Evaluation of a Workplace-Based Sleep Education Program

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Introduction: Poor sleep is common among working adults. Chronic sleep deprivation is associated with health problems. A healthy sleep educational program (using webinars and other intranet-based resources) was offered to employees of a financial services corporation. **Methods:** In 2015, a total of 357 employees (50% completion rate) completed both a pre- and post-program questionnaire assessing sleep quality and workplace productivity. **Results:** Many aspects of sleep statistically improved from T1 to T2 for program participants. These included improvements in hours of sleep, sleep quality, ease of getting asleep, feeling rested, nights of poor sleep, job performance, days of sleepiness, and others. Employees reporting any limitation in productivity also showed significant improvement. **Conclusions:** This workplace healthy sleep intervention was associated with significant improvements in sleep quality and quantity among program participants.

Sleep disorders and inadequate sleep are relatively common problems impacting more than 30% of adults.[1] While the field of sleep disorders is constantly evolving, there has been progress in a greater understanding and classification of sleep disorders. In 1990, the publication of the International Classification of Sleep Disorders (ICSD) provided a common diagnostic and classification system for sleep disorders. Currently, the ICSD identifies more than 80 different sleep disorders within six major classifications. Sleep disorders classifications include: insomnia, sleep related breathing disorders, central disorders of hypersomnolence, circadian rhythm sleep-wake disorders, parasomnias, and sleep related movement disorders.[2]

The most common sleep disorder is insomnia.[3] It is estimated that about 30% of the general population complains of sleep disruption, and about 10% have symptoms of daytime functional impairment and chronic insomnia.[4] Similarly, obstructive sleep apnea, characterized by respiratory difficulties during sleep, carries estimates of up to 21% in women and up to 31% in men in the general population.[4]

The level of sleep disturbance can greatly impact the social and occupational functioning of adult workers. Sleep challenges can have both psychological and medical consequences.[5] Psychological consequences such as increased rates of depression and anxiety have been widely documented.[6] Studies have also demonstrated the association between sleep deprivation and mood. Subjects whose sleep was limited for a week reported feeling more stressed, angry, sad, and mentally exhausted. When normal sleep patterns were resumed, subjects reported mood improvements as well.[7] Reciprocal relationships between sleep and psychological states have also been noted,[8] and people who carry diagnoses of anxiety and depression often report comorbid sleep disturbance. This connection is so strong, in fact, that sleep disturbance (insomnia or hypersomnia) is included as one of the diagnostic criteria for depression in the Diagnostic and Statistical Manual[9] used to diagnose mental disorders.

Similarly, multiple medical consequences of impaired sleep have been identified and the associations between sleep disorders and many health conditions have been noted. Cardiovascular disease, for example, is the most common cause of premature death in adults and sleep disturbance has been associated with increased risk of coronary artery disease and stroke.[10] According to the Centers for Disease Control,[11] sleep is increasingly recognized as important to public health, with sleep insufficiency is linked to motor vehicle crashes and industrial disasters. Persons experiencing sleep insufficiency are also more likely to suffer from chronic diseases such as cardiovascular, hypertension, diabetes, depression, and obesity, as well as from cancer, increased mortality, and reduced quality of life and productivity.[12–14]

Psychological and medical consequences of disturbed sleep have socioeconomic impact on organizations in direct and indirect ways.[15] Insomnia appears to be linked to high health care utilization[16] and the economic impact of direct and indirect costs has been estimated in the tens of billions of dollars annually.[17,18] Studies have suggested an estimate of yearly direct costs of $13.96 billion and demonstrated physician and medical expenses for patients with insomnia that were $5580 and $4220 higher than matched controls.[1] Indirect costs such as absenteeism, productivity loss, and motor vehicle collisions resulting from insomnia were estimated to top $100 billion.[17] Attempts to quantify the economic impact of presenteeism related to sleep disorders have produced wide variations in cost estimates.[1] It is clear that employers are increasingly concerned with these costs.[19]

Few studies of worksite sleep interventions have been reported in the literature. One such study focused on improving physical activity along with sleep hygiene education and the resultant impact on sleep quality measured by the Pittsburgh Sleep Quality Index in 73 randomized employees.[20] While improvements in sleep quality were reported after the 24-week intervention, they were not related to exercise compliance in the study group suggesting that changes were related to the educational impact of the program. Two other worksite sleep interventions have been described in the literature although both studies have very small sample sizes of just 53[21] and 37[22] employees.

