The Effect of the Mindfulness App 7Mind on Stress

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Abstract

Surveys found that students are increasingly stressed, display high stress levels and have difficulties in finding appropriate stress-reducing coping strategies. Therefore, the current study investigated the effect of the mindfulness app 7Mind on the stress levels of university students. For this research, a pretest-posttest experimental design was used, which included 47 participants who completed one mindfulness exercise a day from the 7Mind app for 7 days. To measure their stress levels, participants filled out a questionnaire before the intervention and after using the mindfulness app for 7 days that contained the Perceived Stress Scale, which measured their current stress levels. The results indicate a decrease in stress levels after using the mindfulness app 7Mind for one week ($t(46) = 4.98$, $p < .001$, 95% CI [2.51, 5.92], mean difference = 4.21). This provides a deeper understanding of the relation between mindfulness apps and stress, adding to the growing body of research about stress management for university students.

The Effect of the Mindfulness App 7Mind on Stress

Students are increasingly stressed. A German survey showed that the stress levels of students had almost doubled in 2023 compared to 2015 (Student Stress Germany 2015 and 2023 Statista, 2015). Increased stress levels of university students are a trend reflected in multiple countries, as well as in the Netherlands, where more than 60% of all university students reported feeling excessively stressed in 2020 (Slimmen et al., 2022). Potential reasons for increased stress levels are sleep deprivation, pressure to have good grades or lack of time for family and friends (Damiano et al., 2021). While high stress levels can harm the general wellbeing of students, lower stress levels can also enhance performance and heighten motivation (Gibbons et al., 2010). The World Health Organisation (WHO) defines stress as "a state of worry or mental tension caused by a difficult situation. Stress is a natural human response that prompts us to address challenges and threats in our lives." (World Health Organization, 2023). Consequences of high stress levels for students can range from physical to mental health problems, two examples being depression and high blood pressure, as high stress levels in students often remain over a longer period of time (Schraml et al., 2012). High stress levels over a longer timeframe can also make self-care difficult for most students. This means that most students struggle to maintain a routine in which they eat regular meals or sleep enough for example in stressful periods (Amy Elizabeth Manley et al., 2024). To reduce stress levels, different interventions exist, including mindfulness interventions.

This research defines mindfulness as the experience of psychological freedom acquired when one's attention is quiet, without focusing on any particular point of view (Martin, 1997). Additionally, mindfulness involves observing one's own thoughts and feelings by being in the present moment, without attributing any judgment to them (Kabat-Zinn, 2016). Nevertheless, mindfulness is characterised by a lack of a clear and homogenous definition (Anālayo, 2019). Mindfulness can be beneficial for health in several ways. First, mindfulness can reduce symptoms of depression or anxiety, as well as improve physical illnesses, for example, illnesses associated with chronic pain (Laurie & Blandford, 2016). Secondly, mindfulness generally helps people to be more present in the moment and actively focus on the individual experience. By focusing on their experience, people tend to become calmer and reduce their stress levels (Keng et al., 2011). Third, mindfulness is associated with increased psychological well-being due to being more present in the moment. Therefore, it is related to reducing stress by staying in the present (Laurie & Blandford, 2016). Lastly, mindfulness is associated with the reduction of overall perceived stress and using more adaptive strategies to cope with stress (Weinstein et al., 2009). Specifically for students, mindfulness is connected to a decrease in stress and an

increase in positive health perceptions, as well as in healthy behaviours like healthy exercise and eating habits (Roberts & Danoff-Burg, 2010). For these reasons, students who experience high levels of stress could potentially benefit from a mindfulness intervention.

Nevertheless, there are various reasons, such as a substantial workload or lack of time, why many students struggle to find the time to engage in stress-reducing interventions, often resorting to cigarettes, drugs, or alcohol for self-medication (Lahtinen et al., 2021). Also, studies found that most students report spending time with family and friends to cope with high stress levels, and some students use exercise to lower their stress levels (Pierceall & Keim, 2007). These findings highlight that most students struggle to find a healthy coping mechanism due to a lack of flexibility in time and location of most in-person mindfulness interventions (Danilewitz et al., 2018).

Using technology, for instance, an app, would provide students with the necessary flexibility to participate in mindfulness interventions, enabling them to complete the exercises whenever they have the time and from any location (Steinhubl et al., 2013). Moreover, technology can overcome some of the barriers associated with in-person mindfulness interventions. For example, technology provides anonymity and personalisation, allowing individuals to choose which exercise to do based on their needs (Flett et al., 2020). There is a wide range of mindfulness apps available, ranging from apps offering only breathing exercises to apps that also include workouts, body scans and workshops for different kinds of problems. For example, a study found that the mindfulness app Calm lowered stress levels in students while also decreasing sleep disturbances (Huberty et al., 2019). Headspace is also a well-known mindfulness app that shows a decrease in stress, anxiety and depression for students (Pierce et al., 2024). Therefore, mindfulness apps appear to be a promising tool to help cope with stress, but their effectiveness needs to be studied for different mindfulness applications, specifically for 7Mind, which remains unstudied until now.

