Investigating the Impact of a Multicomponent Positive Psychology Intervention on Students Mental Health: A Qualitative Interview Study on Experienced Mental Well-Being Changes

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Abstract

In recent years, there have been growing concerns about the declining mental health of students. Despite these growing concerns, there is still limited research conducted on the efficacy of positive psychological interventions (PPIs) delivered through mobile apps. Therefore, this study aims to evaluate the effectiveness of a positive psychological intervention named the Training in Positivity (TIP) app. In this study, the focus is on identifying the changes and causes of changes students experience in their mental health. To achieve this, semi-structured interviews were conducted with eighteen students. Then a thematic analysis was used, and five main themes emerged. These themes are positive changes in mental health status, negative changes due to app usage, stability in mental health status, perceived causes of change, and perceived importance of changes. The majority of participants noticed positive changes in their mental health. The main causes that contributed to these changes were engagement with the app, specific exercises, reflection on past behaviours and situations, introspection and external factors. However, there were also some participants who experienced negative effects due to the usage of the Training in Positivity (TIP) app, such as increased pressure and stress from app deadlines, feelings of shame for not completing or forgetting exercises and overanalysing of situations. In conclusion, although the experiences and extent of changes varied among participants the results found in this study still provided valuable information and insights into the effects of the Training in Positivity (TIP) app on student's mental health. Lastly, several limitations were identified, and recommendations for addressing these limitations were also discussed. To conclude, this study shows the impact that the Training in Positivity (TIP) app can have on students' mental health and explores the factors contributing to both the positive and negative effects experienced by students.

Introduction

There has been a growing concern in recent years about the decline in the mental health of students (Halat et al., 2023). The World Health Organization (WHO) defines mental health as "a state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn well and work well, and contribute to their community" (World Health Organization: WHO, 2022, Concepts in Mental Health section, para. 1). Some reasons for this decline might be that being a student comes with several academic and social challenges such as academic performance, pressure from peers, family expectations, relationships, financial stress and sleep deprivation (Al-Maskari et al., 2021). All of these challenges are having a significant impact on students which often leads to heightened stress levels, anxiety, and depressive symptoms (Haikalis et al., 2021). A recent psychiatric epidemiological cohort study that has been conducted in the Netherlands by Have et al. (2022) has found that 40% of young adults between the ages of 18 and 24 had a mental disorder in the previous year. And another study among Dutch students revealed that 97% of the students reported experiencing stress, with 54% describing the stress as very high (Koopman, 2022).

These results would be concerning at any stage in life, but since students are in their early adulthood it is cause for even more concern. As early adulthood is the time between the ages of 18 to mid-30s when individuals go through substantial personal development and major life transitions that will have significant consequences for the rest of their lives (Pusch et al., 2019). Due to these reasons, early adulthood has been identified to be one of the most effective times for interventions because habits and patterns are already being disrupted by ongoing lifestyle changes and personal development (Winpenny et al., 2020). In early adulthood, high levels of stress are very common and come with several short-term consequences such as poor academic performance including lower grades and being more likely to miss classes (Alkhawaldeh et al., 2023). As well as stomach aches, headaches, difficulty sleeping and concentrating, negative thoughts, dissociation and withdrawal from peer and social activities (Weinstein, 2022). However, when mental health conditions are untreated, they can lead to long term consequences such as social problems, unemployment, substance abuse, homelessness, suicidal thoughts and poor quality of life (Ibrahim et al., 2020). Therefore, it is important to address mental health during early adulthood when individuals are going through substantial personal development to increase the likelihood of achieving a more positive mental health state.

The main focus throughout the history of psychology has always been on studying negative mental states that lead to pathology and disorder (Khalid, 2017). This has given a thorough understanding and different treatment plans on how to address these issues that negatively impact people's well-being such as anxiety, stress, depression and other psychological conditions. This main focus on negative mental states has caused well-being to be associated with the absence of the three Ds: disease, disorder, and disability (Keyes et al., 2011). This traditional approach of only concentrating on pathology has taken up the interest of researchers in the psychology field for decades but is now slowly shifting towards the exploration of the influence of positive thinking such as improving an individual's overall well-being, mental health, resilience, life satisfaction and quality of life (Taherkhani et al., 2023; Ryff, 2013). As a result of putting the main focus on studying negative mental states, there has now arisen a significant gap in research about factors contributing to a thriving and fulfilling life. By only looking at pathology and placing the focus on identifying and treating problems, the potential benefits of promoting a positive mindset have been overlooked (Gautam et al., 2024). This gap has remained overlooked for many years.

