

CLINICAL IMPLICATIONS OF COMMUNITY ATTITUDES AND BELIEFS ABOUT  
SLEEP: AN EXAMINATION OF EXCESSIVE DAYTIME SLEEPINESS AND FATIGUE

by

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We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service.

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## ABSTRACT

**Background:** Excessive daytime sleepiness (EDS) and severe fatigue are two widely prevalent, yet undervalued and undertreated clinical conditions. The disparity in their treatment is surprising given their respective multidimensional physiological effects. This may be explained due to the known effects that public attitudes and beliefs can have on utilizing healthcare. Therefore, this study aims to analyze if one's beliefs and attitudes about sleep and sleep treatment impact one's own sleep health, or vice versa.

**Methods:** N = 28 participants presenting with excessive daytime sleepiness ( $ESS \geq 10$ ) were recruited from the community. Participants were administered an Epworth Sleepiness Scale and Fatigue Severity Scale at baseline, as well as a survey about a wide range of beliefs and attitudes about both common strategies to ameliorate daytime sleepiness, as well as seeking medical care about sleepiness. Participants reported whether they Strongly Agree (SA), Agree (A), Disagree (D), or Strongly Disagree (SD) with each respective statement. Ordinal logistic regressions examined agreement associated with baseline sleepiness and fatigue, adjusted for age, sex, and race/ethnicity. Nominal significance was determined as  $p < 0.05$ .

**Results:** Individuals with higher levels of baseline daytime sleepiness were more likely to agree that taking medication (both prescription and/or over-the-counter), napping, and "power[ing] through" are good strategies to alleviate sleepiness symptoms during the day. However, only higher fatigue severity was associated with the endorsement of statements relating to seeking treatment, particularly that they already have spoken with a clinician about their symptoms.

**Conclusions:** Some beliefs and attitudes about sleep were correlated with higher levels of daytime sleepiness and fatigue, especially those related to "powering through" daytime sleepiness and advocacy for medication. Similarly, there is a discrepancy in seeking treatment

for sleep problems between those with high EDS levels versus those with high fatigue levels. Therefore, attitudes and beliefs, and possibly presence of respective conditions/symptoms, can potentially affect treatment utilization and/or efficacy. This fact confirms the importance for clinicians and researchers to pay attention to their own patient's attitudes and beliefs about health. This also emphasizes the need for an increase in public health education about sleep and sleep health.

## INTRODUCTION

Excessive Daytime Sleepiness (EDS) is widely prevalent, the most current estimation being 19 to 30% of the global population (Fernandez-Mendoza et al., 2015; Hein et al., 2019, Liu et al., 2019). Despite its significant presence, prior research has indicated that EDS, among sleep disorders as a whole, are not well-recognized as clinical conditions by the public (Hale, Troxel, & Buysse, 2020). This gap in public understanding may perpetuate current disparities in sleep health, inhibit the efficacy of current treatments of sleep disorders, and may prevent the proper development of future treatments. Therefore, it is crucial that we understand the current state of attitudes and beliefs toward sleep and sleep treatment in order to inform future treatment plans that are maximally beneficial to patients.

## HEALTH IMPACTS OF EXCESSIVE DAYTIME SLEEPINESS AND FATIGUE

EDS relates to this topic well, as the known effects and symptoms of this condition have not changed the general view on its impact on public health and remains clinically undervalued (Pérez-Carbonell et al., 2022). The patient experience of EDS has been defined as an unavoidable urge to fall asleep during periods of time in which “an individual would be expected to be awake and alert” (Takenoshita & Nishino, 2017). The presence of EDS has been correlated with physiological detriments across multiple systems. Individuals with EDS have been shown to report decreased mood and self-reported quality of life (Waldman et al., 2020). A higher prevalence of EDS has also been shown in patients with mood disorders, such as Major Depressive Disorder (Zhang et al., 2021) and/or Bipolar Disorder (Steardo et al., 2019). Other psychiatric comorbidities include anxiety disorders (Choueiry et al., 2016) and Attention-Deficit/Hyperactivity Disorder (ADHD) (Bioulac et al., 2020; Ito et al., 2017). EDS has also been closely associated with an increased risk of cardiovascular disease (Li et al., 2021; Xie et

al., 2018). Specifically, prior research illustrates a relationship between EDS and the risk of vascular disease (Huang, Mariani, & Redline, 2020; Wang et al., 2020) and/or hypertension (Del Pinto et al., 2021). Other comorbidities of EDS include endocrine conditions such as type 2 diabetes mellitus (Misnikova et al., 2019), hypothyroidism (Oh et al., 2020), and Polycystic ovary syndrome (PCOS) (Fernandez et al., 2018).

To further expand upon this analysis, dependent relationships with severe fatigue were also examined. Fatigue and sleepiness are often colloquially used interchangeably, even among discussions between patients and providers. While both conditions do entail “tiredness”, there are important differences between the two conditions. Unlike EDS, this tiredness does not necessitate the desire to sleep, but it is simply a feeling of overall exhaustion (Popp et al., 2017). They are unique subjective experiences, but patients may not be able to categorize them accurately because they are particularly interrelated, which highlights the significance of distinguishing EDS and fatigue as two separate conditions (Shen, Barbera, & Shapiro, 2006) to avoid invalidating one condition over the other (Neu, Linkowski, & le Bon, 2010). These conclusions have resulted in researchers asserting that this distinction is the “key to accurate diagnosis” (Brown & Makker, 2020), and therefore was included in this analysis to observe potential similarities and differences with EDS.

