, optimism, pessimism, and pro-environmental behaviors as one domain of the pro-social behaviors. If sleepiness were associated with subjective affect, it could also be associated with pro-environmental behavior, and optimism and pessimism. The present study tested this hypothesis in two studies. The survey protocol of both studies were reviewed and approved by the Research Ethics Committee of the University of Tsukuba.

2. Study 1

In Study 1, we focused on switching lights off, which was defined as switching off lights when not in use, as a typical pro-environmental behavior conducted at home (Lanzini & Thogersen, 2014). This behavior, which reduces energy consumption, is one of the easiest and most well-known ways of reducing CO_2 emissions at the individual level. We also focused on the level of sleepiness during daytime activities. The purpose of Study 1 was to confirm relationships among sleepiness, pro-environmental behavior, optimism, and pessimism.

3. Methods

3.1. Participants

In Study 1, we collected data using a questionnaire survey. Questionnaires were mailed to 1942 residents aged 20 years or older that were randomly sampled from the voter register in Tsukuba City, Ibaraki, Japan. Of these, 422 questionnaires were returned, and after omitting questionnaires with missing values, data of 382 (184 men) questionnaires were analyzed in the present study. None of the respondents had taken part in any previous investigations on sleepiness, or pro-environmental behaviors. Average age of participants was 48.5 years (SD = 12.6), income was 5,625,600 yen; or USD 46,880 (SD = 2,691,200 yen; or USD 22,420), and education level assessed by the percentage of people with university degrees indicated that 41.1% had degrees. Socio-demographic characteristics of the participants are shown in Table 1. The data used in the present study were collected as a part of an investigation on the effects of providing environmental information in facilitating pro-environmental behaviors.

Table 1
Characteristics of respondents (Study 1).

	Mean or %	SD
Sex (% male)	48.17	
Age (years)	48.53	12.61
Education (% university degree)	41.10	
Income (household annual, yen)	5,625,654	2,691,226
Sleepiness (0–24)	9.23	4.26
Optimism (1–5)	3.16	0.58
Pessimism (1–5)	2.93	0.58
O/P ratio	1.14	0.43
PEB (1–6)	4.79	0.89

O/P ratio: optimism-pessimism ratio. PEB: pro-environmental behavior, n = 382.

3.2. Measures

3.2.1. Subjective sleepiness scale

Two subjective sleepiness scales among others have been commonly used in sleep research, namely the Karolinska Sleepiness Scale (KSS; Akerstedt & Gillberg, 1990) and the Epworth Sleepiness Scale (ESS; Johns, 1991), with the former assessing its transient and the latter the sleepiness in everyday situations. Subjective sleepiness in the present study was assessed using the ESS because we focused on the sleepiness in everyday situations and its association with other psychological factors and behaviors rather than instant sleepiness at certain times. The ESS is a widely used self-report scale that is used to measure the tendency to fall asleep in various situations during the daytime such as watching TV and sitting inactive in a public place. Respondents were asked to provide their evaluation of sleepiness in eight situations, by using a four-point Likert scale consisting of 0 (*would never doze*), 1 (*slight chance of dozing*), 2 (*moderate chance of dozing*), and 3 (*high chance of dozing*). Higher scores indicated greater subjective sleepiness. Cronbach's alpha of the scale in the present sample was 0.78.

3.2.2. Optimism and pessimism

Optimism and pessimism were assessed using the Extended Life Orientation Test (ELOT; Chang, Maydeu-Olivares, & D'Zurilla, 1997), which consists of six items assessing optimism and nine items assessing pessimism. The 15 items comprising the ELOT were originally adopted from two different scales, the Life Orientation Test (Scheier & Carver, 1985) and the Optimism and Pessimism Scale (Dember, Martin, Hummer, Howe, & Melton, 1989), and include items such as 'In uncertain times, I usually expect the best', 'In general, things turn out all right in the end', 'Rarely do I expect good things to happen' and 'Things never work out the way I want them to'. Respondents were asked to rate their state of optimism and pessimism, based on the 15 ELOT items, by using a 5-point Likert scale anchored between 1 (*strongly disagree*) and 5 (*strongly agree*). Cronbach's alphas of the scale for the present sample were 0.70 for optimism and 0.82 for pessimism.

3.2.3. Pro-environmental behavior

The question on pro-environmental behavior asked how often one performs actual behaviors, that is, 'I switch off room lights when not in use.' We assessed switching off lights, because it is a common, daily occurring, pro-environmental behavior that can be conducted at home, which has been investigated in several previous studies (Kaida & Kaida, 2016b; Steg & Vlek, 2009). Respondents were asked to rate their regular behavioral performance using a 6-point scale with a response scale anchored between 1 (*never*) and 6 (*always*).

3.3. Analysis

Respondents' behavioral and ELOT scores were divided into two groups based on their ESS scores. Johns (2000), and Doi and Minowa (2003) employed a summed ESS score threshold of 11 or higher, and 10 or lower to categorize their sample into a high daytime sleepiness group having an ESS scores of 11, or above, and a normal sleepiness group having a score of 10, or below (Doi & Minowa, 2003; Johns, 2000). The present study employed the same criterion to categorize respondents into low and high sleepiness groups. ELOT optimism and pessimism scores were parceled into analysis variables by averaging them