However, in recent years, there has been a shift in the field of psychology moving towards a more holistic approach that recognizes the importance of positive emotions and behaviours (Phan et al., 2021). This shift has given rise to the field of positive psychology. Positive psychology is defined as

> "the scientific study of the strengths that enable individuals and communities to thrive. The field is founded on the belief that people want to lead meaningful and fulfilling lives, to cultivate what is best within themselves, and to enhance their experiences of love, work, and play" (Positive Psychology Center, n.d., para. 2).

Positive psychology focuses on understanding and promoting factors that contribute to individuals' overall well-being, happiness, and success (Magyar-Moe, 2009). Researchers within positive psychology are starting to explore the valuable outcomes of positive thinking, positive emotions, and positive behavioural qualities on both psychological and also physical well-being (Khalid, 2017).

For the newfound interest in the field of positive psychology, new kinds of interventions were created named positive psychological interventions (PPIs). Duan et al. (2022, "Introduction," para. 1) defines positive psychological interventions as "the general term for a series of practical application activities designed to strengthen positive resources". A wide range of studies have demonstrated the positive effects of positive psychology intervention (PPIs). For example, Carr et al. (2020) conducted a meta-analysis of PPI studies

involving participants from clinical and non-clinical child and adult populations and found that PPIs had significantly improved their wellbeing, quality of life, depression, anxiety and stress. Additionally, another study that focused exclusively on participants with clinical disorders also reported improvement in participants overall well-being, anxiety and depressive symptoms (Chakhssi et al., 2018).

Now that PPIs are gaining more interest and their effectiveness is proven, researchers are starting to look into different methods of administering these interventions. For instance, by utilizing mobile mental health apps. Mobile mental health apps are digital mental health services delivered through smartphones which provide either remotely facilitated or self-directed services in the domain of communication, self-monitoring, diagnosis, and treatment (Koh et al., 2022). For instance, a PPI named Zo Erg Nog Niet (ZENN) was created by the University of Twente to promote feelings of gratitude and reflect on the positive aspects of life. Through taking photos, keeping a (digital) diary and receiving daily quotes (De App | Project Zenn, n.d.). Kloos et al. (2022) tested this PPI and found it effective in improving mental health.

Recently another positive psychological intervention in the form of an app called Training in Positivity (TIP) has been developed by the University of Twente. The TIP app consists of six PPIs, which focus on joy, confidence in yourself, confidence in the future, kindness, resilience and connection (University of Twente, 2022). There has already been some research conducted in the student population about the effectiveness of the TIP app. Prior research has looked at the effect of the TIP app on the variables 'positive reframing' and 'ability to adapt'. The results showed that the TIP app did not have a significant affect regarding these variables (Jansen, 2022). Another study explored the effect of the TIP app on depression and anxiety which concluded that there is a mild to minimal decrease in depression and anxiety after using the app (Baars, 2022). Lastly, the impact of the app on students' well-being and self-compassion was also investigated and no significant effect was found (Winkelmann, 2022). However, these studies are all quantitative pilot studies therefore in-depth insight into the experienced changed of these studies is lacking.

The advantages of using mental health apps are that it is cost-effective, anonymous, increase access to mental health care in rural areas and are an easily scalable solution to addressing the mental health treatment gap (Chandrashekar, 2018). Some disadvantages have also been identified such as mental health apps struggle to engage users for a longer period (De Beurs et al., 2017), there is little oversight or regulation (Koh et al., 2022), lack of human interaction (Stiles-Shields et al., 2017) and that there are privacy and data concerns (Zhou et

al., 2019). Even though the use of mental health apps and PPIs have been growing rapidly during the last years there is still limited understanding regarding the efficacy or effectiveness of apps explicitly employing positive psychology (Marshall et al., 2020). All in all, mental health apps and PPIs have been shown promising potential for the treatment of mental health issues but there are still improvements to be made and more research into their effectiveness must be done (Chandrashekar, 2018).

In general, researchers have shown that positive psychological interventions can be used to promote an individual's overall well-being, mental health and life satisfaction and reduce symptoms of anxiety, stress and depression (Carr et al., 2020). However, there is a need for further research to evaluate if using mobile apps for positive psychological interventions is an effective solution to promote mental health in students. Therefore, this study aims to address this gap in the current literature, more specifically to answer the research questions "What are the changes students experience in their mental health after using the TIP app?" and "What is causing the changes students are experiencing in their mental health?". By conducting a qualitative empirical study using interviews, this study aims to contribute valuable insight into the expanding field of positive psychology and help students overcome the academic and social challenges of early adulthood.