It is important to note that these comorbidities present with bidirectional relationships that are not completely understood. However, their correlations mean that they are still important to the patient experience and therefore still must be considered during one’s treatment plan, and as such should continue to be analyzed. This importance can be emphasized through the relationship between EDS and obstructive sleep apnea (OSA). EDS is a well-known comorbidity of OSA, although the severity (or occurrence) of EDS varies by patient (Shao et al., 2019). Prior

research has noted this association, concluding that the presence of EDS with OSA (as compared to without EDS) may lead to different relationships between symptoms, particularly cognitive impairments (Zhou et al., 2016) as well as cardiovascular outcomes (Mazzotti et al., 2019).

These characteristics of OSA “subtypes” have introduced the idea that physicians should assess for the presence/absence of EDS for each patient before developing a treatment plan (Garbarino et al., 2018). Therefore, the clinical significance of research into EDS and its relationships can be emphasized for both current clinicians and the development of future treatment method. Recent research has reflected this need for deeper analysis into EDS, citing its multidimensional detriments to an individual (Mayer, 2022).

#### PUBLIC ATTITUDES AND BELIEFS

While one cannot overstate the importance of objective measurement in medicine, subjective data must also be appreciated as an important aspect of clinical diagnosis and treatment. Overall, qualitative data gained from methods such as focus groups, interviews, or community surveys are able to provide insight that simply cannot be obtained through quantitative measurement alone. Prior research has demonstrated the clinical benefits of subjective measures, such as interviews with Alzheimer’s patients to measure cognitive decline (Taylor, Bouldin, & McGuire, 2018) or interviews with medical trainees to measure risk of burnout (Dubé et al., 2015). Subjective measures are particularly important in the fields of psychology and psychiatry, where neurological dysfunction can heavily influence a patient’s behavior and attitude toward treatment. These facts assert that qualitative and subjective methods must be well-integrated into patient assessment to provide the ideal treatment plan. Of course, these measures may not provide the generalizability that is expected of clinical measures (Chapman, Hadfield, & Chapman, 2015). The use of these methods would reflect a beneficial

movement of medicine toward patient-centered care, as it has illustrated significant benefits for both physicians and patient outcomes (Hutting et al., 2022; Joseph et al., 2021; Ulin, Malm, & Nygårdh, 2015). Included in these subjective measures is the identification of the attitudes and beliefs of the public as a whole, as this can provide empirical reasons behind observed data trends within the community (Busetto, Wick, & Gumbinger).

The development of dysfunctional beliefs or attitudes about health or medicine is a complex but unavoidable process, especially within modern society. Certain contributors to their development may reflect and perpetuate health disparities. For example, research has shown that rural and/or developing communities have poorer health literacy than urban populations (Aljassim & Ostini, 2020). Some studies attribute this trend to the lack of access to specialty care (Cyr et al., 2019), while others state that socioeconomic status effects are also contributing (Wang et al., 2020). Other studies emphasize that these patterns in rural communities greatly impact indigenous communities and fortify other disparities present (Bakker, Koffel, & Theis-Mahon, 2017; Rheault et al., 2019). Modern developments have also proven to be both a blessing and a curse for healthcare, as the seamless integration of social media into our lifestyle has the potential to increase the presence of health anxiety. While virtual communication has increased the reach and ease of sharing information about health, it also can distribute rumors and false information across an international scale which can contribute to increasing public health anxiety (Lagoë & Atkin, 2015; Orui et al., 2020; Oh & Lee, 2019). The fact that these dysfunctional beliefs and/or attitudes can have such a negative impact, yet are so convenient to obtain presents the urgent need for work to ameliorate such beliefs and attitudes.

## METHODS

### PARTICIPANTS

Data for this community-level study were collected from N = 28 participants, consisting of both males and females aged 20-60 years. Prior to enrollment and participation in the intervention, all participants were confirmed to showcase high levels of daytime sleepiness as demonstrated by a score of 10 or more on the Epworth Sleepiness Scale. Recruitment of participants occurred through the use of online classifieds, local alternative and minority papers, social media, and flyers/brochures distributed at local events occurring within the community.

Those who were interested were required to provide informed consent and complete a screening questionnaire. This questionnaire was used to identify individuals with major medical and/or psychiatric conditions that may contribute to high degrees of sleepiness. If one such condition were identified, the participant was considered ineligible and was therefore not scheduled for the focus group intervention.

This screening questionnaire also provided the means for covariate analysis. Respondents were asked to report demographic information including age, biological sex, race/ethnicity, contact information, income level, education level, employment status, and relationship status. Any questions concerning medical history included the participants themselves as well as any pertinent family members.

### MEASURES

#### *Epworth Sleepiness Scale (ESS)*

Levels of daytime sleepiness were assessed using the Epworth Sleepiness Scale (ESS), which has been well-defined as a measure of an individual's general level of daytime sleepiness. (Johns, 1991). This measure has been validated for use in the clinical setting to assess for a wide

variety of sleep disorders that would result in EDS (Walker et al., 2020; Lapin et al., 2018; Bonzelaar et al, 2017). This measure consists of eight items, each describing a different daily situation (e.g., watching TV, driving a car...etc.). The respondent is then asked to report their likelihood of falling asleep during the described situation on a scale from 0-3 (“0 = would never doze; 3 = high chance of dozing”). ESS scores range from 0-24, with higher scores indicating higher levels of daytime sleepiness. Scores of 10 or higher are indicative of EDS and therefore participants with this score were considered eligible and scheduled for focus groups.

#### *Fatigue Severity Scale (FSS)*

Levels of mental and physical fatigue were assessed using the Fatigue Severity Scale (FSS), which was initially defined for use with patients with multiple sclerosis and lupus. (Krupp et al., 1989). However, this single-factor measure has been validated for use across many different clinical populations for the use of measuring fatigue severity (Lerdal, 2021). The FSS is a nine-item questionnaire in total. Most questions ask the respondent to report how fatigue impacts their daily life (e.g., work, physical functioning...etc.), while certain questions ask if specific situations can induce fatigue (e.g., exercise). Participants are asked to rate their agreement with the statement on a Likert scale from 1-7 (1 = strongly disagree, 7 = strongly agree). FSS scores range from 9-63 (or 1-7 if all items are averaged). Higher FSS scores coincide with higher degrees of fatigue. Scores of 36 or more (4 or more if averaged) suggest clinically high fatigue.

