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Abstract

Mental health has received a lot more attention in the last years as have the possibilities that are associated with having a smart-phone and being online. Therefore, it seems to be a logical conclusion to work on improving mental health with online or app-based interventions. The eleMental app is one example of these interventions. The present research evaluated the “Sleep Easy” module, one of four modules, of the app in a longitudinal study in the working population. 71 people participated over the course of four weeks, including three intervention weeks. The exercises making up the intervention were based on mindfulness, relaxation-techniques, hypnosis and positive psychology. The participants received five questionnaires in total, consisting of one pre-test, three weekly intervention questionnaires and one post-test. Main outcomes were sleep quality, well-being, need for recovery and quality of life. The results showed that sleep quality was associated with well-being and need for recovery significantly. Mindfulness significantly mediated need for recovery and quality of life. The frequency of app-usage significantly moderated sleep quality and need for recovery. These findings allow a careful suggestion that using the module “Sleep Easy” may have a positive impact on sleep quality and daily functions, pending confirmation by future studies.

Keywords: mental health, app-based interventions, quality of sleep, mindfulness

Table of Contents

Introduction	1
Theoretical background	3
Sleep quality	3
Sleep Hygiene	4
Subjective well-being	6
Need for Recovery	7
Quality of Life	9
Sleep Quality as a Mediator	9
Mindfulness as a Mediator	11
Evaluation of app	14
Frequency of app-use	15
Method	16
Research design	16
Participants	16
Description of exercises (“Sleep Easy” module of the eleMental app)	18
Measurement instruments	19
Procedure	22
Data analysis	23
Results	23
Preliminary analyses	23
Hypotheses testing	24
Control variables	33
Discussion	33
Limitations	38
Implications for research and practice	38
Conclusion	39
References	40
List of tables	47
List of figures	47
Appendices	48
Appendix A – Mediating effects of Sleep Quality over time	49
Appendix B – Mediating effects of Mindfulness over time	52

Appendix C – Abstract German	56
Appendix D – Eidesstaatliche Erklärung.....	1
Appendix E – Pre-Test Questionnaire	2

Introduction

At this point in time, there is almost nothing that you cannot find an app for. In today's world a big part of our lives is happening online or on a mobile device. Even though a lot of negative effects of these developments have been discussed, many positive things can also arise from it. There are probably many apps out there that are not worth spending money on, however, many do exist that can help improve day to day life. Since mental health has finally started to receive more attention in the past years, apps that focus on mental health have been trending (Chandrashekar, 2018).

Specifically, in the working population mental health problems are an often-occurring issue, not only causing difficulties for the individual, but also costing businesses billions of dollars due to higher turnover, a decrease in productivity and an increase in absenteeism (Neumeier, Brook, Ditchburn, Sckopke, 2017). Hence, it has been accepted that mental health as well as well-being of the employees has to be protected and improved in order to reach organizational success. For a program to be attractive to an organization, it has to be cost-effective, short in application, flexible, easily accessible and cannot be restricted by changing work schedules (Neumeier et al., 2017). A body of studies has shown that interventions in the workplace can increase employee well-being significantly (Neumeier et al., 2017). Therefore, the working population can also be seen as a target group for mental health apps.

At the moment, low regulations can lead to skepticism among users, regarding which apps they should and can rely on (National Institute of Mental Health, 2017). Nevertheless, there are several reasons why apps should be considered as an alternative or addition to other forms of psychological treatment. Smartphones are a steady companion for most people in the western world today and can therefore bring the interventions to those situations where decisions are actually being made (Dennison, Morrison, Conway, Yardley, 2013). Another potential advantage is that users can stay anonymous and avoid potential stigmatization (National Institute of Mental Health, 2017). Furthermore, mental health apps are more cost-effective than traditional forms of psychological treatment (Chandrashekar, 2018). Apps also make it easier to share the information with other people, be it friends or healthcare professionals (Dennison et al., 2013). Technology-based treatment can also be provided to more people at once and reach potential users in hard-to-reach areas (National Institute of Mental Health, 2017). In addition, they can help to track user behavior and offer a more focused intervention, based

on the locations, movements and social engagements the user engages in (Dennison et al., 2013). A World Health Organization survey has shown that in 2015 about 30% of health-related apps targeted mental health (Chandrashekar, 2018). Several studies found that in general the acceptance of mobile phone health apps is high (National Institute of Mental Health, 2017), but people who actually make use of these apps are averagely younger and highly educated (Carroll, Moorhead, Bond, LeBlanc, Petrella, Fiscella, 2017).

Especially in a market where 1.300 apps dedicated to mindfulness and meditation alone existed in 2017 (Gonsalves, 2017) and hundreds more focusing on sleep (American Sleep Association, 2018), it is hard to create another app targeting these areas that will be accepted by the audience. Therefore, evaluation and research-based information and exercises are especially important to make sure the users are provided with high-quality contents.

One of these health apps is called the eleMental app. It was designed by Dr. Baradia Monshi, head of the Institut für Vitalpsychologie in Vienna, Austria, and his team of psychologists, artists and IT experts. After decades of work the eleMental app went online to help people overcome their mental barriers and to improve their psychological well-being. The app is based on personal experiences in the jungle of Sri Lanka but also on scientific research, making sure that the exercises used are able to help people. The app can be used on a smartphone as well as on a computer or laptop. The app currently consists of four different modules, namely “Mindful Now”, “Sleep Easy”, “Happy Flow” and “Chillax Zone”. The app is still being worked on, so other modules will be added in the future. “Mindful Now” includes exercises based on mindfulness and meditation, that are meant to teach to live in the here and now and enhance internal strength by decreasing rumination and restlessness. The exercises making up the “Sleep Easy” module have the goal to help falling asleep, sleeping through the night and waking up happy and refreshed in the morning. Relaxation exercises, meditation and hypnosis-based exercises are the basis of this module. “Happy Flow” works on achieving happiness by using mental lucky charms, like vitality, optimism and target achievement. “Chillax Zone” contains (deep) relaxation exercises and techniques, meant to work against the negative effects of stress that can arise if it is not counteracted with recreation.

The main focus of this master’s thesis will be the evaluation of the “Sleep Easy” module. The other modules are evaluated within the scope of other master’s theses. The evaluation of mental health apps is important in order to make sure that users are

provided with high-quality content and that they can trust the app that they are using (National Institute of Mental Health, 2017). “Sleep Easy” provides the user with different practical audio exercises and a theoretical know how area. 12 different audio exercises are provided, that differ in length and purpose. The exercises are divided into exercises to fall asleep and exercises to wake up refreshed. In the know how section users can find tips and tricks for a better sleep and some interesting facts about sleep. A “self-check” on sleep is also provided.

The main focus of this study will be on investigating the effects of using the eMental app on the quality of sleep. It will also be studied how quality of sleep in turn impacts subjective well-being, quality of life and need for recovery in the working life. Furthermore, it will be examined whether mindfulness plays a role in the effectiveness of the app.

Theoretical background

Sleep quality

Sleep is an essential part of life. Around one third of a person’s life is spent asleep (Troynikov, Watson, Nawaz, & 2018). Although there are many different theories what the exact functions of sleep are, it is abundantly clear that prolonged sleep problems have detrimental effects on every day function and physiological as well as psychological health (Hamilton, Nelson, Stevens, & Kitzman, 2007). Sleep is crucial for recovery after activity and for repairing small damages, as well as maintaining cognitive and hormonal functioning (Troynikov et al., 2018). Psychosocial distress can also arise from inadequate sleep quality. Depression and anxiety as well as an increase in consumption of alcohol and drug use can result from inadequate sleep quality (Brown, Bultz, Soper, 2002).

Sleep problems in the general population are not a rarity. The prevalence is estimated to be between 13% and 52% (Troynikov et al., 2018). In the US, costs to society caused by sleep problems are estimated to be in the tens of billions of US dollars (Martin, Bryson, Corwyn, 2006). Even though research investigating the dangers of sleep problems is important, it should not be forgotten that sleep can also serve as a resource (Troynikov et al., 2018).

Optimal sleep differs from person to person, but the healthy sleeping time ranges from six hours to nine hours of sleep per night in adults. Studies that looked at the relationship between the length of sleep and health have found that a U-shaped relationship

exists between sleep duration and morbidity and mortality (Troynikov et al., 2018). It has been shown in several studies that individuals with high quality sleep report higher levels of personal growth and environmental mastery, a greater purpose in life in general and more positive and satisfying relationships with others (Hamilton et al., 2007).

Trying to improve sleep quality with the help of online programs is not a new construct. For example, the “Sleepio” program set the goal to overcome insomnia by using parts of cognitive behavioral therapy (CBT), something that the “Sleep Easy” module has also incorporated. “Sleepio” has been evaluated scientifically. A randomized-controlled trial with participants of the “Sleepio” program showed improved sleeping times in 75% of the subjects and sleep quality was shown to be more than doubled (115% increase) (Buckland, 2013). Several studies have shown that lasting moderate to large effects on insomnia and sleep quality can be achieved by using CBT for sleep problems (Espie, 2016). The way insomnia is addressed by CBT is that the vicious cycle of poor sleep is breached. Several techniques are part of CBT that consist of a behavioral component, e.g. relaxation techniques, a cognitive component, e.g. managing a racing and worried mind, and an educational component, e.g. teaching about sleep and sleep-inducing mechanisms (Espie, 2016). Since the “Sleep Easy” program also has a basis in CBT and addresses the different components, completing these exercises might result in an improvement of sleep quality over time.

Hypothesis 1a: Participants of the Sleep Easy program show an improvement in sleep quality over time, from pre-test assessment to post-test assessment, including all the intermediate weeks.

Sleep Hygiene

There are many different factors that can affect sleep quality. Sleep hygiene can be described as engaging in activities and behaviors that promote sleep and avert behaviors that hinder refreshing sleep (Mastin et al., 2006). Sleep hygiene is not assessed by measuring outcomes, but it can be measured by evaluating activities, behaviors and environmental variables that can lead to improved or worsened quality of sleep (Mastin et al., 2006). Inadequate sleep hygiene has been classified as a sleep disorder by the American Sleep Disorders Association in 1990 that is “due to the performance of daily living activities that are inconsistent with the maintenance of good quality sleep and full daytime alertness”. Poor sleep hygiene has been shown to be related with increased

occurrences of insomnia and chronic problems with falling or staying asleep in the general population (Brown et al., 2002). Activities, behaviors and environmental factors that are regarded as sleep hygiene are, for example, going to bed and getting up at similar times every day, sleeping in a comfortable bedroom that is not too hot, too bright, too noisy or too stuffy, not consuming alcohol, tobacco or coffee within a few hours of going to bed, or not going to bed worried or angry (Mastin et al., 2006). Sleep hygiene has been shown in several studies to be strongly related to sleep quality (Mastin et al., 2006). Even though some sleep hygiene practices are easier changed than others, e.g. keeping a steady sleep schedule is easier than decreasing worry and anger before going to bed, improving sleep hygiene should be part of the treatment for sleep problems. Oftentimes people are not even aware that their habits can lead to a decline in their sleep quality (Brown et al., 2002). Hence, simply providing information can be a first step, as studies have found that there is an association between sleep-hygiene knowledge and sleep-hygiene practices (Brown et al., 2002). This provision of information is also part of the CBT that is incorporated in parts into the “Sleep Easy” program. The educational component of CBT has been filled with information about sleep hygiene in several studies (Espie et al., 2016).

In addition to the exercises, the eleMental app also provides information to the users. With regard to the “Sleep Easy” module tips and tricks are presented that are based on good sleep hygiene practices. One of the tips given to the users is that physical activity can help improve sleep quality and can make falling asleep easier. Furthermore, the participants of the study received weekly newsletters and sleep hygiene was one of the topics that was addressed. As previous studies have shown, sleep hygiene is related to sleep quality, therefore sleep hygiene should have an impact on the relationship between sleep quality before and after the intervention, in that the better the sleep hygiene practices of the participants are, the more sleep quality should improve over time.

Hypothesis 1b: Sleep Hygiene moderates the relationship between sleep quality in pre-test assessment and sleep quality in post-test assessment and all the intermediate weeks.

Subjective well-being

Well-being is not easily defined. Common descriptions integrate the presence of positive feelings and functioning. It is treated as a multidimensional construct. Nevertheless, the thought that well-being is not only the absence of sickness has been collectively agreed upon (Neumeier et al., 2017). Well-being can be used to assess momentary mood as well as more stable evaluation of life (Sonnentag, 2001). Subjective well-being is often used in order to operationalize general well-being. As stated in the label, happiness, often used as a synonym for subjective well-being, is rated by the person themselves as it is for the most part a subjective phenomenon. Interestingly, well-being is separated from objective life circumstances (e.g. income), achievements (university degree), or psychological functioning (Neumeier et al., 2017).

Employee well-being is an important form of well-being that should be considered when investigating the working population. Simply assessing subjective well-being is not sufficient to represent employees' well-being at work, therefore a measure of job satisfaction should be added, in order to combine a work-specific and a well-being measurement (Neumeier et al., 2017). Studies have shown that job demands and job control are related to well-being (Sonnentag & Zijlstra, 2006). Therefore, assessing job satisfaction is an important part of measuring well-being. Also, situational well-being when coming home from work is oftentimes related to situational well-being just before going to bed (Sonnentag & Zijlstra, 2006). Hence, job strains are usually taken to bed, making the time between coming home and going to sleep a crucial one to let go of the pressures of the work day.

Often times, subjective well-being is measured by positive and negative affect, while the absence of one does not equal the presence of the other. Positive activation is a combination of high positive affect as well as high arousal, defined as feeling active, strong and delighted. Negative activation results from high negative affect and high arousal, described by feeling tense, distressed and angry (Sonnentag, Binnewies, Mojza, 2008).

The importance of well-being should not be underestimated. Well-being has positive impacts on psychological as well as physical health and several social and intellectual advantages associated with higher well-being have been documented. A few examples are that relationships are more stable and satisfying, and greater confidence and better problem- and conflict solving abilities are reported (Neumeier et al., 2017). Personal happiness lies to an extensive part within the individual's power, as the way life

situations are constructed and dealt with, as well as the activities chosen for everyday life can influence well-being immensely (Neumeier et al., 2017). People who make the conscious choice to search for happiness and thereby put effort into their subjective well-being by choosing specific strategies and behaviors are also called “happiness seekers” (Howells, Ivtzan, Eiroa-Orosa, 2016). It has previously been demonstrated that in order to improve well-being, motivation of the participant alone is not enough, but exercises that are engaged in need to have a scientific basis to actually achieve results (Howells et al., 2016). Interventions based on positive psychology (based on Seligman, 1998) have been shown to significantly impact happiness (Howells et al., 2016).

Since the “Sleep Easy” exercises are all based on scientific research and several exercises have been chosen based on positive psychology, well-being should improve over time between the post-test and the pre-test.