Methods

Design

In this study, students were interviewed using an adaptation of the Client Change Interview (Elliott et al., 2001). This is a semi-structured interview method that asks the participant about their experience with the therapy. For instance, the participants are asked if they noticed any changes, and if so, what kind of changes and to which factors they ascribe these changes (Acke et al., 2023). The interviews were conducted by two different researchers using the same semi-structured interview scheme. The main themes of the interview questions revolved around the changes that participants noticed after using the app, as well as their perception of what caused these changes. All the interview questions aimed to discover as much information about the student's views, perceptions and opinions about the app. By using a qualitative research approach, the students were able to express their views, perceptions and thoughts in their own words and give detailed and comprehensive data.

Participants

The first approach to recruiting participants was using a platform named SONA, which is a recruitment and management platform used by the University of Twente's psychology department. Hereby students can sign up for studies and earn SONA credits, a student needs to earn at least 15 SONA credits to be able to graduate. The second approach to recruiting participants was by looking for participants in the personal networks of friends, family and acquaintances of the researchers. Lastly, participants were recruited via advertising this study in the first, second and third-year psychology WhatsApp groups of the University of Twente.

There were some inclusion criteria for the participants such as being able to proficiently speak and read Dutch since the TIP app is only available in Dutch, being a student, and between the ages of 18 and 30 years old. This research aimed to include 25 participants which would be split in half with another researcher for the conducting of the interviews. However, the final sample size ended up being twenty-one participants, with eighteen participants eventually being interviewed. Among these eighteen participants, three identified as male and fifteen as female. All participants had a Dutch nationality and were students enrolled in various universities or higher professional education institutions in the Netherlands.

Procedure

After recruiting and inclusion, participants received an informed consent form. The participants were required to complete the consent form which was hosted on Qualtrics before starting the study. The consent form made sure that the participants understood the information given about the study, that the study is completely voluntary and gave permission to use the data obtained in the study. Then the participants were sent instructions to download the TIP app. The participants could use the app on their phone, iPad or computer. Before being able to start the exercises the participants first had to make an account and use the download code they received to gain access to the app.

During the intervention, participants had the opportunity to ask questions and some were asked about their progress and experiences up to that point. After a month when most participants had finished the intervention, the participants were sent a text or email to plan an online interview. For these interviews, the platform Microsoft Teams and Zoom was used. Before each interview, the participants were asked again to give consent to record and transcribe the interview. When consent was given the recording started. The interviews were

transcribed using the live transcription tool that is built into teams. Then the transcriptions were checked, and adjustments were made since this tool is not always reliable. After conducting, describing and collecting all the interviews the data analysis could start.

The Training in Positivity app

The TIP app consists of six different themes that focus on joy, confidence in yourself, confidence in the future, kindness, resilience and connection. Each separate theme will take about 3 days to complete which makes it an 18-day-long intervention, after completing the 3 days a new theme will open with a new exercise. Each exercise takes about 10-15 minutes a day to complete. Each theme in this intervention featured a unique exercise. The six exercises included in this intervention are the three good things exercise, asking friends or family about personal strengths, imagining your ideal future self, practicing self-compassion during difficult times, finding positive results that come from setbacks and performing acts of kindness towards others. The theme consists of an introduction video with some general information about the theme, then an explanation of the new exercise, and after the exercise is completed, they can do a voluntary listening exercise. Before and after each theme some questions were asked to give the user insights into potential effects of the exercises, as can be seen in Figure 1. This was done by comparing the scores obtained before and after finishing the exercises.

Figure 1. Visualization of TIP-App

Data analysis

The interview data was analysed using thematic analysis. Thematic analysis is one of the most popular qualitative analysis methods used and focuses on recognizing, identifying and reporting significant patterns found in the data, as well as offering a thorough insight into the participants' experiences, perspectives, and thoughts (Jansen, 2023). An inductive approach was used that involves analyzing the data without predetermined categories, theories and frameworks. Using this inductive approach enables the researcher to be guided by the data itself and devise the codes and themes from the interviews (Thomas, 2006).

To analyse the data, the 6 phases of thematic analysis provided by Braun and Clarke (2006) were used. The first phase involves getting familiar with the data by doing multiple readings of the transcribed interviews and making initial notes, such as noting down that the participants seem to be more focused on the positive aspects of their lives or report feeling calmer and less stressed. Following this, the initial codes were created for example in this case 'enhanced focus on positivity' and 'stress reduction'. This was done while keeping in mind the research questions to search for relevant information. After the initial codes were established, the next phase started which was searching for themes. The difference between the initial codes generated and the themes is that the themes are broader. This phase involved searching for commonalities between the codes to be able to group them together to form overarching themes. Then the next phase started by reviewing all the themes again to make sure that all the codes within same theme were coherent and distinct from the other themes. After completing that phase, the last phase began defining and naming the themes by capturing the essence of each theme. For instance, codes such as 'enhanced focus on positivity' and 'stress reduction' were coded under the theme 'positive changes in mental health'.