#### *Surveys*

Upon entry into the first focus group session, participants completed an initial survey addressing their personal experiences with their sleepiness. This survey served two main purposes: 1) to analyze the relationship between one’s attitudes/beliefs about sleep and sleep

treatment and their respective level of daytime sleepiness, and 2) to analyze the effects of the focus group intervention on their beliefs/attitudes about sleep and sleep treatment and/or their daytime sleepiness.

First, this survey asked participants to answer questions pertaining to the degree to which their typical sleep and degree of daytime sleepiness impact different parts of their everyday life. All questions were answered on a simple Likert scale (0 = strongly agree, 3 = strongly disagree). These questions are reported below.

<b>Statement</b>	<b>Subject</b>
<i>Sleep</i> impacts my...	Life
	Physical Health
	Mental Health
	Physical Performance
	Mental Performance
	Relationships
<i>Sleepiness</i> impacts my...	Life
	Physical Health
	Mental Health
	Physical Performance
	Mental Performance
	Relationships

Other items on the survey asked participants about their understanding of how sleep works and how confident they are in seeking healthcare providers for treatment of their sleep problems.

These items are reported below.

<b>Statement</b>	<b>Subject</b>
People with ... should discuss their problems with their doctor or healthcare provider.	Insomnia
	Sleep apnea
	Daytime sleepiness
I have talked to my doctor about...	Sleep problems
	Daytime sleepiness
If I had problems [with] ..., I would discuss it with my doctor or healthcare provider.	Sleeping
	Daytime sleepiness
I understand...	The basics of how sleep works
	The basics of how sleepiness works

	The difference between sleepiness and fatigue
If I have trouble [with] ..., I know what to do.	Falling asleep
	Poor quality sleep
	Daytime sleepiness

The remaining items on the survey presented respondents with commonly known methods to treat daytime sleepiness. They were asked which treatments they would consider for their own sleepiness and if they had any concerns with more intensive clinical treatments compared to lifestyle changes or over-the-counter supplements. These questions are reported below.

Statement	Subject
Excessive daytime sleepiness is something that can be improved with...	Medical treatment Psychological treatment Complementary/alternative medicine treatment
I am concerned about side effects of medical treatments for daytime sleepiness.	
When experiencing daytime sleepiness, the following things are good strategies for dealing with it:	Just "power through it"?
	Caffeine
	Vigorous exercise
	Mild or moderate movement or exercise
	Trying to get better sleep at night
	Eating or drinking something to "wake you up"
	Napping
	Giving up and letting yourself be sleepy
	Improve your diet/eat healthy
	Relaxing activities at night
	Meditation, breathing exercises, or other relaxation techniques
	Watching TV, browsing the internet, or other distracting activities
	Just keep moving
	Setting alarms
	Take prescription medication to improve sleep
	Take over-the-counter medication to improve sleep
	Take prescription stimulant medication
Take over-the-counter stimulant medication	
Take prescription medication that reduces daytime sleepiness	
Take over-the-counter medication that reduces daytime sleepiness	

## STATISTICAL ANALYSES

Responses to the questionnaire/survey items were given on the Likert scale. As such, participants were evaluated as categorical/ordinal variables, and distributions (% responses in each category) were generated. To determine the relationship between baseline scores on questionnaires and the responses to survey items, ordinal logistic regression models were computed. These models examined relationships between each survey item as an outcome, with baseline daytime sleepiness and fatigue scores set as independent variables (which were adjusted for age, sex, and race/ethnicity).

## RESULTS

### CHARACTERISTICS OF THE SAMPLE

From the total N = 28 participants, the majority of this sample were female (69.23%) and non-Hispanic White (61.54%). The mean age of this sample was 33 years (standard deviation = 10.04 years). The mean ESS score of this sample was 15, illustrating that these participants presented with clinically relevant EDS. More detailed information about the characteristics of the sample used for this dataset are reported in Table 1.

### BELIEFS AND ATTITUDES ABOUT SEEKING TREATMENT

The distribution of baseline rates of agreement with different statements related to pursuing treatment are represented in Figure 1. All participants agreed with the belief that people with sleep apnea and/or insomnia should discuss their sleep problems with their doctor. More than 80% of participants endorsed multiple statements: that they understood the basics of how sleep works, that they are concerned about the potential side effects of medical treatment for daytime sleepiness, and finally that people experiencing daytime sleepiness should discuss their problems with a doctor. Over 70% of participants endorsed multiple statements: they indicated that they would discuss sleep problems and/or daytime sleepiness with their doctor, they understood the physiological basics of sleepiness, and finally that EDS can be improved with both psychological and/or alternative medicine treatments. Over 50% of participants endorsed multiple statements: they understood what to do when they experience daytime sleepiness and/or trouble falling asleep at night, they understood the difference between sleepiness and fatigue, and that daytime sleepiness can be improved with conventional medical treatment. However, less than half of the participants indicated that they had already spoken with their doctor about sleep

problems and/or daytime sleepiness, as well as knowing what to do when they experience poor sleep quality.

Upon analyzing the degree of agreement with the various statements relative to baseline ESS and FSS score (Table 2), higher ESS scores were not correlated with the endorsement of any statements. However, baseline fatigue was associated with an increased likelihood of indicating that they have already spoken with a doctor about their sleep problems and/or daytime sleepiness. The difference in already having spoken with a doctor, and therefore identifying potential poor sleep health, in those with high daytime sleepiness versus high fatigue should be noted.