Hypothesis 2: Participants of the Sleep Easy program show an improvement in subjective well-being over time, from pre-test assessment to post-test assessment, including all the intermediate weeks.

Need for Recovery

Work takes up a considerable amount of time of the waking day of employees. Lunch breaks as well as after-work hours and weekends therefore are important times for recovery from work demands (de Bloom et al., 2017). Restocking psychological and physiological resources and thereby increasing the chance of keeping working capacities and occupational health high are important reasons for engaging in sufficient recovery from work (Sonnentag & Zijlstra, 2006). The concept of need for recovery is seen as a conscious emotional state and is defined as a “person’s desire for being – temporarily – relieved from exposure to stressors in order to replenish his or her resources” (Sonntag & Zijlstra, 2006). Long-term loss of resources can lead to exhaustion, impairments both physically and mentally and losses of function, eventually possibly resulting in worsening of the individual’s health (Sonntag & Zijlstra, 2006).

The *Effort Recovery Model* (Meiman & Mulder, 1998) and the *Conservation of Resources Theory* (Hobfoll & Shirom, 2001) address two mechanisms that are important for recovery. The first one being the replacement of the demands and the second one the build-up of new resources. The *Effort Recovery Model* (Meiman & Mulder, 1998) states that physiological, behavioral and subjective responses occur to efforts at work. Under normal circumstances, as soon as the work demands are ceased, the

systems that were impacted by the work stress return to their normal states. If, however, the demands do not stop, recovery is made impossible and longer term negative effects can be the outcome (Meiman & Mulder, 1998). The *Conservation of Resources Theory* (Hobfoll, 1998) states that when a stressful or demanding work situation arises, the individual's resources are put in danger. The individual then strives to restore those resources, which is only made possible if other resources, such as additional time and social support, are available (Hobfoll, 1998). Taken together, recovery experiences are subjective experiences that only occur when the demands and stressors caused by the job are removed and only then psycho-physiological resources can be restored (de Bloom et al., 2017).

Stress at work can have direct effects, but can also lead to so called after-effects, when the job demands do not have an immediate impact on the individual but unfold later and often in the evening hours. However, those hours are especially important for recover from work, making it more difficult to unwind and fall asleep (Sonnentag, 2001). The longer, more exhausting and more demanding the work day has been, the longer the straining activities have to be performed, resulting in more and more resources being required and consumed. Therefore, the process of restocking the resources is prolonged (Sonnentag & Zijlstra, 2006). In the working population this means that when the individual has to return to work the next morning, the resources may not yet have been fully rebuilt, resulting in a vicious cycle of not having enough resources available and not having enough time to refill them (Sonnentag & Zijlstra, 2006). The after-effects are especially dangerous with regards to recovery, as cognitive detachment is made impossible and therefore recovery processes cannot unfold (Sonnentag, 2001).

Relaxation exercises have been shown in numerous studies to be an effective tool for recovery from job demands (de Bloom et al., 2017). Progressive muscle relaxation and deep-breathing strategies are the most common of these exercises (de Bloom et al., 2017). The "Sleep Easy" module of the eleMental app incorporates several of these strategies that also differ in length and can therefore be easily practiced during different times of the day. When the participants engage in these exercises regularly, the need for recovery should decrease over time.

Hypothesis 3: Participants of the Sleep Easy program show a decrease in need for recovery over time, from pre-test assessment to the post-test assessment, including all the intermediate weeks.

Quality of Life

Quality of Life as defined by the World Health Organization Quality of Life (WHOQOL) Group is based on the idea that a subjective reflection that is ingrained within a cultural and social context, as well as within the environment makes up an individual's quality of life (The WHOQOL Group, 1998).

Quality of life can be measured objectively and subjectively, with the objective dimension assessing the health status and the subjective dimension assessing the quality of life that is actually experienced by the individual. For example, two people who have the same health status and live with the same disease or disability can have very different attitudes toward their life, thus showing the importance of the subjective part (Testa & Simonson, 1996).

Different domains create quality of life, them being physical health, psychological health, social relationships, also including social support, and the environment one lives in and what it provides, for example financial resources, health care and physical safety (The WHOQOL Group, 1998). These domains are separate from one another and are influenced by an individual's way of life, which are the result of experiences, beliefs, perceptions (of health) and expectations (Testa & Simonson, 1996). This individual's way of life, especially beliefs, perceptions and expectations can be affected by engaging in exercises based on positive psychology, mindfulness and relaxation techniques. Since most of the exercises in the "Sleep Easy" module have their origin in one of these techniques, performing these exercises regularly should have a positive effect on quality of life over time.

Hypothesis 4: Participants of the Sleep Easy program show an improvement in quality of life over time, from pre-test assessment to post-test assessment, including all the intermediate weeks.

Sleep Quality as a Mediator

Well-Being. Even though a linear relationship between sleep quality and well-being cannot be assumed, data from different studies suggest that sufficient sleep may have a positive effect on well-being (Hamilton et al., 2007). On the other hand, poor sleep negatively impacts affect the following day. Anticipation of how lack of sleep will reduce one's ability to work productively on that day also leads to a decrease in positive

effect and a rise in negative effect (Sonnentag, Binnewies, Mojza, 2008). Studies have shown that when symptoms of insomnia are improved, well-being during the day increases by 58% (Buckland, 2013). Sleep is sometimes characterized as a resource and it seems quite logical that feeling well-rested has a positive impact on well-being, which has also been demonstrated in several studies (Troynikov, Watson, Nawaz, 2018). Therefore, the better the sleep quality, the more well-being should improve over time during the intervention phase.

Hypothesis 5a: Sleep quality mediates the relationship of well-being over time, from pre-test assessment to post-test assessment, including all the intermediate weeks.

Need for Recovery. Poor sleep hinders deriving new resources, which means that fewer resources are available for regulation the subsequent day. Therefore, when the person is met with a stressful day at work or with high demands, not enough resources are available to recover after work (Sonnentag et al., 2008). Additionally, even more of the available resources have to be used during the work day after a night of poor sleep, since concentration levels are lower and additional effort needs to be invested to achieve one's goals (Sonnentag et al., 2008). This can result in a vicious cycle, where poor sleep leads to less available resources, leading to less recovery after work, leading to an increase in fatigue at night and so on (Sonnentag et al., 2008). Therefore, the better the sleep quality, the more improvement should be seen in need for recovery over time.

Hypothesis 5b: Sleep quality mediates the change of need for recovery over time, from pre-test assessment to post-test assessment, including all the intermediate weeks.

Quality of Life. It has been demonstrated that sleep problems are causing an increase in fatigue, which in turn can lead to a reduced quality of life (Espie et al., 2016). People who reported their sleep quality to be good also reported their quality of life to be better. This has been demonstrated in clinical as well as non-clinical samples (Roeser, Eichholz, Schwerdtle, Schlarb, & Kübler, 2012). A study by Espie et al. (2018) has shown that CBT was not only effective in reducing the symptoms of insomnia, but also

had a positive impact on quality of life. Since a relationship between those two variables has already been established, an improvement in sleep quality should in turn lead to an improvement in quality of life in our study as well. Poor sleep can translate to one reaction after another, affecting several domains of quality of life (OSF HealthCare, 2017). Hence, the better the sleep quality, the more quality of life should improve over the duration of the study.

Hypothesis 5c: Sleep quality mediates the change of quality of life over time, from pre-test assessment to post-test assessment, including all the intermediate weeks.

Mindfulness as a Mediator

Mindfulness has received increased interest over the past years. Many exercises that can be used to improve mental health are based on mindfulness. The eleMental app is no exception to that. But what exactly is “mindfulness”? There is no one collectively decided upon definition of mindfulness in research. However, mindfulness originates in Buddhism and can be seen as a meditative wisdom practice (Kabat-Zinn, 1994). Mindfulness is all about awareness and is often times used synonymously. It is about being in the present moment and observing this moment as attentively but objectively as possible (Brown & Ryan, 2003; Brown, Ryan, & Creswell, 2007; Kabat-Zinn, 1994). That is, no reactions or judgements should be incorporated into the observation (Kabat-Zinn, 2015).

Observation of inner thoughts and feelings as well as impulse control can all be learned through mindfulness (Kabat-Zinn, 2015). Humans are usually very fast in evaluating a situation as either good or bad, therefore judgment is added very quickly (Brown et al., 2007). Mindfulness makes it possible to observe the situation detached from any expectations or previous experiences.

Mindfulness is a skill to be learned and is often compared to a muscle that needs to be trained repeatedly and frequently in order to develop (Brown & Ryan, 2003). When practicing regularly and intensely, a strong state of mindfulness can emerge and might eventually even result in trait mindfulness. State mindfulness can change quickly and frequently, as it depends on several internal and external factors, such as mood and situation (Brown & Ryan, 2003).

Mindfulness has also been shown to have positive effects in work surroundings. Stressful and demanding situations can be better dealt with when being emotionally detached. Weinstein, Brown and Ryan (2009) have shown that mindfulness exercises led to a decrease in work-stress perceived by employees.

Interventions that included mindfulness-based exercises have been proven empirically to have several positive effects on mental and physical health in clinical and non-clinical populations (Chiesa & Serretti, 2009; Roeser et al., 2013; Wright, 2017). Since many of the exercises in the “Sleep Easy” module are based on mindfulness, it is likely that it has a mediating effect on the outcome variables.

Sleep Quality. Studies have shown that mindfulness enhances self-reported sleep-quality (Howell, Digdon, Buro, & Sheptycki, 2008). Mindfulness could have this effect by increasing higher attentiveness to and recognition of bodily cues, such as fatigue. Furthermore, mindfulness can make it easier to disengage from commonplace worries that are disturbing sleep (Howell et al., 2008). With the help of mindfulness, the goal of sleep improvement can be met more easily by accepting one’s sleep patterns and not trying to control them (Howell, Digdon, & Buro, 2009).

Insomnia is often reinforced by vicious cycles of dysfunctional arousal-producing process and unhelpful interpretations of sleep, mutually reinforcing one another (Lundh, 2005). Mindfulness is also incorporated in more and more treatments for insomnia. It is thought that heightened awareness of one’s mental and physical state when noticing symptoms of insomnia and practicing how to focus mental processes differently can change the handling of the symptoms (Ong, Ulmer, Manber, 2012). Based on these results, mindfulness should lead to improved sleep quality over time, in that a higher score in mindfulness influences the improvement in sleep quality over all weeks more strongly.

Hypothesis 6a: Mindfulness mediates the relationship of sleep quality before and after the intervention, including all the intermediate weeks.

Well-Being. Mindfulness is thought to indirectly increase well-being by improving self-regulatory behavior by shifting one’s focus on personal needs and values and accepting them the way they are and by improving the ability to act accordingly (Howell et al., 2008). Relaxation techniques of the mind as well as the body are not only increasing

positive affect in the short run, but also reduce negative affect (e.g. tension) in the long run (Sonnentag, Binnewies, Mojza, 2008). Positive emotions toward one area of life can then spill-over to other areas of life (Frederickson, 2004). A body of studies that have been collected over the course of more than three decades has shown that mindfulness has a beneficial effect on well-being (Howells et al., 2016). Therefore, the higher the participants score on mindfulness, the stronger the relationship between subjective well-being from the pre-test via the intermediating weeks to the post-test should be, resulting in a higher increase.

Hypothesis 6b: Mindfulness mediates the relationship between subjective well-being before and after the intervention, including all intermediating weeks.

Need for Recovery. A body of studies has shown that mindfulness interventions are able to boost recovery from work (de Bloom, 2017). One of the many benefits of mindfulness that have been found so far is that it enhances day-to-day recovery (Hülshager, Walkowiak & Thommes, 2018). Especially psychological detachment, which is an important part of recovery experiences, has been shown to be improved by mindfulness (Hülshager et al., 2018). The observative ways taught by mindfulness lead to an objective analysis of stressful and demanding events, rather than emotional actions. This improves dealing with stressful and demanding situations, therefore leaving more resources for recovery after work (Hülshager et al., 2018).

Several of the exercises that are included in the “Sleep Easy” module of the e-Mental app are based on mindfulness. The more mindful the participants are or become, the stronger the relationship between participating in the intervention and need for recovery should be, as in the more mindful the participants are, the more need for recovery should decrease over time.

Hypothesis 6c: Mindfulness mediates the change in need for recovery over time from pre-test assessment to post-test assessment, including all intermediate weeks.

Quality of Life. Research has found clear results that mindfulness is correlated positively and significantly with quality of life, especially life-satisfaction. Quality of life is influenced by the experiences, beliefs, perceptions (of health) and expectations that

make up an individual's way of life (Testa & Simonson, 1996). Mindfulness can help change these variables that make a person who they are, because enhanced self-awareness that results can heighten positive characteristics and strengths (Baer, Smith & Allen, 2004), curiosity, which has been shown to be linked to life satisfaction (Ivtzan, Gardner & Smailova, 2001), and perseverance to overcome obstacles. This in turn makes it easier to pursue and achieve one's goals (Brown, Ryan, & Creswell, 2007). Mindfulness can also improve the ability to deal with setbacks and adapt to changes that arise from life events and therefore buffer the negative effect those situations could otherwise potentially have on quality of life (Tang et al., 2009). Based on this, the higher participants score on mindfulness, the more quality of life should improve over time from the pre-test to the post-test.

Hypothesis 6d: Mindfulness mediates the relationship between quality of life before and after the intervention over time, including all intermediating weeks.

Evaluation of app

Enjoying an exercise or a mindfulness-based intervention more, leads to better improvements in the outcomes (Howells, Ivtzan, Eiroa-Orosa, 2016). People who do not enjoy or take the exercises seriously will not engage in them as thoroughly and therefore not achieve the same results as people who are eager to participate (Howells et al., 2016). Howells et al. (2016) explained this by the person-intervention-fit. The higher this fit, the more positive the attitude and the higher the motivation toward exercises become. Attitude and motivation are important predictors for the effectiveness of the program (Lyumbomirsky & Layous, 2013). The more an intervention is enjoyed, and the more motivated people are, the better the evaluation of the program is in the end. It has also been argued that exercises based on positive psychology and mindfulness are only effective as long as they increase positive emotions in the participants (Lyumbomirsky & Layous, 2013). Therefore, participants who evaluated the exercises and the program in general more positively should show higher improvements than participants whose evaluations were more negative.

Hypothesis 7: Evaluation moderates the effectiveness of the program over time from pre-test assessment to post-test assessment, including all intermediating weeks.

Frequency of app-use

Most treatments and therapies require more than one dose or appointment in order to be successful. Especially with regards to mental health, longer term interventions have been shown more successful than one-time only interventions, with number of therapy sessions and clinical outcomes being related positively, in that longer treatment often leads to more improvement (American Psychological Association, 2019). Considering that forming habits takes at least three weeks, sometimes months (Carden & Wood, 2018), this seems to be an appropriate time-frame for an intervention. Also, during this intervention the more exercises (up to a certain threshold) are completed per week the more effect the program should have. Studies have shown that the amount of program usage and the number of weeks participated were related to changes from the pre-test to the post-test in internet-based interventions (Manwaring et al., 2008).