7Mind is a mindfulness app that offers audio-guided meditations and aims to integrate mindfulness into people's daily lives (Hahn et al., 2024). While it is known from research that apps like Headspace and Calm show improvement in well-being and a reduction of stress levels in students (Huberty et al., 2019), the effect of the app 7Mind remains fully unstudied. Unlike Calm or Headspace, 7Mind shows benefits, such as its free mindfulness exercises, that make this app important to be studied separately. Compared to, for example, Headspace, where a subscription is needed to be able to perform the exercises, 7Mind offers both an advanced meditation program that costs money and free meditation exercises. Another benefit of the 7Mind app is that it offers specific courses for students, for example, for concentration or exam

anxiety. Furthermore, the application concentrates on breathing exercises, which makes it less overwhelming for people performing mindfulness exercises without any prior knowledge.

While showing important benefits, the effectiveness of this app on stress levels remains unknown. Compared to other interventions that used different mindfulness apps, this study is more structured by choosing for the participants which exercises to perform. Therefore, the current research uses the app 7Mind to study its effect on stress. Consequently, the study aims to obtain first insights into the possible effects of the mindfulness app 7Mind in reducing the stress levels of university students. The hypothesis is that after using the 7Mind app for 7 days, the stress levels of students will be lower than before using the app. The goal of this study was to ameliorate stress management for students by assessing the possible effects of a mindfulness intervention that could help students lower their stress levels.

Methods

Design

To study the effect of the mindfulness app 7Mind on stress levels in a student population, the current study used a quantitative research design, more specifically, a single-arm, open-label, pretest-posttest experimental design. First, participants had to fill out a baseline questionnaire that measured their perceived stress level. Next, participants used the 7-day free trial of the mindfulness app 7Mind once a day during the week, following a plan computed by the researchers that outlined which exercises the participants needed to do on which day (Appendix B). After using the app for a week, participants filled out the same questionnaire on perceived stress and one extra item. The item consisted of a question where the participants reported whether they completed all mindfulness exercises from the plan or not. In this research, the dependent variable is the perceived stress level, and the independent variable is the time point, in this case, pre- and post-intervention. Additionally, ethical approval was obtained on 20.03.2025 from the Ethics Committee BMS from the Domain of Humanities and Social Sciences (request number 250526) (Appendix C).

Participants

In this research, a sample of 47 participants has been recruited through snowball and convenience sampling. The desired sample size was 34 participants, which was computed using an a priori type of power analysis with the app G*power. To compute the desired sample size, an effect size of 0.5 was assumed, as well as a 0.05 α error probability. The total sample size of 34 participants was computed, as well as the actual power of 0.81. (Appendix D). All participants were university students. For the recruitment of participants, both researchers

posted an Instagram story on their personal Instagram accounts, promoting the study. Additionally, participants were recruited through convenience sampling, with both researchers contacting university students from their personal networks who fulfilled the eligibility criteria. These were, for example, friends or fellow students. Furthermore, recruitment from the University of Twente was extended to the University of Bielefeld in Germany, where a participant proposed to share the study with fellow students. For this, the study was shared via the university's email system. The inclusion criteria were that participants needed to be between 18 and 27 years old, had to be enrolled at a university, and needed to have sufficient English knowledge to be able to complete all mindfulness exercises. Additionally, participants needed to possess a smartphone to be able to use the app.

Materials

7Mind

7Mind is a mindfulness app that offers mindfulness courses for different topics, for example, sleep, mental and physical health. Additionally, the app has different mindfulness courses for different levels, ranging from beginner to advanced users (Hahn et al., 2024). The app 7Mind is available on the Google Play Store as well as the Apple App Store, offering a mix of free courses and courses that are only available through a paid subscription, making parts of the app accessible to everyone.

Perceived Stress Scale

The Perceived Stress Scale (PSS) (Cohen et al., 1983) was used to assess the perceived stress level of participants both before and after the intervention. This scale is a 10-item questionnaire that evaluates the degree to which an individual perceives his life as being stressful in the previous month (Cohen, 1994). An example question is: In the last month, how often have you been upset because of something that happened unexpectedly? All items are measured on a 5-point scale, ranging from never (=0) to very often (=4). In previous studies, adequate concurrent validity of the PSS was reported when correlating with the Daily Stress Inventory (Pearson's $r = .62$, $p < .001$) (Machulda et al., 1998). For the current study, validity was found to be significant for both the pre-PSS ($\alpha = .87$) and the post-PSS ($\alpha = .84$). To assess the stress level, the total score will be calculated by adding all item scores and reversing some items (items 4, 5, 7 and 8). The table displays how the PSS scores were interpreted (Table 1) (Cohen, 1994).

Table 1

Interpretation of PSS scores

PSS Score Range	*Total Score*	*Perceived Stress Level*
0-7	Much lower than average	Very low
8-11	Slightly lower than average	Low
12-15	Average	Average
16-20	Slightly higher than average	High
21 and over	Much higher than average	Very high

One-week plan

A seven-day plan (Appendix B) was designed for the participants, which entailed a description of the mindfulness exercises that needed to be completed each day. It was computed to make sure that all participants performed the same exercises, so that the conditions of the intervention were the same for all participants. One week was chosen to increase participation and decrease dropout rates, which was often the problem when the intervention took a few weeks (Huberty et al., 2019). The plan consisted of one mindfulness exercise, ranging from 5 to 17 minutes from the app 7Mind each day. The decision of which exercises to include was made based on the length of the exercise (not more than 20 minutes) and that the exercises focused on lowering stress levels and enhancing wellbeing, which was mentioned in the description of each exercise. One exercise a day was fixed to make sure that participants had a chance to complete all exercises without any problems due to a lack of time. For the exercises, an ideal time to perform them was included in the plan, which served as a guideline for the participants to know when to do which exercises. This ideal time differed between morning and evening, and it was chosen by taking into consideration the length of the exercise and the topic of the exercise. For example, relaxation was recommended for the evening, while motivation for the day was recommended for the morning. The ideal time was a recommendation, but participants could still choose when to complete the exercises.

