Design considerations for an AI-prompted "Future-Self" video journaling tool to enhance self-efficacy

by

Gabriela A. Torres

B.S. Economics and Finance

Universidad de Piura, 2010

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Authored by:	Gabriela A. Torres Department of Engineering February 1, 2024
Certified by:	Sang-Gook Kim Professor of Mechanical Engineering, Thesis Supervisor
Accepted by:	Joan Rubin Executive Director System Design and Management Program

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Abstract

This study explores a self-management digital solution designed to empower individuals struggling with emotional self-regulation. With a focus on increasing self-efficacy in specific areas or goals, the study proposes an 'AI-prompted future selfie-video journaling tool' to guide users through the process of recording video selfies with future-self narratives. The study aims to gain insights into a Large Language Model (LLM) that should be fine-tuned based on unique experiences, compare different styles of guided approaches, test metrics for self-efficacy and Future self-continuity feedback, and identify pain points for an efficient design. In a 5-day experiment with participants aged 24-77 from the USA and Peru, insights were gained by playing a simulated WhatsApp AI-assistant chatbot role. Participants were guided to set concrete goals and empowering emotions, then followed the process of recording at night and later replayed the video upon waking up the next day, utilizing the 15-minute window of theta brain waves. Those who completed the task reported gains in self-reflection on emotions, leading to more positive thoughts about daily activities. However, the study identified a key challenge: the necessity for personalized adaptation to ensure the LLM's understanding of both general patterns and the intricacies of individual mental health preferences for effective user engagement and education.

Thesis supervisor: Sang-Gook Kim

Title: Professor of Mechanical Engineering

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Contents

List of Figures

List of Tables

Chapter 1

Introduction

1.1. Motivation

Globally, stress levels are currently exceeding 50%, driven by a complex mix of factors. Key contributors include childhood distress, daily life challenges, and broader societal issues such as economic hardships, war, violence, and the impact of social media.

Childhood distress, marked by traumatic experiences, has a profound impact on brain development, hindering the cultivation of self-regulation skills and positive self-beliefs. This not only affects immediate well-being but also increases vulnerability to stress in adulthood.

In the United States, approximately 7.5 million children, constituting 10% of the population, experience severe trauma due to abuse, not accounting for less severe cases. Alarmingly, around 80% of these victims develop psychiatric illnesses, behavioral problems, and emotional issues before reaching the age of 21. Furthermore, a substantial percentage, ranging from 30% to 90%, of individuals meeting criteria for co-occurring disorders like depression and anxiety, or borderline personality disorder (BPD) have a history of child abuse or trauma.[1]

Lower self-regulation skills are a consequence of childhood distress's impact on the pre-frontal cortex

The malleability of brain development implies that sustained and overwhelming exposure to stress fundamentally alters the chemistry and developmental trajectory of a child's

[1] Statista. (2023). The most stressed out populations worldwide. https://www.statista.com/statistics/1057961/the-most-stressed-out-populations-worldwide/

body and brain. This alteration leaves individuals less equipped to handle stress in adulthood, rendering them more vulnerable to adverse outcomes.

Understanding the impact of stress on the prefrontal cortex, responsible for higher-order functions such as language, social behavior, mood regulation, attention, and emotional control, becomes crucial. Additionally, it plays a role in regulating emotions and more primitive areas of the brain.

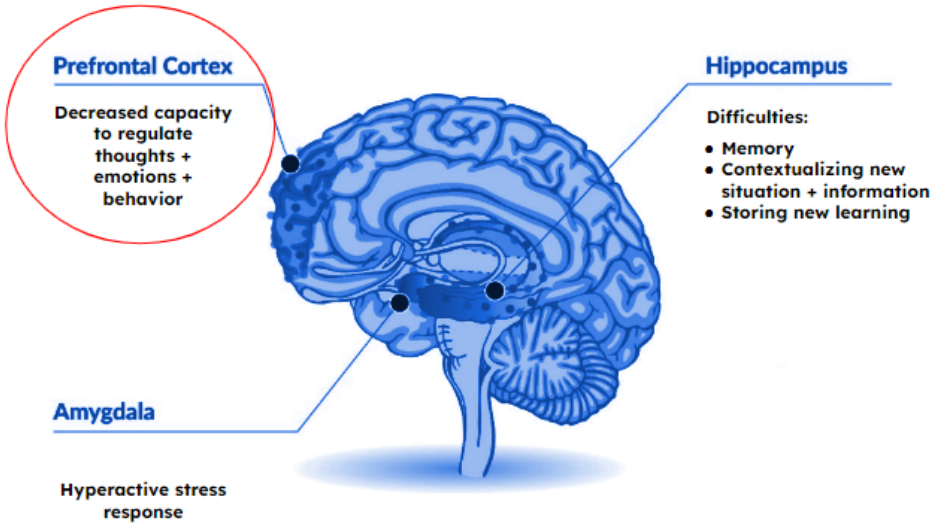


Figure 1.1: illustrates where is the prefrontal cortex located in the brain and which are its principal functions[2]

Research indicates that early biological and neurological stressors result in DNA methylation, disrupting typical brain functioning. This interference manifests in challenges related to emotional regulation and stability, impulse control, coping skills, interpersonal skills, and cognition, affecting the capacity to learn.