Additionally, enjoyment of the exercises does not only predict the evaluation of the program, but also the frequency of app-usage, with more enjoyment leading to higher frequency (Lyumbomirsky & Layous, 2013). In turn this could mean that the more participants use the app, the more they are enjoying using it. Therefore, participants who completed more exercises during the intervention should show higher improvements than participants who completed less exercises.

Hypothesis 8: Frequency of app-use moderates the effectiveness of the program over time from pre-test assessment to post-test assessment, including all intervening weeks.

In the following, all the hypotheses are summarized in Figure 1, which shows the research model of the current study. This study contributes to existing research and literature by evaluating a mental health online intervention program, thereby being part of the movement to empirically and scientifically study as many interventions provided to the users in a form of self-guidance as possible. Furthermore, this study will be able to document within-person changes and will be able to pin-point when the intervention starts to be effective, due to the weekly measurements. In addition, the pathways that show the effectiveness of the intervention are further investigated by incorporating mediators and moderators into the model.

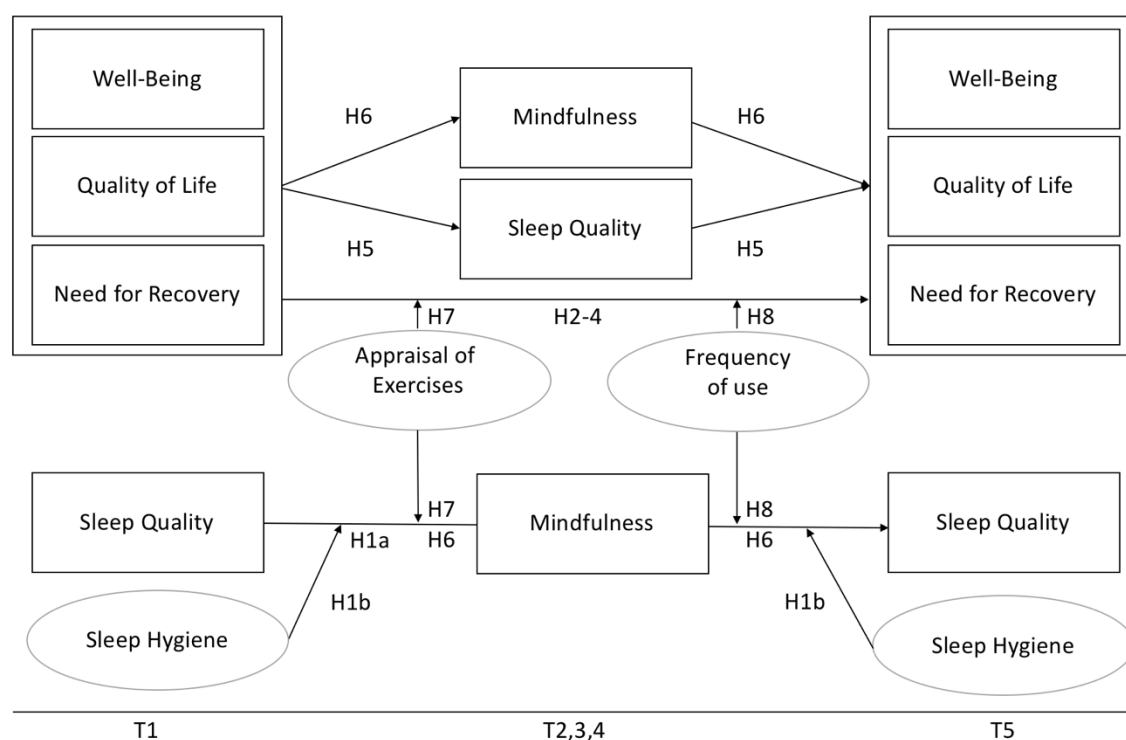


Figure 1. Research model

Method

Research design

The present study was designed as a quantitative longitudinal intervention study. One group was studied over the course of four weeks, including a three-week self-guided online intervention period. No control group was included. The participants were asked to fill out five questionnaires in total, consisting one pre-test, three weekly intervention questionnaires and a post-test one week after the end of the intervention phase. This approach made it possible to detect changes over time in the various outcomes.

Participants

The study included 71 people from Germany and Austria. The cohort consisted of 47 women and 24 men. The age ranged from 17 to 59 ($M = 36.65$, $SD = 12.96$). 34 (47.9%) were married, 33 (46.5%) were single at the time of the study and 4 (5.6%) were divorced. 39 people (54.9%) did not have children at the time of the study, 32 people (45.1%) had children.

One (1.4%) person finished compulsory school, 17 (23.9%) had a high school degree, eight (11.3%) have finished an apprenticeship and more than half of the

participants (57.7%) had a university degree. On average, the participants had been employed in their current job for 7.21 years ($SD = 9.53$). 51 (71.8%) of the participants worked between 31 and more than 40 hours per week. The rest (28.2%) worked between 10 and 30 hours per week. 21 (29.6%) were holding a leading position. 61 (85.9%) worked in a company at the time of the study and 10 (14.1%) were self-employed. 29 (40.8%) of the participants worked in the field of Health and Medicine, 10 (14.1%) were employed in the field of Social Work, eight (11.3%) worked in Trade and Sales, five (7%) worked in Research, four (5.6%) worked in Finances and Law, three (4.2%) worked in Media, Art and Culture or Travel and Sports respectively. Two (2.8%) worked in IT, Security or Transportation respectively and one person (1.4%) worked in the hotel industry, with food or in automobile trade respectively. For an overview of the results, see Table 1.

Participants were recruited in various ways. I reached out to personal contacts (family, friends, colleagues) and asked them to spread the study in their social environments. Dr. Monshi shared the study on his Facebook profile and I also used the online website “Psychologie Heute” to share the study. 91 people signed up to participate in the study, however 20 people did not register for the eleMental app and were therefore excluded.

Table 1

Demographics

Demographics	Sleep Easy
Total number	71
Number of females (%)	47 (66.2%)
Age range in years (M, SD)	17-59 (36.65, 12.96)
Married (%)	34 (47.9%)
Mean years in current job (SD)	7.21 (9.53)
Number of full-time workers (%)	51 (71.8%)
Holding a leading position (%)	21 (29.6%)
Number with children (%)	32 (45.1%)
Number with university education (%)	41 (57.7%)

Note. M = Mean, SD = standard deviation

Description of exercises (“Sleep Easy” module of the eleMental app)

A total of 12 exercises were included in the “Sleep Easy” module that the participants could choose from during the intervention phase. The goal was either falling asleep at night, falling asleep again after awaking at night or waking up with a positive mindset and refreshed. Exercises have also been added that focus on reducing worries and rumination, since these can result in sleep-hindering thoughts. All of the exercises were based on scientific research that has shown the effectiveness of these practices.

The audios were in German with an Austrian accent and spoken by a male voice. While listening, the participants had the chance to create their own personal experience by adjusting the sound of the voice and of the background. The participants were also free to choose which of the exercises they wanted to do. The exercises did not have to be completed in order to prove useful. As soon as relaxation or sleepiness begins, the exercise was successful. The participants were granted free access for the module that they signed up for. After completion of the study, all participants were given access to the eleMental app for one month free of charge. For users independent of the study the app is available in app stores for about 5€ per month.

In the following there will be a short description of each of the exercises.

“Evening Quest”: this exercise is 6:30 minutes in length. The goal is to finish each day on a positive note and to create a happy end by thinking about questions that draw attention to the positive and beautiful parts of the day.

“Bodyscan 2 sleep”: this exercise takes 20 minutes to complete. The goal is to fall asleep while performing this exercise. By drawing ones focus on the whole body, deep relaxation will develop into deep sleep. This exercise is mindfulness-based.

“Tauchgang in den Tiefschlaf”: the total length of this exercise is 45 minutes. Sleep is child’s play. Children create their own fantasy worlds and sink into deep sleep. Everyone has this ability hidden somewhere inside them and this exercise helps finding and using it. It is inspired by hypnotherapy by M. Erickson (1957).

“Muskelspiel für Schlaf”: this exercise is 17 minutes in length. Muscle relaxation by Jacobson (1934) with the permission to fall asleep. Flex, relax, listen, fall asleep.

“Der innere Schlafraum”: the total length of this exercise is 1 hour and 45 minutes. Visiting the inner place of sleep for a relaxing night.

“8sam Atmen”: this exercise comes in four different lengths. There is a shot, that is 1:30 minutes, the small version with 4 minutes in length, the medium version that takes 9 minutes to complete and the large version with a total of 15 minutes. Observing

one's own breathing is an old mindfulness exercise. It conveys ease and the power of concentration. The base of this meditation lies in the Buddhist Vipassana practice.

“Chill & Nap”: This exercise is 20 minutes in length. Whether it is called powernap or siesta, sleeping or drowsing for a short amount of time is ideal to refill the energy tanks in demanding times.

“Überdrüber-Blick”: This exercise takes 17:30 minutes to complete. Stress can prevent seeing the wood for the trees. This exercise provides an overview of one-self. This far-sightedness makes deep relaxation and serenity possible. It was inspired by Julius Kuhl, Vipassana meditation and hypnotherapy by M. Erickson (1957).

“Woop”: This exercise consists of two parts. The first one, written preparation, takes 1 minute and the second one, mental anchoring, takes another 6 minutes. Everyone has intentions that are harder to keep than others. WOOP helps actually achieving and keeping those intentions.

“Beziehungsweise”: 12 minutes are the time set for this exercise. Relationships can be very complicated. This exercise helps create proximity and distance playfully to become a wise man or woman with regards to relationships.

“Morning Quest”: This exercise is 7 minutes in length. Morning blues does not have to be the case, not even on Mondays. Everyday deserves the chance to become one of the greatest of life, which can be achieved by getting in touch with the best thoughts and feelings.

“Wake up, Smile up”: 10 minutes are needed to complete this exercise. When the mind approaches the body positively, a smile goes through the whole body. This smile wanders out to the world and comes right back. This exercise is inspired by the positive psychotherapy by Rüdiger Dahlke (2009).

Measurement instruments

The study that was conducted for the present master's thesis consisted of five questionnaires in total, namely a pretest, three weekly intervention questionnaire and a posttest. All of them were in German. The pretest consisted of questions regarding socio- and work demographics. Participants were asked to state their age, gender, marital status, number of children, highest completed level of education, employment duration, average working hours, leading position, employment status and job field.

For all of the questionnaires the following measurement instruments were used:

Sleep Quality. To measure sleep quality 19 items from the Pittsburgh Schlafqualitäts Index (PSQI) (Buysse et al., 1989) were used. The German version was published in 1996 by Riemann and Backhaus. The index is suitable for evaluating the change in sleep quality by repeated measures over time. The PSQI consists of seven components, namely subjective quality of sleep, sleep latency, duration of sleep, sleep efficiency, sleeping disorders, sleeping pill consumption and daytime fatigue. For the first four items the questions had to be answered by time indications, while for the remaining questions participants rated their answers on a 4-point Likert Scale (1 = never to 4 = always). A sample item was “At what time did you averagely go to bed during the last week?”. The average Cronbach’s alpha over the five questionnaires was $\alpha = .80$.

Sleep Hygiene. Sleep hygiene was measured with 13 items from the Sleep Hygiene Index (SHI) (Mastin, Bryson & Corwyn, 2006). Sleep hygiene is not assessed by measuring outcomes, but rather by evaluating the impact of behaviors and environmental variables on sleep quality. A German version of the SHI could not be found and therefore I did a back-and-forth translation of the items with a bilingual colleague. Participants rated their answers on a 5-point Likert Scale (1 = never to 5 = always). A sample item was “I consume alcohol, tobacco or caffeine within 4 hours before bedtime.”. The average Cronbach’s alpha over the five questionnaires was $\alpha = .84$.

Mindfulness. The Mindfulness Attention Awareness Scale, with a total of 15 items (e.g. “I find it difficult to stay focused on what’s happening in the present.”), (Brown & Ryan, 2003) was used in its German version (Michalak, Heidenreich, Ströhle, & Nachtigall, 2008) to measure Mindfulness. It is designed for the appraisal of awareness (open or receptive) of and attention to the present, in order to determine dispositional mindfulness. As the items are negatively formulated, the answer scores had to be reversed for the analysis. Participants rated their answers on a 6-point Likert Scale (1 = never to 6 = always). Higher states of mindfulness were indicated by higher scores. The average Cronbach’s alpha over the five questionnaires was $\alpha = .95$.

Need for Recovery. In order to measure need for recovery, 11 items from the Need for Recovery Scale (e.g. “Often, after a day’s work, I feel so tired that I cannot get involved in other activities.”) (Veldhoven and Broersen, 2003) were used. The scale is used for indicating fatigue at work by evaluating emotional, cognitive and behavioral

symptoms that are not reversed between finishing work and starting again the next day. Participants rated their answers on a 6-point Likert Scale (1 = never to 6 = always). The higher the score, the higher the need for recovery. The average Cronbach's alpha over the five questionnaires was $\alpha = .92$.

Well-Being. To measure well-being, the Short Form of Positive and Negative Affect Schedule (I-PANAS-SF) (Thompson, 2007) was used. Positive and negative affect are seen as dimensions of the same construct. Positive affect describes the state (or trait, depending on the situation) as enthusiastic, active and awake, while negative affect describes it as distressed, angry or afraid. Participants rated their answers of the ten items on a 5-point Likert Scale (1 = very slightly or not at all to 5 = extremely). Sample items were "upset"; "Inspired"; "alert"; "attentive". The average Cronbach's alpha over the five questionnaires was $\alpha = .90$.

Job Satisfaction. Job Satisfaction was measured with three items from the Michigan Organizational Assessment Questionnaire (MOAQ-JSS) (Cammann et al., 1983). A German version of the MOAQ-JSS could not be found and therefore we did a back-and-forth translation of the items with a bilingual colleague. Participants rated their answers on a 5-point Likert Scale (1 = strongly disagree to 5 = strongly agree). A sample item was "All in all, I am satisfied with my job.". The average Cronbach's alpha over the five questionnaires was $\alpha = .75$.

Quality of Life. Ten items from the World Health Quality of Life (WHOQoL) Questionnaire were used in order to measure quality of life (e.g. "How satisfied are you with your health?"). The WHOQoL is divided into four domains, namely quality of life in general, the quantity of experiences, the quality of experiences and feelings. Participants rated their answers on a 5-point Likert Scale (1 = always to 5 = not at all. The average Cronbach's alpha over the five questionnaires was $\alpha = .93$.

In all questionnaires except the pre-test participants were asked to indicate which exercises they did during the last week, how often they did them and how they would evaluate them.

