



Mind Captain: A Positive Technology App for Youth Well-being

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Abstract. The COVID-19 emergency has notoriously adversely affected youth's mental health, leading to a dramatic increase not only in clinically relevant disorders but also in generalized sub-syndromic affective maladjustment and emotional dysregulation. As youth mental health apps hold unique potential for support of this vulnerable population, we have been developing a novel digital app for youth well-being called “Mind Captain”, aimed to increase emotional literacy as a prerequisite for emotion management, to offer strategies to deal with difficult emotions and train positive strengths. Innovative features are: 1) the involvement of youth workers who will receive a dedicated training aimed at including the app in their youthwork; 2) a psychological framework composed of well-established constructs from Socio-Emotional Learning, the third-wave Cognitive-Behavioural approach of Acceptance and Commitment Training, Positive Psychology and Compassion Focused approach 3) a metaphorical storytelling, based on the user being the captain of a ship and voyaging on a flexible route of personal growth, starting from emotional self-awareness through emotional self-regulation to positive empowerment; each voyage destination has a precise psychological function. A support website will offer extra psychoeducational and research materials. The human-centered design approach included bench-marking analysis and systematic review of m-health youth apps, youth need analysis from literature and through dedicated national and international focus groups, the continuous project team interaction for a gradual refinement to achieve a minimum viable product to be tested for usability, engagement, functionality, effectiveness.

Keywords. Positive Technology, Positive Psychology, Acceptance-Commitment Training, m-Health, Youth Positive Mental Health, Emotional Intelligence, Human-Centered Design, Youth work.

1 Introduction

The aftermath of the COVID-19 pandemic has shed light on a pressing issue - the mental health crisis affecting today's youth. Shockingly, one in seven individuals aged

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10 to 19 experiences a mental disorder (World Health Organization [WHO], 2021). This crisis has underscored the urgent need for evidence-based interventions tailored to young people, not only to provide remedial support but also to prevent mental health issues from emerging. Unfortunately, numerous challenges hinder young individuals from accessing mental healthcare services, including limited opportunities and emotional barriers driven by the pervasive stigma surrounding mental health. A particularly vulnerable demographic within this crisis is university students, who grapple with low levels of well-being and distress at significant rates. Addressing these challenges necessitates the development of positive psychological interventions that can enhance positive mental health while also preventing or alleviating negative mental health (e.g., Seligman & Csikszentmihalyi, 2000; Wood & Tarrier, 2010).

Considering the widespread ownership of smartphones among today's youth, mental health apps tailored to this demographic hold unique promise. However, in an app industry driven by profit motives, questions about the quality, regulation, and efficacy of youth mental health apps become increasingly urgent (Wang et al., 2018). Furthermore, the complexity of assessing app quality is compounded by the fact that it does not necessarily predict an app's success in the real-world marketplace. Recent discussions have highlighted Engagement, Functionality, and Aesthetics as features that strongly influence user retention, often more so than the mere provision of information. Intriguingly, user experience alone does not guarantee sustained engagement with mental health apps (Kaveladze et al., 2022).

Currently, the majority of mobile health (m-health) apps cater to monitoring or alleviating clinical suffering, targeting conditions such as depression, anxiety, distress, or specific disorders like sleep disorders, Obsessive Compulsive Disorder, and even schizophrenia. These clinical apps predominantly draw from a Cognitive Behavioral framework. In contrast, apps aimed at promoting psychological well-being, as opposed to treating clinical issues, remain scarce (Petrovic et al., 2023). This scarcity reflects a persistent emphasis on healing psychopathological aspects, which unfortunately perpetuates the narrow view of mental health as solely the absence of psychological difficulties.

However, as advocated by World Health Organization (2013), mental health should be viewed as the state in which one can realize his/her own potential and make a positive contribution to society, extending beyond the mere absence of psychological issues. WHO introduced the concept of Positive Mental Health, encompassing positive emotions (affect), personality traits like self-esteem and mastery, and resilience - the ability to cope with adversity (World Health Organization [WHO], 2004). This holistic concept of well-being encompasses subjective well-being, positive relationships, and personal growth (Keyes, 2002), and it can be fostered through activities designed to enhance positive affect, cognitions, and behaviors, all grounded in well-established psychological constructs.

