Vila: A Stress Relieving Lighting Solution for the Workplace

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to everyone that made this project possible

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A stress relieving lighting solution for the workplace

The health of Americans is deteriorating because of the stress caused in the workplace. Designers experience this frequently because of fast work pace, constant revisions, and a lack of direct control over their work.

Vila is designed to relieve this stress by introducing warm lighting into their workspace. Warm light at 2200 to 3000 Kelvin has been proven to reduce stress. Lighting is also considered work appropriate as it is essentially non-disturbing to coworkers.
research
Stress is a part of everyday life and at its optimum stress keeps one active, alert, and able to deal with problems that arise. If too much stress is experienced it can drain one’s physical and mental energy and therefore one's health and sense of well-being.

Stress can be caused by a multitude of reasons but the most common causes for stress are problems work, relationship problems, unemployment, and financial problems. Among these work is cited as the most common stressor at 65%. Overall though, 80% of workers say that they have felt stressed at work. Of these workers, 63% say that they are not well equipped to handle their stress. This leads to workers being burned out from the stress they experience at work.

As soon as one is in a stressful situation the body reacts by releasing the stress hormones adrenaline and cortisol into the blood. This makes the heart beat faster and constricts the blood vessels to get more blood to the core of the body, instead of exterminates like the feet and hands. It also increases the blood pressure temporarily, but as soon as the stress goes away the blood pressure returns to normal.

Stress can easily be detected as the body shows physical symptoms even at low stress levels. Early signs of stress are headaches, muscular tension, increased heart rate and sweating, clenched hands, restlessness, and agitation.

**WORK STRESSORS**

There are several reasons why people are stressed at work, and there is no one stressor that applies to all. It rather depends on whether or not the job is a good personality fit to each individual, no matter the profession. Some of the most common work stressors are:

- Low salaries
- Travel for work
- Competitiveness with coworkers
- Deadlines
- Excessive workloads
- Few growth and/or advancement opportunities
- Work that is not engaging
- Lack of social support
- Lack of control over job related decisions
- Conflicting demands from supervisors and managers
- Unclear performance expectations

Stress is unavoidable, however, it can be managed so that it does not have negative health precautions.

**STRESS RELIEF**

There are several ways to relieve stress and depending on the person some work better than others. These generally focus on relieving the symptoms of the stress rather than eliminating the cause of the stress itself. Some common stress relievers include:

- Exercising
- Taking breaks
- Eating a healthy diet
- Meditating
- Getting massages
- Listening to music

**STRESS RELATED ILLNESS**

The stress will make you sick if it is ignored for a longer period of time, but even at early stages it will effect your everyday health. Common symptoms of stress and stress related illness are:

- Muscle tension
- Headaches and migraines
- Depression
- Anxiety
- Stomach ulcers
- High blood pressure
- Heart disease
In the United States, 44% of people lose 1 hour of productivity a day due to stress.

Moreover, 65% cite work as their largest stressor.

According to ComPsych Corporation, a Human Resource Firm
62% of workers routinely find that they end the day with neck pain.

34% had difficulty sleeping because of stress.

12% have called in sick because of job stress.

According to the American Institute of Stress
Light has a big impact on human behavior and mood. Different wavelengths of light also have physical affects on blood pressure, pulse, respiration rates, brain activity, and biorhythms. One of these biorhythms is the circadian rhythm, the body’s internal clock. One rhythm is 24 and one quarter hours in length. It helps regulate sleep patterns and is what makes us wake up in the morning and feel tired at night.

**AFFECTS OF LIGHT**

Lighting also plays an important role in people’s emotions and well-being can be directly influenced by light. The brightness, color, direction, and contrast of the light can both positively and negatively affect people’s concentration, productivity, and stress levels. For example, blue bright light helps people to keep focused and awake, while red warm light calms people down, relieves stress, and helps them fall asleep. This means that blue lighting is more beneficial during daylight hours and red light more beneficial to reduce stress and at night.

Blue light has also been shown to boost attention, reaction times, mood, while it is disruptive at night. This is why it is important to be exposed to the right type of lighting throughout the day. In a case study with elementary school students, it was found that color temperature has large impacts on their performance. When blue light was used, they were able to improve their reading speed and accuracy while also keeping attentive and focused. When red light was used, the students were able to work together more effectively, minimizing conflict.