In 2013, a total of 11,230 of 18,555 full-year employees at the study organization who had employer medical coverage (60.5% response rate) completed a health risk appraisal (HRA) questionnaire. Among HRA participants, 41.6% ($N = 4677$) reported having poor sleep ($n = 4483$ with less than 7 hours plus $n = 194$ with 9 and more hours). Sufferers of poor sleep were more likely to be women and older than other employees. Average medical and pharmacy costs for an employee with poor sleep in 2013 were $2815 and $931, respectively compared with an average of $2652 and $902, respectively, for all employees. There are additional costs related to absenteeism (11.8% reported 6 or more illness days compared with 10.0%), disability (7.4% filed a non-pregnant disability claim compared with 6.4% of other employees) and decreased on-the-job productivity (presenteeism, 68% reported any work limitation

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compared with 62%) for those with sleep problems as well. For example, those with sleep problems reported more health risks, more missed work days and more on-the-job work limitations on the HRA in 2013 than other employee participants. The current study examines the value of a worksite educational program designed to provide psychoeducation, skill building, and relaxation techniques for employees who self-reported sleep disturbance.

METHODS

Study Population

Participants in this study were employees of a multinational Fortune 100 financial services corporation headquartered in New York City with major offices in Fort Lauderdale, FL; Salt Lake City, UT, and Phoenix, AZ. In 2015, the corporation employed approximately 20,000 employees in the United States. The average age of employees was 42.7 years and 62% of employees were women. Employees were eligible to enroll in a Consumer Directed Health Plan with a health spending account. In addition, the company offered a global well-being (''wellness'') program called Healthy Living, which features best-in-class resources, an annual HRA, enhanced access to care, and a supportive work environment. The program goals are to improve employee health, business productivity/performance, and to control long-term health and productivity costs.

Intervention

To help promote healthy sleep in the workforce, the Disease Management team at this corporation partnered with Healthy Minds Employee Assistance Program to design a *Healthy Sleep for Healthy Living* educational program in 2015. *Healthy Sleep for Healthy Living* was offered to all employees in the United States. This population includes a large virtual group that does not have access to on-site Wellness Centers in their work location. A total of 760 US-based employees enrolled in the program, 43 of them terminated their employment after that time, and 357 employees (50% of whom remained employed) completed the pre- and post-program surveys.

The program focused on increasing participants' knowledge about factors that influence sleep and providing them with skills and behavioral techniques to improve their own sleep. The goals for the program included helping participants to:

- Understand the role of sleep, health, and productivity.
- Learn healthy sleep hygiene habits.
- Identify sleep disorders and resources for treatment.
- Practice relaxation and mindfulness for better sleep.

The program spanned 5 months and consisted of:

1. Completing sleep questionnaires (based on a Mayo Clinic tool[21]) that inquired about their self-reported sleep quality, sleep behaviors, confidence in dealing with sleep problems, energy level, daytime performance, productivity, and depression before and after the completion of their participation in the program.
2. A specialized sleep webinar series, offered by a physician who is a sleep expert and assistant professor of neurology at a major teaching institution and a Healthy Minds counselor. All webinars were available for replay throughout the program. The webinar topics covered:
   - Sleep basics
   - Sleep hygiene
   - Sleep disorders
   - Relaxation and mindfulness
3. Each webinar was followed by a lively question and answer session with the experts.
4. Participants were given access to a member-only intranet site that housed additional resources and tools that supported the webinar topics. The intranet site was updated monthly with new content.
5. Participants received monthly emails, which encouraged them to participate in the webinars (live and via replay), review content on the intranet site and implement the strategies.
6. Various incentives and raffles prizes were included to encourage program registration, webinar participation, and post-program questionnaire completion. All program participants received a Healthy Sleep kit with eye mask, a small bottle of lavender scented spray and program information. Prizes such as therapeutic pillows and wearable devices with activity and sleep monitoring were raffled off for those completing a post-program questionnaire.

A communication plan was developed using a creative logo and tag line to invite employees who need a good night's sleep to opt into the program. Eye catching graphics including a pillow and ZZZ's with the tag line, ''*sleep well*'' were used as a friendly, non-threatening approach to Healthy Sleep. Communications were posted on the company's intranet and flyers and posters advertising the program were placed in all of the Health and Wellness Centers and in other public worksite areas. Registration for the program consisted of completing the online pre-program sleep questionnaire.