Children exposed to prolonged and intense stress, lacking coping tools, shape their brains differently. This alteration decreases their self-control capacity, making them prone to maladaptive stress responses in adulthood, such as excessive drinking, anger, and frustration. Moreover, they are more susceptible to experiencing Borderline Personality

[2] Turnaround for Children. (2020). Stress and the Brain. https://turnaroundusa.org/wp-content/uploads/2020/03/Stress-and-the-Brain_Turnaround-for-Children-032420.pdf

Disorder (BPD) and co-occurring disorders like depression, anxiety, bipolar disorder, substance abuse, and eating disorders.[3]

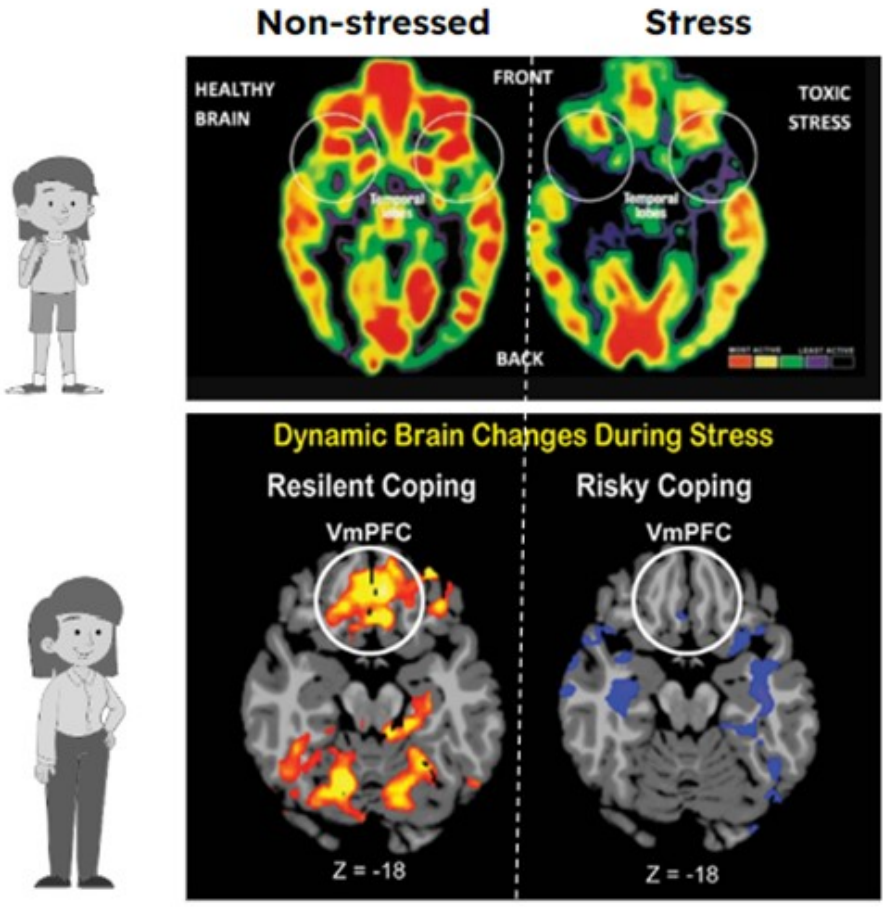


Figure 1.2: illustrates the differences in brain scans between children experiencing healthy development and those undergoing toxic stress, with a comparison to brain scans of adults engaging in various coping mechanisms.[4]

[3] Genetic Engineering & Biotechnology News. (n.d.). Brain Finding May Help Identify People Most Likely to Stress Out. https://www.genengnews.com/news/brain-finding-may-help-identify-people-most-likely-to-stress-out/

[4] Genetic Engineering & Biotechnology News. (n.d.). Brain Finding May Help Identify People Most Likely to Stress Out. Retrieved from https://www.genengnews.com/news/brain-finding-may-help-identify-people-most-likely-to-stress-out/

Luidens, A. (2018, August 9). Curaçao Needs a Truth & Reconciliation Process (Publication No. 10.13140/RG.2.2.22936.70403).