Frequent Use: "How often did you do the following exercises this week? Answers could be given on a 3-point Likert scale ranging from 0 to more than 3 times.

Appraisal of Exercises: “How did you like the following exercises?” Answers could be given on a 5-point Likert scale ranging from very poor to very good.

In the post-test one item concerning the recommendation of the app was incorporated and the participants were given the possibility to give written feedback.

Procedure

The eleMental app consists of four different modules. Those are “Sleep Easy”, “Chillax Zone”, “Mindful Now” and “Happy Flow”. The modules “Mindful Now” and “Happy Flow” have already been evaluated as part of a master’s thesis. A colleague of mine and I prepared the evaluation of the other two modules together, with her focusing on “Chillax Zone” and me on “Sleep Easy”. We also planned our respective studies together and followed the same research design.

At first, we created a landing page on the online platform MailChimp that we used to sign up participants and send out the information, newsletters and questionnaires. Shortly before the start of the study the participants were asked to create an account for the eleMental app, which was then activated for the “Sleep Easy” module, to make sure the participants do not use any exercises from other modules. The study itself was conducted using the online platform SoSci Survey. The only inclusion criteria were that (a) the participants work a minimum of ten hours per week, that (b) they conduct at least three exercises per week during intervention phase, that (c) they have access to the internet at home, that (d) they speak and understand German and that (e) they do not receive any other form of psychological treatment during the intervention period. All participants were aware of the study and its purpose and were informed on the first page of every questionnaire about the conditions and their right to stop the study at any given moment without providing a reason. As an incentive, participants were informed before the start of the study that they have the chance of winning one of three one-year eleMental abonnements free of charge, equaling a monetary value of about 50€. The winners were informed shortly after the completion of the study.

Five questionnaires were sent to the participants during a time period of four weeks. The different questionnaires that were used can be found in Appendices A, B and C. The study contained one pre-test, three weekly intervention questionnaires and one post-test. The questionnaires were sent out on Mondays in the early evening, except the post-test, which was sent out on a Tuesday, because of a holiday that fell on the Monday. The participants were asked to fill out the questionnaire within five days.

On Thursdays a reminder was sent to the participants to fill out the questionnaire. The time needed to fill out the questionnaires was about 10-12 minutes for the pretest and 5-7 minutes for the following questionnaires. During the period of the study, the participants also received several newsletters, providing them with interesting information and tips about sleep and mindfulness.

We provided the participants with our respective E-Mail address in case any questions or problems with the app or questionnaires arose, however other than that and the newsletters we sent out, the study was completely self-guided by the participants.

Data analysis

The data from the five questionnaires was downloaded from SoSci Survey. Since the study was conducted anonymously, to test the hypotheses the questionnaires of each participant had to be matched by an individual code they had to state in the beginning of every questionnaire. Participants who filled out at least two questionnaires that could be matched to each other were included in the analysis. The code consisted of the birthday, the last two numbers of the birth year, the first letter of the mothers first name and the first letter of the fathers first name. To evaluate the data, IBM SPSS version 32 and SPSS Process Macro were used. Cronbach's Alpha was calculated for every questionnaire. Then repeated measures ANOVA and moderator, model 1, and mediator, model 4, analyses were conducted.

Results

Preliminary analyses

A power analysis was conducted in order to calculate the adequate sample size. In order to ensure a power of .80 a sample size of 30 people was needed. Drop-out rates have been shown to be quite high in online-interventions, ranging from 12.5% to 34.3% (Donker et al., 2013). Our study was no exception, with drop-outs occurring after every week (Pre-Test: N = 71, Week 1: N = 62, Week 2: N = 58, Week 3: N = 50, Post-Test: N = 47).

Before testing the hypotheses, normal distribution of the sample was checked, and the appropriate forms of analyses have been selected. Also, the relationship between the relevant study variables was looked at by correlating these variables with one

another. Table 2 shows these correlations. Additionally, the means and standard deviations of the relevant study variables are shown.

Table 2

Means (M), standard deviations (SD) and intercorrelations between study variables

Variable	M	SD	Sleep Quality	Mindfulness	Need for Recovery	Quality of Life	Well- Being
Sleep Quality	1.65	.30	1				
Mindfulness	3.71	.89	-.25	1			
Need for Re- covery	3.05	.62	.43**	-.42**	1		
Quality of Life	2.16	.51	.34**	.50**	.406**	1	
Well-Being	3.89	.40	-2.59	.57**	-.43**	-.683**	1

Note. * = $p < .05$, ** = $p < .01$

Hypotheses testing

Hypothesis 1a, examining the difference of sleep quality between the pre-test and the post-test, predicting an improvement in sleep quality over time, was tested with a repeated measures ANOVA, looking at all the weeks, to see whether the means of dependent groups differ between the different points of measure. Hypothesis 1a was rejected, as the results were not significant. $F(4; 32) = 1.497$, $p = 0.226$, partial $\eta^2 = 0.158$, indicating that sleep quality does not change significantly between pre- and post-test.

Hypothesis 1b, examining a possible moderation effect of sleep hygiene on the relationship between sleep quality before the intervention and after the intervention was tested with a moderator analysis. The results show, summarized in Table 3, that sleep hygiene does not moderate the relationship significantly at any point of measure, therefore the hypothesis was rejected.

Table 3

Moderation effects of Sleep Hygiene on Sleep Quality over time

Time of measure	Moderator	Coefficient	SE	t	p-value	CI
Sleep Quality						
Pretest – Week1	Pre_SleepHygiene	0.43	0.37	1.21	.236	-0.30; 1.17
Pretest – Week2	Pre_SleepHygiene	-			-	-
Pretest – Week3	Pre_SleepHygiene	0.34	0.28	1.20	.241	-0.24; 0.91
Pretest – Posttest	Pre_SleepHygiene	3.84	1.83	2.10	.058	-0.16; 7.83
	Post_SleepHygiene	-2.55	1.58	-1.62	.131	-5.99; 0.88

Note. Coefficient = unstandardized b

Hypothesis 2, looking at the change in well-being between the pre-test and the post-test, predicting an improvement in well-being over time, was also tested with a repeated measures ANOVA, looking at all different points of measure separately. Well-being in the post-test does not significantly differ to well-being in the pre-test, $F(4; 18.784) = 0.812$, $p = 0.502$, partial $\eta^2 = 0.031$, therefore Hypothesis 2 was rejected.

Hypothesis 3, investigating the relationship of need for recovery between the pre-test and the post-test, predicting a decline of need for recovery, was once again tested with a repeated measures ANOVA, looking at the points of measure independently. The results show that there is no significant change in need for recovery between the different time points, $F(4; 18.784) = 0.812$, $p = 0.521$, partial $\eta^2 = 0.031$, meaning that Hypothesis 3 was rejected.

Hypothesis 4, examining the difference in quality of life between the pre-test and the post-test, predicting an improvement in quality of life, was also tested with a repeated measures ANOVA, looking separately at the different measurement points. The analysis concluded that quality of life in the post-test does not significantly differ from quality of life in the pre-test, $F(4; 6.037) = 2.494$, $p = 0.084$, partial $\eta^2 = 0.088$. As a result, Hypothesis 4 was rejected.

An overview of all the values of the repeated measures ANOVAs that were conducted for each hypothesis can be found in Table 4.

Table 4

Repeated measures ANOVA

Measurement period		Sleep Quality	Well-Being	Need for Recovery	Quality of Life
	<i>n</i>	Mean (<i>SD</i>)	Mean (<i>SD</i>)	Mean (<i>SD</i>)	Mean (<i>SD</i>)
Pre-test (T1)	33	1.65 (0.30)	3.89 (0.40)	3.05 (0.62)	2.16 (0.51)
Week1 (T2)	33	1.51 (0.37)	3.94 (0.35)	2.97 (0.68)	2.05 (0.40)
Week2 (T3)	33	1.43 (0.32)	3.91 (0.54)	2.90 (0.76)	2.04 (0.47)
Week3 (T4)	33	1.51 (0.35)	4.02 (0.46)	2.82 (0.78)	2.02 (0.43)
Post-test (T5)	33	1.44 (0.25)	3.82 (0.67)	2.83 (0.93)	2.10 (0.56)
<i>p</i>		0.226	0.502	0.521	0.084
<i>Partial Eta</i>²		0.158	0.031	0.031	0.088

Note. Time; T1 = before intervention phase; T2 = after one week intervention; T3 = after two weeks intervention; T4 = after three weeks intervention; T5 = one week after completion of intervention phase

The following figures show the change in the main variables over time. Even though no significant effects have been found for any of the variables, trends can be observed.

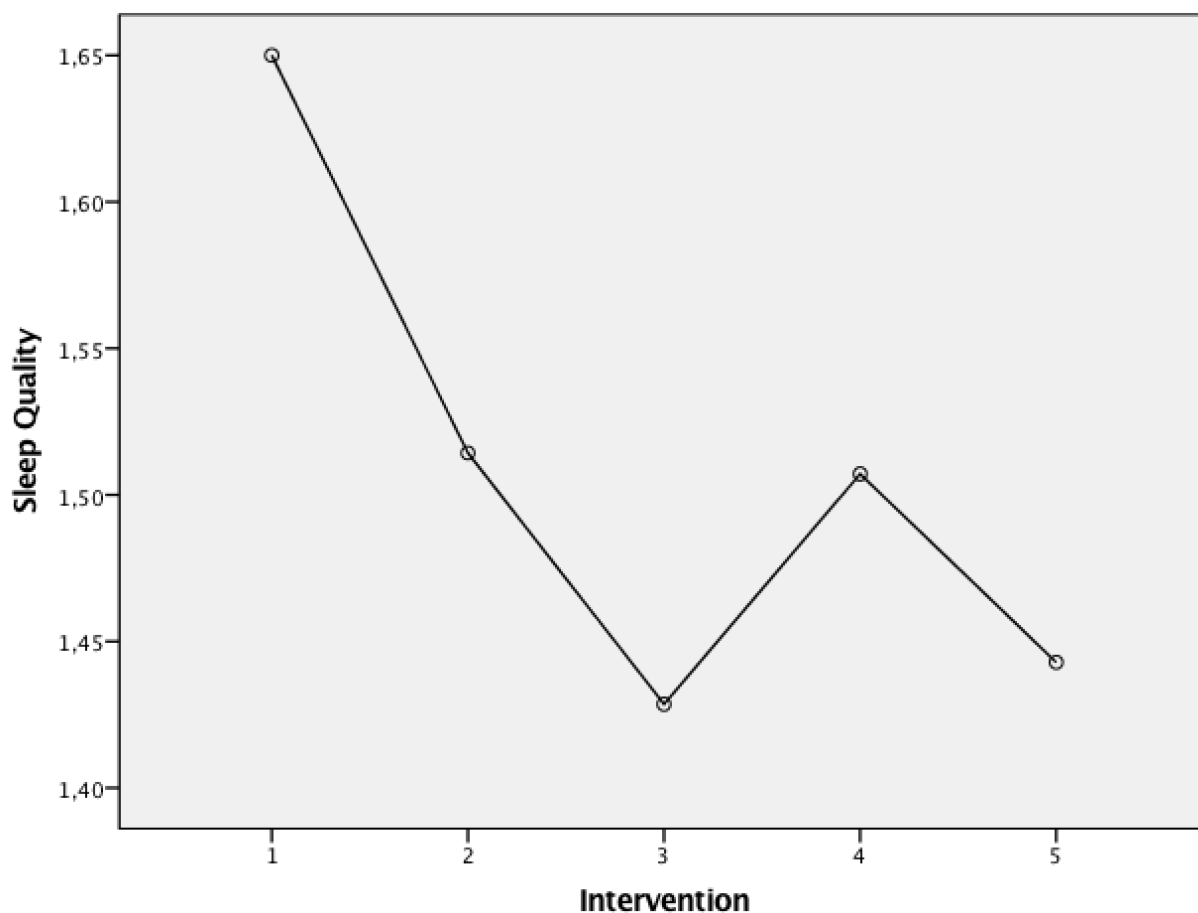


Figure 2. Repeated measures ANOVA for Sleep Quality. The X-axis shows all measurements from the pre-test (T1) to the post-test (T5).

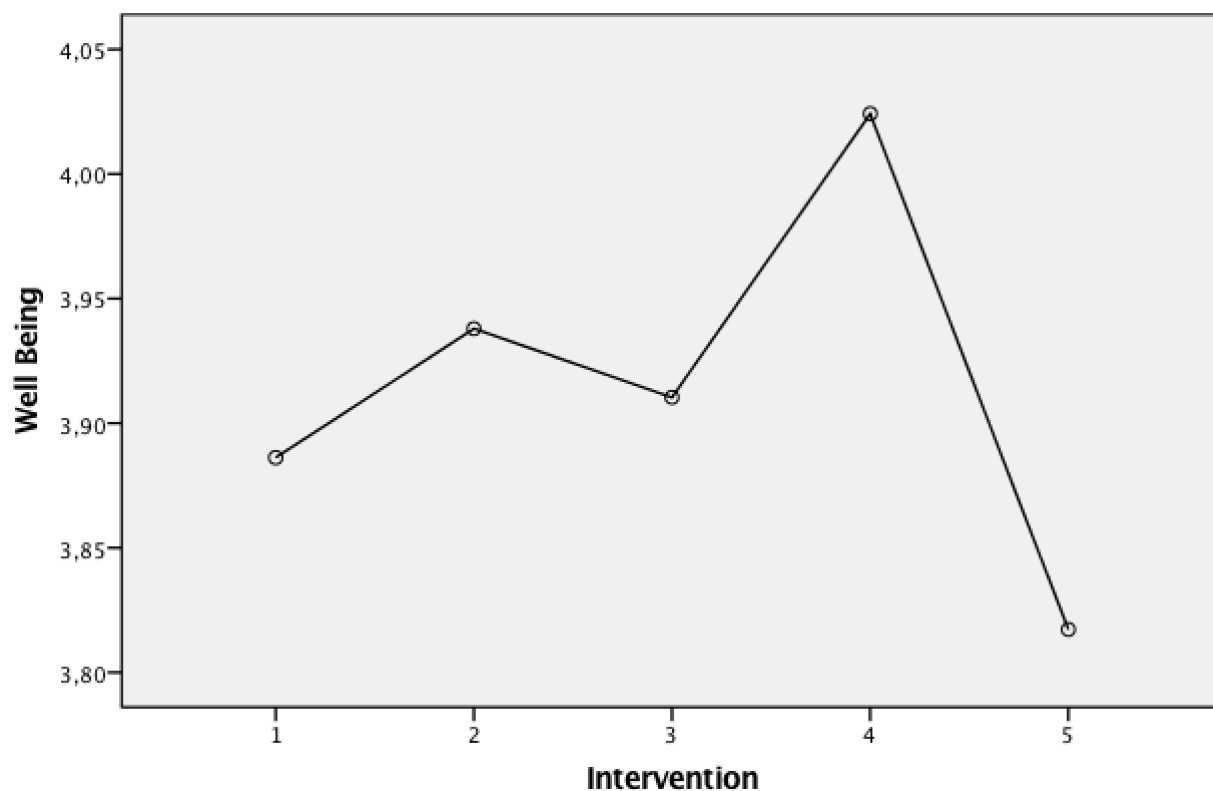


Figure 3. Repeated measures ANOVA for Well Being. The X-axis shows all measurements from the pre-test (T1) to the post-test (T5).