An eight-item version of the Work Limitations Questionnaire (WLQ)[23,24] was included in the sleep questionnaire to assess health-related impact on work performance. These questions evaluated the percentage of time at work that an emotional or physical problem interfered with one or more of four work domains: time management, physical work activities, mental/interpersonal activities, and overall output or productivity. Employees were asked to base their responses on their previous 2 weeks of work and to rate any impairment on a five-point scale of ''all of the time (100%),'' ''most of the time,'' ''half of the time (50%),'' ''some of the time,'' and ''none of the time (0%).'' Additionally, the response option ''does not apply to my job'' was also provided. The brief version of the WLQ was scored as four subscales, representing the four work domains. A separate, dichotomous score for each sub scale (yes/no) indicated whether or not any work limitations were noted for either of the two items that made up each subscale (ie, amount of limitation for either item). The response for each subscale was judged to be valid if a rating was provided for at least one of the two items in each scale. A dichotomous overall work limitation score was also constructed to indicate whether any of the four work domains were affected.

ANALYSIS

Responses from the baseline and post-program questionnaires were analyzed by the University of Michigan Health Management Research Center (Ann Arbor, MI). SAS 9.0 (SAS Institute Inc., Cary, NC) was used to complete all statistical analyses. Demographic variables were tested using *t* test for the continuous variables and chi-square test for the categorical variables to determine whether those who completed the post-program questionnaire were different from those who only completed the baseline questionnaire. McNemar's test was used to test the changes in distribution of categorical variables from T1 to T2. All data were de-identified before transmission to the University of Michigan Health Management Research Center (Ann Arbor, MI) and this study was conducted in accordance with the University of Michigan Institutional Review Board (IRB).

RESULTS

A total of 717 eligible employees enrolled in the *Healthy Sleep for Healthy Living* program by completing the baseline sleep questionnaire and remained employed throughout the study

duration. The post-program questionnaire was completed by 357 employees (50% completion rate). The program outcomes reported in this study are for the 357 employees who completed both the pre- and post-program questionnaires.

Demographics

The demographics of participants are summarized in Table 1 for all program enrollees at baseline ($N = 717$), all participants who completed both T1 and T2 questionnaires ($N = 357$), and participants who did not complete the 6-month follow-up questionnaire ($N = 360$). The age distribution of the three groups of employees was statistically different, with T1T2 questionnaire completers more likely to be older than those who did not complete the T2 questionnaire. The majority of participants were women and they were also more likely to complete the post-program survey compared with man participants. The distribution of participants by race/ethnicity was statistically different, with a larger percentage of Caucasian employees completing the post-program questionnaire.

Employees were asked about their usual work shift and T1T2 questionnaire participants were significantly more likely to work the day shift compared with the other groups. The distribution of employees by geographic work location was also different, with more T1T2 completers working in Arizona and Utah compared with employees who did not complete the T2 questionnaire. At this corporation, some employees have the ability to telecommute and perform their work from home or another location. The distribution of these virtual workers was not statistically significant across the three demographic comparison groups.

Program Participation

On the post-program questionnaire, participants were asked about which sleep webinars they viewed/listened to (either live or on replay). The most widely accessed webinar was ''Sleep Basics'' which was viewed by 85.4% of T2 questionnaire respondents. Other webinar topics included sleep hygiene (watched by 57.4%), common sleep conditions and treatments (61.9%), and strategies for calming an overactive brain (50.4%). In addition to the webinars, a ''Sleep Community'' intranet site was developed containing program information and other resources was accessed by 61.6% of respondents. Employees were also asked about which sleep resource(s) they found to be useful. Most employees found the webinars to be the most useful (68.3%), followed by the sleep kit (58.5%), sleep E-mails (51.0%), and intranet resources (15.4%). Overall, 67% of respondents reported that the *Healthy Sleep for Healthy Living* program was very or extremely helpful and valuable.