This decline in self-regulation skills, essential for managing cognition and emotion to enable goal-directed actions, has far-reaching implications. Self-regulation serves as the cornerstone for lifelong functioning across diverse domains, encompassing mental health, emotional well-being, physical health, academic achievement, and socioeconomic success. Recognizing that external adverse conditions may be beyond our control, the cultivation of self-regulation skills becomes paramount for gaining command over our thoughts, emotions, and behaviors.[5]

Therefore, empowering individuals to acquire and enhance these skills is essential for effectively navigating daily challenges and promoting overall well-being through the use of self-management digital solutions is the main motivation of this study.

1.2. Increasing demand of mental health and wellness services

Therapy services

Amidst the ongoing mental health crisis, numerous individuals are seeking external assistance to address specific symptoms associated with this state of dysregulation, with therapy from a professional being in high demand.

Various therapeutic approaches, including cognitive-behavioral therapy, psychodynamic therapy, and acceptance and commitment therapy, aim to assist individuals in gaining a profound understanding of their thoughts and emotions. The overarching goal of therapy for those experiencing these specific symptoms is to aid individuals in identifying effective strategies for coping and recovery.

Therapy has demonstrated notable efficacy due to its comprehensive nature. Through collaboration, therapists guide individuals in identifying the root causes of their symptoms, fostering reflection on emotions and thought patterns, and offering actionable steps toward recovery. The therapist's active listening and observational skills

[5] Turnaround for Children. (2020). Stress and the Brain. https://turnaroundusa.org/wp-content/uploads/2020/03/Stress-and-the-Brain_Turnaround-for-Children-032420.pdf

play a pivotal role in nurturing a therapeutic connection and facilitating a deeper understanding of the patient's unique experiences.

When executed appropriately, this therapeutic process has the potential to empower individuals, providing them with greater control over their mental well-being.

In recent years, there has been a significant surge in the demand for therapeutic services, particularly in the aftermath of the COVID-19 pandemic. This increased demand underscores the heightened need for mental health support. However, this surge in demand presents several challenges. Notably, in the United States, observations reveal that over 50% of individuals discontinue psychotherapy before starting due to extended waiting times of up to 12 weeks. Additionally, approximately 30% terminate treatment after the initial appointment, citing discomfort with their therapist as one of the reasons. This discomfort may arise from various factors, including therapists feeling overwhelmed and unable to maintain highly personalized sessions with their patients. Interviews with therapists in the United States indicate expressions of frustration, particularly concerning challenges related to providing effective and personalized therapy amidst increasing demand.[6] Therapists expressed going through the following needs and challenges:

- A desire for pre-existing knowledge about the patient's story and objectives.
- The challenge of gaining a deeper understanding of the patient's emotions between sessions, particularly within a limited 40-minute timeframe.
- Hospital-provided information is perceived as cold and insufficient for capturing the genuine narrative, as observed in therapists' perspectives. Lacking crucial information about the patient’s background, the fist session with the patient feels more like an interview, impacting in patient’s perception and willing to continue.
- Sense of being overwhelmed due to an excessive caseload with the statement "I have TOO MANY patients!"

This has led to an increase in telehealth options, such as apps like BetterHelp, Talkspace, 7 Cups, which offer connections to online therapies. Another emerging trend in recent years is the expansion of mental health and wellness self-management options, including

[6] Research performing interviews to 10 therapists in United States

meditation and specialized solutions tailored for specific use cases such as anxiety, depression, ADHD, drug abuse, sleep problems, among others.

Self-management apps

As dysregulation translates into several symptoms such as anxiety, depression, and various other challenges, another online mechanism for addressing them is through a personalized, case-specific approach. This is how several apps target these issues, tailoring interventions to individual needs:

Table 1.1: Analysis of mental health and wellness apps

Type of App	Description	How Does It Work?	Metrics
Mindfulness and Meditation Apps (E.g. Calm, Headspace, Insight Timer)	Meditation stands out as a powerful technique within the spectrum of self-management options for self-regulation. While its efficacy is high, the process of mastering it poses a considerable challenge. Contemporary mobile apps come to the aid of users by providing specific meditation techniques that have been proven to effectively reduce stress.	Users are encouraged to dedicate time to daily meditation sessions, typically around 10 minutes, using guided techniques provided by the app. The process involves staying present with discomfort, building discomfort resilience over time.	User engagement, completion of meditation sessions
Cognitive Behavioral Therapy (CBT) Apps (E.g. BetterHelp,	CBT apps leverage virtual platforms to promote mental well-being through the application of CBT principles. These apps	Users engage in activities and practices designed to identify and modify negative thought patterns, alter behaviors contributing to mental health challenges, and cultivate	User engagement, completion of therapy modules, self-reported mood assessments