Procedure

Data collection took place from 21 March 2025 to 23 May 2025. First, participants filled in an informed consent in Qualtrics that included a description of the purpose of the study and information on the voluntary nature of participation. Also, participants were informed that their data would be handled confidentially and that they had the right to withdraw at any time during the study without negative consequences. Only participants who consented were forwarded to the questionnaire via Qualtrics, entailing the PSS and questions about demographic

information, including age, gender, and nationality, as well as self-assessment of how often they currently do mindfulness exercises in their everyday life.

Furthermore, participants filled in their email addresses so they could receive the exercise plan and all other relevant links. Participants were provided with links for the app on both the Apple App Store and Google Play Store. After completing the pretest questionnaire, participants received a one-week plan via email that described which mindfulness exercises needed to be done on which day to ensure consistency in the usage of mindfulness exercises across participants (Appendix B). To ensure data security, all personal information was pseudonymized with codes, and the data was stored only on servers from the University of Twente. When participants downloaded the app, they had to create an account using their email addresses, and they were automatically able to use the 7-day free trial. Afterwards, they could select the exercise they had to do each day and then complete the exercise. After using the app for seven days, participants filled out a post-experiment questionnaire that was sent to them via email. To match the participants' responses across both questionnaires, the pseudonymized codes from both questionnaires were used. People who reported not completing all exercises, not consenting to the usage of their data or not fitting the inclusion criteria were excluded from data analysis; their responses were deleted and not taken into consideration when analysing the data.

Data Analysis

The data gathered within this study was analysed using the program RStudio (Appendix A), and participant characteristics (mean, range, standard deviation and frequencies) and PSS scores were computed. Before analysing the data, the data was prepared and cleaned, where participants with missing data were excluded from data analysis, and outliers were checked. To assess whether stress levels changed after using the mindfulness app, a paired sample t-test was conducted, which compared pre- and post-experimental test scores of the PSS. A threshold of $p < 0.05$ was used to analyse the significance of all statistical tests, and plots were computed to visualise the pre-post difference in stress levels. Additionally, assumptions for parametric testing were conducted to determine whether the data met parametric assumptions. The data met parametric assumptions; therefore, parametric testing could be conducted. Lastly, a Cohen's d was used to calculate the effect size.

Results

Descriptive statistics

The final analysis included 47 participants (14 males, 32 females, 1 other) who were aged between 18 and 27 years old, with a mean age of 21.91 and a standard deviation of 1.53. The ethnicity of the participants included 38 German and 4 French people. Other ethnicities that could be found were Chinese (*n* = 1), Turkish (*n* = 1) and Peruvian (*n* = 1), as well as German and French (n = 1) (Table 2). The drop-out rate of this study was 35.6%, with 73 participants who completed the pretest questionnaire and 47 participants who could be included in the final analysis. Most participants who could not be included in the final analysis had not completed the posttest questionnaire or had not completed all the mindfulness exercises of the plan.

Table 2

Final participant descriptives

Characteristic	n
Total participants	47
Gender	
Male	14
Female	32
Other	1
Ethnicity	
German	38
French	4
Chinese	1
Turkish	1
Peruvian	1
German and French	1

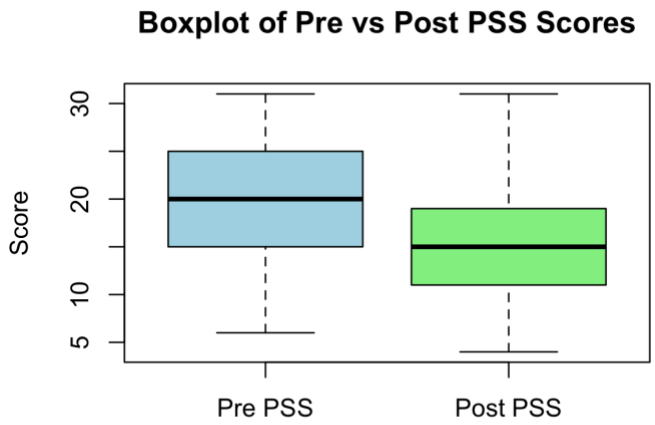
Moreover, descriptive statistics of the Perceived Stress scores, both for the pretest and posttest, were computed. The Perceived Stress score of the pretest had a mean of 19.40 and a standard deviation of 6.76. The score of the PSS for the pretest ranged from 6 to 31, compared to a range between 4 and 31 for the posttest. The Perceived Stress score of the posttest had a mean of 15.10 with a standard deviation of 5.91.

Parametric assumptions test

Before beginning with data analysis, it was tested whether the data met parametric assumptions. In order to check if the assumption of normality was met, a Shapiro-Wilk test was conducted once for both pre- and post-questionnaires. The results showed that the assumption of normality was met ($p > 0.05$) with a p-value of 0.54 for the difference between the PSS scores of the pre- and post-test questionnaire. Furthermore, the boxplot showed that no extreme outliers could be found (Figure 1). Because all assumptions were met, parametric testing could be conducted.