#### BELIEFS AND ATTITUDES ABOUT STRATEGIES FOR AMELIORATING DAYTIME SLEEPINESS

The distribution of baseline rates of agreement with different statements about strategies for ameliorating daytime sleepiness (worded as, “good strategies for dealing with [daytime sleepiness]”) are reported in Figure 2. All participants agreed that better sleep during the night would in turn improve daytime sleepiness. Over 90% of participants agreed that making healthy lifestyle changes, including improving diet, incorporating napping, mild/moderate exercise, meditation during the day, or relaxing activities at night, would improve daytime sleepiness. Over 80% of participants endorsed that daytime sleepiness could be alleviated by setting alarms to sound throughout the day. Over 70% of participants agreed that eating and/or drinking something meant to “wake you up”, including caffeinated food and drink, would alleviate daytime sleepiness. Over 60% of participants endorsed that working through your daytime sleepiness through either “power[ing] through it” or simply “giving up and letting yourself be sleepy” would result in an improvement in daytime sleepiness. However, less than half of

participants agreed with the ideas of using vigorous exercise, distracting activities (such as browsing the internet or watching TV) to alleviate daytime sleepiness. Less than half of participants also agreed that medications, including those that are over-the-counter or prescription and/or sleep-promoting or stimulant would help with daytime sleepiness.

Upon analyzing the degree of agreement with the various statements relative to baseline ESS and FSS score (Table 3), a higher baseline ESS score was associated with only the endorsement of “power[ing] through” daytime sleepiness, and no other strategy statements. Higher baseline fatigue levels were associated with the endorsement of using naps and/or taking medications (over-the-counter and/or prescription), but no other statements.

## DISCUSSION

This analysis was conducted to propose the idea that individuals experiencing daytime sleepiness and/or fatigue may have an increased likelihood of developing specific beliefs or attitudes about sleep and sleep health treatments. Our resulting data supports this overall hypothesis, and also illustrates the possibility of certain beliefs and attitudes being correlated with the presence of EDS versus severe fatigue.

### GAPS IN SYMPTOM RECOGNITION AND UTILIZATION OF HEALTHCARE

Individuals with a high baseline degree of daytime sleepiness (indicated by a high ESS score) were significantly likely to endorse the idea of “power[ing] through” their daytime sleepiness, rather than using any external interventions. High ESS scores were not associated with the endorsement of any items related to seeking treatment. These two observations are related in that they reflect a gap in the utilization of healthcare for patients experiencing EDS. However, higher degrees of fatigue (indicated with high FSS scores) were correlated with endorsing that they have already spoken with their doctor about their sleep problems. This illustrates one significant difference between the experience of daytime sleepiness compared to fatigue.

This may be in part due to a common stigma that equates sleepiness to laziness (Alger, Brager, & Capaldi, 2019; Lamari et al., 2021). Individuals in fear of being stigmatized may not express their experiences as problematic and simply accept their symptoms as normal. Or, after enough experiences with stigma, individuals have been shown to develop internalized stigma (Bulgin, Tanabe, & Jenerette, 2018), which in turn are correlated with a decrease in self-worth and the development of maladaptive coping strategies such as isolation (Tran & Lumley, 2019). Prior reviews of the literature have stated that there is an interconnectedness between sleep

health and stigma, where sleep disorders symptoms are stigmatized while simultaneously, the experience of stigma can negatively impact one's sleep health (Nwanaji-Enwerem et al., 2022). Individuals experiencing EDS and subscribing to this strategy of “power[ing] through” their sleepiness may feel that they either truly are “lazy” and not recognize their sleepiness as a treatable condition or, in fear of being stigmatized, may not express their experiences as problematic and simply accept their symptoms as normal.

On the other hand, higher fatigue severity may correlate with more utilization of healthcare because of the difference in subjective experiences between the two conditions. One aspect of EDS is that symptoms are often relieved by a period of sleep (Thorarinsdottir et al., 2019), and although the reduction in symptoms may be short-lived, it reflects the normal mechanism of sleep which could result in misplaced recognition of EDS signs as the fault of the individual being “lazy”. Fatigue differs in that sleep often does not provide relief, which may result in easier recognition of its multidimensional symptoms as abnormal (Maestri et al., 2020). In addition, sleep disorders as a whole are known to be poorly recognized by both patients and physicians (Ford et al., 2014). This may be in part due to the tendency of sleep disorders to be present in tandem with another condition, for example, with obstructive sleep apnea (OSA). Studies have shown that up to one-third of OSA patients underestimate their degree of sleepiness (Leger & Stepnowsky, 2020), and that while there is difficulty in diagnosis due to the complex nature of EDS, there remains insufficient screening for EDS symptoms (Rosenberg et al., 2021).

Even before employing any formal data analyses, there were pertinent results from the baseline survey answers alone that should be mentioned. While these results are not to be considered generalizable to the entire population, they are noteworthy in that their presence can start the conversation of what aspects of seeking treatment should be addressed in deeper

analysis. From the items about seeking treatment for daytime sleepiness, all participants stated that if someone were to experience insomnia or sleep apnea, they should speak to a doctor. While not all participants agreed in someone speaking with a doctor for daytime sleepiness specifically, a large majority (of 80%) did agree. It is essential to note that these items concern the health of someone else, not of the respondent themselves. Fewer participants (70%) reported that they themselves would consider seeing a doctor for sleep problems, while less than half said that they already have sought the help of a doctor. This presents an incongruity between these participant's beliefs for others versus those for themselves and may affect not only the utilization of healthcare, but may result in an underestimation of the prevalence of EDS and fatigue as a whole.

These findings present the importance for health education for the public. For example, one such education session on schizophrenia resulted in both an increase in the identification of symptoms and decreased personal stigma toward patients, which may reduce the time for individuals to seek care (Thorsteinsson et al., 2019). Therefore, educational interventions may be able to address both stigma and lack of recognition simultaneously, and as such should be considered important to develop for public health outcomes.