**LIGHT TEMPERATURE**

The most stress relieving light temperature is 2200 Kelvin to 3000 Kelvin. This is a warm white light that allows for stress reduction and a decrease in heart rate.
well-being at work

Most people lose an hour of productivity a day due to workplace stress, costing American businesses $300 billion per year. To help reduce this stress and consequently also the costs related to stress, Vila was designed to be stress relieving from every point of view. This includes function, form, color, and materiality. Introducing a lighting solution that combats stress fits well in with the current workplace design trends, as there is a shift from wellness and well building to well-being. This means that businesses are valuing the well-being of their employees. Healthy employees are important to business as it helps them reduce healthcare costs, and it increases the employee productivity and happiness.

In a survey of 1005 small businesses and enterprises in the United States it was found that 93% find the health of their employees important to their bottom line. Large businesses like Johnson & Johnson and Steelcase have the same mentality and invest large amounts of money into improving their employee health. However, their approach is drastically different from the course of action that was taken to improve health in the beginning of the 2000s. Then there was large focus on building healthy environments for their employees, free of toxic materials rather than focusing on improving the health of the employees themselves. Now the focus is on a holistic health approach that improves the health of the employees themselves, in addition to the office environment.

Steelcase describes this as a holistic approach to mental, physical and emotional wellbeing. Among various health problems like weight management, high stress levels, smoking habits, and psychological well-being, stress is the main concern of employers. In fact, 42% of the employers surveyed by National Small Business Association and Humana consider their employees high stress a concern for their organization. This is worsened by the fact that 54% of a person’s waking hours are spent at work. So, even alleviating a little of this stress can improve the employee’s health tremendously and in turn the organization at large. It has been found that when employee well-being increases, direct and indirect costs of healthcare decrease. This is because absenteeism decreases and employee engagement and performance improves. So, investing in employee well-being is a valuable tool for businesses to use to improve their budgeting.

Companies that invest in employee well-being are getting great monetary and performance benefits out of it. Johnson & Johnson estimated that their investment in well-being programs saved them $250 million this past decade, as they did not need to spend as much on healthcare for their employees. The same goes for Steelcase, and they are looking to spend 3% less than anticipated on their health employee insurance premiums thanks to their investment in employee well-being.

There currently is not a lighting solution for office environments that has a focus on improving the health. Introducing a lighting solution into the office landscape would be beneficial as the right type of lighting can help reduce stress levels by both giving employees the choice of brightness and placement of the light, giving them more control over their workspace. It also has emotional and physical benefits, making people happier which if often overlooked in the regular office.

Employees and companies both benefit from having not just a healthy office environment but also focusing on the well-being of the employees. Light can help improve their well-being, reducing the amount of money businesses spend on healthcare premiums further. Companies that do this will also be better liked by their employees making them more productive, happier, and more likely to stay with the company, rather than finding a new job. Purchasing Vila would be a great first step towards improving employee well-being.
There currently is not a lighting solution for office environments that has a focus on improving the health.

According to Steelcase White Papers
target consumer

Vila is for people that work in design professions and deal with a lot of graphic content on a daily basis. This includes professions like graphic, UX and UI, interactive, textile, and industrial design. These professions require people to sit in front of computer monitors for the most part of the day. Their work days are generally 8 to 12 hours long. They also commonly work late nights and overtime closer to project deadlines.

WORKSPACE

Many people that deal with graphic content have more than one desk. One is generally for digital tasks and one for physical tasks. Some designers also have workspaces in several locations to meet their different design needs. Things that people have on their desks are:

- Computer (laptop or desktop, 2 monitors is common)
- Papers
- Pens and pencils of all kinds
- Drawing tablets
- Notebooks
- Sketchbooks
- Planners

STRESS

Stress is common among people who work with graphic content although the amount and longevity differs from person to person. People who work with graphic content are exposed to a multitude of stressors just like people who work in other professions. People provide different perspectives on what makes graphic design stressful, the most common ones are the high pace, constant revisions and lack of direct control.

The pace at which work has to be completed is high and deadlines are generally short and the designers work on several projects at the same time. This is proved by the fact that many people think that anyone can design. However, designing takes a lot of time as the design process has multiple steps and is not always linear. This can also leads to misunderstandings between the designer and the clients as they generally do not know how involved the design process is.

All great designs go through several rounds of revisions. This is to improve the design by testing colors, changing the size, material testing, and so on. Revisions can also be ordered by clients, supervisors, and managers.

The designer does not have complete control over the project as the clients, art directions, and supervisors have the final say. This leads to work that is uncertain and hard to complete without feeling stressed.