Figure 1

Boxplot of the PSS Scores Pre and Post-Test

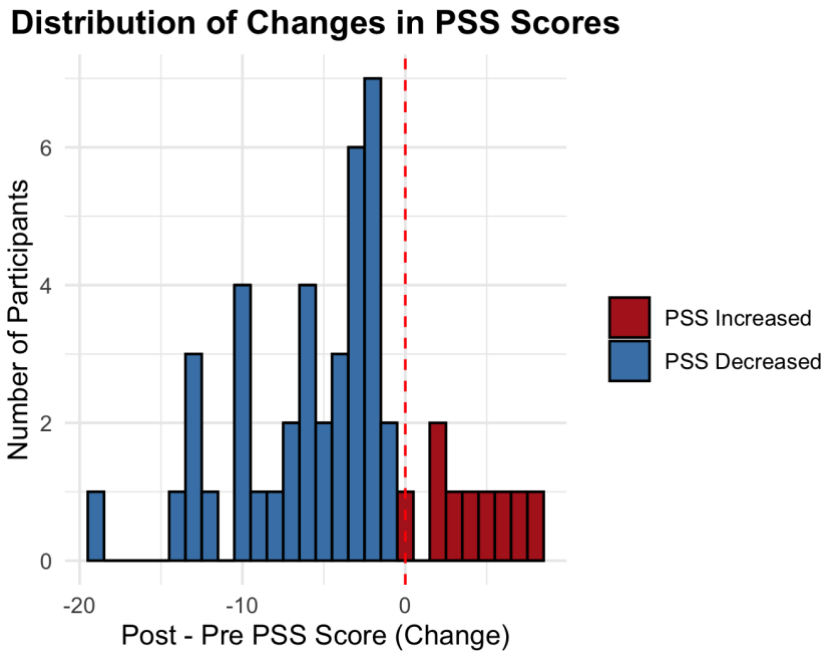


Paired sample t-test and Cohen's d

The paired sample t-test showed a significant difference in the perceived stress scores when comparing the scores before and after using the mindfulness app for 7 days ($t(46) = 4.98$, $p < .001$, 95% CI [2.51, 5.92], mean difference = 4.21) (Appendix A). These results suggest that, on average, the scores were 4.21 points lower after using the mindfulness app than before the intervention. In addition to the paired sample t-test, Cohen's d was computed to analyse the effect size. The analysis showed a medium effect size ($d = 0.66$, 95% CI [0.37, 0.95]). This indicates that there is a medium effect size when comparing the PSS scores before and after the usage of the mindfulness app. In order to visualise the difference in the PSS scores pre- and post-intervention, a plot (Figure 2) was computed to show the scores of the changes in the PSS scores before and after the intervention.

Figure 2

PSS scores before and after the intervention



Note: The blue side shows the participants where the PSS score decreased, and the red side indicates the participants where the PSS score increased.

Discussion

The aim of this study was to analyse the effect of the mindfulness app 7Mind on the stress levels of university students. The hypothesis was that the stress levels would be lower after using the app for one week. The results show that indeed the average perceived stress level of students statistically significantly decreased when comparing the PSS before and after using the app 7Mind for one week. While for some participants the stress score increased, most people reported a decrease in perceived stress. An explanation for this could be that mindfulness exercises help people be calmer and handle stressful situations better, for example, upcoming exams (Ramasubramanian, 2016). Furthermore, mindfulness exercises have been proven to reduce the hormonal effects of stress responses, which could lead to lower stress levels (Chand & Sazima, 2024). Likewise, mindfulness is associated with lowering physiological effects that are linked with stress, for example, high blood pressure or elevated cortisol levels (Kirk et al., 2023). This means that mindfulness can reduce the perceived stress level as people feel fewer physiological responses to stress. Consequently, the results of this study are in accordance with the outcomes of existing literature stating that mindfulness exercises, for this study specifically exercises from the app 7Mind, could lower the stress level of university students. The findings

of this study add to the existing literature by extending it to the possible effect the app 7Mind could have on stress, specifically for university students.

Time Span of Mindfulness Intervention

One interesting finding was that an effect for engaging with the app 7Mind was found after using the app for one week. This is surprising because previous research often used mindfulness interventions that lasted between 4 and 10 weeks due to the argument that mindfulness is a skill that needs time to be practiced in order to develop the full potential of mindfulness (Chand & Sazima, 2024) and most participants reported in the pretest questionnaire that they never did any mindfulness exercises prior this intervention. While the current research lasted only one week, a decrease in perceived stress level can already be observed for most participants. The topic of the timespan needed to experience the benefits of mindfulness is understudied. Some studies argue that a minimum of four weeks of consistent practice is needed to observe a measurable reduction in stress levels (Economides et al., 2018). The current study shows that one week of daily mindfulness practice may already be beneficial in the reduction of the participants' stress levels. A recommendation for future research is therefore to keep the one-week time span for the intervention but to add a post-questionnaire after 4 weeks, for example, so that the long-term effect of mindfulness exercises from the 7Mind app on stress can be analysed.

Confounding Variables

While the current study showed a decrease in perceived stress level after completing the mindfulness exercises, it is unclear if other factors influenced the decrease in perceived stress level. Because participants filled in the PSS questionnaire, which is specifically constructed to measure perceived stress level, confounding variables that could influence how high students' stress levels are were not analysed. Research suggests that students' stress levels can be influenced by different aspects of the student's lives. For example, academic requirements, like a high workload, or other life factors like relationships with family and friends or eating and sleeping habits, can have an important impact on the student's stress level (Ross et al., 1999). It is possible that these factors also influenced the participants' stress levels and could have led to a decrease in stress level that is not necessarily caused only by the mindfulness exercises the participants performed. A recommendation for future research is therefore to add another questionnaire that would analyse specific factors that could influence stress levels or add a question in the pre and post questionnaire where the student has to describe in his own words what is making him feeling stressed to be able to control for other factors that could influence the change in the student's stress levels. An example from previous research could be the Stress

Overload Scale (SOS) (Economides et al., 2018). Moreover, other factors that need to be analysed in future research are sleep, self-esteem and general wellbeing.