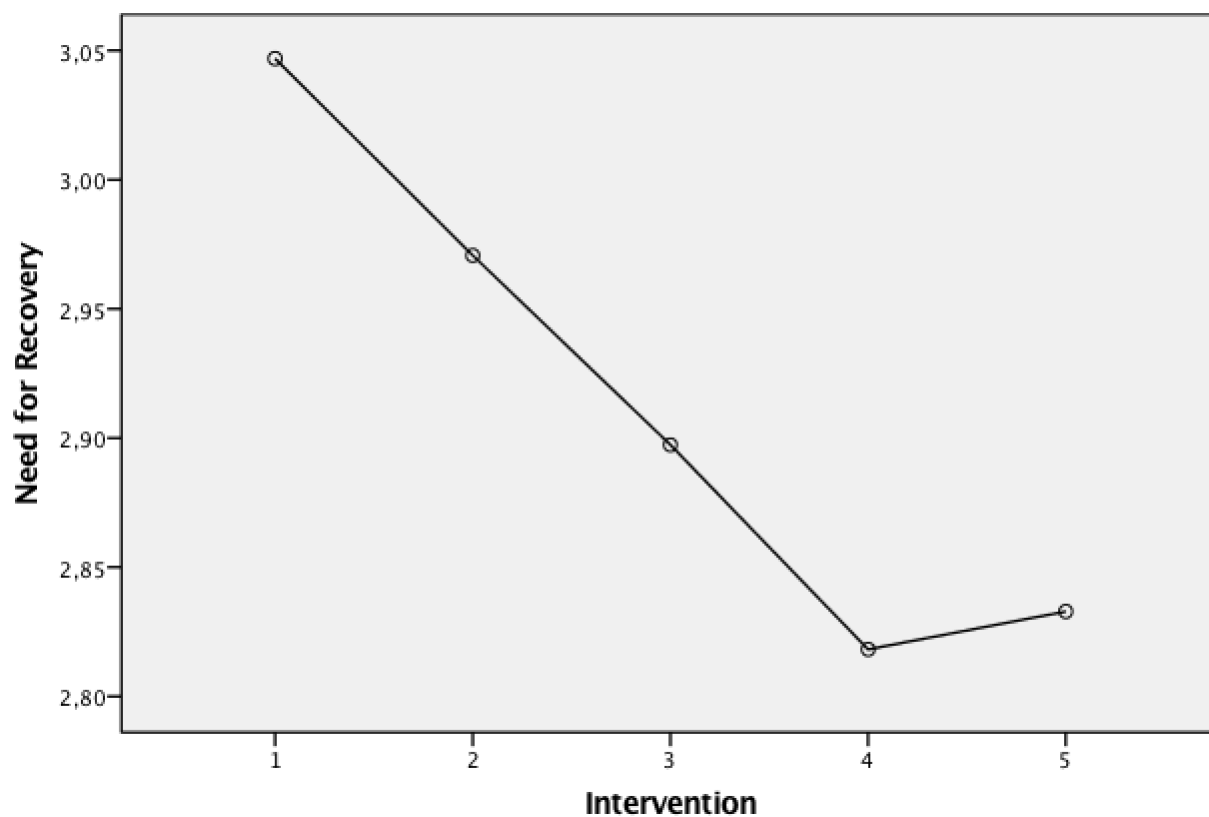


Figure 4. Repeated measures ANOVA for Need for Recovery. The X-axis shows all measurements from the pre-test (T1) to the post-test (T5).

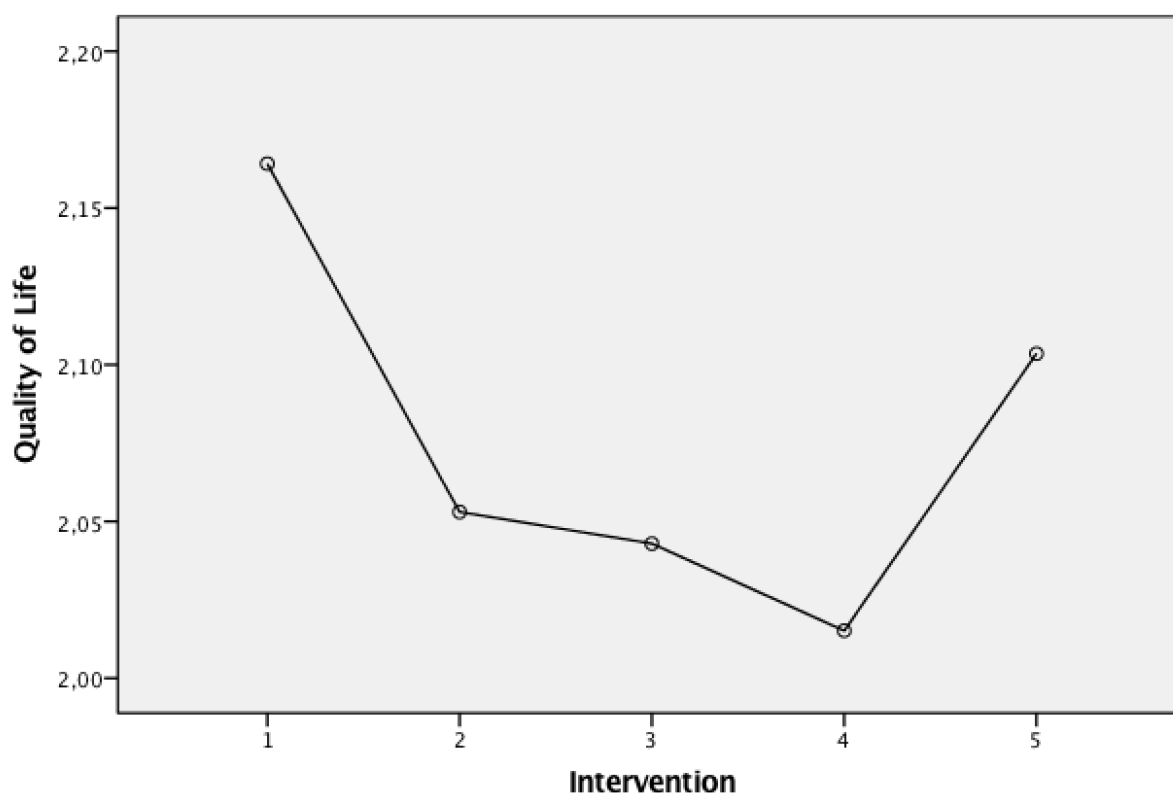


Figure 5. Repeated measures ANOVA for Quality of Life. The X-axis shows all measurements from the pre-test (T1) to the post-test (T5).

For Hypothesis 5 a, b and c only the significant effect will be reported in the text due to a large amount of data. A complete overview of the results can be found in Appendix A.

Hypothesis 5a, examining a mediation effect of sleep quality on the relationship between well-being in the post-test and in the pre-test (Hypothesis 2) and all the intermediate weeks, expected that the better the sleep quality, the more improvement in well-being should be observed. This was tested with a mediation analysis in PROCESS Macro. An indirect effect of the Mediator Week1_SleepQuality was found for the relationship between the intervention and well-being from the pre-test to Week1 (0.1343; CI=[0.0148; 0.2965]). For all the other weeks no significant effect was found.

Hypothesis 5b, examining a mediation effect of sleep quality on the relationship between need for recovery in the post-test and in the pre-test (Hypothesis 3) and all the intermediate weeks, expected that the better the sleep quality, the more improvement in need for recovery should be observed. This was tested with a mediation analysis. An indirect effect of the Mediator Week1_SleepQuality (0.0835; CI=[0.0027; 0.2213]) was found for the relationship between the intervention and need for recovery from the pre-test to Week1.

Hypothesis 5c, examined a mediation effect of sleep quality on the relationship between quality of life in the post-test and in the pre-test (Hypothesis 4) and all the intermediate weeks, with the expectation that the better the sleep quality, the more improvement in quality of life should be observed. This was tested with a mediation analysis. No significant mediation effects have been found.

For Hypothesis 6 a, b, c and d only the significant effect will be reported in the text due to a large amount of data. A complete overview of the results can be found in Appendix B.

Hypothesis 6a, looking at the possible mediation effect of mindfulness on the relationship between sleep quality before and after the intervention (Hypothesis 1) and all the intermediate weeks, predicted that the higher the participants score on mindfulness, the stronger the improvement of sleep quality should be. This was tested with a mediation analysis. No significant effect was found therefore, the hypothesis was rejected.

Hypothesis 6b, looked at a possible mediation effect of mindfulness on the change of well-being over time (Hypothesis 2) and all the intermediate weeks, predicting that the higher the participants score on mindfulness, the stronger the improvement in well-being from pre- to post-test should be. This was tested with a mediation analysis. An indirect effect of the Mediator Pre_Mindfulness was found for the relationship between the intervention and well-being from the pre-test and Week3 (-0,1975; CI=[-0,4093; -0,0380]). For all the time points no significant effect was found.

Hypothesis 6c, examining a possible mediation effect of mindfulness on the change of need for recovery over time (Hypothesis 3) and all the intermediate weeks, predicted that the higher the participants score on mindfulness, the stronger the improvement in well-being from pre- to post-test should be. This was tested with a mediation analysis. An indirect effect of the Mediator Week1_Mindfulness (0.1326; CI=[0.0199; 0.3097]) was found for the relationship between the intervention and need for recovery from the Pretest to Week1. An indirect effect of the Mediator Week2_Mindfulness (0,2321; CI=[0,0465; 0,4862]) was found for the relationship between intervention and need for recovery from pre-test to Week2. An indirect effect of the Mediator Post_Mindfulness (0.4667; CI=[0.0476; 1.1643]) was found for the relationship between intervention and need for recovery from pre-test to post-test. For the other measurement points, no significant effect was found.

Hypothesis 6d, investigated at a possible mediation effect of mindfulness on the change of quality of life over time (Hypothesis 4) and all the intermediate weeks, predicting that the higher the participants score on mindfulness, the stronger the improvement in quality of life from pre- to post-test should be. This was tested with a mediation analysis. An indirect effect of the Mediator Week1_Mindfulness (0.0974; CI=[0.0025; 0.2363]) was found for the relationship between intervention and quality of life from pre-test to Week1. No significant effect was found for the other measurement points.

Hypothesis 7, investigating the evaluation of the program as a moderator variable, expected that participants who evaluate the intervention more positively show higher improvements from the pre-test to the post-test. This could not be tested, because the app was not evaluated by a sufficient amount of people in order to perform an analysis.

Hypothesis 8, examining the frequency of use of the app as a moderator variable, expected the participants who used the app more often to show higher improvements from pre- to post-test and all the intermediate weeks. This was tested with a moderator analysis. Due to a large amount of data, only the significant results will be documented in the text. A complete overview of the results of frequency as a moderator can be found in Table 5 added below the results of Hypothesis 8.

Hypothesis 8a: Week1_Frequency significantly moderates the relationship between Week1_SleepQuality and Posttest_SleepQuality ($b=2.8591$; $p=0.0459$; $CI=[0.0626; 5.6556]$). No significant moderation effect has been found for the other measurement points.

Hypothesis 8b: No significant effect has been found for the moderation effect of frequency on the relationship of well-being in the pre-test and well-being in the post-test, including all intermediating weeks.

Hypothesis 8c: Week1_Frequency ($b=2.4316$; $p=0.0082$; $CI=[0.6992; 4.1641]$) and Week2_Frequency ($b=-1.8400$; $p=0.0136$; $CI=[-3.2611; -0.4190]$) significantly moderate the relationship between Week1_NeedforRecovery and Week2_NeedforRecovery. No significant effect has been found for the other measurement points.

Hypothesis 8d: No significant effect has been found for the moderation effect of frequency on the relationship of quality of life in the pre-test and well-being in the post-test, including all intermediating weeks.

Table 5

Moderation effects of Frequency over time

Time of measurement	Moderator	Coefficient (unstandardized b)	SE	t	p-value	CI
Sleep Quality						
Week1 – Week2	Week1_Frequency	1.58	1.56	1.01	.327	-1.71; 4.86
	Week2_Frequency	-1.29	1.43	-0.91	.377	-4.29; 1.70
Week1 – Week3	Week1_Frequency	-0.04	0.91	-0.04	.969	-1.97; 1.89
	Week3_Frequency	-1.12	1.14	-0.99	.338	-3.53; 1.29
Week1 – Posttest	Week1_Frequency	2.86	1.26	2.28	.046*	0.06; 5.66
	Post_Frequency	-1.47	1.68	-0.87	.402	-5.22; 2.28
Well-being						
Week1 – Week2	Week1_Frequency	3.53	2.25	1.57	.133	-1.17; 8.23
	Week2_Frequency	-1.29	1.55	-0.84	.414	-4.53; 1.95
Week1 – Week3	Week1_Frequency	-0.65	0.68	-0.96	.350	-2.07; 0.77
	Week3_Frequency	0.88	0.67	1.31	.206	-0.53; 2.29
Week1 – Posttest	Week1_Frequency	0.39	2.47	0.16	.875	-4.83; 5.62
	Post_Frequency	-0.88	2.44	-0.36	.722	-6.05; 4.28
Need for Recovery						
Week1 – Week2	Week1_Frequency	2.43	0.83	2.92	.008**	0.70; 4.16
	Week2_Frequency	-1.84	0.68	-2.69	.014*	-3.26; -0.42

Week1 – Week3	Week1_Frequency	0.52	0.66	0.79	.435	-0.82; 1.87
	Week3_Frequency	-	-	-	-	-
Week1 – Posttest	Week1_Frequency	0.71	0.92	0.78	.448	-1.24; 2.67
	Post_Frequency	-1.07	0.90	-1.19	.252	-2.99; 0.85
Quality of Life						
Week1 – Week2	Week1_Frequency	1.97	1.38	1.42	.169	-0.90; 4.84
	Week2_Frequency	-1.11	1.15	-0.97	.344	-3.49; 1.27
Week1 – Week3	Week1_Frequency	-0.07	0.57	-0.12	.906	-1.25; 1.11
	Week3_Frequency	-0.48	0.52	-0.93	.363	-1.57; 0.60
Week1 – Posttest	Week1_Frequency	0.30	2.39	0.13	.902	-4.80; 5.40
	Post_Frequency	0.35	2.52	0.14	.891	-5.02; 5.73

Note. * = $p < .05$, ** = $p < .01$

Control variables

Some significant control variables were found in the pre-test. Job satisfaction correlated positively with well-being ($r = .319$, $p = .006$). Job satisfaction also correlated with quality of life ($r = -.486$, $p = .000$). However, the significant correlations did not prove to be significant as a covariate and therefore did not have any influence on the statistical analyses.