## PATIENT PREFERENCE FOR LIFESTYLE CHANGES

On the items concerning strategies to alleviate daytime sleepiness, lifestyle changes overall were more popular than the use of medications. This preference has been replicated in prior research across a variety of medical conditions and treatments. Such examples include patient preference for lifestyle changes when being treated for cardiovascular disease (Jarbøl et al., 2017), type 2 diabetes mellitus (Veldwijk et al., 2013), and osteoporotic fractures (Beaudart

et al., 2022). This inclination toward lifestyle changes may be explained from the observation that more than 80% of participants reported that they are concerned about the potential side effects of medical treatment for daytime sleepiness. It has been reported previously that this in fact is a common concern of patients and that this fear can influence patient treatment preference away from certain medication types (Bradley et al., 2019; Hellings et al., 2012), or away from allopathic medication completely and toward alternative/complementary methods, such as acupuncture (Liou et al., 2021). These concerns from patients have also been shown to not only deter patients from agreeing to certain treatment plans altogether, but can affect adherence to ongoing treatment plans and may result in patients modifying medication without the guidance of a clinician (Kulkarni et al., 2008; Uchmanowicz et al., 2018). This presents a significant risk of adverse health outcomes, as well as disparity in proper treatment for medical conditions, including sleep disorders where medication may be recommended. Finally, the concept of a “nocebo effect”, defined as an “induction or worsening of symptoms” due to patient expectations of a medical treatment (Planès, Villier, & Mallaret, 2016), may be relevant as a significant presence of these fears of side effects may increase the overall risk of nocebo effects within a community.

These findings highlight the importance of effective patient-clinician communication. Previous research has indicated that fears of side effects can be ameliorated through patient-centered communication alone (Dauer et al., 2011; Rossi et al., 2021), and even can combat the risk of nocebo effects specifically (Evers et al., 2018). In proper patient-clinician communication lies the principal aspect of patient education and health literacy, which has also been shown to improve the patient experience and health outcomes (Gillam et al., 2016).

## A NEED FOR PUBLIC HEALTH EDUCATION

The solution for ameliorating some of these dysfunctional beliefs and attitudes, and in turn their negative impacts, may lie in increased efforts toward community health education. One principal aspect of educational interventions and campaigns is to increase health literacy within the community. This method of intervention has previously proven beneficial on the prevention and recognition of various conditions, some of which include lung cancer (Crothers et al., 2016) and infectious diseases (Paintain et al., 2014; Wright et al., 2015). Another notable example includes the implementation of health education in schools' curriculum, which when applied effectively, can improve exercise behaviors in students (Yuksel et al., 2020; van Sluijs et al., 2021) and may even decrease rates of obesity (Auld et al., 2020). These benefits have also been extended to sleep health, in which education sessions have proved successful in addressing sleep health concerns by increasing awareness of disorders and, in turn, improve community sleep health (Seixas et al., 2020; Tanaka & Tamura, 2016). Some communities themselves have indicated the need for sleep education and noted specific populations that could benefit from such education (Spadola et al., 2022).

However, it should be noted that there are ways in which these education methods can be tailored to be most effective. One principal concept to be considered is that these interventions should not be generalized, rather they should be tailored to the specific community in which it will serve. As was addressed above, health disparities are affecting disadvantaged populations greatly, sleep health being one of the identified gaps (Jackson et al., 2020). Therefore, educators and experts must understand the community that they are aiming to help, as work in this area has revealed that different cultures have different tendencies when it comes to seeking treatment or even how they perceive illness (Gopalkrishnan, 2018). Culturally-tailored education has been

conducted and has been illustrated to be more effective in providing better health outcomes through the implementation of cultural liaisons in the development of the course and working in collaboration with local medical centers (Itzkowitz, 2016).

Overall, providing education can itself prove beneficial to the community. A review from Nutbeam and Lloyd (2020) discusses health literacy as both an independent determinant as well as a mediating determinant of health. While they state that work toward increasing health literacy should not be deemed a “substitute for the need to tackle the root causes of inequity”, it can reduce the impacts of certain aspects of health disparities and fill gaps in care.

#### IMPLICATIONS FOR FUTURE TREATMENT

While large-scale community education efforts would certainly have wide impact in addressing sleep health concerns, significance of the personal influence a clinician can have with a single patient also plays a key role. Overall, this analysis supports that the beliefs and attitudes of a patient can reflect not only the state of their health, but also can provide insight into their risk of non-adherence. Therefore, it is imperative that treatment teams make efforts to assess an individual’s attitudes and beliefs toward their respective condition and treatment before employing a specific plan. In relation to this analysis, clinicians should consider assessing their patient’s own beliefs and attitudes during their initial evaluation.

While the effects of different beliefs and attitudes has been discussed above, other research has worked to integrate potential assessments. Al-Noumani et al. (2019) conducted a review of patients with hypertension and their adherence to medication, and found that there were benefits to physician awareness of their patient’s attitudes and beliefs, particularly an increase in treatment adherence. They support the use of the previously coined the “SIMPLE” method for ensuring patient adherence, which includes “Modifying patient beliefs” by being

aware of dysfunctional beliefs and evaluating the need for an educational intervention (Atreja, Bellam, & Levy, 2005). Another study from Park et al. (2018) concluded that “beliefs about medication may indeed be a powerful predictor” for adherence in elderly patients, although beliefs and attitudes should be continuously assessed as patient satisfaction with their medication may alter their likelihood of adherence.

This type of examination has also been endorsed for patients with sleep disorders, particularly those who were recommended cognitive behavioral therapy for insomnia (CBT-I). In one recent review of the literature surrounding CBT-I adherence, it was found that “fewer dysfunctional beliefs about sleep predicted greater adherence” (Mellor et al., 2022). Consistent treatment with CBT-I has also been shown to ameliorate dysfunctional beliefs about sleep (Eidelman et al., 2016; Thakral et al., 2020), and therefore is reflective in the impacts of patient attitudes, as well as cognitive and/or educational intervention.