Talkspace, Woebot.	guide users through structured exercises that align with the core tenets of CBT, including cognitive restructuring, behavioral activation, and mindfulness techniques.	mindfulness for enhanced self-awareness. The integration of CBT strategies into these apps allows users to access therapeutic interventions conveniently.	
Goal-setting Apps (E.g. Strides, Todoist, Google Keep)	Goal-setting apps empower users to articulate, track, and attain personal and professional objectives by providing a structured and supportive digital environment.	Users define specific, measurable, achievable, relevant, and time-bound (SMART) goals. They input goals, break them down into actionable tasks with set deadlines, and use visual progress tracking tools. Reminder systems send notifications about upcoming tasks or deadlines, enhancing accountability.	Goal completion rates, task completion times
Positive Affirmation Apps (E.g. ThinkUp,I Am - Positive Affirmations, Affirmations for a Positive Mind)	Positive affirmation apps contribute to fostering a positive mindset by delivering daily affirmations and motivational content.	Users receive daily uplifting statements and customizable affirmations. Visualization techniques may be integrated, guiding users through mental imagery exercises. Timely notification reminders prompt users to engage with affirmations throughout the day.	User engagement with affirmation content, frequency of app usage, self-reported changes in mindset
Educational/ Skill Learning Apps (E.g. Mindvalley, Gaia)	Educational and skill learning apps cater to the thirst for knowledge and personal development.	Users enroll in structured courses covering various topics, engaging in interactive exercises, quizzes, and assessments. Multimedia elements, such as video lectures and presentations, enhance the learning	Course completion rates, quiz scores, time spent on learning modules

		experience. Progress tracking features monitor advancement, and gamification elements may be integrated for enhanced engagement.	
Life Coaching Apps (E.g. Coach.me, Life Coach, MindDoc)	Life coaching apps serve as virtual platforms offering coaching and guidance for individuals committed to personal development.	Users set personalized goals, monitor progress through in-app tools, and engage in regular check-ins with virtual coaches or mentors. Motivational content, such as inspirational messages or audiovisual material, is integrated to encourage users in their journey. users receive feedback from coaches, creating a supportive and collaborative environment.	Goal achievement rates, user interactions with coaches
Future-Self Therapy Apps (E.g. FutureMe,My Effectiveness, Strides)	Future-self therapy apps employ diverse strategies to guide users in envisioning and actively working towards their future selves. These applications integrate features such as goal-setting, personal development planning, and self-reflection to foster a proactive and intentional approach to personal growth.	Users articulate long-term goals, create actionable plans, and engage in regular self-assessment to track progress. Apps like "FutureMe" encourage users to compose letters to their future selves, promoting reflective practice. Others like "MyEffectiveness" and "Strides" utilize structured frameworks for goal setting and progress tracking.	Articulation of long-term goals, progress tracking
Neuro Linguistic Programming (NLP) Apps	Neuro Linguistic Programming apps utilize NLP techniques to enhance users'	Users engage in exercises rooted in NLP principles, involving self-reflection, language pattern recognition,	User engagement with NLP exercises, progress in

(E.g. NLP Practitioner, NLP Techniques, NLP Coaching & Psychology)	communication skills, reframe limiting beliefs, and foster personal growth.	and visualization techniques. Activities challenge and reshape limiting beliefs, fostering a positive mindset. Apps may incorporate audiovisual materials, interactive exercises, and goal-setting features.	reframing beliefs
Hypnosis Apps (E.g. Hypnobox, Calm Hypnosis, Mindset)	Hypnosis apps leverage hypnotherapy principles to induce a state of focused attention and heightened suggestibility.	Users engage with guided audio sessions, which aim to induce relaxation and address specific concerns. Some apps encourage users to record personalized audios during guided sessions, facilitating a self-hypnosis process.	User engagement with hypnosis sessions, self-reported relaxation levels

Mental health apps face challenges, including the subjectivity of self-reported data and the complexity of sustaining long-term user engagement, leading to potential drop-offs. Assessing the true impact of interventions is intricate due to diverse individual experiences. Encouraging people to stay engaged regularly is difficult because interest might decrease. Making interventions personalized requires advanced algorithms, and getting recognized as evidence-based is still a challenge. Working with traditional mental health providers for smooth integration is complicated, and issues like data privacy continue to pose ongoing challenges.

While there may not be dedicated apps solely focused on measuring self-efficacy, various mental health and personal development apps indirectly contribute to enhancing self-efficacy by incorporating goal-setting, positive affirmation, and skill-building features. These aspects, when integrated into the apps, can positively impact users' confidence and belief in their ability to accomplish tasks and overcome challenges.

Despite the availability of various therapy apps, the use of selfies in mental health applications is still not widely explored. While many apps focus on different therapeutic

approaches, incorporating selfies for self-reflection and therapeutic engagement remains an area that hasn't been widely adopted. Although selfies are often linked to negative impacts on self-esteem, there is potential for their positive use in therapy that has not been fully used in the development of mental health applications.