Discussion

The main focus of the study was to evaluate the effectiveness of the “Sleep Easy” module of the eleMental app. Therefore, comparing the results from the pre-test to the post-test seems like the logical thing to do. However, analyzing the change in outcomes from the pre-test to every measurement point provided the opportunity to see whether a certain time period could be indicated to the users to achieve the highest results. Other studies have shown that mindfulness-based interventions can show results after ten days or less (Howells et al., 2016). However, forming a habit takes about three

weeks up to months (Carden & Woods, 2018), therefore it was interesting to see if a certain week provided especially high changes.

Some of the participants seemed to have a problem with the code that had to be filled out in the beginning of every questionnaire, in order to be able to match all questionnaires belonging to the same person. As a result, participants who filled out all the questions still had to be excluded from the analysis if the codes could not be matched with 100% certainty.

Compared to the general population, the study population was over-educated and over-feminized. It has been shown that women are more likely to participate in online surveys and studies than men (Smith, 2008). Also, due to recruitment of volunteers for the study in my personal environment, 40.8% of the participants worked in the field of health and medicine. It can be argued that people working in those fields have better knowledge of health-promoting behaviors and activities (McAvoy et al., 1999). Therefore, the results cannot be generalized.

When looking at the results of the ANOVA of the hypotheses testing, none of the effects turned out to be significant. This could be explained by the fact that when studying the means of the main variables of the study (see table 4), it can be seen that the study population already had good starting values. The mean of the sleep quality before starting the intervention was already quite low (indicating good quality of sleep) and therefore unproblematic. Hence, it does not come as a surprise that the intervention did not result in any substantial effects, since there was not a lot of room for improvement to begin with. The same can be said for well-being, with the starting point of the population being quite high. Lyumbomirsky and Layous (2013) have reported, that people starting an intervention with low positive affect benefit the most from interventions based on positive psychology. They argue that this is due to more room for improvement. However, a trend in the direction of improvement could be observed. Sleep quality, well-being, need for recovery and quality of life all showed minor changes in their respective means from the pre-test to the post-test. As none of these differences were significant, these trends cannot be interpreted, however usage of the app might result in actual improvements when applied to a larger and better selected sample.

When investigating the effects of the app it could be helpful to compare a group of people who reported having a good sleep quality in the beginning of the study and participants who reported having a bad quality of sleep to begin with. Larger effects would be expected in participants starting out with a worse value. However, in this study

the data did not allow for subgroup analyses, given that the sample size was relatively small and none of the participants reported a value of sleep quality higher than 2, with 5 being the worst sleep quality. In other words, none of the participants had a poor quality of sleep to start with.

Sleep quality has been found to decline with age and that around 50% of individuals aged 60 or older suffer from insomnia (Lo & Lee, 2012). This is especially important considering that our society is going through changes in ageing trends and more and more people grow older. Since a decrease in sleep quality can lead to several psychological and physiological health problems (Lo & Lee, 2012), it is important to also consider the older generations when studying sleep quality and possible interventions. However, the mean age of the population of this study was quite low with an average of 36.65 years ($SD = 12.96$) and therefore does not provide the possibility of looking at an older age group. Splitting the sample to compare younger and older participants to see whether sleep quality differs significantly between the two groups was not possible, as, again, the sample in general was not big enough to meet the criteria for statistical analyses. Perhaps more importantly, the oldest person in the present cohort was 59 years old, and therefore the study population did not really provide the opportunity to study an older generation. However, research has shown that the people who in general make use of online mental health programs or apps are averagely younger (Carroll et al., 2017), resulting in the question, whether older people, no matter if they suffer from sleep problems or not, would even use an app. Therefore, the present cohort may be representative for those who are more likely to use apps as sleeping aid.

Sleep hygiene did not show a significant moderation effect on the change of sleep quality over time. A possible explanation for this could also be that the starting value of sleep quality was pretty high in the sample. Sleep hygiene improvements are especially helpful for people who have trouble sleeping at night. For people who are good sleepers and are functional during the day there is no need to change their sleeping habits and routines (OSF HealthCare, 2017). Therefore, when no sleep problems are present, improving sleep hygiene does not add any additional value.

When interpreting mediation effects, often times one condition for it to actually make sense to look at those effects, the direct effect of one variable to the other has to be significant (e.g. Field, 2013). However, Zhao, Lynch Jr. and Chen (2010) have reconsidered mediation analyses as established by Baron and Kenny in 1986. According to them, the only requirement that should be met in order for a mediation effect to mean

something, is that the indirect effect, hence the effect of the mediator, be significant. They argue that a significant zero-order effect of X on Y is not a necessity for establishing mediation, because competitive (only the mediator is significant) and complementary (direct path and mediator are significant) mediation, as they call it, both have equal theoretical interest (Zhao et al., 2010). Based on their reasoning, I will discuss the significant mediation effects that I have found in my study, even though none of the direct effects have been found to be significant in the repeated measures ANOVAs.

Sleep quality as a mediator has been shown in this study to have a significant indirect effect on well-being and need for recovery from the pre-test to week 1 only. This could be due to habituation of the participants to the intervention, or a decrease in eagerness of participants to really engage in the intervention. As the exercises and the program in general were something new to the participants in the first week, it is possible that the effects were strongest in the beginning. Habituation has been shown to be a psychological learning process repeated exposure to a stimulus, in this case the exercises, can lead to the response to be weakened (Sincero, 2011). Therefore, after having listened to the exercises a few times, it is possible that their effects may be diminished.

The results of mindfulness as a mediator look a bit different. Significant indirect effects of mindfulness on well-being, need for recovery and quality of life have been found. For well-being, an indirect effect of mindfulness was found from the pre-test to week 3, for need for recovery indirect effects were found from the pre-test to week 1, week 2 and the post-test and for quality of life an indirect effect was found from the pre-test to week 1. These results show that mindfulness seems to be an important mediator and the effects seem to be longer lasting (with the exception of quality of life) than the effects of sleep quality as a mediator. A possible explanation for this could be that many of the exercises included in the "Sleep Easy" program were based on mindfulness. Considering that the question in the pre-test whether the participants had previous experiences with meditation and relaxation exercises had been answered with a mean of 2.16 (SD = 1.04), corresponding to the answer of "rather little" on a scale of 5, the sample did on average not have a lot of experience before participating in the study. Therefore, the participants possibly improved in mindfulness over time, resulting in a longer lasting indirect effect. Sleep quality was not impacted by mindfulness at all. Here again the high overall sleep quality of a sample makes it unlikely for any changes to be detected. A possible explanation for quality of life not being affected by sleep quality as a mediator at all and by mindfulness as a mediator only in the first week, could be that quality of life

is more stable and therefore less likely to change over the course of a few weeks. Questions relating, for example, to having enough money to satisfy one's needs (WHOQOL Group, 1993) are not likely to change over the course of one week. In the long run objective as well as subjective reports of quality of life can obviously change due to (sudden, unexpected) life events of different sorts, but it has been shown that concepts such as adaptation and coping, both aim at normalizing stimuli (Allison, Locker, & Feine, 1997). While adaptation works by contrasting, shifting the focus on other life domains that are currently positive, coping works by dealing with demands by changing cognitive and behavioral thoughts and efforts. This results in keeping the level of an individual's quality of life relatively constant (Allison et al., 1997). Therefore, an intervention would have to be administered over a longer time-period in order to measure possible effects (Howells et al., 2016).

Whether evaluation of the app works as a moderator or not could not be analyzed, as not enough people responded to the respective questions. It is possible that the time between completing the exercises and filling out the next questionnaire was too long. In accordance with the recency effect, stating that information that has recently been collected is most easily remembered and recalled (Hogarth & Einhorn, 1992), it could be that participants did not remember how they liked the exercises they completed first or exercises that they completed a longer time period ago.

Frequency of app-usage has been shown in this study to have significant moderating effects on sleep quality and need for recovery. For sleep quality, frequency moderated the effect of week 1 to the post-test significantly. For need for recovery, the relationship between week 1 and week 2 was moderated significantly by frequency. Here it is again possible that a habituation effect set in after having tried the exercises (Sincero, 2011). Considering that frequency did not have any significant moderation effect on well-being, a possible explanation could be that frequency was evaluated in total and the exercises were not split by scientific basis, for example mindfulness, relaxation techniques, hypnosis or positive psychology. However, for well-being it has been shown that mindfulness-based interventions and exercises based on positive psychology have the strongest effects (Lyubomirsky & Layous, 2016). Therefore, evaluating only those exercises based on frequency could show different results. For quality of life the same reasoning as before can be applied here as well. Due to the relative stability of the variable over shorter time periods (Allison et al., 1997), it is most likely not that easily affected by short-term interventions.

Limitations

In addition to the issues with the study population that have already been mentioned above, the collection of the sample also limits the generalizability of the results to the general population. Since most of the participants were recruited from my own personal social environment, several of the people took part in the study as a favor to me and not because of their interest in the app. Research has shown that people who self-select the programs and exercises they engage in show more improvements after the intervention (Howells et al., 2016). Therefore, the results may be falsified by people not using the app regularly and not completing the exercises as focused as they would have to be in order to achieve meaningful results.

Another limitation is that the app could only be evaluated in a German-speaking population, since the app is only available in German. Therefore, the results are not generalizable to other countries.

Additionally, the intervention was completely self-guided by the participants and the studied relied on self-reports and subjective rather than objective measurements, therefore socially desirable responding behavior cannot be excluded.

Furthermore, the present study was conducted without a control group, therefore the interpretation of the results has to be done cautiously, as it cannot be ruled out that factors other than the intervention may have contributed to the changes in the outcomes.

Implications for research and practice

Future longitudinal studies should look for an alternative way to assure anonymity to the participants, in order to prevent losing data due to wrong codes. An option could be to shorten the codes to reduce confusion and room for mistakes.

In recruiting participants, future studies should use internet platforms to advertise for the study in order to reach more people who are really motivated to engage in the intervention.

Future research should include a study population of individuals who suffer from sleeping problems, because the effectiveness can be better researched within this target group. There is not that much room for improvement when sleep quality is already quite high to begin with.

Another possibility that should be considered in further research should be studying older populations with regards to their willingness to make use of mental health apps in general and how such interventions influence their sleep problems.

In the future, it could make sense to include a control group in the study. For example, a study group with sleep problems taking part in the intervention could be compared to a control group with sleep problems that are not participating in any intervention. A group of people not reporting any sleep problems could also be added to participate in the intervention, making it possible to establish for what group the intervention can be used best.

In further research, quality of life should be assessed with a different scale. Alternatively, different outcomes should be chosen for an intervention that does not exceed three weeks, since the construct of quality of life is quite stable and only longer-term effects are likely to be reflected.

Additionally, the evaluation of the exercises, which could be an important variable to consider in the analyses should be studied differently in the future. A possible adjustment could be that right after an exercise is finished, the app sends a short evaluation question to the participant, for example, showing five stars and asking how the user liked that particular exercise.

Another angle for future studies could be a stronger focus on the person-intervention-fit (Howells et al., 2016). The eleMental app should be broadened by adding different voices (female, children) and dialects to the audios, making the user experience more individual and increasing the chance of more people having a person-intervention-fit with the modules of the eleMental app.

Conclusion

Even though we were not able to find many significant results in the present study, our research does contribute to online mental health interventions by providing an evaluation that is lacking in many other apps and programs that are available. Our findings show that even in a sample that does not have many sleep or well-being problems to start with, using a mindfulness-based program can have positive effects for people in the working-population. However, our results need to be interpreted with caution, since mediators and outcomes were sometimes measured simultaneously, not allowing any claims about causality. Therefore, further research including more appropriate cohorts is needed for a comprehensive evaluation of the “Sleep Easy” module.

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List of tables

Table 1: Demographics	17
Table 2: Correlation matrix	24
Table 3: Moderation effects of Sleep Hygiene on Sleep Quality over time	25
Table 4: Repeated measures ANOVA	26
Table 5: Moderation effects of Frequency over time	32-33

List of figures

Figure 1: Research model	16
Figure 2: Repeated measures ANOVA for Sleep Quality.	27
Figure 3: Repeated measures ANOVA for Well-Being.	28
Figure 4: Repeated measures ANOVA for Need for Recovery.	28
Figure 5: Repeated measures ANOVA for Quality of Life.	29

Appendices

- A: Tables for Hypothesis 5 a, b, c
- B: Tables for Hypothesis 6 a, b, c, d
- C: Abstract German
- D: Eidesstaatliche Erklärung
- E: Pre-Test questionnaire

Appendix A – Mediating effects of Sleep Quality over time

Table 1

Mediating effect of Sleep quality on Well-Being over time (Hypothesis 5a)

Time of measure	Mediator	Indirect effects	CI	Effect size
Pre-test – Week1	Pre_SleepQuality	-0.0054	-0.0857 0.0520	-0.0049
	Week1_SleepQuality	0.1343	0.0148 * 0.2965	0.1222
Pre-test – Week2	Pre_SleepQuality	0.0038	-0.0876 0.0946	0.0034
	Week2_SleepQuality	0.0350	-0.0711 0.1495	0.0328
Pre-test – Week3	Pre_SleepQuality	0.0016	-0.0750 0.0829	0.0015
	Week3_SleepQuality	-0.0085	-0.1052 0.0746	-0.0081
Pre-test – Post-test	Pre_SleepQuality	0.0481	-0.1392 0.3063	0.0259
	Post_SleepQuality	0.1431	-0.2329 0.4280	0.0832

Note. Effect sizes are completely standardized; * = significant indirect effect

Table 2

Mediating effect of Sleep Quality on Need for Recovery over time (Hypothesis 5b)

Time of measure	Mediator	Indirect effects	CI	Effect size
Pre-test – Week1	Pre_SleepQuality	-0.0503	-0.1748 0.0431	-0.0453
	Week1_SleepQuality	0.0835	0.0027 * 0.2213	0.0715
Pre-test – Week2	Pre_SleepQuality	0.0138	-0.1133 0,1267	0.0121
	Week2_SleepQuality	0.0095	-0.1167 0,1018	0.0079
Pre-test – Week3	Pre_SleepQuality	0.0528	-0.0682 0.2285	0.0452
	Week3_SleepQuality	0.0352	-0.0393 0.1279	0.0313
Pre-test – Post-test	Pre_SleepQuality	0.0250	-0.1147 0.1631	0.0176
	Post_SleepQuality	-0.0503	-0.2464 0.0850	-0.0308

Note. Effect sizes are completely standardized; * = significant indirect effect

Table 3

Mediating effects of Sleep Quality on Quality of Life over time (Hypothesis 5c)