Results

During the analysis of the eighteen interviews, five themes and 19 subthemes emerged to quantify the information gathered from the interviews, which are outlined in Table 1. Three main themes have been defined to answer the first research question related to potential experienced changes in mental health. These main themes are "Positive changes in mental health status", "Negative changes due to app usage" and "Stability in mental health status". For these three themes, a total of ten subcodes were defined. For the second research question related to causes of these potential experienced changes in mental health two main

themes were identified "Perceived causes of changes" and "Perceived importance of changes". These two themes consisted of nine subcodes.

Table 1

Overview of Themes

Theme	Subtheme
1. Positive changes in mental health status	Enhanced focus on positivity
	Increased self-awareness
	Overall improvement
	Increased mindfulness
	Stress reduction
2. Negative changes due to app usage	Pressure and stress due to app deadlines
	Feelings of shame for not completing or forgetting an exercise
	Overanalysing of situations
3. Stability in mental health status	Consistent emotional state
	Unchanged mental health
4. Perceived causes of change	Engagement with the app
	Specific exercises
	Introspection
	Reflection on past behaviours and situations
	External factors
5. Perceived importance of changes	Significant improvement
	No significant improvement
	Short term benefits
	Welcome changes but not necessary

Positive changes in mental health status

The first theme "Positive changes in mental health status" refers to the improvements the participants noticed in their overall well-being after using the app. In total five subthemes were created for this theme.

The first subtheme "Enhanced focus on positivity" was mentioned by the majority of participants. The participants talked about experiencing a notable shift towards a more

positive mindset. They reported more actively focusing and searching for positive aspects of their lives, developing feelings of gratitude and becoming more optimistic. For example, participant 8 said:

> I think it's just really important to, yeah, think about the positive things in life and that you're experiencing. And even if it is a really small thing, that just umm… kind of reliving, it can really help making you feel better.

Furthermore participant 5 said about the positivity exercises:

> Well, because of using the app you get umm like confronted with it. Yeah, like you have to fill it in. So, you, you're like, forced. Well not really forced, but like forced to look at positive things from the day.

The second subtheme is "Increased self-awareness". This subtheme emerged because participants mentioned that the exercises made them reflect more on their thoughts, emotions, and behaviours and better understand themselves, as mentioned by participant 16: "I think for me, I just learned to appreciate the little things better and just be more aware of what I'm feeling and why I'm feeling it."

Furthermore, participant 18 described the process of reflection underlying the increased self-awareness:

> Umm I mean in general, it makes you kind of evaluate yourself as a person. Umm like who you are? What's important to you? What you're good at, what you're not as good at that kind of thing. I think that it is valuable to self-reflect umm more often.

The third subtheme "Overall improvement" was in different aspects of their lives they described being able to handle stress better, having a greater appreciation of their relationships with friends and family, having more positive feelings about themselves and others and feeling better in general. When participant 4 was asked a week into the intervention how it was going with the app she said: "I actually think it is helping me I am just feeling better in general and more energized to start the day."

The fourth subtheme "Increased mindfulness" mostly came forward when the participants started talking about the listening exercises. Nevertheless, opinions about this exercise were divided as some found the listening exercises tedious. However, at the same time, others found that this meditation exercise helped them become more aware of the present moment and helped them calm down after having a stressful day. When participant

14 was asked if she experienced any changes in her way of behaving, feeling or thinking she said:

> Well, umm considering like the mindfulness trainings, I really umm how do you say… had benefits from that... Yeah, in one sentence it will be that I act more mindful. So not only during the sessions and the actual mindful thinking, but also doing umm studying mindful and thinking when I'm studying, I'm only studying. Or when I'm cooking, I can be texting, listening to music. I'm doing five things at the same time, but sometimes I think that's also what my therapist before told me. Just like once a week, put everything aside.

The last subtheme for this theme is "Stress reduction". Participants reported a noticeable reduction in stress levels and associated symptoms. When asked about what the participants think caused the changes in their overall mental well-being participant 17 said:

> Well, umm what I would say is yes, that I umm noticed some changes. I got a little bit less stress and it gave me a nice routine to do before bed, because I always did it before I went to sleep.