Research has demonstrated the potential of smartphone-based interventions, including mindfulness apps, to significantly enhance elements of well-being in adolescents, such as positive affect and reduced depressive symptoms (Howells et al., 2016). Moreover, the use of mobile apps for wellness and fitness has been linked to subjective well-being in university students, with technology readiness playing a pivotal role (Aboelmaged et al., 2021). Nevertheless, the effectiveness of mental health apps for this age group remains under-researched, with limited evidence regarding their

impact on emotional self-awareness (Punukollu & Marques, 2019). In light of these considerations, our chapter aims to explain the development of a "well-being app" called "Mind Captain" within the framework of Positive Technology (Riva et al., 2012; Gaggioli et al., 2017), which focuses on technologies specifically designed to support well-being and foster personal growth in individuals, groups, and institutions.

The primary goals of the app development were twofold: to enhance the well-being of young people and to provide youth workers and their organizations with a digital tool to support and augment their professional effort. The app was developed in a European context including academics, IT experts, youth work organizations and young people themselves.

The application is currently under development within the framework of the European youth work sector. In the years 2017-2018, the European Youth Forum conducted a series of structured dialogues with young people across Europe to gather insights for the European Union's Youth Strategy (2021-2027). Among the significant outcomes of this process was the establishment of Youth Goals, with a particular focus on mental health and well-being. Youth Goal 5 explicitly identified Mental Health and well-being as a key priority. The objective extends beyond merely improving mental well-being and eliminating the stigma associated with mental health issues. It also aims to equip the youth work sector with effective (digital) tools designed to enhance the overall well-being of young individuals

The chapter is structured into four main sections, each addressing a critical aspect of the development and validation of Mind Captain. In the first section, we delve into the theoretical foundation that underpins the well-being app, which cover concepts and principles from Positive Technology, Socio-Emotional Learning, Acceptance and Commitment Training and Compassion Theory. Drawing from established psychological constructs and research findings, we discuss the rationale for focusing on well-being rather than solely addressing clinical issues and the significance of adopting a holistic approach to mental health. Next, we describe the human-centered design (HCD) methodology employed in the development of the app, stressing the importance of placing the end-users, in this case, young individuals aged 13-24 year old, at the center of the design process. In the third section, we provide a comprehensive overview of the conceptual framework of the well-being app. We outline its core features, functionalities, and the specific strategies employed to enhance users' positive mental health. The final section of the chapter summarizes the methods and tools that we plan to use to assess the effectiveness and impact of the well-being app on its target audience, particularly young individuals.

2 Theoretical basis for the development of the app

The theoretical building blocks that we have identified for designing our app are as follows.

2.1 The Emotional Intelligence (EQ) component

Since the initial investigations that identified Emotional Intelligence as pivotal for individual and social well-being (Salovey & Sluyter, 1997; Goleman, 1995), it has been

conceptualized as the competency enabling an individual to perceive, comprehend, and regulate emotions. This includes the ability to (1) accurately perceive, appraise, and express emotions; (2) access and/or generate feelings when conducive to thought; (3) comprehend emotions and emotional knowledge; and (4) regulate emotions to foster emotional and intellectual development. Significantly, Emotional Intelligence (EQ) plays a fundamental role in social functioning, impacting satisfaction with relationships, emotional regulation, and positive interactions.

In the app sections called Emotional Compass and mood tracking, we have focused on the first and third components, which pertain to emotional self-awareness. This involves the capacity to recognize one's own emotions, identify their physiological and cognitive manifestations, understand their purposes, and acquire a broader emotional literacy essential for supporting these capacities. Emotional Literacy involves proficiency in communicating with accurate emotion vocabulary in both intrapersonal and interpersonal relationships (Alemdar & Anilan, 2020). It differentiates itself from Emotional Intelligence in that while "intelligence" implies a relatively stable trait, the term "literacy" is more connected to language and the cultural aspects of emotion that can be enhanced through linguistic use, thus making it amenable to improvement using an application.