Limitations

Due to the sampling methods of this research, the generalizability of the findings is limited. The high drop-out rate, which could be explained due to the use of a per-protocol (PP) analysis limited the generalizability of the findings even further. Additionally, the usage of convenience and snowball sampling led to most people being either German or French. Consequently, a recommendation for future research would be to add an incentive so that students feel more motivated to participate in the study, as well as to complete all parts of the study. A downside of adding an incentive would be that the risk for bias would be higher, as participants could only participate because of the incentive and not because they want to complete mindfulness exercises (Göritz, 2006). This could lead to participants giving false responses only to receive the incentive. A different sampling method, for example, simple random sampling, could be used to ensure that a wider range of ethnicities are included in the study (Nghi Tran Tin & Hung Phu Bui, 2024). Or, future research could include all participants, even the ones who only completed a part of the intended exercises.

Another important point could be to see if different exercises have a different impact on the stress levels. In the current study, a fixed schedule was provided for the participants with exercises they needed to complete. Future research could let the participants decide which exercises they want to complete themselves. If participants can choose the exercises based on their personal needs, the effect on stress could potentially change. This means that the current results cannot state any effect of the app 7Mind itself on stress, but it analysed the potential effect of exercises specifically designed for stress and wellbeing of the app 7Mind on stress.

Another limitation of this study was that it was designed as a single-arm, open-label pre-test-post-test experimental design, making the effect of mindfulness on stress unclear. To solve this problem, future research could add a control group that does not complete the mindfulness exercises. It could then be analysed how their stress levels change. This could help to understand if any confounding variables changed the participants' stress levels or if the mindfulness exercises are the reason for the decrease in students' stress levels. Furthermore, an inclusion criterion could be added that states that only people with a high stress score on the PSS should be included to better analyse the influence of mindfulness on stress. This would lead to specifically analysing the effect of mindfulness on high stress levels, which is what has negative implications for students and therefore needs to be lowered, for example with mindfulness exercises.

Practical Applications

The study indicated that mindfulness exercises may help decrease students' stress levels. For practical applications, this would mean that, for example, students could use the app and integrate mindfulness into their daily life to help lower their stress levels. Developers of mindfulness applications could think about designing a course in their mindfulness app that is specifically designed for the needs of students, such as a course that could support students in managing their stress levels.

Conclusion

The current study analysed the effect that the mindfulness app 7Mind has on the stress levels of students. The findings indicate that, on average, stress levels are lower after completing mindfulness exercises daily for 7 days with the app 7Mind. While the perceived stress level is lower, the generalizability of the findings remains unclear due to, for example, a high dropout rate. Lastly, it remains unclear if the decrease in stress levels is due to the mindfulness exercises or if it could be influenced by other factors that were not accounted for in this study. Therefore, while showing a decrease in students' stress levels, further research is needed in order to analyse if the effect is generalizable and if it is influenced by other factors in a student's life.

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AI statement

During the preparation of this work the author used the free version of Grammarly in order to check the grammar of the written text. After using this tool/service, the author reviewed and edited the content as needed and takes full responsibility for the content of the work.