As discussed above relating to patient preference for lifestyle changes, the importance of effective patient-clinician communication cannot be overstated. And, in assessing for patient beliefs and attitudes, the possibility of an educational intervention entails that communication to one’s patient should be clear and tailored to the patient themselves. Street et al. (2009) describes that while prior studies have shown the improved health outcomes with effective patient communication, but also notes that studies that considered the patient within the greater context of “physiological, personal, and social determinants of health” had a higher likelihood of patient benefits. More recent studies have also illustrated a similar trend, where training physicians on the use of effective communication tactics provided patients with better health outcomes (Tavakoly Sany et al., 2020). Some described aspects of effective patient-clinician communication include simplified and concise explanations (i.e., decreased use of jargon) (Back,

Fromme, & Meier, 2019), providing of written materials for the patient to reference (Blackburn, Ousey, & Goodwin, 2019), and the collaboration with respective cultural liaisons (Mackean et al., 2020).

Collectively, the significance of a patient's attitudes and beliefs toward their condition and prospective treatment can impact their health outcomes. As such, it is important that clinicians consider these factors in their assessment and treatment plan development. This also entails that during this assessment, the need for educational intervention is evaluated, and that the act of educating one's patient is clear and effective.

### *Limitations*

This study used surveys and questionnaires as the main method of gathering participant information. As such, the data is vulnerable to participant biases and mistakes, such as the social-desirability bias. Only a small number of interested participants (N = 28) were eligible for analysis, and the implications of a small sample size should be considered when interpreting the results of this study. Therefore, the relationship between one's beliefs and attitudes about sleep and one's levels of daytime sleepiness and fatigue cannot be fully understood with this analysis alone. A similar study protocol with a larger pool of participants may confirm the findings of this study and support universal applicability, which would provide further insight into appropriate interventions for those suffering from high levels of daytime sleepiness and/or fatigue.

## CONCLUSIONS

The described results illustrate not only that Excessive Daytime Sleepiness and/or severe fatigue can be correlated with a tendency to agree with certain dysfunctional attitudes and beliefs, but it also reflects the importance of ameliorating these dysfunctional beliefs as they can perpetuate current health disparities and contribute to further health detriments. Collectively, patients seemed to prefer lifestyle changes over pharmaceutical interventions. Also, there was a tendency of patients to not consider seeking treatment for sleep problems important for themselves but recommended it for others. Individuals with EDS endorsed the acceptance of their symptoms without any intervention, reflecting a potential gap in care, while participants with severe fatigue were amicable toward accepting clinical treatment.

Addressing these beliefs entails that more effort toward public health education, particularly for sleep health. These efforts may also extend to the dynamics of the patient-physician relationship, as education through effective provider communication at the individual patient-level provides significant benefits to patient outcomes. Due to this significance, there should be consideration toward deeper analysis of patient beliefs and attitudes, as well as the determination of methods to effectively assess and address those that are dysfunctional in order to improve the chances of better health outcomes.