1.3. Selfies as a therapeutic approach

Selfies, a widespread activity especially on social media platforms like TikTok and Instagram, have been linked to various negative effects on well-being and body confidence. Current research indicates that viewing selfies online can adversely impact adolescents' mental health and self-esteem. Seeking external validation through feedback on selfies and engaging in social comparison, prevalent on platforms, further contribute to the potential harm associated with selfie practices.[7]

On the other hand, selfies on social platforms foster a sense of belonging, making individuals feel part of a community, essential for a feeling of safety and comfort. They also aid in the formation of a positive identity, helping individuals understand who they are and influencing how others perceive them. These self-portraits act as a source of self-esteem boost, promoting a positive self-image, and contribute to the acceptance of physical flaws, assisting individuals in acknowledging and embracing their unique attributes. For example, in a study among women in China, selfie-posting was significantly and positively related to women's self-esteem[8]

Recognizing the positive potential of selfies in aspects such as identity exploration, enjoyment, and boosting self-esteem, along with their capacity to strengthen the connection with oneself, offers a pathway to redefine self-perceptions. Expressing pride in oneself through selfies becomes a personal affirmation, contributing to a positive self-

[7] McLean SA, Jarman HK, Rodgers RF. How do "selfies" impact adolescents' well-being and body confidence? A narrative review. Psychol Res Behav Manag. 2019 Jul 9;12:513-521. doi: 10.2147/PRBM.S177834. PMID: 31372071; PMCID: PMC6628890.

[8] Wang, Y., Wang, X., Liu, H., Xie, X., Wang, P., & Lei, L. (2020). Selfie posting and self-esteem among young adult women: A mediation model of positive feedback and body satisfaction. *Journal of Health Psychology, 25*(2), 161-172. https://doi.org/10.1177/1359105318787624

reflection. This process has the potential to enhance self-efficacy. Ultimately, individuals benefit from feeling like the protagonists of their narratives, aligning with the concept of being their own best friend.

1.4. An AI prompted future selfie-video journaling tool

The proposed approach of this study is to guide adults to set concrete goals and desired positive emotional states in various life aspects (mental health, work, finance, among others), particularly in areas where they may doubt their ability to succeed. Users would then create video-selfies, delivering self-affirmation messages for their daily schedule as if they had already successfully accomplished their future activities. This process aims to evoke positive emotions surrounding the performance of each activity, contributing to an enhanced sense of self-efficacy. The idea is to perform the process of recording in the night because it emulates the process of journaling (described in section 1.7), which has shown to be positive for the brain to release stress before bedtime and sleep better. Then, replay the video in the morning when waking up, when the brain is in a 15-minute window of theta waves, utilizing optimal moments for the brain to absorb information more effectively could significantly enhance its impact of this process. Therefore, feeling that it already happened increases their self-efficacy in the specific goals they pursue. Figure 1.3 illustrates the positive feedback loop of how having an emotional connection (visualization) of a future version of yourself having accomplished a goal increases your self-efficacy to accomplish that goal as it enhances decision-making and motivation to take action:

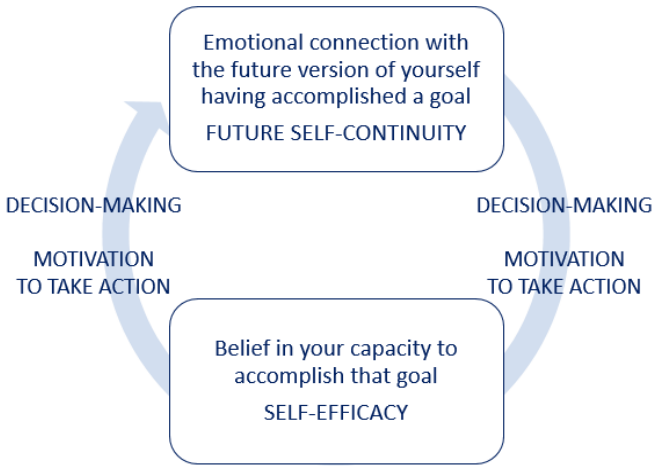


Figure 1.3 : Positive feedback loop of how an emotional connection with your future self increases self-efficacy

The innovation of this approach lies in the absence of existing solutions in the self-management mental health or wellness apps market that utilize video-selfies. The concept aims to leverage visual and auditory feedback for self-reflection. The idea is to position the user as the main character, placing them at the center of their personal growth and motivation. By focusing on the user, this approach instills the capability to believe in oneself, particularly in challenging or negative environments. In this scenario, the user is the main character.