Pre- and Post-Program Sleep Questionnaire Results

As noted in the Methods section, results are reported for the 357 employees who completed both the T1 andT2 questionnaires. Participants were asked several questions about their sleep quantity and quality, such as: ''During the past month, how many hours of sleep did you usually get each night? (This may be quite different to

TABLE 1. Demographics of T1 and T2 Questionnaire Participants

	All Participants at T1		T1 and T2 Questionnaire Participants		Did Not Complete T2 Questionnaire	
	$N = 717$		$N = 357$		$N = 360$	
	N	%	*N*	%	*N*	%
Age[a]						
20–35 years	196	27.3%	78	21.8%	118	32.8%
36–50 years	315	43.9%	163	45.7%	152	42.2%
51+ years	206	28.7%	116	32.5%	90	25.0%
Gender[a]						
Male	212	29.6%	86	24.1%	126	35.0%
Female	505	70.4%	271	75.9%	234	65.0%
Ethnicity[a]						
Asian	96	13.4%	38	10.6%	58	16.1%
Black or African American	45	6.3%	15	4.2%	30	8.3%
Hispanic or Latino	74	10.3%	35	9.8%	39	10.8%
Other	87	12.1%	39	10.9%	48	13.3%
White	415	57.9%	230	64.4%	185	51.4%
Work shift[a]						
Days	659	91.9%	336	94.1%	323	89.7%
Evenings	17	2.4%	10	2.8%	7	1.9%
Multiple shifts/rotating	12	1.7%	5	1.4%	7	2.0%
Nights	15	2.1%	2	0.6%	13	3.6%
Other	14	2.0%	4	1.1%	10	2.8%
Work location[a]						
Arizona	257	35.9%	136	38.1%	121	33.6%
Florida	67	9.3%	35	9.8%	32	8.9%
Utah	76	10.6%	46	12.9%	30	8.3%
New York	125	17.4%	47	13.2%	78	21.7%
Other	192	26.8%	93	26.1%	99	27.5%
Virtual workers						
All of the time	77	21.6%	77	21.6%	84	23.3%
Some of the time	145	40.6%	145	40.6%	132	36.7%
None of the time	135	37.8%	135	37.8%	144	40.0%

[a] $P < 0.05$ difference comparing T1 only group with T1 to T2 group.

TABLE 2. T1 and T2 Sleep Results ($N = 357$)

	T1	T2
Hours of sleep each night in past month[a]		
3–4 h	22 (6.2%)	12 (3.4%)
5–6 h	180 (50.4%)	123 (34.5%)
6–7 h	136 (38.1%)	191 (53.5%)
8–9 h	19 (5.3%)	31 (8.7%)
Quality of sleep in past month[a]		
Bad/fairly bad	105 (29.4%)	38 (10.6%)
Fairly good	179 (50.1%)	185 (51.8%)
Good/very good	73 (20.5%)	134 (37.5%)
How often do you feel well rested (1 = never—10 = always)[b]	4.59	5.87
Confidence dealing with sleep problems (1 = none—10 = extreme confidence)[b]	5.14	6.71
Knowledge of sleep (1 = none—10 = extremely knowledgeable)[b]	5.18	7.53
How often do you lie awake and worry (1 = never—10 = always)[b]	5.27	4.29
How often trouble getting to sleep (>20 minutes) (1 = never—10 = always)[b]	4.91	3.91
How often trouble staying asleep (1 = never—10 = always)[b]	5.74	4.99
How often think of sleep problems during day (1 = never—10 = always)[b]	3.32	2.61
How often fall asleep during day (1 = never—10 = always)[b]	2.36	1.92
Overall quality of life (1 = poor—10 = excellent)[b]	7.19	7.50
Energy level at work (1 = very low—10 = very high)[b]	6.08	6.78

[a] $P < 0.0001$ McNemar's test comparing T1 with T2.
[b] $P < 0.0001$ t test comparing average score T1 with T2.

the number of hours you spent in bed.)'' Results are summarized in Table 2 and show statistically significant improvement in employee responses from T1 to T2 in 12 different sleep measures. For example, at baseline, only 20.5% of respondents reported ''good or very good'' sleep quality in the past month, which improved to 37.5% of respondents at T2. Many questions asked employees to rate their response on a scale from 1 to 10, such as ''How often do you have trouble getting to sleep (more than 20 min)? (1 = never, 10 = always)''. The average response score was calculated at T1 and T2. These average scores showed significant improvement from T1 to T2. For example, the average score at T1 for ''After a typical night's sleep, how often do you feel well rested? (1 = never, 10 = always)'' was 4.59 which improved to 5.87 ($P < 0.0001$) at T2. Other questions are shown in Table 2.