Crucially, emotional awareness is the prerequisite for emotion regulation, which is the aim of the sections "Safe Harbour" and "Land of Wisdom", as it will be explained below.

One key element of well-being is the ability to effectively regulate emotions – more precisely, to manage and modulate one's responses to an emotional experience. This skill is especially crucial for youth, given that brain structures involved in regulating behavioral expression of emotions are the last to mature (Bell & McBride, 2010). ER can be defined as the ability to flexibly adopt a wide repertoire of strategies with high variability across different situations: strategies used in regulating emotions can be adaptive (e.g., cognitive reappraisal, acceptance, defusion) or maladaptive (e.g., avoidance, suppression, rumination). The inflexible deployment of nonadaptive ER strategies especially avoidance-based strategies is associated to negative psychological outcomes (Aldao et al., 2015): avoiding adverse emotions is achieved through detachment, distraction, suppression, and fusion (the latter being the excessive identification with our feelings/thoughts).

ER has been shown to protect from the vulnerability to a wide range of mental disorders and in general to negative psychological health (Chervonsky & Hunt, 2019). Thus, we can say that psychological well-being consists mainly in psychological flexibility when adopting functional ER strategies, such as acceptance of difficult emotions and de-fusion from maladaptive rumination.

A growing body of evidence indicates the transdiagnostic role of ER in the development and maintenance of psychopathology in adolescence. Poor ER lowers help-seeking in youth, is a risk factor for drug abuse (Nawi et al., 2021) among youths. Better ER was associated with lower odds of suicidal behavior among youths (Colmenero-Navarrete et al., 2022), fewer depressive and anxiety symptoms (Chen & Bonanno, 2021).

2.2 The Positive Psychology component

Positive Mental Health has been promoted mainly through Positive Psychological Interventions, based on Positive Psychology, which directly attempts to improve positive aspects of mental health, such as well-being and optimism, grounded in the assumption that all human beings have the capacity to flourish, and existing strengths (Seligman & Csikszentmihalyi, 2000).

Positive Psychology Intervention exercises, including counting your blessings, practicing kindness, expressing gratitude, using personal strengths, have been proved efficacious with both clinical and non-clinical samples, for improving indicators of well-being (Carr et al., 2020; Hendriks et al., 2020). We have specifically focused on character strengths training according to the VIA model (Peterson & Seligman, 2004), which has been proved to be connected to adolescents' positive mental health (Ahrnberg et al., 2021) choosing the following strengths: Temperance (e.g., self-regulation); Hope; Empathy; Awe; Courage; Optimism.

However, as argued also by Pawelski (2016), Positive Psychology as conceived by its originators aims not only to the promotion of the preferred but also to the avoidance of the dis-preferred (The so-called "Tyranny of the positive attitude", Held, 2002). In its second-wave (Lomas & Ivztan, 2016; Wong, 2012; Gruman et al., 2018) positive psychology recognizes the interplay among positive and negative psychological experiences. These are the reasons why we have chosen to integrate the Positive Psychology framework with a component – as explained below in section 2.4 – which attempts to offer tools for the acceptance and regulation of adverse emotions.

2.3 The Acceptance and Commitment component

ACT (Acceptance and Commitment Therapy and Training) is a contextual behavioral approach whose effectiveness has now been supported by many randomized controlled trials (Gloster et al., 2020). Its core messages are: accept what is out of your personal control, and commit to action that improves and enriches your life. It does this by a) teaching you mindfulness skills to deal with your painful thoughts and feelings effectively, in such a way that they have much less impact and influence over you; and b) helping you to clarify your core values and use that knowledge to guide, inspire, and motivate committed action.