Later when asked how important she would rate these changes she said:

> Umm, I would say very, because I have quite some stressful things ahead of me like graduating and maybe like, you know, moving and a new internship and a new country. So, I think this will, yeah, really help me to get through it better. To handle stressful things better. (participant 17)

Negative changes due to app usage

The second theme "Negative changes due to app usage" refers to adverse effects or outcomes experienced by the participants as a result of their engagement with the app. Three different subthemes are created for this theme.

The first two subthemes are "Pressure and stress due to app deadlines" and "Feelings of shame for not completing or forgetting an exercise". Participants reported experiencing heightened pressure and stress as a result of the deadlines of the exercises in the app. This is because the exercises had to be completed before midnight or you would not be able to start the next exercise the following day. They expressed feelings of shame and self-criticism

when they were unable to complete or forgot to do the exercise. When participant 1 was sent a message to schedule the interview she said: "I am so sorry I am not finished with the app yet I was just really busy with work and school but that is no excuse of course I should have made the time but is that a big problem?" After twenty minutes she texted again saying: "I really hope that I did not mess up your study I am so sorry please don't hate me."

The participants in this study were given eighteen days to complete the intervention and do all the exercises because of deadlines related to the project. However, normally participants would also be advised to do the exercises daily, but then the expectation and possible perceived pressure to perform the exercises every day by the researcher would not be there. They would even be able to do the exercises only when they felt they would be helpful for them therefore these negative feelings of pressure, stress and shame could also be because of the different circumstances created because this is a research study. While several students expressed their feelings of pressure and stress due to the deadlines participant 7 mentioned the app to be a source of stress:

I did find it a bit stressful sometimes to actually manage to do it every single day. The fact that umm you had the deadline kind of at midnight and the fact that you had to do it was kind of adding more stress in my life. So, I would say that was more of a bad change.

The third subtheme is the "Overanalysing of situations". Some participants reported that certain exercises made them engage in more reflecting and overanalysing of their thoughts and behaviours. This occasionally resulted in more negative feelings, rumination on difficult situations and self-criticism:

Umm I think before using the app I already kind of overanalysed everything I did or where it came from. Umm so I might did that a bit more, but not in an extreme way. Maybe reflecting more on everything that you do kind of makes it harder. Yeah, like you're overanalysing everything even more, which might feel a little bit umm maybe sometimes negative towards yourself, but yeah, like why did I do that or stupid I did that or something like that. So yeah, in that case, it might be a bit negative sometimes. (participant 6)

Stability in mental health status

The third and last theme related to this research question is "Stability in mental health status". This refers to the maintenance of a consistent emotional and psychological state over time. It suggests that a participant's mental health stayed nearly unchanged, with no significant positive or negative fluctuations or disruptions in their mental health due to engagement with the app. For this theme, two subthemes emerged, as mentioned in Table 1.

The first subtheme is "Consistent emotional state". The participants reported having a very stable emotional state with not many fluctuations and being able to cope with stressors and challenges they would encounter during the day. One example that was mentioned by participant 10: "Umm I always feel kind of the same like I am an umm autopilot, well maybe not autopilot but umm just not very happy but also not very sad you know just umm yeah the same."

The second subtheme is "Unchanged mental health". Most participants said that their mental health status remained almost unchanged when comparing it to their mental health before and after using the app. Some participants mentioned some small improvements in their mental health such as focusing more on positive things and more self-awareness but did not see a big shift in their overall mental health: "I feel like I have become a bit more conscious about it, but I don't necessarily think it really improved my mental health in any way. (participant 7)

Perceived causes of change

Regarding the second research question related to perceived causes of mental health changes, two different themes were created. The first theme is the "Perceived causes of change", which is the participant's subjective perception of what contributed to the changes they experienced in their mental health.

The first subtheme created for this theme is "Engagement with the app". Most of the time participants said that actively using the app was the main cause of their experienced change. However, found it hard to identify exactly which aspects of the app helped them become more self-aware, mindful, less stressed, and overall improved their well-being. They did mention that the app gave them a sense of accountability and an easy, cheap and accessible way of working on improving their mental health. Participant 3 explained how the app made her think and act upon things that actually make her happy:

Umm, I feel like I started thinking a lot more about how I want to spend my time with

friends. Yeah, like umm before I already made sure that I hang out with friends at

least once a week or so, but now I think about it a bit more actively because I have realized that through the app that being with friends is really good for my happiness. I've always really enjoyed spending time with friends, but I don't think I would have thought about it more actively if I hadn't used the app.

The second subtheme is "Specific exercises". As mentioned above, most participants were not sure what exercises were effective in improving their mental health. However, several participants did mention that the first exercise the three good things exercise was one of their favourites and helped them to focus more on positive aspects of their life. This exercise increased their feelings of happiness and gratitude which in return had beneficial effects on their mental health: "Umm I think umm the first couple of exercises where you focus on the positives and the appreciation of the positives were very helpful, made me feel better while doing them as well as after doing them." (participant 18).