Table 3 shows more comparisons of the baseline and post-program questionnaires for the 357 employees who completed both questionnaires. There was a significant improvement in the nights of poor sleep quality reported in a typical week from T1 to T2 among program participants. Similarly, there was significant improvement in the respondents' answers for ''How many days is your job performance or daily activities affected by inadequate or poor sleep quality?'' and ''How many days are you bothered by sleepiness?'' and ''How many naps do you take per day?''

It was interesting to note that there was no significant change in the distribution of answers to the question regarding the number of nights your sleep is interrupted by a bed partner, child, or pet. The similarity in answers from T1 to T2 indicates that employees are responding honestly about their sleep circumstances. It is unlikely over a relatively short period of time that factors such as these could be changed. Also, the change in responses to the question about number of nights the employee takes medication (prescribed or over the counter) to help sleep was also not statistically significant. At baseline, 70.3% of employees reported 0 nights of taking medication compared with 74.8% at T2. This change is not statistically significant but it shows that any improvements in sleep outcomes that are observed in the survey results are not likely a result of increased medication usage among program participants.

Changes in the On-the-Job Work Limitations

As noted in the Methods, the eight question version of the WLQ was included in the participate questionnaire at T1 and T2 inquired about on-the-job work limitations experienced by employees. Results can be seen in Fig. 1 and show that a significant improvement was observed in the percentage of employees reporting work limitations in three of the four domains (time, psychological, and output) as well as in any work limitation overall.

Sleep Program Outcomes

The post-program questionnaire included questions about changes employees made based on their participation in the *Healthy Sleep for Healthy Living* program (participants could have selected more than one change). The results are shown in Fig. 2 and show that most participants (53.8%) understand the role of healthy sleep in a healthy life and 49.6% of participants avoid lighted screens before bed after participation in the program. Additionally, about one-third of program participants reported making the following changes as a result of the program: avoiding caffeine, alcohol, and nicotine that interfere with sleep, creating a sleep-inducing bedroom, creating a soothing pre-sleep routine, and have shared program information with their family. Very few participants (3.4%) started a new prescribed sleep medication and 2.5% started a new over the counter sleep medication.

DISCUSSION

This educational sleep program for employees of a global financial services corporation was evaluated with the use of pre- and post-program questionnaires. Out of 717 employees who enrolled in the program by completing the pre-program questionnaire, 357 also completed the post-program questionnaire and were available for pre-post comparison testing. Program completers were more likely to be older, women, Caucasian, day shift workers, and employed in Utah or Arizona compared with those who did not complete the post-program questionnaire.

Program results showed that many measures of sleep quality and quantity statistically improved from Time 1 to Time 2 for program participants. These measures include improvements in the

TABLE 3. T1 and T2 Sleep Results, Continued ($N = 357$)

	T1	T2
Nights of poor sleep quality in typical week[a]		
0 nights	21 (5.9%)	27 (7.6%)
1–2 nights	108 (30.3%)	198 (55.5%)
3–5 nights	170 (47.6%)	101 (28.3%)
6–7 nights	58 (16.2%)	31 (8.7%)
Nights of sleep interruption by partner/child/pet		
0 nights	116 (32.5%)	129 (36.1%)
1–2 nights	125 (35.0%)	130 (36.4%)
3–5 nights	74 (20.7%)	65 (18.2%)
6–7 nights	42 (11.8%)	33 (9.2%)
Nights of taking medication to help sleep		
0 nights	251 (70.3%)	267 (74.8%)
1–2 nights	49 (13.7%)	35 (9.8%)
3–5 nights	17 (4.8%)	23 (6.4%)
6–7 nights	40 (11.2%)	2 (9.0%)
Days of job performance or daily activity affected by inadequate or poor sleep[a]		
0 days	152 (42.6%)	267 (59.1%)
1–2 days	165 (46.2%)	35 (33.9%)
3–5 days	31 (8.7%)	23 (6.4%)
6–7 days	9 (2.5%)	2 (0.6%)
Days bothered by sleepiness[a]		
0 days	48 (13.4%)	105 (29.4%)
1–2 days	158 (44.3%)	180 (50.4%)
3–5 days	107 (30.0%)	55 (15.4%)
6–7 days	44 (12.3%)	17 (4.8%)
Naps per day[b]		
0 naps	297 (83.2%%)	321 (89.9%)
1+ naps	60 (16.8%)	36 (10.1%)

[a] $P < 0.0001$ McNemar's test comparing T1 with T2.
[b] $P < 0.05$ McNemar's test comparing T1 with T2.

usual hours of sleep each night, ''good'' or ''very good'' sleep quality in the last month, trouble getting to sleep, feeling well rested, nights of poor sleep quality, job performance affected by poor sleep, days bothered by sleepiness, and naps taken per day.