Hayes and colleagues (1999) developed ACT as a 'third wave' behavioral intervention. Of the ACT six core psychological processes (Hayes, 2004), we have chosen to focus on: (1) acceptance, which involves fully permitting the experience of internal events (e.g., being willing to experience anxiety; acknowledging the presence of highly self-critical thoughts); acceptance counteracts the dysfunctional response modulation which involves attempts to suppress or avoid emotional experience; (2) cognitive defusion, which involves distancing oneself from mental content rather than fusing with it (e.g., recognizing that the thought "I am worthless" is not equivalent to being worthless); (3) being present, which involves ongoing contact with events as they occur (e.g., being mindfully attuned to ongoing internal and external experiences); (4) values, which give direction to the (5) committed action, which allows engagement in behaviour reflective of endorsed values.

The collective enactment of these processes contributes to increased psychological flexibility, defined as “contacting the present moment as a conscious human being, fully and without defense, as it is and not as what it says it is, and persisting or changing in behavior in the service of chosen values” (Hayes et al., 2012). Enhanced levels of psychological flexibility allow people to experience life without the influence of excessive psychological fusion with thoughts and feelings and failed attempts to control them through suppression and avoidance, thus fostering intentional engagement in behaviours that embody valued life directions.

ACT has been shown to enhance well-being among adolescents (e.g., Burckhardt et al., 2016) and university students (Howell & Passmore, 2019), also with non – clinical population in the form of a Training, Acceptance and commitment models and programs have been showed to be useful for early intervention among young people. Furthermore, the results indicate that mobile technology may be of assistance in youth interventions and may provide elements—such as enhanced self-knowledge and more autonomy over one’s actions—that promote the targeted goals of acceptance and commitment therapy (Puolakanaho et al., 2019).

2.4 ACT and Positive Psychology

ACT and Positive Psychology were created only years apart: they both promote human flourishing, and often share overlapping themes and applications, particularly when it comes to psychological strengths, mindfulness, and values-oriented action for meaning in life. For this, we have chosen to integrate these theories for a more profound and enduring improvement.

Ciarrochi et al. (2013) identify compatibilities between ACT and positive psychological interventions: both employ such practices as goal-setting and mindfulness; both contribute significantly to effective applications in clinical, educational, social, and workplace settings; and both are applied at individual, interpersonal, organizational, and societal levels. Furthermore, theorists have recently identified a role for increased psychological flexibility in the promotion of well-being (Levin et al., 2016), emphasizing an ACT-based process in service of the main aim of positive psychological interventions.

2.5 The Self-Compassion component

Self-compassion, a concept rooted in mindfulness and positive psychology, (Neff, 2023) holds profound significance for promoting positive mental health among youth. It entails treating oneself with kindness and understanding, especially in the face of setbacks or challenges. For young individuals navigating the complexities of adolescence, cultivating self-compassion becomes a powerful tool for emotional resilience.

The ability to acknowledge one's struggles without harsh self-judgment and to respond to personal failures with a sense of understanding and support fosters a more robust mental well-being. Research suggests that self-compassion is associated with lower levels of anxiety, depression, and stress among youth, while concurrently promoting higher levels of life satisfaction and overall psychological flourishing. (Latharen et al., 2019).

3 Human-Centered Design process

Human-Centered Design (HCD) is a creative approach to problem-solving that starts with a deep understanding of the people who will use the product (Lyon et al., 2020). In the realm of app development, it's a framework that prioritizes the end-users' (young people and youthworkers) needs and experiences throughout the design and development process. HCD has a great potential in supporting complex health interventions simply by navigating population problems that often influence successful end-result (Adam et al., 2020).

In this manner, HCD can support the development of meaningful products and concretely purposeful and sustainable mobile apps for adolescents and young adults. Lyon et al. (2020) emphasize that HCD is an iterative cycle that involves collecting continuous information about the users and their context, and then using this knowledge to design solutions that are tailored to meet their specific needs and challenges. The development of the application aimed at enhancing youth well-being followed an iterative design process, informed by the principles of Human-Centered Design and Positive Technology.