Appendix A

R-script

```
#prequestionnaire
#data cleaning
#change name
Pre_test <- Bachelor_Thesis_May_23_2025_11_57
#delete from pretest dataset the column 1 to 17 (columns not needed for data analysis)
Pre_test<- Pre_test[, -c(1:17)]
#delete the first rows that only explain things and delete the first participant (me)
Pre_test<- Pre_test[-c(1, 2, 3), ]
#delete participants that did not complete the whole questionnaire
Pre_test<- Pre_test[-c(67, 69, 70, 71), ]
#delete participants that are not students
Pre_test<- Pre_test[-c(30, 42, 46), ]
#delete columns from the mental health contiunuum questionnaire
Pre_test<- Pre_test[, -c(20:33)]
#change scale of PSS
Pre_test <- Pre_test %>%
  mutate(across(10:19, ~ recode(.,`1` = 0, `2` = 1, `3` = 2, `4` = 3, `5` = 4)))
#postquestionnaire
#data cleaning
#change name
Post_test <- Post_test_May_23_2025_11_58
#delete from pretest dataset the column 1 to 17 (columns not needed for data analysis)
Post_test<- Post_test[, -c(1:17)]
#delete the first rows that only explain things and delete the first participant (me)
Post_test<- Post_test[-c(1, 2, 3), ]
#delete participants that did not complete the whole questionnaire
Post_test<- Post_test[-c(30, 36 , 37, 38), ]
#delete participants that are not students
Post_test<- Post_test[-c(13, 20 ), ]
#delete participants that did not complete the whole mindfulness exercises
Post_test<- Post_test[-c(25, 28 , 35, 36, 38, 44, 45, 49, 50, 51, 58), ]
#delete columns from the mental health contiunuum questionnaire
```

```
Post_test<- Post_test[, -c(19:32)]
#change scale of PSS
Post_test <- Post_test%>%
  mutate(across(9:18, ~ recode(.,`1` = 0, `2` = 1, `3` = 2, `4` = 3, `5` = 4)))
#clean both datasets so they include the same participants
#delete participants that did not fill in both tests in the post test
Post_test<- Post_test[-c(28), ]
Post_test <- Post_test [-c(26  ), ]
#delete participants that did not fill in both tests in the pre test
Pre_test<- Pre_test[-c(2, 7, 9, 28, 29, 30, 35, 40, 41, 43, 45, 53, 54, 56, 58, 59, 61  ),]
Pre_test<- Pre_test [-c(42  ), ]
#descriptive statistics
#age_pre
mean_age <- mean(as.numeric(Pre_test$Age), na.rm = TRUE)
print(mean_age)
#age_post
mean_age_post <- mean(as.numeric(Post_test$Age), na.rm = TRUE)
print(mean_age_post)
#mean of age of both questionnaires (participants changed age, birthday?)
a <- 21.91489
b <- 22.3617
mean_value <- mean(c (a, b))
print(mean_value)
#check parametric assumptions
PSS_scores_Pre_and_Post_26_05_25 <- PSS_scores_Pre_and_Post_26_05_25 %>%
  rename(pre_PSS = 2,post_PSS = 3)
#scale of measurement
str(PSS_scores_Pre_and_Post_26_05_25)
#normality of the difference between both scores
PSS_scores_Pre_and_Post_26_05_25$diff                                    <-
PSS_scores_Pre_and_Post_26_05_25$post_PSS                                 -
PSS_scores_Pre_and_Post_26_05_25$pre_PSS
qqnorm(PSS_scores_Pre_and_Post_26_05_25$diff)
qqline(PSS_scores_Pre_and_Post_26_05_25$diff, col = "red")
```

```
hist(PSS_scores_Pre_and_Post_26_05_25$diff, main = "Histogram of Differences", xlab =
"Difference (Post - Pre)")
#Shapiro-Wilk test for normality
shapiro.test(PSS_scores_Pre_and_Post_26_05_25$diff)
#no extreme outliers
boxplot(PSS_scores_Pre_and_Post_26_05_25$pre_PSS,
PSS_scores_Pre_and_Post_26_05_25$post_PSS,
      names = c("Pre PSS", "Post PSS"),
      main = "Boxplot of Pre vs Post PSS Scores",
      ylab = "Score",
      col = c("lightblue", "lightgreen"))
#paired sample t-test
t.test(PSS_scores_Pre_and_Post_26_05_25$pre_PSS,
PSS_scores_Pre_and_Post_26_05_25$post_PSS, paired = TRUE)
#cohen's d
cohen.d(PSS_scores_Pre_and_Post_26_05_25$post_PSS,
PSS_scores_Pre_and_Post_26_05_25$pre_PSS, paired = TRUE)
#visualizing the difference between pre and post PSS scores
df_long <- PSS_scores_Pre_and_Post_26_05_25 %>%
 mutate(id = row_number()) %>%
 pivot_longer(cols = c(pre_PSS, post_PSS),
              names_to = "Time",
              values_to = "PSS")
ggplot(df_long, aes(x = Time, y = PSS, group = id)) +
 geom_line(aes(color = as.factor(id)), size = 0.8, show.legend = FALSE) +  # colored lines per
participant
 geom_point(color = "black", size = 3) +  # black points
 theme_minimal() +
 labs(title = "Pre vs Post PSS Scores",
      x = "Time", y = "PSS Score") +
 theme(
   plot.title = element_text(hjust = 0.5, face = "bold", size = 16),
   axis.title = element_text(size = 14),
   axis.text = element_text(size = 12)
```

```
  )
#plot for the difference between the scores
library(dplyr)

ggplot(PSS_scores_Pre_and_Post_26_05_25, aes(x = diff_PSS)) +
  geom_histogram(binwidth = 1, aes(fill = diff_PSS < 0), color = "black") +
  scale_fill_manual(values = c("firebrick", "steelblue"),
                    labels = c("PSS Increased", "PSS Decreased")) +
  geom_vline(xintercept = 0, linetype = "dashed", color = "red") +
  theme_minimal() +
  labs(title = "Distribution of Changes in PSS Scores",
       x = "Post - Pre PSS Score (Change)",
       y = "Number of Participants",
       fill = "") +
  theme(plot.title = element_text(hjust = 0.5, face = "bold"))
#descriptive statistics
#participant descriptives
#age
mean_age <- mean(as.numeric(Pre_test$Age), na.rm = TRUE)
print(mean_age)
sd_age <- sd(as.numeric(Pre_test$Age), na.rm = TRUE)
print(sd_age)
#gender
freq_gender <- as.data.frame((table(Pre_test$Gender)))
#ethnicity
freq_ethnicity <- as.data.frame((table(Pre_test$Ethnicity)))
#pre test mean and SD
mean_pre <- mean(as.numeric(PSS_scores_Pre_26_05_25$...2), na.rm = TRUE)
print(mean_pre)
SD_pre <- sd(as.numeric(PSS_scores_Pre_26_05_25$...2), na.rm = TRUE)
print(SD_pre)
#post test mean and SD
mean_post <- mean(as.numeric(PSS_scores_Pre_and_Post_26_05_25$post_PSS), na.rm =
TRUE)
```

```
print(mean_post)
SD_post <- sd(as.numeric(PSS_scores_Pre_and_Post_26_05_25$post_PSS), na.rm = TRUE)
print(SD_post)
library(psych)

# cronbach's alpha for Pre-PSS
library(psych)
pss_items_pre <- Pre_test[, c("PSS_PH_1 _1", "PSS_PH_2 _1", "PSS_PH3 _1",
                    "PSS_PSE_4 _1", "PSS_PSE_5 _1", "PSS_PH_6 _1",
                    "PSS_PSE_7 _1", "PSS_PSE_8 _1", "PSS_PH_9 _1",
                    "PSS_PH_10 _1")]
alpha(pss_items)
str(pss_items)
pss_items[] <- lapply(pss_items, function(x) as.numeric(trimws(x)))
str(pss_items)
alpha(pss_items)
alpha(pss_items, check.keys = TRUE)

#cronbachs alpha for Post-PSS
pss_items_post <- Post_test[, c("PSS_PH_1 _1", "PSS_PH_2 _1", "PSS_PH3 _1",
                    "PSS_PSE_4 _1", "PSS_PSE_5 _1", "PSS_PH_6 _1",
                    "PSS_PSE_7 _1", "PSS_PSE_8 _1", "PSS_PH_9 _1",
                    "PSS_PH_10 _1")]

alpha(pss_items_post)
str(pss_items_post)
pss_items_post[] <- lapply(pss_items_post, function(x) as.numeric(trimws(x)))
str(pss_items_post)
alpha(pss_items_post)
alpha(pss_items_post, check.keys = TRUE)
```