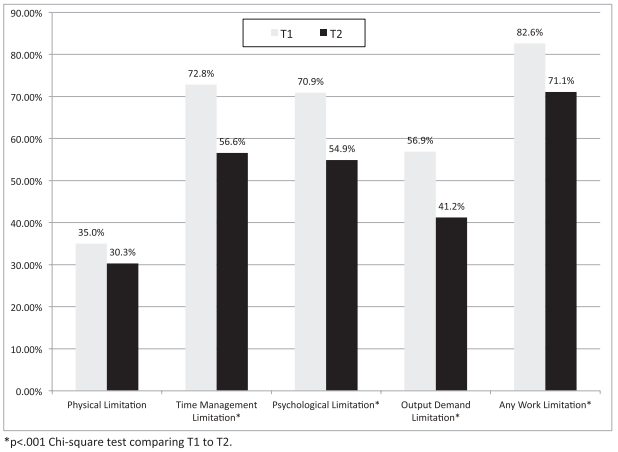
The sleep webinars focused on educating employees about the basics of good sleep, sleep hygiene, sleep conditions and treatments, and strategies for calming an overactive brain, among others. When asked about changes made based on the program, employees reported improvements in understanding the role of healthy sleep, avoiding lighted screens before bed, avoiding caffeine/alcohol/tobacco, and creating a soothing routine and bedroom. These changes are, in many cases, easy to implement but can have a major impact on the quality of sleep of employees.

Because the program focused on behavioral and environmental factors contributing to sleep, there was less emphasis on the use of pharmaceuticals to improve sleep. This was reflected in the program outcomes showing that just 3.4% of participants started a new prescribed sleep medication and 2.5% started a new over the counter sleep medication. Similarly, a larger percentage of employees reported zero nights of taking sleep medication from baseline (70.3%) to T2 (74.8%). While this change was not statistically significant, it shows that changes in sleep outcomes observed from T1 to T2 were likely due to things other than increased medication usage.

In the past several years, many employers have become aware of the importance of presenteeism—lost on-the-job productivity due to employee health. Participants in the *Healthy Sleep for Healthy Living* program reported significant improvements in three out of four work limitation domains as well as any work limitation overall. In this financial services organization, few jobs are physically demanding compared with a manufacturing corporation. This is reflected in the relatively low percentage of employees reporting a physical limitation (35.0% at T1) on the WLQ questions. The change to 30.3% at T2 was not statistically significant. Significant improvements were seen in the percentage of employees reporting a time management limitation (72.8% T1 to 56.6% T2), psychological limitation (70.9% T1 to 54.9% T2), and output demand limitation (56.9% T1 to 41.2% T2). When all work limitation domains were combined to any work limitation, the improvement was from 82.6% reporting a limitation at T1 to 71.1% at T2. These improvements are quite large from a practical perspective. When 10% to 15% fewer employees report a work limitation, the improvements in productivity at work could be very significant. From the literature, it is clear that poor sleep quantity and quality can have a major impact on daytime productivity and alertness.[1,7,15,16,18] An educational sleep intervention, which improves sleep quality and quantity could also be associated with improvements in productivity at work.

This corporation offers a variety of wellness programs, which are aimed at helping employees stay healthy and become healthier. Program goals include:

1. Improve access and remove barriers to care.
2. Simplify and improve the experience with the healthcare system.
3. Inform and educate participants about the benefits of good health.
4. Deliver innovative and engaging benefit designs that reinforce the messages of good health.



*p<.001 Chi-square test comparing T1 to T2.

FIGURE 1. Change in on-the-job work limitations from T1 to T2*.