The goal was to create a digital solution that would resonate with young users, offering them a metaphorical and engaging journey towards improved emotional regulation and positive mental health. Additionally, the aim was to offer youth workers a digital tool. It is posited that the efficacy of the app is optimized when integrated within the framework of a youth work intervention.

3.1 Research and Conceptualization

Initial efforts focused on desk and field research to understand the landscape of existing m-health youth applications. A benchmarking analysis was conducted (Petrovic et al., 2023), assessing the apps in terms of accessibility, privacy, security, clinical foundation, engagement, and interoperability, using the American Psychological Association (APA) evaluation model. This was complemented by a systematic review of literature spanning from 2000 to 2022 to ensure a comprehensive understanding of the domain. Keywords like "Mobile apps," "mental health," "youth," "adolescents," and "young adults" guided the literature search, providing a solid foundation for the app's conceptual development.

Findings suggested that existing mental health apps are limited because they are not universally available on all operating systems, focus narrowly on specific issues, and are mixed in with many unverified apps, making it hard for users to find effective ones. The analysis also showed that an optimal app should be cross-platform, offer general well-being support with personalized screening, and be designed with the user's involvement. Additionally, the review indicated that the optimal mental health app needs to be created following a human-centered design approach, allowing the user's involvement in the app creation, while offering skill training for decreasing mental health issues but also enhancing positive mental health and well-being. Finally, well-being features should offer eudaimonic and connection-based experiences and not only hedonic/emotional experiences.

3.2 Needs Analysis and Framework Development

To tailor the app to the specific needs of its target audience, several focus groups over multiple moments were organized, gathering insights from both youth workers and young individuals. Participants from these focus groups came from different European countries, such as Italy, the Netherlands, North-Macedonia and Slovenia, ensuring a culturally diverse perspective. These sessions were invaluable, revealing the youth's desire for a tool that would offer new strategies for managing anxiety and difficult emotions, mood tracking, journaling activities, relaxation techniques, personalization, and gamification features. Based on this feedback, a psychological framework was integrated, combining validated approaches from Emotional Intelligence, Emotion Regulation, Positive Empowerment, and Compassion.

3.3 Crafting the User Experience

The design phase prioritized an intuitive user interface, featuring a clean, visually appealing design with familiar navigational patterns and icons. Animations and micro-interactions were introduced to enhance user engagement, and a bright, calm color scheme was selected to convey a sense of tranquility. The app's architecture was crafted to support easy customization, including notifications, reminders, accessibility features, and progress tracking.

3.4 Iterative Design and Prototyping

As the app took shape, continuous participatory tests were conducted, focusing on usability, engagement, and functionality. Real-time feedback during these tests led to adjustments in the app's content and design, ensuring that the interface was user-friendly and the activities were not overwhelming. Prototypes underwent iterative revisions, incorporating user feedback to simplify complex features and enhance the overall experience.

4 Concept of the app

Researchers have investigated the degree to which the content of mental health promotion apps aligned with young people's media preferences, discovering an overreliance on static content, that is, written text, and recommended more visual and interactive solutions (Michel et al., 2018). We need concepts and methods that meet youth where they are. Thus, our effort has been to identify an evocative story-telling device, able to be expanded and enriched in further upgrades and based on a solid psychological framework.

4.1 Metaphors

Using metaphors in psychological work is a widespread and old tradition. ACT employs stories, experiential exercises, and metaphors toward the aim of promoting

psychological flexibility. Thus, we turned to metaphors and started studying them in the perspective of identifying a dynamic metaphor able to be extended to the several psychological functions we intended to implement.

Metaphors play a fundamental role in human cognition and emotion, allowing us to conceptualize affective states and processes more vividly. Metaphors are important for creating and constituting one's emotional reality, and conceptualization has actual consequences on experience (Kövecses, 2000). Metaphors also have potential for connecting elements that are usually distant, and to combine them in a novel way, which is alike the creative thinking process. As Carl Jung's archetypes, they are universal patterns or motifs in the collective unconscious, rhetorical tools deeply rooted in our mind.