Some other stressor that designers experience are:

- Long work days
- Working at night
- Short deadlines
- Working with clients unaware of the design process
- Judgement of unfinished work
- Juggling several projects at once
- Competition and pressure to outperform coworkers

TARGET ENVIRONMENT

Most of these stressors take place in front of monitors, which is why I want to target this area to provide stress relief in. This will allow for stress relief that constantly is present at work.

The ideal environment would be a large office landscape where everyone has their own desk with the space for a lighting solution to improve their desk lighting.
A graphic designers desk at an architecture firm in a traditional cubicle landscape
A graphic designer’s workspace in home office
Most people lose an hour of work a day due to workplace stress, costing American businesses $300 billion per year.

According to Haworth Research
I interviewed several designers and one that particularly stood was with the graphic and industrial designer Jeanee Vilja. An excerpt of the interview can be found below.

**What company did you work for?**
I worked for Pacific Lutheran University in their Communications Department.

I managed print and web projects with clients including the Athletic Department, Office of Admissions, the Mortvedt Library, and the Women’s Center. Finished products included branding for Pacific Lutheran University's library, marketing for concerts, CRM contact cards, e-mail templates, web ads, admission brochures, and posters.

**How many hours did you work on a regular day?**
7-11 hours.

**Did you work overtime or late nights?**
I occasionally worked overtime.

**Did you feel stressed at work? If yes, how often did you feel stressed at work?**
Yes, I would say stress is normal. When I was working, I would be stressed every day. But the severity would change based on daily circumstances.

**What causes you to get stressed?**
Work can be stressful when you are juggling multiple projects. It can be stressful to somewhat force creativity and reach your full potential for each project. Work can be stressful when you are juggling multiple projects. It can be stressful to somewhat force creativity and reach your full potential for each project. Some days are better than others. You can near a deadline and create something you are not necessarily proud of. In many cases, trial and error causes stress. You may try 12 designs and not reach the best solution before you have to move onto the next step. In other cases, you may be very happy with a design but client may not be. To be precise, deadlines, clients, making decisions on a product that will be printed thousands of times and is going to a professional printer can cause one to get stressed. Then you are making decisions as the printer is printing hundreds of copies of the design a minute! You have to be focused and tell the printer exactly what colors need to be changed to make sure that “the grass is green and the sky is blue.”

**Do you feel that there is something that makes a graphic designer more stressed than someone of another profession?**
I do think it can be more stressful than other jobs. There are a lot of factors that determine if it is more stressful than it should be. How is the work environment? Does the facility provide natural light? Does the team work as a team? How many projects do you have a given time? Is the company making one designer do the job of 4? I have seen this occur.

**Work can be stressful when you are juggling multiple projects. It can be stressful to somewhat force creativity and reach your full potential for each project.**

**What helps you relieve stress?**
Walking, roller blading, listening to music, spending time on hobbies like editing home footage, speaking to friends and family, and/or going out for food during small breaks.

**Did your company help you handle your stress?**
They did. Each week we would have group meetings and I always had the opportunity to speak with more experienced graphic designers if I needed critique, help, and/or advice.
I tracked a number of students and professionals that work with graphic content to see how their days were affected by light. I asked them to wear a Fitbit for two days, one of which they did everything as they normally would and the second where they included warm lighting into their routine. Overall their heart rate went down 5-15 beats per minute when they were surrounded by warm light.

Normal day - the bpm increased rapidly because of stress and exercise

Day with warm light - less rapid increases and decreases because of stress and lower daily bpm
market research

The current market is full of products designed to provide stress relief. These products include products like stress dolls, candles, yoga mats, stress balls, fidget toys, music players, Zen gardens, pillowcases, gaming consoles, light alarm clocks, heart rate monitors, head massagers, essential oil diffusers, acupuncture pillows, portable lights, full body massagers, and so on. They are all treating the stress differently and will therefore not provide the right type of stress relief for everyone.

I surveyed designers to find out which products they thought were stress relieving and work appropriate. Stress relieving being that it reduces stress related symptoms such as muscle tension, headaches, and so on. As for work appropriate it was that it does not disturb others around the office. This means no loud or repeating sounds, no scents, or other things that can bother others working in the same space.

I found that there was not a product that was both stress relieving and work appropriate. The products that were the most work appropriate did not provide enough stress relief and the ones that were the most stress relieving were lacking appropriateness for work. The most stress relieving products were generally in the low to mid-price range, while the most expensive ones were usually the least stress relieving. The same results were found for the work appropriate products.