Time of measure	Mediator	Indirect effects	CI	Effect size
Pre-test – Week1	Pre_SleepQuality	-0.0220	-0.1164 0.0409	-0.0211
	Week1_SleepQuality	0.0495	-0.0581 0.1931	0.0472
Pre-test – Week2	Pre_SleepQuality	0.0272	-0.0842 0.1409	0.0284
	Week2_SleepQuality	0.0447	-0.0605 0.1573	0.0474
Pre-test – Week3	Pre_SleepQuality	-0.0144	-0.0726 0,0328	-0.0191
	Week3_SleepQuality	0.0204	-0.0247 0.0888	0.0272
Pre-test – Post-test	Pre_SleepQuality	0.0056	-0.2021 0.2088	0.0044
	Post_SleepQuality	0.3465	-0.0381 1.0138	0.2359

Note: Effect sizes are completely standardized; * = significant indirect effect

Appendix B – Mediating effects of Mindfulness over time

Table 4

Mediating effect of Mindfulness on Sleep Quality over time (Hypothesis 6a)

Time of measure	Mediator	Indirect effects	CI	Effect size
Pre-test – Week1	Pre_Mindfulness	-0.0832	-0.3246 0.1309	-0.0750
	Week1_Mindfulness	-0.0675	-0.3192 0.0406	-0.616
Pre-test – Week2	Pre_Mindfulness	-0.2020	-0.5311 0.0916	-0.1748
	Week2_Mindfulness	-0.0227	-0.1501 0.1103	0.0197
Pre-test – Week3	Pre_Mindfulness	-0.1427	-0.4348 -0.0518	-0.1378
	Week3_Mindfulness	-0.0331	-0.1302 0.0557	-0.0319
Pre-test – Post-test	Pre_Mindfulness	-0.010	-0.4542 0.4620	0.0074
	Post_Mindfulness	0.2161	-0.0855 0.7959	0.1593

Note: Effect sizes are completely standardized; * = significant indirect effect

Table 5

Mediating effect of Mindfulness on Well-Being over time (Hypothesis 6b)

Time of measure	Mediator	Indirect effects	CI	Effect size
Pre-test – Week1	Pre_Mindfulness	-0.0211	-0.1988 0,1349	-0.0189
	Week1_Mindfulness	0.0978	-0.0892 0.2653	0.0890
Pre-test – Week2	Pre_Mindfulness	-0.0937	-0.3675 0.1231	-0.0841
	Week2_Mindfulness	0.1237	-0.0225 0.2901	0.1159
Pre-test – Week3	Pre_Mindfulness	-0.1975	-0.4093* -0,0380	-0.1853
	Week3_Mindfulness	-0.1151	-0.3861 0.0358	-0.1102
Pre-test – Post-test	Pre_Mindfulness	-0.2174	-0.8889 0.2855	-0.1170
	Post_Mindfulness	0.3972	-0.3554 1.0649	0.2309

Note: Effect sizes are completely standardized; * = significant indirect effect

Table 6

Mediating effect of Mindfulness on Need for Recovery over Time (Hypothesis 6c)

Time of measure	Mediator	Indirect effects	CI	Effect size
Pre-test – Week1	Pre_Mindfulness	-0.0185	-0.1957 0.1103	-0.0166
	Week1_Mindfulness	0.1326	0.0199 * 0.3097	0.1135
Pre-test – Week2	Pre_Mindfulness	-0.1614	-0.3887 0.0318	-0.1419
	Week2_Mindfulness	0.2321	0.0465 * 0.4862	0.1919
Pre-test – Week3	Pre_Mindfulness	-0.1542	-0.3764 0.0940	-0.1319
	Week3_Mindfulness	0.0701	-0.0805 0.3791	0.0623
Pre-test – Post-test	Pre_Mindfulness	-0.0768	-0.3557 0.1221	-0.0543
	Post_Mindfulness	0.4667	0.0476 * 1.1643	0.2861

Note. Effect sizes are completely standardized; * = significant indirect effect

Table 7

Mediating effects of Mindfulness on Quality of Life over time (Hypothesis 6d)

Time of measure	Mediator	Indirect effects	CI	Effect size
Pre-test – Week1	Pre_Mindfulness	-0.0246	-0.1596 0.1408	-0.0237
	Week1_Mindfulness	0.0974	0.0025 * 0.2363	0.0929
Pre-test – Week2	Pre_Mindfulness	-0.1161	-0.3203 0.0908	-0.1212
	Week2_Mindfulness	0.0627	-0.0467 0,2159	0.0665
Pre-test – Week3	Pre_Mindfulness	-0.0615	-0.1751 0,0651	-0.0815
	Week3_Mindfulness	0.0649	-0.0418 0.1627	0.0862
Pre-test – Post-test	Pre_Mindfulness	-0.2679	-1.0612 0.1117	-0.2134
	Post_Mindfulness	0.2615	-0.2287 0.7768	0.1780

Note. Effect sizes are completely standardized; * = significant indirect effect

Appendix C – Abstract German

Mentale Gesundheit hat in den vergangenen Jahren deutlich mehr Aufmerksamkeit erlangt, ebenso wie die Möglichkeiten die mit Smartphones und ständigem online-sein verbunden sind. Daher wirkt es logisch, mentale Gesundheit anhand von online oder app-basierten Interventionen zu verbessern. Die eleMental App ist ein Beispiel solcher Interventionen. Die gegenwärtige Untersuchung hat das „Sleep Easy“ Modul, eins von vier Modulen, der App in einer Langzeitstudie in der Arbeitspopulation untersucht. 71 Leute haben über einen Zeitraum von insgesamt vier Wochen, einschließlich drei Interventionswochen, teilgenommen. Die Übungen der Intervention basieren auf Mindfulness, Entspannungsübungen, Hypnose und positiver Psychologie. Die Teilnehmer haben insgesamt fünf Fragebogen erhalten, bestehend aus einem Pre-Test, drei wöchentlichen Interventionsfragebögen und einem Post-Test. Die Hauptvariablen die untersucht wurden sind Schlafqualität, Wohlbefinden, Erholungsbedarf und Lebensqualität. Die Ergebnisse haben gezeigt, dass Schlafqualität Wohlergehen und Erholungsbedarf signifikant mediiert. Mindfulness mediiert Erholungsbedarf und Lebensqualität signifikant. Häufigkeit der App Verwendung moderiert Schlafqualität und Erholungsbedarf signifikant. Diese Erkenntnisse erlauben die vorsichtige Tendenz, dass die Verwendung des Moduls „Sleep Easy“ positive Resultate erzielen kann.

Schlüsselbegriffe: mentale Gesundheit, app-basierte Interventionen, Schlafqualität, Mindfulness

Appendix D – Eidesstaatliche Erklärung

Ich versichere, dass ich die vorliegende Masterarbeit selbst verfasst und dazu keine anderen als die angeführten Behelfe verwendet habe und dass die Arbeit in gleicher oder ähnlicher Form noch keiner anderen Prüfungsbehörde vorgelegen hat. Alle Ausführungen der Arbeit, die wörtlich oder sinngemäß übernommen wurden sind als solche gekennzeichnet.

Wien, am:

Unterschrift: _____

Juliana Hoeper

Appendix E – Pre-Test Questionnaire



Sleep_Easy → base

05.05.2019, 15:38



Liebe/r TeilnehmerIn,
vielen Dank für dein Interesse und
Engagement an meiner Studie
teilzunehmen!

Das Ziel dieser Studie ist, die Wirksamkeit
der Übungen aus dem Modul „Sleep Easy“
auf die Schlafqualität und daraus
resultierende Veränderungen im Alltag zu
untersuchen.

In Kooperation mit Herrn Dr. Bardia
Monshi, vom Institut für Vitalpsychologie,
führe ich, Juliana Hoeper, Studentin an der
Universität Wien, diese Untersuchung zum
Thema „Wirksamkeit einer App-basierten
Intervention im Arbeitskontext“ durch.

Bei der Beantwortung der Fragen gibt es
keine richtigen und falschen Antworten – es
zählt lediglich dein individuelles Befinden.

Die Bearbeitung des Fragebogens dauert
etwa 15 Minuten. Nimm dir bitte
ausreichend Zeit und versuche
Ablenkungen und Störungen zu vermeiden.

Die Daten werden nur für wissenschaftliche
Forschungszwecke verwendet. Die
Auswertung erfolgt anonym und unter
Einhaltung der gesetzlichen Vorschriften
des Datenschutzes.

Danke und viel Spaß! :)



Damit ich nach Ende der Studie deine Fragebögen einander zuordnen kann, ohne dass deine Anonymität eingeschränkt wird, bitte ich dich nachfolgend einen individuellen Code zu erstellen. Der Code besteht aus folgenden Bausteinen:

Dein Geburtstag (TT) - Beispiel: 05
Dein Geburtsjahr (JJ) - Beispiel: 94
Erster Buchstabe des Vornamens der Mutter – Beispiel: K
Erster Buchstabe des Vornamens des Vaters – Beispiel: M

Der Beispiel-Code würde also so aussehen: 0594KM

Wichtig! Diesen musst du bei jedem Fragebogen erneut eingeben, also bitte merk ihn dir.

Bitte erstelle nun deinen individuellen Code.

Dein Geburtstag (TT) Dein
Geburtsjahr (JJ)
Erster Buchstabe des Vornamens der
Mutter
Erster Buchstabe des Vornamens des

Vaters

CODE



Geschlecht

☐ Weiblich

☐ Männlich

☐ Anderes



Alter

Ich bin Jahre alt



Was ist deine höchste abgeschlossene Ausbildung?

- ☐ Pflichtschule
- ☐ Lehrabschluss
- ☐ Fachschule
- ☐ Matura/Abitur
- ☐ Fachhochschule/Universität



Nationalität

☐ Deutsch

☐ Österreichisch

☐ Andere



Familienstatus

☐ Ledig

☐ Verheiratet

☐

Geschieden

 Verwittwet



Anzahl der Kinder

☐ 0

☐ 1-2

☐ 3-4

☐ 5 oder mehr



**Hast du bereits Vorerfahrungen mit
Meditation und/oder
Entspannungsübungen?**

Sehr
wenig
oder
gar
nicht



Eher
wenig



Mittel



Eher
viel



Sehr
viel





Wie viele Stunden arbeitest du etwa im Durchschnitt pro Woche für deinen Job (inkl. Überstunden etc.)?

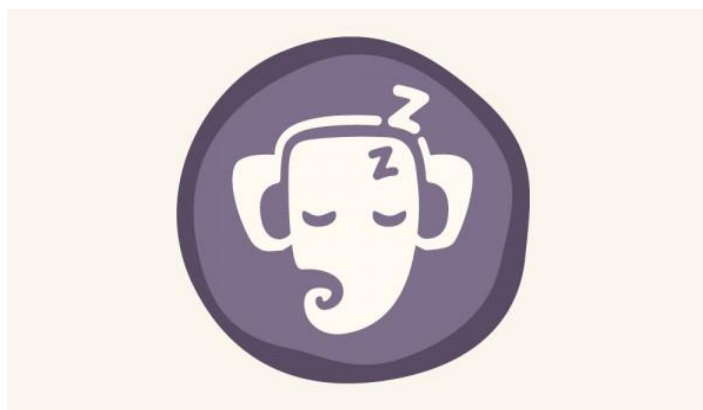
☐ <10h

☐ 10-20h

☐ 21-30h

☐ 31-40h

☐ >40h



**Wie lange bist Du bereits in deinem
aktuellen Job für diese Organisation
tätig?**

 Jahre



In welcher Position arbeitest du hauptberuflich?

- ☐ unselbstständig beschäftigt
- ☐ selbstständig beschäftigt

Seite 13



Hast du Führungsverantwortung?

- ☐ Ja
- ☐ Nein



In welchem Berufsfeld arbeitest du?



Die folgenden Fragen beziehen sich auf deine üblichen Schlafgewohnheiten und zwar nur während der letzten Woche. Deine Antworten sollten möglichst genau sein und sich auf die Mehrzahl der Tage und Nächte beziehen. Beantworte bitte alle Fragen

Wie lange hat es während der letzten vier Wochen gewöhnlich gedauert, bis du nachts eingeschlafen bist?

In Minuten

Wieviele Stunden hast du während der letzten vier Wochen pro Nacht tatsächlich geschlafen?

(Das muss nicht mit der Anzahl der Stunden, die du im Bett verbracht hast, übereinstimmen.)

Effektive
Schlafzeit
(Stunden) pro
Nacht



Wie oft hast Du während der letzten vier Wochen schlecht geschlafen?

Kreuze bitte für jede der folgenden Fragen die für dich zutreffende Antwort an.
Beantworte bitte alle Fragen.

Weil du nicht innerhalb von 30 Minuten einschlafen konntest?

Gar nicht	Weniger als einmal pro Woche	Ein- der zweimal pro Woche	Dreimal oder häufiger pro Woche
☐	☐	☐	☐

Weil du mitten in der Nacht oder früh morgens aufgewacht bist?

Gar nicht	Weniger als einmal pro Woche	Ein- der zweimal pro Woche	Dreimal oder häufiger pro Woche
☐	☐	☐	☐

Weil du aufstehen musstest, um zur Toilette zu gehen?

Gar nicht	Weniger als einmal pro Woche	Ein- der zweimal pro Woche	Dreimal oder häufiger pro Woche
☐	☐	☐	☐

Weil du Beschwerden beim Atmen hattest?

Dreimal

Weil du husten musstest oder laut
geschnarcht hast?

	Weniger als	Ein- der	Dreimal oder
Gar nicht	einmal pro Woche	zweimal pro Woche	häufiger pro Woche
☐	☐	☐	☐

Weil dir zu kalt war?

	Weniger als	Ein- der	Dreimal oder
Gar nicht	einmal pro Woche	zweimal pro Woche	häufiger pro Woche
☐	☐	☐	☐

Weil dir zu warm war?

	Weniger als	Ein- der	Dreimal oder
Gar nicht	einmal pro Woche	zweimal pro Woche	häufiger pro Woche
☐	☐	☐	☐

Weil du schlecht geträumt hast?

	Weniger als	Ein- der	Dreimal oder
Gar nicht	einmal pro Woche	zweimal pro Woche	häufiger pro Woche
☐	☐	☐	☐

Weil du Schmerzen hattest?

	Weniger als	Ein- der	Dreimal oder
Gar nicht	einmal pro Woche	zweimal pro Woche	häufiger pro Woche
☐	☐	☐	☐

Aus anderen Gründen?

Gar nicht	Weniger als einmal pro Woche	Ein- der zweimal pro Woche	Dreimal oder häufiger pro Woche
☐	☐	☐	☐



**Wie würdest du insgesamt die Qualität
deines Schlafes während der letzten vier
Wochen beurteilen?**

- ☐ Sehr gut
- ☐ Ziemlich gut
- ☐ Ziemlich schlecht
- ☐ Sehr schlecht

Wie oft hast du während der letzten vier Wochen
Schlafmittel eingenommen (vom Arzt
verschriebene oder frei verkäufliche)?