Additionally, many apps incorporating self-hypnosis or Neurolinguistic Programming rely solely on audios, and those employing a future self mechanism often use methods such as sending a letter from the future, centering goal setting exclusively through writing or connect to their future-self through an avatar.[9]

The goal is to identify an effective design that helps users engage in positive imaginal experiences, fostering a connection with their future selves. This aims to enhance self-efficacy and boost confidence in achieving various life goals, including but not limited to the following:

[9] Mönninghoff, A., Fuchs, K., Wu, J., Albert, J., & Mayer, S. (2022). The Effect of a Future-Self Avatar Mobile Health Intervention (FutureMe) on Physical Activity and Food Purchases: Randomized Controlled Trial. Journal of Medical Internet Research, 24(7), e32487. https://doi.org/10.2196/32487

- Reducing feelings of anxiety due to work conditions: Developing the belief that I can gain better control over myself each day and gradually manage anxiety feelings.
- Overcoming trauma: Cultivating the belief that I can recover from traumatic experiences and progressively diminish their impact.
- Developing a better self-image to handle relationships: Believing that others perceive me positively, and I can foster healthy relationships.
- Overcoming guilt for past mistakes: Developing the belief that I can genuinely let go of guilt and feel more confident in handling similar situations in the future.

In this study, the problem we are addressing is the reduced self-regulation skills in adults, manifested in various ways (anxiety, depression, procrastination, negative thinking, among others). To address this issue, we focus on increasing the self-efficacy of individuals in a specific area they want to work on by developing a stronger connection with their future selves, measured as Future self-continuity. This is achieved through the 'AI-prompted future selfie-video journaling tool,' which involves recording video selfies and future-self narratives guided by an AI-powered assistant.

In this study, the primary focus centers on enhancing the efficacy of the Large Language Model (LLM) by adopting a nuanced approach that involves universal training followed by individual fine-tuning based on unique mental health experiences. This personalized adaptation ensures the LLM's understanding of both general patterns and the intricacies of individual mental health preferences. Proficiency in these tasks is crucial for the optimal training of an AI-powered assistant. By assuming the role of a simulated AI chatbot through WhatsApp I gain insights into how the AI-powered assistant will help you to:

- Define an area of work and goals where you need to develop self-efficacy.
- Determine your levels of self-efficacy and connection with your future self in this specific area.
- Assess and improve your self-affirmation process positively.
- Guide you in recording the video selfie.
- Remind you to perform the recording at night and watch it in the mornings upon waking up.

For future research, the solution will undergo additional testing with a real AI bot. However, for the purposes of this study, we aimed to explore the design implications of this approach, considering the challenges that users may encounter while engaging in this practice.

Chapter 2

Rationale for the concept

2.1 Belief in our capacity to self-regulate is crucial to strengthening self-regulation skills

Since self-regulation is a skill, even if it hasn't been developed early on, it can be acquired later, with multiple opportunities for intervention, making it a powerful target for change. Self-regulation can be strengthened by being taught like literacy, with focused attention and support practice opportunities provided across contexts. It is crucial to underscore that cases involving biological conditions necessitate distinct treatment and alternative resources, emphasizing the need for separate considerations.

One crucial point to develop self-regulation skills is actually believing that, as humans, we have the capacity to self-regulate and learn how to self-regulate to achieve specific tasks, which means developing self-efficacy beliefs about our capacity to manage distinct emotions, such as anger, sadness, fear, shame and guilt. In a study about how willpower affects self-regulation, the findings indicate that decreased self-control following a depleting task or during demanding periods may be a reflection of individuals' beliefs regarding the accessibility of willpower, rather than an actual depletion of resources. This underscores the significance of people's beliefs in influencing self-control outcomes[10] creating a negative feedback loop between the development of self-regulation skills and self-efficacy.

[10] Job, V., Dweck, C. S., & Walton, G. M. (2010). Ego Depletion—Is It All in Your Head?: Implicit Theories About Willpower Affect Self-Regulation. Psychological Science, 21(11), 1686-1693. https://doi.org/10.1177/0956797610384745