DESIGN CRITERIA

To provide successful stress relief in the workplace Vila was designed according to the following design criteria:

- Small footprint
- Close to monitor
- Does not disturb other workers
- Simple technology
TOP 5 STRESS RELIEVING AND WORK APPROPRIATE PRODUCTS
The market gap was found by combining results from consumer surveys, user commentary, and professional research studies.

At $79.99 Vila includes the features of the most successful stress relief products on the market while combining them to make them overall more successful. It allows for quality materials and components while also differentiating itself from the more expensive lighting solutions currently on the market.
prototyping & development
initial sketching

I started sketching with stress relief in mind and therefore avoided using color as that can invoke stress. I then showed the sketches to 30 designers within different disciplines. They all thought that continuous and rounder forms communicated stress relief. Angular forms with sharp corners were found to be the least stress relieving.
form development

The form that was found to be the most stress relieving was the oval as it was associated with smooth pebbles used to reduce anxiety.

To figure out the size of the form I made several blue foam models that ranged in size from 3” to 8” and had people pick their top three.
Many designers mentioned that the smallest oval was too close in size to a computer mouse.

The oval that was the most liked next to a monitor was 7.5” x 4.5” x 2” in size.
first prototype

Warm LED strips were used to create the lighting affect

The top was made out of a textured translucent acrylic

The first prototype had no clear indication of how to use it which confused the users
material research

To find out what materials and colors were the most stress relieving, I surveyed 150 designers. I gave them all 3 stars and they had to put it on the images they found the most stress relieving. The ones that received the most stars were images that were neutral in tone, textured, and reminiscent of sleep, rest, or eating.

150 designers had the chance to vote on which images they found the most stress relieving

natural materials, neutrals colors
Textiles and water were both cited as stress relieving.
Technology was generally not seen as stress relieving, unless it was connected to a personal interaction with music for example.
colors

Garden Jade

Marshmallow White

Powder Blue

Classic Teak

Soft Beige

Charcoal Gray
form and materiality

Neutrals in combination with round continuous forms created stress relieving impression

DESIGNERS WERE SURVEYED

I asked 15 designers to pick different types of material, color, and texture samples that they found stress relieving. They then had to combine them with the initial sketches to create their own personal stress relieving light. Metals were scarcely used as it was associated with stress inducing products. Instead mostly matte plastics, woods, and textiles were combined with neutral colors. These materials correlated with the survey results from the material research boards.
interface layout

Two larger buttons and one smaller

Buttons along the edge of the form

Uniform button sizes

One larger button to signify an important functionality

Uniform button form at differing scales

Three buttons of the same size and form
BUTTON PLACEMENT

After allowing a number of people to place buttons of different forms and sizes onto the final form a number of things were clear.

- Buttons of the same form were preferred
- Buttons were preferred on one edge of the form
- Signifiers for the button functions were needed
- Buttons should not protrude too much from the overall form
- Placement of the buttons has to be clear even if one is not looking at them, but rather just touching them

BUTTON FUNCTIONS

The button functions were then chosen through giving 20 designers the option to pick 4 of the function below.

- Power button
- On button
- Off button
- Light intensity button
- Increased light intensity
- Decreased light intensity
- Battery check
- Bluetooth connectivity
- Pulsing light
- Circadian rhythm mode

The 4 buttons that were chosen were a power button, two light intensity buttons, and a circadian rhythm mode button.
final interface

Circadian rhythm
Light intensity control buttons
On / off button

Silicone / frosted plastic
Silicone / brushed aluminum
Silicone

Wood / textile
Silicone
final form

The angled split allows for maximum light dispersion while still allowing room for ample room for the button interface.
fabrication

A number of prototypes were made and each one further developed the functionality and materiality of the design. The first one was made using a resin printed light diffuser, a yellow foam body, and LED strips. The second one was made using a resin printed light diffuser, a poplar wood body, and Arduino lights, and controls.
Hollow space allows space for the internal components

First completed prototype
Sanding the wood body to match the oval form of the light diffuser

Matching the profile of the light diffuser to the wood body

Sanding the wood body to match the oval form of the light diffuser
The second prototype uses push buttons controlled via Arduino to turn the LEDs on and off.
Vila.
material choices

Wood finish allows for a textured grain

Textile finish allows for a soft texture
features

Circadian rhythm
Changes the light temperature throughout the day following a modified circadian rhythm between 2200 - 3000 Kelvin

Light temperature
Change the light temperature between 2200 - 3000 Kelvin

Light temperature indicator
The lenses light up to indicate what light temperature the light is