Appendix B

Mindfulness one-week plan

Appendix C

Application for ethical approval

UNIVERSITY OF TWENTE.

Humanities & Social Sciences (HSS)

250526 APPLICATION FOR ETHICAL REVIEW

Application nr:	250526	**Intro form:**	8 - Introduction
Researcher:	Roth, A.B-PSY)	**Middle form:**	7 - Humanities & Social Sciences (HSS)
Supervisor:	Serno, C. (BMS-PGT)	**Outro form:**	5 - Submission
Reviewer:	ten Klooster, P.M. (BMS-PHT)		
Status:	Positive advice by reviewer		
Date of application:	19-03-2025 16:24		
Application version:	1		

0. GENERAL

0.1. Personal details

Student/employee number: s3006336
Initials: A.
First name: Alicia
Last name: Roth
Email : a.roth@student.utwente.nl
Education/department: n/a
Faculty: n/a
Study field: B-PSY
Study level: BSC
Faculty/service department: BMS (Selected for this application)

0.2. Project title

The effect of the mindfulness app 7Mind on wellbeing and stress

0.3. Summary

With technology becoming increasingly used in psychological interventions, this study aims to analyse the effect of the mindfulness app 7mind on stress reduction and the well-being of students. The study is structured in a pre-post design. Students will use the app for a week by doing mindfulness exercises from the app 7Mind and fill out questionnaires before and after the week they use the mindfulness app. These theses will, therefore, analyse what effect the usage of the app 7mind has on the student's perceived stress level and general well-being.

0.4. Start date (estimated) and end date (estimated) for your research project

Start date: 20-03-2025
End date: 04-07-2025

0.5. If additional researchers (students and/or staff) will be involved in carrying out this research, please name them: [Please include full name and email]

Full name	Email
Louise Christine Rohde	l.c.rohde@student.utwente.nl

0.6. In which context will you conduct this research?

Bachelor's thesis

0.6.1. Please select your supervisor (if applicable)

Serno, C. (BMS-PGT)

0.7. Please select an ethics committee

Humanities & Social Sciences (HSS)

1. GENERAL

1.1. Is this research project closely connected to a research project previously assessed by the Domain Humanities and Social Sciences (HSS) or BMS Ethics Committee?

No/Unknown

1.2. Are external organization(s) involved which commission or provide funding for your research?

No/Unknown

2. RESEARCH INVOLVING EXISTING DATA OR DOCUMENTS (SECONDARY DATA)

2.1. Will you be using existing (secondary) data pertaining to individuals, groups or organizations?

No

3. RESEARCH INVOLVING THE COLLECTION OF NEW DATA

3.1. Does your research project involve direct or indirect contact with human participants?

Yes

3.2. Will you be collecting new data from individuals acting as respondents, interviewees, participants or informants?

Yes

3.3. Can the research project be considered as medical research?

No

4. RESEARCH POPULATION

4.1. Please provide a brief description of the intended research population(s)

University students between 18 and 27 years old from Germany and the Netherlands.

4.2. How many individuals will be involved in your research?

We aim to approximately have 100 participants.

4.3. Which characteristics must participants/sources possess in order to be included in your research?

Participants must be university students between 18 and 27 years old. The inclusion criteria will be good proficiency in English because all mindfulness exercises the participants must complete are in English, as well as the questionnaires used. An exclusion criterion will also be if participants do not use the app for one week daily. We will provide participants with an exercise schedule that they will need to follow. People under 18 will be excluded, as well as people over 27. The focus will be on people from the Netherlands and Germany, but people from other countries will not be excluded. Additionally, people will need to have a smartphone on which they can download the mindfulness app.

4.4. Does this research specifically target minors (<16 years), people with cognitive impairments, people under institutional care (e.g. hospitals, nursing homes, prisons), specific ethnic groups, people in another country or any other special group that may be more vulnerable than the general population?