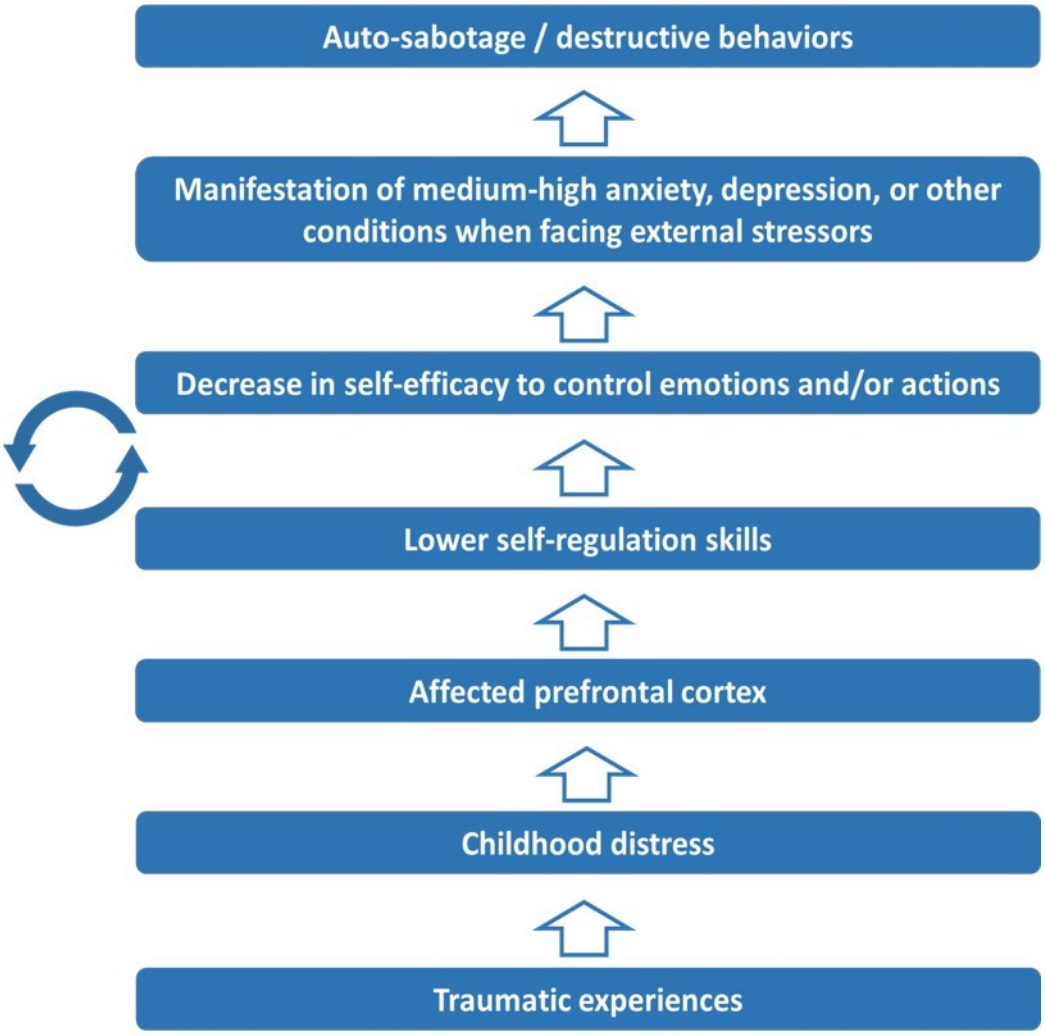


Figure 2.1: illustrates the impact of childhood traumatic experiences and distress in adult mental health conditions. We can observe the negative feedback loop between the development of self-regulation skills and self-efficacy

People's beliefs about willpower play a crucial role. Those with a limited theory believe that exerting self-control depletes their willpower and requires restoration, while those with a non-limited theory believe that exerting self-control can activate their willpower.

2.2 The importance of Self-efficacy

Self-efficacy, refers to an individual's belief in their capacity to execute behaviors necessary to produce specific performance outcomes, such as controlling anxiety or winning a race. It's the confidence in one's ability to influence events and control over one's environment. Self-efficacy denotes people's self-confidence and beliefs about their ability to perform in different situations and this is why it can be connected with specific goals. It functions as a multilevel and multifaceted set of beliefs that influence how people feel, think, motivate themselves, and behave during various tasks. These beliefs are mediated by cognitive, motivational, affective, and selection processes to generate actual performance. Self-efficacy development is closely intertwined with a person's experiences, competencies, and developmental tasks in different domains at different stages in life.[11]

The concept of self-efficacy was introduced by psychologist Albert Bandura and since the 1970s, the social cognitive theory proposed by him has been one of the most influential theories used to guide the understanding of human behavior and the motivational determinants of such behavior.

As self-efficacy is related to our belief system, it is important to understand how beliefs are formed. A belief is something we consider to be a fact, anything that we assume to be true. Beliefs are generally formed in two ways: through our experiences, inferences, and deductions, or by accepting what others tell us to be true. Most of our core beliefs are formed when we are children. When we are born, we enter this world with a clean slate and without preconceived beliefs. Our caregivers play a big part in molding our beliefs from a very young age. Our environmental context (school, friends, others) also plays an important part. Because we are unable to discern between truth and falsehood when we are very young, we often accept what we are told as truth. We are also greatly influenced by what we experience. In this sense, children who had a positive environment are more likely to have strong beliefs in their capacity to achieve things.

[11] Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review, 84(2), 191–215.

As we mentioned, self-efficacy relates to specific areas or outcomes. In this sense, someone can have high self-efficacy in their financial management but low self-efficacy in managing relationships. Therefore, it can be targeted and measured by a specific area. Here are some examples:

- Academic performance in adolescents

  When applied in the context of adolescent development, particularly concerning academic performance, self-efficacy theory suggests that an adolescent's academic behavior is influenced by how their beliefs (cognitions) are shaped by the support provided by significant others, including parents, teachers, and peers (the environment). Bandura argues that self-efficacy plays the most pivotal role in affecting a person's cognition, and his proposition has been central to the popularity of self-efficacy studies since the 1990s, highlighting the crucial impact of self-beliefs on academic performance and contributing to a more profound understanding of how environmental support interacts with personal beliefs to shape educational outcomes in adolescence.