Power
Turns VILA on and off
rechargeable battery

Vila is battery powered using a lithium ion rechargeable battery.
manufacturing

STEP JOIN

ultrasonically weld

nest

combine

two shot molding
paint lower section opaque

injection

screw
**Double Shot Injection**

- ABS + Silicone Rubber
- Injection molded ABS
- Water transfer printed wood grain heat formed polymer based woven textile
- Screw boss for security

**Snap & Overall or Ring Snap (Remote)**

- Injection molded ABS
- Polycarbonate
- Outsourced circuit board, LEDs, battery compartment
- Molded ABS

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**Dimensions Table**

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**Title:**

**Exploded Assembly_v3**

**Scale:** 1:2  **Weight:**  **Sheet 1 of 1**
Push buttons
Double shot injection molded ABS and silicone rubber

Push button prongs
Injection molded ABS

Multiple lens assembly
Injection molded polycarbonate

Light diffuser
Injection molded polycarbonate

Wood/textile body
Injection molded ABS with water transfer printed wood grain or thermoformed polyester textile

Control circuit board

Control circuit board housing and light cover
Injection molded ABS

Light cover
Injection molded ABS

Motherboard

Light diffuser
Injection molded polycarbonate

Wood/textile body
Injection molded ABS with water transfer printed wood grain or thermoformed polyester textile

Battery housing and light cover
Injection molded polycarbonate

Battery cover
Injection molded ABS
orthographics

7.5"

4.5"

2"
final model
market entry
TWO MARKETS

Businesses
Bulk purchase
Sold through workspace and health experts

Small Office, Home Office
Sold through online retailers ($79.99)
business model

CUSTOMER SEGMENT
Segmented market with two main segments - design businesses and small offices and home offices (SOHO). The businesses would buy Vila at bulk pricing through workspace and health experts and then give them to their employees for use at their desks. This would be an investment in employee health and well-being. Small offices and home offices would buy Vila at retail price directly from online retailers for use in their workspaces.

VALUE PROPOSITIONS
Large and small businesses would be able to decrease their healthcare costs with a reduction in stress thanks to Vila. It could also serve as an incentive to employees to care about their health and workplace performance. Vila is also the first of its sort on the market for stress relief which could entice people to buy it for themselves.

CHANNELS
Vila would be sold through online retailers and through workspace and health experts depending on the end customer. The advertising would be done through web ads and social media with targeted campaigns.

CUSTOMER RELATIONSHIPS
The customer relationship would be maintained through an online community and through co-creation on the Vila website. It would engage and inform consumers of the problems that stress causes and how Vila can help reduce that.

REVENUE STREAMS
Vila would make revenue through asset sales of the lighting solution itself. It would therefore be an one time sale. Vila would be sold at a fixed price dependent on the customer segment. Large businesses would pay a lower wholesale price, while private individuals would pay a higher price.
KEY ACTIVITIES

Producing new lights and also refining the design, functionality, and manufacturing of Vila.

KEY PARTNERS

Vila would have a buyer-supplier relationship with a number of companies to manufacture the lights. This would require less capital investment and improve economic security.

COST STRUCTURE

Vila would depend on a mixture of fixed and variable costs. This would allow Vila to be produced and sold at a fixed price. It would also allow for both large and small production runs.

KEY RESOURCES

Physical resources in the form of lights themselves, the intellectual property concerning the knowledge of stress reduction and functionality of Vila.
dec outcomes
1. Integration & Skills
Integrate the skills and knowledge acquired through the DEC Core curriculum to propose solutions to real-world problems, through:

a. Strategy Identification
   p. 7, 76-77

b. Formulation of value propositions
   p. 7, 76-77

c. Identification and explanation of systems
   p. 52-53, 76-77

d. Formulation of research questions
   p. 7-27

2. Synthesize Interdisciplinary Work
Synthesize interdisciplinary work (both collaboratively and independently) through:

a. Proposal of solutions/hypotheses
   p. 7-27

b. Interdisciplinary collaboration
   p. 16-22, 52-53, 64-67

3. Communicate Findings
Communicate capstone experience findings effectively using multiple modes
   All pages

4. Professional Relevance
Evaluate the relevant professional, ethical and social responsibilities associated with the capstone experience
   p. 7-27, 76-77

5. Global Context
Explain the global context of the capstone experience
   p. 16-19

6. Applications | Trends | Technologies
Interpret emerging applications/practices/trends/technologies as they apply to the capstone experience
   p. 22-27, 52-53

7. Capstone Experience
Relate the capstone experience to relevant contemporary issues
   All pages