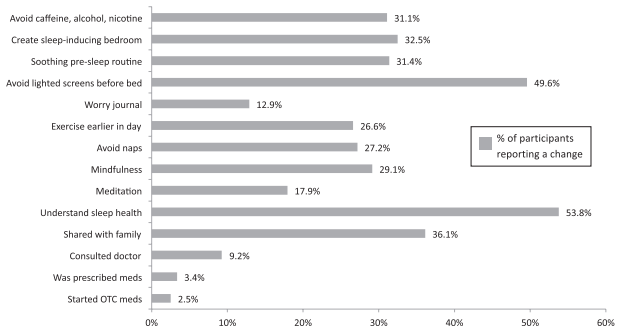


FIGURE 2. Self-reported changes made as a result of the *Healthy Sleep for Healthy Living* Program.

5. Keep costs below the market trend with a high degree of satisfaction.

The *Healthy Sleep for Healthy Living* program supported those goals since quality sleep is vital to good health in many ways. On the post-program questionnaire, 67% of employee respondents indicated that the program was ''very'' or ''extremely helpful and valuable''. Since the program was developed internally at the corporation and was implemented through the company intranet, the program costs were relatively small and could be re-offered in the future for little additional cost.

Only three other reports of worksite sleep interventions were found in a search of the peer reviewed medical literature. Atlantis et al[20] studied a worksite exercise and behavioral intervention on sleep quality among 73 employees. Although significant improvements in the Pittsburgh Sleep Quality Index were found at post-program, the changes were not related to exercise compliance and were likely associated with the sleep hygiene education portion of the intervention. In another study, 53 members of a worksite wellness center participated in an 8-week educational program to improve healthy sleep.[21] Results were similar to those found in the current study, with improvements observed in several measures of sleep quality and quantity. Finally, a community-based 5-week sleep education program was offered to 37 employed women with initial poor sleep quality and invested by Chen et al.[22] At post-program evaluation all six components of the Pittsburgh Sleep Quality Index were significantly improved, as was the overall measure of sleep quality.

LIMTIATIONS

There are some limitations to the current study. While a randomized, controlled trial would allow for causal relationships to be identified, that type of study is rarely, if ever, feasible in a worksite environment. The current study did not account for the seasonal variations in sleep patterns, which often occur in the United States. Another limitation is the relatively short evaluation period from pre- to post-program questionnaires. It is unknown whether the observed changes would be sustained over a longer time period. Also, many different topics were covered by the program and it is unknown which components were most effective at improving sleep outcomes. Further study of worksite based sleep education programs would benefit from a longer follow up period and separate evaluation of different program components. Finally, with the advent of wearable technology, objective measures of sleep could be incorporated into the educational program and its evaluation. Furthermore, as we have indicated, the participants who completed both the T1 and T2 questionnaires were significantly different, demographically, than employees who completed only the T1 questionnaire. This fact limits the generalizability of the findings of this study as the employees who complete both questionnaires (older, more likely to be women and on day shift and in the New York location) may be more likely to see positive results from the sleep intervention compared with other employees.

CONCLUSIONS

Many factors of today's world have the potential to negatively impact employees' quantity and quality of sleep. The demands of work life balance, the pervasive aspects of technology, trading sleep time for work or play time, or medical or psychological conditions that disrupt sleep can all play a role in sleep quality. While sleep deprivation can be due to unrecognized sleep disorders, in many cases simple steps can be taken to improve sleep. For example, these can be as simple as exercising earlier in the day rather than in the evenings, or avoiding bright screens, alcohol or caffeine in the hours before sleep. If sleep quality is not improved, over the long-term sleep deprivation can result in decreased alertness and job performance, memory and cognitive impairment, higher risk of occupational or automobile injury, and poor overall quality of life. Therefore, employers have an interest in helping employees improve their quality and quantity of sleep. This relatively low-cost and easily implemented intervention was associated with several improvements in sleep measures of participants.

Healthy sleep is integral to overall general health and vitality. This intranet-based healthy sleep education program consisting of informational webinars and other resources was evaluated by pre- and post-program questionnaires for 357 employees of a global financial services organization. Results from the questionnaires showed significant improvement on several measures of sleep quality and quantity, as well as reductions in self-reported work limitations. A majority of participants found the program to be very or extremely helpful and valuable. Incorporating sleep wellness initiatives into comprehensive worksite wellness programs may be helpful in improving employee health and productivity.

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