The third subtheme is "Introspection". By doing the exercises, participants said they became more aware of their thoughts, feelings, emotions, strengths and weaknesses. But not only of their own, but also of others and made them more kind towards them. This was put into practice in the last exercise in which they were encouraged to perform a kind action towards others. Introspection also increased participant's awareness and helped them identify pitfalls, triggers and unhelpful patterns in themselves. This newfound information can help them even after completing the app to improve their mental health further. For example, participant 9 mentioned:

Some of the later modules I am not sure which number, umm but some really focused on the people close around you. And that made me kind of aware of me not always making the most time for those around me like my grandparents and my parents umm... Which also brought on some feelings of like maybe shame and like, oh, I should do better umm so that wasn't always pleasant, but it is good to be aware, I guess. So, yeah.

The fourth subtheme is "Reflection on past behaviours and situations". Some participants experienced some discomfort and negative feelings associated with reflecting on past behaviours and situations, but overall found it a helpful tool. The exercises encouraged them to be more self-compassioned, let go of feelings of guilt and find a positive outcome to

certain behaviours and situations. By not only focusing on the negative feelings associated with the occurred behaviour or situation but by looking more at the positive aspects. For example, the lessons learned from past mistakes and looking at them from different perspectives made the participants able to let go of some of the negative feelings and thoughts they were holding onto:

> Umm maybe I think mostly looking differently at certain situations because normally with umm things that I felt, I failed or I did wrong, I usually feel really bad about that. But then with the app, I started to look at it more in a way of what is positive about it or why it happened and not like drag myself down because I felt like I did something wrong. (participant 6)

The last subtheme for this theme is "External factors". There are also other external variables to be accounted for in the improvement or deterioration of their mental health. Some participants mentioned that some events and changes in their environment had an impact on their mental health in both positive and negative ways. When participant 9 was asked if something changed in her mental health after using the app she replied: "I think it got a bit better. I don't know if that is umm if that's all because of the app, I think there are multiple factors of course."

She later elaborated on this answer when she was asked if the changes she experienced would also have happened if she had not used the app. She replied with:

> They might have. Yeah. Like I said, it's also a lot circumstantial and the circumstances have improved somewhat. So, it umm yeah. So, it's hard to differentiate whether it was because of the app or partly because of the app or not.

Perceived importance of changes

The second theme for this research question is the theme "Perceived importance of changes" which is the participant's subjective perceptions of how important the changes they experienced in their mental health were to them. There were a lot of divided opinions on the perceived importance of the changes they experienced. This also seemed to vary a lot depending on the degree to which the participants noticed changes.

The first subtheme for this theme is "Significant improvement". Several participants stated that they thought the improvements in their mental health were very important to them. For example, participant 13 mentioned:

I think really important because it made me better like see that you don't have to stress about everything so much and as well, like the part of letting go. So, I think they are, yeah for me, they're like big things that I can struggle with, and I feel like I have improved on those aspects. So, I think I can say that it's really important.

Furthermore, participant 15 mentioned:

I think very important because umm how you think about yourself and umm just like your own thoughts umm it's very important umm if that's all good, because if you have like very negative thoughts and you think about everything negative about yourself, about others. Yeah, I think it is very important yeah.

The second subtheme is "No significant improvement". Some participants did not notice a change in their mental health when they compared it to their mental health before and after using the app or mentioned only noticing some small improvements but said they were not significant enough to have an impact on their lives or well-being. Since the app did not make a big change for these participants, they would categorise the changes that they experienced as not significant. As expressed by participant 10 when asked if his mental health changed after using the app:

No, not really either. Basically, you feel quite the same. Like I said, I was just taking care of the parts during the app, so I just focus on what the app is like requesting me to do and then like after it's finished, I just go on with my life. The same as I did before.

The third subtheme is "Short term benefits". A portion of participants mentioned they did experience temporary improvements during or right after having completed an exercise but that these changes did not last: "Umm I haven't experienced any long-term changes, but maybe I can tell you something about umm what I felt in the short term after exercises." (participant 3).