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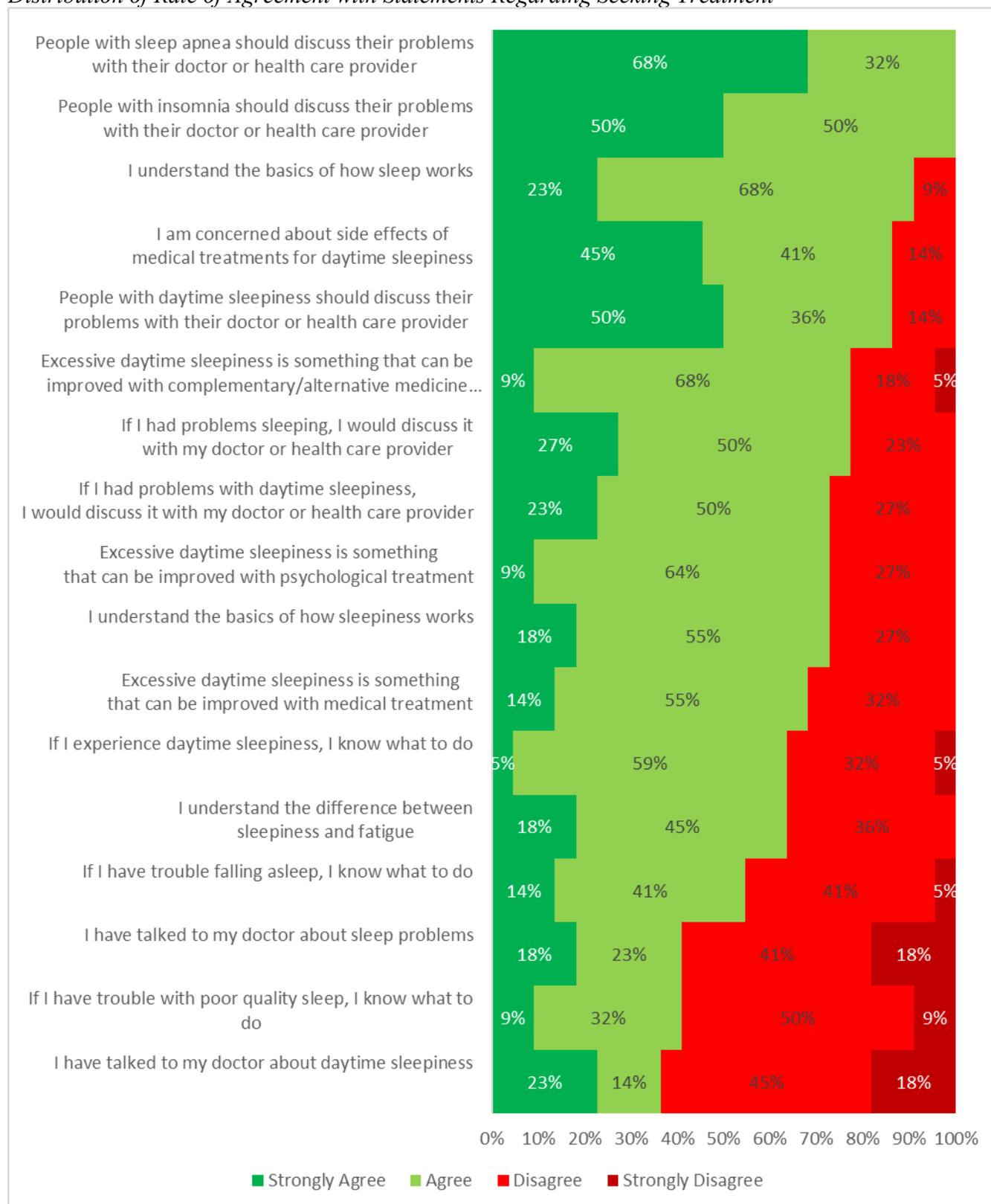
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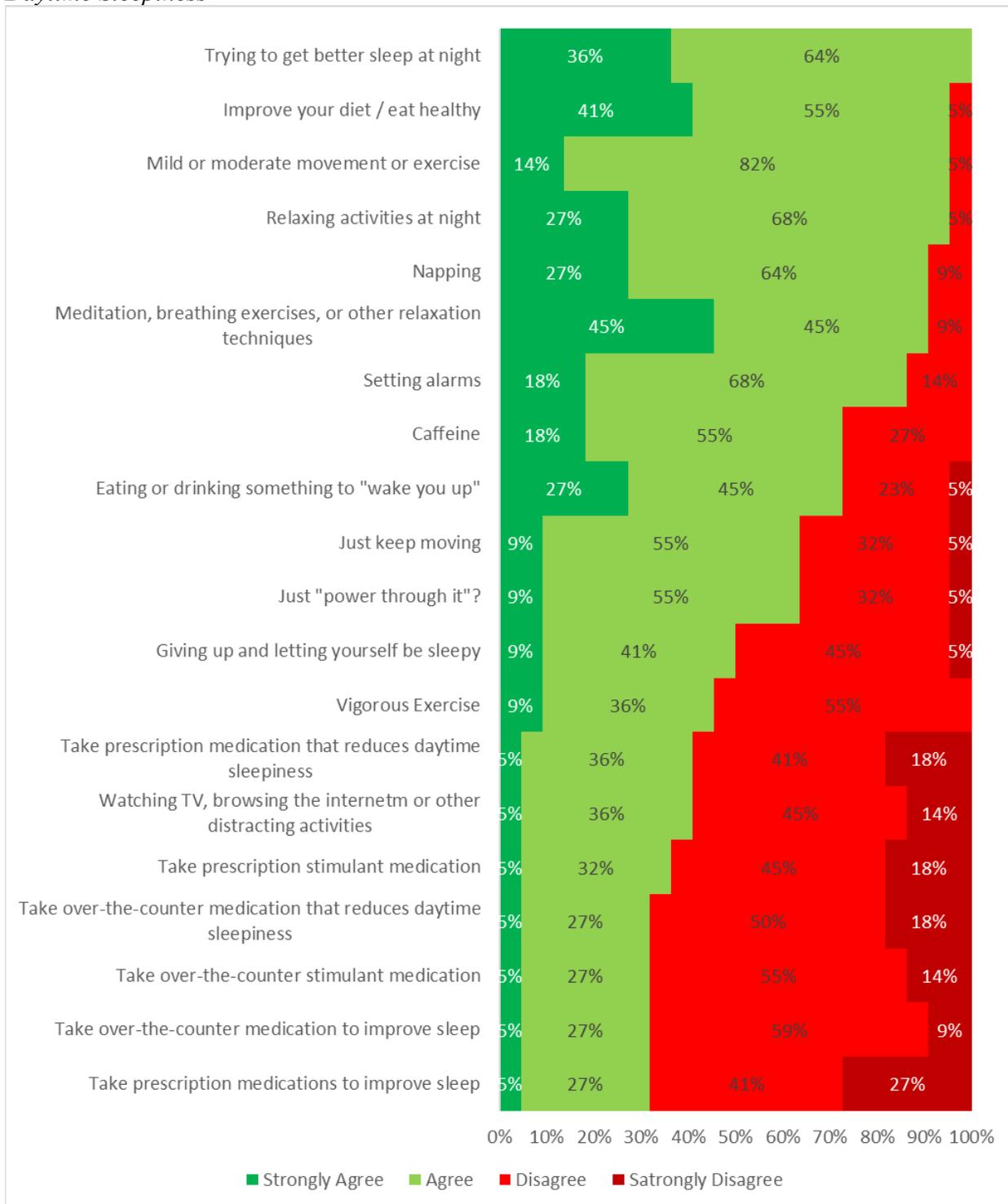
**Table 1***Characteristics of the Sample*

<b>Variable</b>	<b>Category/Units</b>	<b>Complete Sample (N = 28)</b>
Age	Years	32.8 (SD = 10.0)
Biological Sex	Male	31.8%
	Female	68.2%
Race/Ethnicity	Non-Hispanic White	59.1%
	Hispanic/Latino	22.7%
	Black/African American	9.1%
	Asian	9.1%
	American Indian/Native American	0.0%
Sleepiness	ESS Score	15.05
Fatigue	FSS Score	48.32

**Figure 1**  
*Distribution of Rate of Agreement with Statements Regarding Seeking Treatment*



**Figure 2**  
*Distribution of Rate of Agreement with Statements Regarding Strategies for Ameliorating Daytime Sleepiness*



**Table 2***Associations between Baseline Daytime Sleepiness and Fatigue and Beliefs and Attitudes about Seeking Treatment*