Even the neuroscientific research - through FMR during the creation of a new metaphor - has shown new associative networks between different areas of the brain ('default' areas, divergent thinking areas, 'executive control' areas) (Beatty et al., 2017)

We chose a metaphor that 1) matches as closely as possible with the situation faced by the person; 2) is something the person truly understands; 3) is memorable, so it can be reusable and referred to over time; 4) encourages the person to seek clues that apply to their current experience; 5) encourages to extract potential new perspectives that lead them to see the consequences of their actions.

4.2 The Sea Voyage

Our app "metaphorization" aims at opening a new mental space which may hold a transformative potential and allow the young person to gain novel insights.

The metaphor of the sea voyage is a universal narrative structure in which a goal-directed protagonist confronts obstacles, overcomes them, and eventually reaps rewards. It has been the allegory for self-knowledge, emotional growth, empowerment since the origins of time. Table 1 details the several metaphorical items incorporated in the app concept.

During the voyage, the helmsman steers the ship and keeps it on course (on the direction that has been fixed), not let it off course. A life on course is a good life, vice versa, a life off course is a bad life.

There is a message welcoming you on board and instilling a sense of responsibility: *You are the captain of your own boat, and your actions will determine your well-being. It will be up to me to move and steer as I see suitable, based on how the voyage unfolds. It's a message that activates me in a positive way and engages me more.*

In Table 1 are presented the metaphorical components of the app concept and their symbolical meaning with reference to the positive mental health growth of the young user.

Table 1. The metaphors used in drafting the app's concept

App metaphorical item	meaning
The Captain	the user who is determining life's voyage; if the person does not feel the captain he/she needs self-esteem and self-efficacy skills, together with focus on the route (= values and goals)
The Ship	The user, voyaging life route; it can be strengthened; it may also represent the body
The Sails	The user's psychological resources; the more resources/skills/strengths you acquire, the bigger your sails become;
The Weather Conditions	State emotions as identified by the user in the Emotional Compass and Mood tracking sections
The Logbook	The voyage diary where the user can keep track of emotions, thoughts and behaviour thus reinforcing self-reflection and do some strength-training tasks.
The Science Button	It will open a box with a short psychological explanation for the ratio of each activity and task
The Emotional Compass	Weather conditions symbolize emotions. The user reads through and identifies current emotional states, their intensity and the words to describe them. The chosen emotion will determine the weather landscape for the next navigation (e.g. sadness will be symbolized by a rainy landscape, etc.)
The Mood tracking	A timeline will visualize emotional fluctuation on a daily, weekly or monthly thus favouring emotional awareness and acceptance.
The Turtle	The wise companion who guides the user to acquire new skills self-soothing, acceptance, self-regulation, management of irrational self-criticism. It could represent our inner "wise mind".
The Seabird	The young companion who accompanies the voyage by reinforcing skill training.
The Steering Wheel	The values clarification that gives life direction
The Life Buoy	Leads to the first psychological help in the Safe Harbour in case of mild emergency. A disclaimer reminds user to seek professional help in case of high psychoemotional issues.
The Safe Harbour	The safe peaceful condition where the user can stop and breathe rhythmically, following the waves rising and falling, guided by the two voyage companions. This can lower neurophysiological arousal induced by emotional hyper-activation.
The Land of Wisdom	The place where the user can experience the two emotion regulation metaphor guided by the two voyage companions. This can help acquire a mental attitude to open up to adverse emotions by making space to them and at the same time taking a wider

	perspective so as to counteract dysfunctional identification with difficult thoughts and emotions.
The Island of Strengths	Each gem in the rock represents a strength and opens an activity of strengths-training

This metaphor is not a one-to-one translation of the whole psychological framework to an adolescent context. Instead, it represents the attempt to develop a prevention model that reflects the core of the chosen theories and at the same time revitalizes them in a concept that is easy to understand, convey, and remember. For example, the connection between flexibility, values, and committed action just naturally seems to fall out of the metaphor of “the captain at the ship’s wheel”.