- ☐ Während der letzten vier Wochen gar
nicht
- ☐ Weniger als einmal pro Woche
- ☐ Einmal oder zweimal pro Woche
- ☐ Dreimal oder häufiger pro Woche

Wie oft hattest Du während der letzten vier Wochen Schwierigkeiten wachzubleiben, etwa beim Autofahren, beim Essen oder bei gesellschaftlichen Anlässen?

- ☐ Während der letzten vier Wochen gar nicht
- ☐ Weniger als einmal pro Woche
- ☐ Einmal oder zweimal pro Woche
- ☐ Dreimal oder häufiger pro Woche

Hattest du während der letzten vier Wochen Probleme, mit genügend Schwung die üblichen Alltagsaufgaben zu erledigen?

- ☐ Keine Probleme
- ☐ Kaum Probleme
- ☐ Etwas Probleme
- ☐ Große Probleme

Schläfst du allein in deinem Zimmer?

- ☐ Ja
- ☐ Ja, aber ein Partner/Mitbewohner schläft in einem anderen Zimmer
- ☐ Nein, der Partner schläft im selben Zimmer, aber nicht im selben Bett
- ☐ Nein, der Partner schläft im selben Bett



Unten findest du eine Sammlung von Aussagen zu tagtäglichen Erlebnissen. Bitte gib mittels der Skala von 1 bis 6 an, wie häufig oder selten du derzeit jedes dieser Erlebnisse hast. Bitte antworte so, wie du diese Dinge derzeit wirklich erlebst und nicht, wie du denkst, dass du die Dinge erleben solltest. Bitte behandle jede Aussage unabhängig von den anderen Aussagen.

Tagtägliche Erlebnisse

Ich könnte ein Gefühl haben und mir dessen erst später bewusst werden.

Immer Sehr häufig Manchmal Selten Sehr selten Nie

☐ ☐ ☐ ☐ ☐ ☐

Ich zerbreche und verschütte Dinge aus Achtlosigkeit, ohne den Dingen Aufmerksamkeit zu schenken oder weil ich an anderes denke.

Immer Sehr häufig Manchmal Selten Sehr selten Nie

☐ ☐ ☐ ☐ ☐ ☐

Ich finde es schwierig, auf das
konzentriert zu bleiben, was im
gegenwärtigen Augenblick passiert.

Immer	Sehr häufig	Manchmal	Selten	Sehr selten	Nie
☐	☐	☐	☐	☐	☐

Ich neige dazu, schnell zu gehen, um dort

hin zu kommen, wo ich hingeh, ohne
darauf zu achten, was ich unterwegs
erlebe.

Immer	Sehr häufig	Manchmal	Selten	Sehr selten	Nie
☐	☐	☐	☐	☐	☐

Ich neige dazu, Gefühle körperlicher
Anspannung oder Unwohlsein nicht
wahrzunehmen, bis sie meine
Aufmerksamkeit vollständig in Anspruch
nehmen.

Immer	Sehr häufig	Manchmal	Selten	Sehr selten	Nie
☐	☐	☐	☐	☐	☐

Ich vergesse den Namen einer Person
fast sofort nach dem er mir das erste Mal
gesagt wurde.

Immer	Sehr häufig	Manchmal	Selten	Sehr selten	Nie
☐	☐	☐	☐	☐	☐

Es sieht so aus als würde ich
„automatisch funktionieren“, ohne viel
Bewusstsein für das, was ich tue.

Immer	Sehr häufig	Manchmal	Selten	Sehr selten	Nie
☐	☐	☐	☐	☐	☐

Ich hetze durch Aktivitäten, ohne wirklich
aufmerksam für sie zu sein.

Immer	Sehr häufig	Manchmal	Selten	Sehr selten	Nie
☐	☐	☐	☐	☐	☐

Ich bin so auf das Ziel Konzentriert, das ich erreichen möchte, dass ich den Kontakt dazu verliere, was ich hier und jetzt tue, um dieses Ziel zu erreichen.

Immer	Sehr häufig	Manchmal	Selten	Sehr selten	Nie
☐	☐	☐	☐	☐	☐

Ich erledige Aufträge oder Aufgaben automatisch, ohne mir bewusst zu sein,

was ich tue.

	Sehr			Sehr	
Immer	häufig	Manchmal	Selten	selten	Nie
☐	☐	☐	☐	☐	☐

Ich bemerke wie ich jemandem nur mit einem Ohr zuhöre, während ich gleichzeitig etwas anderes tue.

	Sehr			Sehr	
Immer	häufig	Manchmal	Selten	selten	Nie
☐	☐	☐	☐	☐	☐

Ich fahre zu Orten wie von einem „Autopiloten gesteuert“ und frage mich dann, wie ich dort hingekommen bin.

	Sehr			Sehr	
Immer	häufig	Manchmal	Selten	selten	Nie
☐	☐	☐	☐	☐	☐

Ich bemerke, dass ich gedankenverloren der Zukunft oder der Vergangenheit nachhänge.

	Sehr			Sehr	
Immer	häufig	Manchmal	Selten	selten	Nie
☐	☐	☐	☐	☐	☐

ich merke, wie ich Dinge tue, ohne auf sie zu achten.

	Sehr			Sehr	
Immer	häufig	Manchmal	Selten	selten	Nie
☐	☐	☐	☐	☐	☐

EFFECTIVENESS OF

Immer	häufig	Manchmal	Selten	selten	Nie
☐	☐	☐	☐	☐	☐

Seite 19



Die folgenden Fragen beziehen sich auf deine Schlafhygiene. Bitte beziehe dich in deinen Antworten auf die letzte Woche. Deine Antworten sollten möglichst genau sein und sich auf die Mehrzahl der Tage und Nächte beziehen. Beantworte bitte alle Fragen.

Ich schlafe tagsüber zwei Stunden oder länger.

Nie
Selten
Manchmal
Häufig
Immer

Ich gehe von Tag zu Tag zu anderen Zeiten zu Bett.

Nie
Selten
Manchmal
Häufig

Immer

Ich stehe von Tag zu Tag zu unterschiedlichen Zeiten auf.

Nie
Selten
Manchmal
Häufig
Immer

Ich mache innerhalb einer Stunde vorm zu Bett gehen Sport bis zum Schwitzen.

Nie
Selten
Manchmal
Häufig
Immer

Ich bleibe zwei oder dreimal die Woche länger im Bett als ich sollte.

Nie
Selten
Manchmal
Häufig
Immer

Ich konsumiere Alkohol, Tabak oder Koffein innerhalb von 4 Stunden vorm zu Bett gehen.

Nie
Selten
Manchmal
Häufig
Immer

Ich mache etwas, das mich vorm zu Bett gehen aufwecken könnte (z.B. Videospiele spielen, das Internet benutzen, putzen).

Nie
Selten
Manchmal
Häufig
Immer

Ich gehe gestresst, wütend, aufgeregt oder nervös zu Bett.

Nie
Selten
Manchmal
Häufig
Immer

Ich verwende mein Bett für andere Dinge außer schlafen oder Sex (z.B. fernsehen, lesen, essen oder lernen).

Nie
Selten
Manchmal
Häufig
Immer

Ich schlafe in einem ungemütlichen Bett (z.B. schlechte Matratze oder schlechtes Kissen, zu viele oder zu wenig Decken).

Nie
Selten
Manchmal
Häufig
Immer

Ich erledige wichtige Aufgaben vor der Schlafenszeit (z.B. Rechnungen zahlen, Zeitplanungen oder lernen).

Nie
Selten
Manchmal
Häufig
Immer

Ich denke, plane oder Sorge mich, wenn ich im Bett bin.

Nie
Selten
Manchmal
Häufig
Immer

Seite 20



Die folgenden Wörter beschreiben unterschiedliche Gefühle und Empfindungen. Lies bitte jedes Wort und kreuze dann in der Skala neben jedem Wort die Intensität an. Du hast die Möglichkeit, zwischen fünf Abstufungen zu wählen. Gib bitte an, wie du dich in den letzten Tagen gefühlt hast.

Wenn du an dich selber denkst und daran, wie du dich normalerweise fühlst, in welchem Maß fühlst du dich im allgemeinen...

Verärgert

Sehr stark
Ziemlich
Mäßig
Ein wenig
Gar nicht

Feindselig

Sehr stark
Ziemlich
Mäßig
Ein wenig
Gar nicht

Wach

Sehr stark
Ziemlich
Mäßig
Ein wenig
Gar nicht

Beschämt

Sehr stark
Ziemlich
Mäßig
Ein wenig

Gar nicht

Angeregt

Sehr stark
Ziemlich
Mäßig
Ein wenig
Gar nicht

Nervös

Sehr stark
Ziemlich
Mäßig
Ein wenig
Gar nicht

Entschlossen

Sehr stark
Ziemlich
Mäßig
Ein wenig
Gar nicht

Aufmerksam

Sehr stark
Ziemlich
Mäßig
Ein wenig

Gar nicht

Ängstlich

Sehr stark
Ziemlich
Mäßig
Ein wenig
Gar nicht

Aktiv

Sehr stark
Ziemlich
Mäßig
Ein wenig
Gar nicht

Seite 21



Diese Reihe von Fragen hat als Zielsetzung zu erfahren, wie du dich in Bezug auf deine Lebensqualität fühlst. Bitte denke hierfür an dein Leben im Laufe der letzten zwei Wochen.

**Hast du ausreichend Energie für dein
tägliches Leben?**

☐ Immer

☐ Meistens

☐ Mittelmäßig

☐ Ein wenig

☐ Gar nicht

**Hast du genug Geld um deine
Bedürfnisse zu befriedigen?**

☐ Immer

☐ Meistens

☐ Mittelmäßig

☐ Ein wenig

☐ Gar nicht

**In welchem Maß bist du bezüglich der
folgenden Bereiche zufrieden?**

In welchem Maß bist du Zufrieden mit...

...deiner Gesundheit?

Sehr Weder Un- Sehr
 zufrieden Zufrieden noch zufrieden unzufrieden



...dir selbst?

Sehr Weder Un- Sehr
 zufrieden Zufrieden noch zufrieden unzufrieden



...deiner Fähigkeit, die Aufgaben des
 täglichen Lebens zu erledigen?

Sehr Weder Un- Sehr
 zufrieden Zufrieden noch zufrieden unzufrieden



...deinen Beziehungen zu anderen
 Menschen ?

Sehr Weder Un- Sehr
 zufrieden Zufrieden noch zufrieden unzufrieden



...deinem Lebensort?

Sehr Weder Un- Sehr
 zufrieden Zufrieden noch zufrieden unzufrieden



Alles zusammen gesehen, bist du
zufrieden mit deinem Leben im
Allgemeinen?

Sehr Weder Un- Sehr
zufrieden Zufrieden noch zufrieden unzufrieden

Wie viele Male hast du das Gefühl
gehabt, dass du die wichtigen Dinge
deines Lebens nicht mehr unter
Kontrolle hast?

- ☐ Nie
- ☐ Fast nie
- ☐ Manchmal
- ☐ Ziemlich oft
- ☐ Sehr oft

Wie viele Male hast du das Gefühl gehabt, dass
du dem, was dir passiert, nicht mehr gewachsen
bist?

- ☐ Nie
- ☐ Fast nie
- ☐ Manchmal
- ☐ Ziemlich oft
- ☐ Sehr oft

Wie würdest du deine Lebensqualität
einschätzen?

- ☐ Sehr gut
- ☐ Gut
- ☐ Mittelmäßig
- ☐ Schlecht
- ☐ Sehr schlecht
- ☐ WEIß NICHT

**Alles zusammen gesehen, wie würdest
du sagen, wie du dich dieser Tage
fühlst? Bist du...**

- ☐ Sehr glücklich ?
- ☐ Glücklich ?
- ☐ Weder glücklich noch unglücklich ?
- ☐ Unglücklich ?
- ☐ Sehr unglücklich ?
- ☐ WEIß NICHT

Seite 22



Bitte gib an, wie du dich in den letzten vier
Wochen durchschnittlich nach einem
Arbeitstag gefühlt hast.

Es fällt mir schwer, am Ende eines Arbeitstages abzuschalten.

Immer
Häufig
Manchmal
Selten
Nie

Am Ende eines Arbeitstages fühle ich mich total kaputt.

Immer
Häufig
Manchmal
Selten
Nie

Meine Arbeit führt dazu, dass ich mich am Ende eines Arbeitstages ziemlich erschöpft fühle.

Immer
Häufig
Manchmal
Selten
Nie

Nach dem Abendessen fühle ich mich meistens noch einigermaßen fit.

Immer
Häufig
Manchmal
Selten
Nie

Ich finde meistens erst am zweiten arbeitsfreien Tag etwas Ruhe.

Immer
Häufig
Manchmal
Selten
Nie

Es fällt mir schwer, mich in den Stunden nach Feierabend zu konzentrieren.

Immer
Häufig
Manchmal
Selten
Nie

Ich kann mich nur schwer auf Andere einlassen, wenn ich selber gerade erst nach Hause gekommen bin.

Immer
Häufig
Manchmal
Selten
Nie

Ich brauche im allgemeinen mehr als eine Stunde, um mich nach Feierabend wieder völlig zu regenerieren.

Immer
Häufig
Manchmal
Selten
Nie

Wenn ich nach Hause komme, will ich einige Zeit in Ruhe gelassen werden.

Immer
Häufig
Manchmal
Selten
Nie

Häufig bin ich so abgespannt, dass ich es einfach nicht mehr schaffe, andere Dinge zu erledigen.

Immer
Häufig
Manchmal
Selten
Nie

Manchmal bin ich gegen Ende eines Arbeitstages so müde, dass meine Leistungsfähigkeit vermindert ist.

Immer
Häufig
Manchmal
Selten
Nie

Seite 23



Die folgenden Fragen beziehen sich auf

Wie zufrieden bist du mit deinem Job?

Alles in allem bin ich mit meinem Job zufrieden

stimme voll zu
stimme eher zu
unentschieden
stimme eher nicht zu
stimme gar nicht zu

Grundsätzlich mag ich meinen Job nicht

stimme voll zu
stimme eher zu
unentschieden
stimme eher nicht zu
stimme gar nicht zu

Grundsätzlich arbeite ich gerne hier

stimme voll zu
stimme eher zu
unentschieden
stimme eher nicht zu
stimme gar nicht zu

Vielen Dank für deine Teilnahme!

Deine Antworten wurden gespeichert, du kannst das Browser-Fenster nun schließen.

Bis zum nächsten Mal - der nächste Fragebogen folgt dann am 01.04.2019! :)

Bei Fragen oder Anmerkungen kannst du mich gerne jederzeit kontaktieren:
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