<b>Belief</b>	<b>FSS</b>			<b>ESS</b>		
	<b>oOR</b>	<b>95% CI</b>	<b>p</b>	<b>oOR</b>	<b>95% CI</b>	<b>p</b>
People with insomnia should discuss their problems with their doctor or health care provider	0.96	(0.77, 1.20)	0.720	0.94	(0.84, 1.06)	0.340
People with sleep apnea should discuss their problems with their doctor or health care provider	1.01	(0.79, 1.30)	0.921	0.93	(0.80, 1.08)	0.321
People with daytime sleepiness should discuss their problems with their doctor or health care provider	0.98	(0.80, 1.21)	0.882	0.95	(0.85, 1.07)	0.392
I understand the basics of how sleep works	0.89	(0.70, 1.13)	0.324	1.00	(0.89, 1.12)	0.987
I understand the basics of how sleepiness works	0.79	(0.62, 1.01)	0.062	0.99	(0.89, 1.10)	0.826
I have talked to my doctor about sleep problems	1.21	(0.93, 1.59)	0.163	1.54	(1.08, 2.19)	0.016
I have talked to my doctor about daytime sleepiness	1.17	(0.91, 1.51)	0.220	1.33	(1.04, 1.70)	0.022
If I had problems sleeping, I would discuss it with my doctor or health care provider	1.04	(0.86, 1.27)	0.673	1.07	(0.97, 1.19)	0.180
If I had problems with daytime sleepiness, I would discuss it with my doctor or health care provider	1.05	(0.87, 1.28)	0.609	1.05	(0.95, 1.17)	0.300
I understand the difference between sleepiness and fatigue	0.87	(0.70, 1.09)	0.215	1.05	(0.94, 1.17)	0.403
If I have trouble falling asleep, I know what to do	1.03	(0.84, 1.26)	0.771	0.94	(0.85, 1.04)	0.205
If I have trouble with poor quality sleep, I know what to do	0.94	(0.75, 1.16)	0.551	0.93	(0.84, 1.04)	0.208
If I experience daytime sleepiness, I know what to do	1.11	(0.87, 1.41)	0.395	0.99	(0.89, 1.10)	0.843
Excessive daytime sleepiness is something that can be improved with medical treatment	1.08	(0.88, 1.33)	0.466	0.97	(0.88, 1.07)	0.586
Excessive daytime sleepiness is something that can be improved with psychological treatment	0.94	(0.72, 1.22)	0.631	0.90	(0.79, 1.04)	0.158
Excessive daytime sleepiness is something that can be improved with complementary/alternative medicine treatment	0.94	(0.75, 1.20)	0.640	0.95	(0.84, 1.08)	0.432
I am concerned about side effects of medical treatments for daytime sleepiness	0.93	(0.75, 1.16)	0.524	0.99	(0.89, 1.10)	0.868

**Table 3**

*Associations between Baseline Daytime Sleepiness and Fatigue and Beliefs and Attitudes About Strategies for Ameliorating Daytime Sleepiness*

<b>Strategy:</b>	<b>FSS</b>			<b>ESS</b>		
	<b>oOR</b>	<b>95% CI</b>	<b>p</b>	<b>oOR</b>	<b>95% CI</b>	<b>p</b>
Just "power through it"	0.88	(0.69, 1.12)	0.291	0.81	(0.68, 0.96)	0.015
Caffeine	0.93	(0.75, 1.16)	0.530	0.95	(0.85, 1.06)	0.342
Vigorous Exercise	1.19	(0.93, 1.53)	0.166	1.06	(0.95, 1.19)	0.316
Mild or moderate movement or exercise	1.22	(0.80, 1.86)	0.352	1.00	(0.86, 1.16)	0.992
Trying to get better sleep at night	1.34	(0.92, 1.96)	0.124	0.96	(0.83, 1.10)	0.541
Eating or drinking something to "wake you up"	1.15	(0.92, 1.45)	0.224	1.09	(0.96, 1.23)	0.188
Napping	2.55	(1.11, 5.84)	0.027	1.10	(0.95, 1.27)	0.205
Giving up and letting yourself be sleepy	1.25	(0.98, 1.59)	0.070	1.03	(0.93, 1.14)	0.540
Improve your diet / eat healthy	0.87	(0.67, 1.14)	0.318	0.93	(0.81, 1.07)	0.319
Relaxing activities at night	0.87	(0.66, 1.14)	0.309	0.74	(0.54, 1.02)	0.063
Meditation, breathing exercises, or other relaxation techniques	0.75	(0.55, 1.02)	0.068	0.92	(0.80, 1.06)	0.253
Watching TV, browsing the internet or other distracting activities	0.94	(0.76, 1.17)	0.604	0.89	(0.77, 1.02)	0.087
Just keep moving	1.07	(0.87, 1.32)	0.525	1.00	(0.90, 1.12)	0.935
Setting alarms	0.77	(0.58, 1.03)	0.082	1.00	(0.89, 1.12)	0.989
Take prescription medications to improve sleep	1.49	(1.09, 2.02)	0.012	1.06	(0.96, 1.18)	0.252
Take over-the-counter medication to improve sleep	1.55	(1.02, 2.36)	0.039	1.13	(0.97, 1.32)	0.117
Take prescription stimulant medication	1.22	(0.95, 1.56)	0.114	1.09	(0.96, 1.24)	0.193
Take over-the-counter stimulant medication	1.13	(0.89, 1.44)	0.302	0.97	(0.86, 1.08)	0.557
Take prescription medication that reduces daytime sleepiness	1.21	(0.96, 1.54)	0.114	1.06	(0.94, 1.18)	0.335
Take over-the-counter medication that reduces daytime sleepiness	1.11	(0.88, 1.39)	0.383	0.98	(0.88, 1.09)	0.734