Our choice of app strategies was based on the taxonomy of predispositions with which young people approach mental health tools, developed by Fleming et al. (2019), e.g. the differentiation between *players or gamers*, that is, those from whom fun had the highest priority; *engagers*, that is, those for whom support to their well-being had the highest priority but who are open to gamified approaches; *skeptics*, that is, those who do not see value in digital interventions; and *Straight-talkers*, that is, those who explicitly do not want any gamified content in their mental health applications. Thus, instead of just aiming at young people in general, we kept in mind the category of “engagers” and “straight-talkers”, for several reasons, the most significant being that the app was intended not only for individual use but found its best use within the relationship with a youth worker, and this shifted the focus from entertainment to empowerment. Table 2 presents the overall app design as regards the environments, their psychological aim and the metaphorical strategies that have been devised.

Table 2. Design principles of Mind Captain app

App section	Psychological framework	Strategies
EMOTIONAL COMPASS	Emotional Intelligence Emotional Literacy	Metaphor of the weather forecast: <ul style="list-style-type: none"> - Recognize emotions: notice sensations, thoughts and behaviours related to each emotion - Distinguish emotional intensity into three levels: low, medium, high - Expand emotion vocabulary for each intensity - Understand the meaning of each emotion, so that also adverse emotions reveal their function - Observe and accept all emotions, without avoiding or suppressing them
MOODTRACKING	Emotional Awareness Emotion Regulation	<ul style="list-style-type: none"> - Keep a track of emotions on a daily, weekly or monthly timeline - Reflect on the context for each tracked emotion and on the coping strategies applied
SAFE HARBOUR The BUOY leads to the Safe Harbour	Stress-reduction self-soothing	Slow breathing techniques enhance interactions between autonomic, cerebral and psychological flexibility, linking parasympathetic and CNS activities related to both emotional control and well-being. The breathing exercises in this section are two: <ul style="list-style-type: none"> - Mindful breathing, which favours Acceptance - Box breathing: equal duration of inhalations, breath retentions, and exhalations. It has been shown to improve mood and anxiety as well as reduce physiological arousal (respiratory rate, heart rate, and heart rate variability).

LAND OF WISDOM	Emotion Regulation: Acceptance Training (ACT)	Acceptance Metaphor: the weather is always changing but the sky remains the same. The different weather conditions represent the ever-fluctuating emotions and thoughts, and the sky represents the self. Acceptance is the most important step towards managing your difficult emotions and feeling better. Accepting is not giving up or not trying to improve things. It means allowing your difficult thoughts and feelings to occur inside you, without trying to change them nor ignore them. Just make space for them
LAND OF WISDOM:	Emotion Regulation: Defusion Training (ACT)	Defusion Metaphor: Leaves on the stream – this exercise helps you - instead of seeing the world from “inside” your thoughts - to take a step back and view them from afar. By doing so, you will gain perspective on your thoughts and feelings, reducing their power. This is called «defusion».

<p>ISLAND OF STRENGTHS</p>	<p>Positive Psychology</p> <p>Strengths-based training</p> <p>Self - compassion</p>	<ul style="list-style-type: none"> - Empathy: the empathetic activities checklist allows the user to reflect on active listening without judgment, intended to increase empathy and patience. - Courage: the “my best possible self” visualization - Awe: the awe-inducing walk - Self-compassion: the compassionate letter to myself; imagery practice aimed to develop a compassionate image of another mind that has caring intent towards the self; - Gratitude: the Three Good Things exercise - Hope: the metaphor of the clouds slowly discovering the sun – a goal setting activity - Optimism: ABCD task aimed at: <ul style="list-style-type: none"> - Identifying dysfunctional beliefs about self and others - Challenging these beliefs - Reframing them - developing a compassionate self to decrease self-criticism, recognizing your efforts and treating yourself kindly
<p>STEERING WHEEL</p> <p>Goal: values identification</p>	<p>Acceptance and Commitment Training</p>	<p>The values appear on the wheel as rewards for completing the app tasks. Values clarification activates a free effort to “stay with” adverse emotions, motivated by the final direction. This motivation is the willingness of a value-based action even if it means feeling some pain along the way.</p>

4.3 Prototype design

The app’s prototype was created using the powerful graphics engine Unreal Engine, known for its ability to deliver high-quality graphics, making it an ideal choice for developing video games. Every aspect of the app's visual elements, including the scenery and characters, was hand-drawn. Characters were subsequently transformed into 3D models and seamlessly integrated into the 2D environments.