No

4.5. Are you planning to recruit participants for your research through the BMS test subject pool, SONA?

No

5. METHODS OF DATA COLLECTION

5.1. Please describe how you collect your data?

Participants will be recruited through snowball sampling and convenience sampling through contacts and via an Instagram story. First, participants will receive, through Qualtrics, an informed consent form that includes a description of the purpose of the study, and information on the voluntary nature of participation. Also, participants will be informed that their data will be handled anonymously and that they have the right to withdraw at any given time during the study without negative consequences. Participants will also provide their email addresses to get all the information and links needed to complete the participation in the study. Only participants who will consent will be forwarded to the questionnaire via Qualtrics, including the Perceived Stress Scale, the Mental Health Continuum Short form and questions about demographic information, including age, gender and nationality. After filling out the pretest questionnaire, participants will receive the one-week plan that describes which mindfulness exercises need to be done on which day to ensure consistency in the usage of mindfulness exercises across participants. When participants download the app, they have to create an account with an email, and they automatically can use the 7-day free trial. They can then select in the app the exercise they have to do each day and then complete the exercise. After using the app for one week, participants will fill out a post-experiment questionnaire that includes a question about whether participants completed all mindfulness exercises and both scales to measure their well-being and stress levels after the intervention. The post-experiment test will be sent to participants with the PDF of the exercise plan after they fill in the pre-test questionnaire, and then a reminder will be sent if they forget to fill in the post-test questionnaire. Participants will need to fill in a unique code on both the pre-and post-test so they can be matched to the participants. The unique code will consist of the last two letters of their last name and the first two letters of their first name. Regarding data manipulation, the data will be cleaned in the case of incomplete responses, missing data and outliers will be checked. Also, participants who do not meet the inclusion criteria or meet the exclusion criteria will be excluded from the data. The data will be transformed by computing well-being and stress level score and categorical variables will be changed to numercial formats.

6. BURDEN AND RISKS OF PARTICIPATION

6.1. Are there short-term or long-term burdens and/or risks to the participants?

No

6.2. Can the participants benefit from the research and/or their participation in any way?

Yes

By doing mindfulness exercises, participants can potentially increase their well-being and reduce their stress levels temporarily.

6.3. Will the study expose the researcher to any risks?

No

7. INFORMED CONSENT

7.1. Will you inform potential research participants completely about the aims, activities, burdens and risks of the research before they decide whether to take part in the research?

Yes

Participants will, before taking part in the study, read through a description of the study on Qualtrics that includes the aim and activities of the study.

7.2. Will you withhold information from participants and/or will you use deception?

No

7.3. Will you clearly inform research participants that they can withdraw from the research at any time without explanation/justification?

Yes

7.4. Who will provide the consent?

Participant

7.5. How will you obtain the voluntary, informed consent of the research participants (or their legal representatives in case of non-competent participants)?

Active, non-anonymous online consent will be used to obtain the voluntary, informed consent of the research participants.

7.6. Please upload your informed consent procedure/form here

Consent_form.pdf

7.7. Are the research participants somehow dependent on or in a subordinate position to the researcher(s) (e.g. students or relatives)?

No

7.8. Will participants receive any rewards, incentives or payments for participating in the research?

No

7.9. In the interest of transparency, it is a good practice to inform participants about what will happen after their participation is completed. How will you inform participants about what will happen after their participation is concluded?

Participants will receive the researcher's contact details, so that they can contact the researcher if they have questions/would like to know more.

8. CONFIDENTIALITY AND ANONYMITY

8.1. Does the data collected contain personal identifiable information that can be traced back to specific individuals/organizations?

No

9. DATA MANAGEMENT

9.1. I have read the UT data policy and/or info specific for students handling data.

Yes

9.2. I am aware of my responsibilities for the proper handling of data, regarding working with personal data, storage of data, sharing and presentation/publication of data.

Yes

10. OTHER POTENTIAL ETHICAL ISSUES/CONFLICTS OF INTEREST

10.1. Do you anticipate any other ethical issues/conflicts of interest in your research project that have not been previously noted in this application? Please state any issues and explain how you propose to deal with them. Additionally, if known indicate the purpose your results have (i.e. the results are used for e.g. policy, management, strategic or societal purposes).

The purpose of our results are of societal nature, specifically to bridge the research gap of the effect of the 7Mind app and to provide new research that can be expanded by testing the effect of other variables (except from well-being and stress).

11. CLOSURE

11.1. I have answered all questions truthful and complete

Yes

12. COMMENTS

No comments have been added to this application.

13. CONCLUSION

Status: Positive advice by reviewer

The BMS ethical committee / Domain Humanities & Social Sciences has assessed the ethical aspects of your research project. Based on the information you provided, the committee does not have any ethical concerns regarding this research project.

It is your responsibility to ensure that the research is carried out in line with the information provided in the application you submitted for ethical review. If you make changes to the proposal that affect the approach to research on humans, you must resubmit the changed project or grant agreement to the ethical committee with these changes highlighted.

Moreover, novel ethical issues may emerge while carrying out your research. It is important that you re-consider and discuss the ethical aspects and implications of your research regularly, and that you proceed as a responsible scientist.

Finally, your research may be subject to research compliance regulations such as the EU General Data Protection Regulation (GDPR), Codes of Conduct at UT related to (Scientific)Integrity or other codes of conduct that are applicable in your field, and the obligation to report a security incident (data breach or otherwise) at the UT.

20-03-2025 18:27

Appendix D

A priori type of power analysis with the app G*power