Some did express that the improvements were nice and that they benefitted from them for a short period. However, using the app did not improve their mental health overall since the effects were temporary:

I think I am already pretty good at reflecting, so the app was just another tool to do

that with. So, on the short term, it might have been useful but in the long term I don't

think it contributes to my mental health. (participant 11)

The last subtheme is "Welcome changes but not necessary". Several participants who did experience changes viewed the changes as welcome but not necessarily essential for their overall well-being. While they acknowledged the value of the positive changes, they did not have a major impact on them, as experienced by participant 7:

I wouldn't say the changes are that significant, but I do think it's umm I mean it's

definitely a positive change, not a negative one. To be more conscious about what

you're grateful for and what your talents are and also to express how you feel about

other people and how much they mean to you and stuff like that. So I do think it's a

positive change umm I don't think the impact is that big though.

Discussion

This research study aims to investigate the impact of the Training in Positivity app on student's mental health. To be more specific answer the following two questions "What are the changes students experience in their mental health after using the TIP app?" and "What is causing the changes students are experiencing in their mental health?". To be able to answer these questions, the participants were asked to complete an 18-day-long intervention and were then interviewed. Then, a thematic analysis was performed on the interviews. After completing the thematic analysis, several changes and causes of changes emerged from the interviews.

The primary benefits highlighted by the students were their enhanced focus on positivity, increased self-awareness, increased mindfulness and stress reduction. The enhanced focus on positivity was a result of several exercises such as the Three Good Things exercise. This exercise involves reflecting on and writing down three positive things or experiences that happened during the day. Participants experienced this exercise as a helpful tool to focus more on the positive aspects of their life, appreciate the little things and increase their gratitude. These effects are also seen in research . For example, in the study by Roberts

(2019), it was found that the Three Good Things exercise can help reduce our innate inclination to dwell on the negative aspects and instead emphasize on all the positive aspects that are present around us. In this two-week intervention using the Three Good Things exercise, they found a significant improvement in their participants not only in their happiness but also in their depressive symptoms.

A different study, similar to the Training in Positivity (TIP) app, also required participants to complete daily exercises in a mental health app that focused on mindfulness and the positive aspects of life. This study found that the intervention group using the app reported notably lower levels of perceived stress compared to the participants in the control group, not only immediately after the intervention but also during the follow-up periods (Toh et al., 2022).

Another benefit that helped improve the mental health of the students was the effects they experienced, mostly due to the listening exercises. Because they were able to be more mindful, which is also seen in the research of Keng et al. (2011) who concluded that mindfulness results in various positive psychological effects such as increased subjective well-being and having less psychological symptoms.

During the interviews, some aspects of the app were also mentioned that affected the students in a negative way such as increased pressure and stress due to the deadlines or experiencing feelings of shame for forgetting or not being able to do an exercise. However, these daily exercise deadlines were necessary due to the timeframe of the data collection period, during which participants were asked to complete the intervention so that interviews could be conducted. However, if this was not a research study students would not have had the external expectations or perceived pressure to meet daily exercise deadlines and could do the exercises at their own convenience. This is fortunate, because it has been found that deadlines have a negative impact on people's work-life balance, creativity, and physical health and increase feelings of anxiety and stress (Psychologs Magazine, 2023).

Excessively overthinking and rumination on the past has also been proven to decrease students' mental health status (Jamshaid et al., 2020; Qasim et al., 2022). Several participants also reported being negatively affected by the exercises that were designed to make them reflect more on past behaviours and situations. They reported having an increasing amount of negative feelings about themselves or situations and ruminating more. Still, some students also reported that reflection on past behaviours and situations was a helpful tool and helped them be more self-compassioned, let go of feelings of guilt and find a positive outcome to

certain behaviours and situations. that increased rumination and overanalysing resulted in them having more negative feelings about themselves or their situations.

Most participants did notice changes while using the app, but these changes were not always significant enough to change their mental health. Therefore, these participants reported having a consistent emotional state and unchanged mental health. Even though several studies have been conducted that support the use of mobile-based apps as an effective way of improving people's mental health, there is still an ongoing discussion about their overall efficacy (Chandrashekar, 2018). For example, Weisel et al. (2019) concluded that there is still not enough generalizable evidence to support the use of standalone smartphone apps to help with mental health treatment. This was again found in a systematic meta-review where there was looked at several randomised controlled trials of mobile mental health apps involving participants from the general population. The review reported not finding enough convincing evidence that any mobile app intervention significantly enhanced outcomes related to anxiety, depression, smoking or drinking habits, suicidal thoughts, or overall well-being (Goldberg et al., 2022). So, even though several studies have already been conducted on the efficacy of mental health apps, further research is necessary to reach a definitive conclusion.

Throughout the study, it became evident that daily engagement with the app came with challenges. Other studies have similarly found that mental health apps have a generally low engagement rate, this is why ways to improve this are studied extensively for instance by Torous et al. (2018) and Chang et al. (2023). Nevertheless, in general the participants' engagement rate in this study was high and was found to be a big factor in improving their mental health.