An extensive set of animations was then crafted, covering not only the characters (such as the turtle and seabird) but also the landscapes (comprising three distinct islands), props (including waves, leaves, stones, and more), and even dynamic weather effects. These animations were designed to provide users with a rich variety of skills and activities to engage with. As users acquire new skills, they can progressively enhance their personal scores, monitor their progress, and unlock rewards that gradually transform the appearance of their in-app ship. To deliver a dynamic two-dimensional user experience (UX), a deliberate choice was made to balance graphical fidelity with performance. Although technically the characters are three-dimensional, the backgrounds consist of two-dimensional planes carefully illustrated and positioned to create a sense of depth using the parallax technique (Fig. 1). For user convenience, the app offers touch-based interaction, allowing users to access all available options. Users can choose to either read the on-screen text or utilize the built-in artificial intelligence to listen to voice narration, all provided in the English language.

To ensure user data privacy, all data is exclusively stored on the user's device. In its current version, the app is compatible with Android smartphones and tablets, with a minimum API level of 29 and a maximum of 32.



Figure 1. Screenshots of the MIND CAPTAIN app

5 Usability test

The prototype underwent a preliminary user testing through a think-aloud protocol (a technique that involves asking individuals to verbalize their thoughts, ideas, and mental processes while they are engaged in a specific interaction task) and a semi-structured interview. The sample included 10 young university students aged 21-24. Overall, the app concept and design were well-received. However, findings exposed some UI and functionality weaknesses, which included navigation challenges and limited feedback. These concerns were addressed in the development of the final prototype.

6 App assessment

The effectiveness study is planned using a quasi-randomized control trial, with youth coming from several European countries. A series of validated scales is administered at baseline, after which the young people will use the app for 7 days, followed by a second administering of the test battery. The young people in the waitlist will be offered to use the app after the second testing round.

7 Conclusions

The emergence of the COVID-19 pandemic has brought unprecedented challenges to the mental health of young individuals, exacerbating the prevalence of mental disorders and emotional distress. In response to this growing concern, our development of a cutting-edge digital application for youth well-being represents a significant stride towards addressing these issues. The app has been purposefully designed to augment emotional literacy, which is fundamental for effective emotion management, and provides users with practical strategies to navigate complex emotions and reinforce positive attributes.

Key features of the app include:

- *Theory-driven psychological design framework*: The foundation of the app is a robust psychological framework that integrates elements from Socio-Emotional Learning, Acceptance and Commitment Training, Positive Psychology, and Compassion Focused Therapy. This multi-faceted approach ensures a comprehensive support system for the user.

- *Metaphorical Storytelling*: Employing a unique storytelling technique, the app engages users in a metaphorical journey where they are the captains of their own ships, exploring various destinations that each represent key stages in their personal growth journey—from gaining emotional self-awareness to achieving positive empowerment.

- *Human Centered Design*: this approach has been pivotal in the app's development, involving a thorough benchmarking analysis, a systematic review of existing mobile health applications for youth, and an extensive needs analysis through literature review and focus group discussions on both national and international levels. This iterative process has been instrumental in refining the app to produce a minimum viable product

that is currently being tested for usability, engagement, functionality, and overall effectiveness.

As the data collection process for the final empirical testing and validation of the app is ongoing, the full impact of the tool is yet to be determined. However, the preliminary design and conceptual framework show promise in providing a valuable tool for young individuals to improve their mental health and emotional well-being in these challenging times.

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