In this study, there were a lot of divided opinions about the range and perceived importance of the changes the students experienced. Most of the students who said that the intervention did not significantly improve their mental health expressed it was since the benefits of the app were short-lived. This is also seen in the research of Stratton et al. (2017) in this study improvements in the mental health of employees were seen but these effects were already halved at the follow-up. Most studies on this topic do not incorporate post-intervention follow-ups, so in much research it remains a question if the benefits observed in the short term by using the app extend over longer periods (Linardon et al., 2024). The research study by Hood et al. (2021) also mentioned that the benefits of positive psychology interventions may be short-lived if the participants are not motivated to maintain the activities and positive attitude learned during the intervention.

Limitations and Future Directions

Even though this study provided valuable and in-depth insights, and revealed numerous benefits and strengths of the Training in Positivity (TIP), it is also important to recognise the limitations that were present in this study. Starting with the recruitment of participants. The recruitment program SONA was only able to recruit four participants for this study, so the other seventeen participants were recruited through convenience sampling. This has had the effect that over half of the participants who participated were Psychology students. As a result, they were overrepresented in this study which could lead to several biases. For instance, confirmation biases may be more prevalent among psychology students because they have more extensive knowledge about mental health apps and the effects they could have on people than students from other academic fields. Which could lead them to unconsciously align their answers with their preexisting beliefs and expectations of mental health apps. Additionally, sampling biases by overrepresenting a group in general make results less generalisable over the broader population. Lastly, the fact that most of the psychology students in this study were friends or acquaintances increased the likelihood of them giving desirable answers which could compromise the accuracy and validity of the data they provided. In future studies, it would be better to use a more diverse representation of the student population to ensure that every student and academic field has the chance to be equally represented in the study. This approach will increase the generalizability of the findings.

Secondly, despite putting in an effort to find twenty-five participants only eighteen participants participated in the interviews. However, in qualitative research the focus is more on the depths of insights and valuable information that can be gathered from the participants than the quantity of participants. Therefore, smaller sample sizes are often sufficient to achieve data saturation and more common in qualitative studies. Of these eighteen students, some students did not complete the entire intervention. While most participants were able to come very far there was still a significant amount of participants who had not finished all the exercises. Therefore, they did not complete the entire intervention and the results might not give a good representative view of how the intervention as a whole would have affected their mental health. At the same time participants that did not complete the entire intervention also provided valuable insights for the research. Such as highlighting potential barriers of adherence, identifying drawbacks, suggesting improvements or providing other reasons for not completing the intervention. In this case, one of the most named reasons was lack of time.

Therefore, in the future, it would be good to give the participants more time to complete the entire intervention.

Thirdly, the participants were not provided with a definitive definition of the term "mental health". This made the questions more ambiguous and open to interpretation. However, most of our participants were psychology students themselves so they had a good understanding of the meaning of mental health. Nevertheless, in future research, it would be good to give a clear definition of terms that could be interpreted in multiple ways. To ensure that all the participants in the interviews and the interviewers themselves have a shared understanding of the terms being discussed to avoid misunderstandings.

Fourthly, there was a language barrier. While most participants spoke English sufficiently some of the participants had some trouble with the English language or with the fact that the study was in Dutch, but that the interviews were in English. This made it harder for some of the participants to talk about the topics they wanted to address in the interview. If further research would be conducted it would be good to make sure everyone has a sufficient English vocabulary or give the participants the option to do the interviews in their mother language.

Lastly, the interviews were conducted by two different interviewers with different research questions. While the interviewees were interviewed with a structured interview scheme the focus of the interviewer was naturally more on their own research questions. This for example resulted in the behaviour of following up more on topics and questions that were of interest for their particular research questions. In the future, it would be good to take enough time to discuss with fellow researchers what kind of information is most valuable for not only their research but also for the other researcher's study to be able to get even more in-depth information from the interviewees. Perhaps if there is enough time even interview the participants together or plan a separate interview with the same participant to get the most valuable information.

Conclusion

To conclude, this research study provided valuable insights into the impact of the Training in Positivity (TIP) app on students' mental health. Several notable positive findings were observed including enhanced focus on positivity, increased self-awareness, increased mindfulness and stress reduction. However, there were also some minor negative effects found, such as students experiencing increased feelings of pressure, stress and shame due to not being able to complete exercises and overanalysing more. Nevertheless, the TIP app has

shown to be very promising in being able to change students' mental health for the better. Future studies should further investigate the benefits and challenges of using the TIP app while also addressing the limitations mentioned in the discussion.

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