- Career development

  Imagine an individual navigating their professional path, aiming for career success and job satisfaction. According to self-efficacy theory, this person's belief in their capability to perform tasks and overcome challenges in their chosen career significantly influences their career trajectory. The support and mentorship they receive from influential figures in their professional network, such as colleagues, mentors, or supervisors, play a vital role in shaping these self-efficacy beliefs. Bandura's theory suggests that a strong sense of self-efficacy in the workplace can impact goal-setting, resilience in the face of setbacks, and overall career satisfaction. This application of self-efficacy theory has spurred research on how individuals' beliefs about their abilities contribute to their career development and success.

- Trauma response

  Self-efficacy is a critical element in trauma coping. It acts as a confidence booster, influencing the effective utilization of cognitive control and executive function—mental tools crucial for navigating challenging emotions. High self-efficacy enhances one's ability to shift mindset, update understanding of trauma, and manage emotions adeptly. Conversely, low self-efficacy may impede the efficient use of these cognitive tools, complicating emotional navigation. Drawing from the concepts of cognitive control and executive function, this inner confidence becomes instrumental in addressing the neurobiological aspects of trauma response, impacting psychiatric symptoms and overall coping effectiveness. In essence, self-efficacy emerges as a pivotal factor shaping the connection between cognitive processes and emotional resilience in the face of trauma.[12]

Individuals who experience childhood distress face a dual challenge characterized by an inadequate environment that fails to nurture the development of self-regulation skills and a lack of empowering beliefs about themselves and their willpower and capacity to regulate themselves. Childhood distress encompasses various adverse experiences, ranging from trauma to neglect, which can hinder the acquisition of essential self-regulation abilities. The absence of a supportive environment during formative years contributes to difficulties in managing thoughts, emotions, and behaviors. Simultaneously, the insufficiency of empowering beliefs results in low self-efficacy, hindering individuals from cultivating confidence in their capacity to exert willpower and navigate challenges successfully.

[12] Benight, C. C., Shoji, K., James, L. E., Waldrep, E. E., Delahanty, D. L., & Cieslak, R. (2015). Trauma Coping Self-Efficacy: A Context-Specific Self-Efficacy Measure for Traumatic Stress. Psychological Trauma, 7(6), 591-599. https://doi.org/10.1037/tra0000045

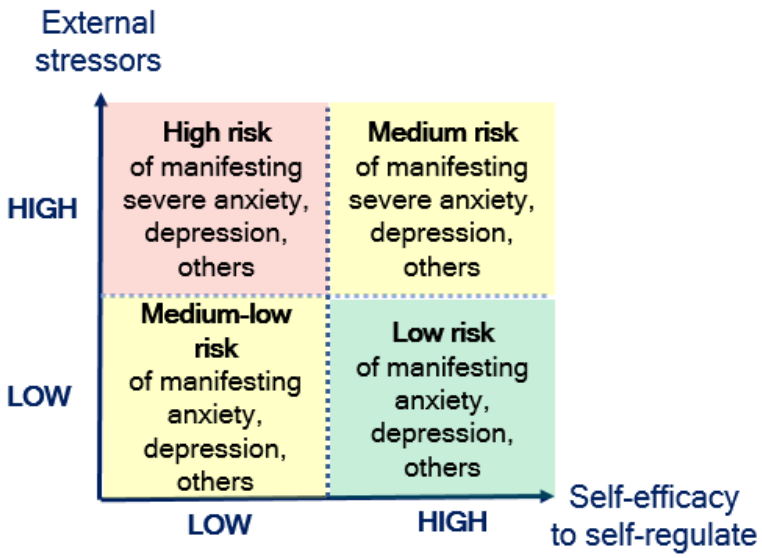


Figure 2.2: Illustrates how people with lower self-efficacy in their capacity to self-regulate are at more risk to develop mental health conditions.

The psychologist Bandura outlined the four major sources of influence on self-efficacy: Performance experiences, vicarious experiences, verbal and social persuasion, and physiological and affective states, and in 2013, James Maddux suggested a fifth route to self-efficacy through imaginal experiences. Each one of them poses different challenges:

Table 2.1: Analysis of sources of influences on self-efficacy

Sources of influences on self-efficacy	Description	Main challenges
Performance experiences	Previous and relevant experiences can shape an individual's perception of their competence in performing a specific task. This aspect tends to exert the most significant influence on self-efficacy. For instance, someone may feel more confident about winning a race if they have been successful in the last two years.	This relies on past results. If a person has consistently failed in a specific area (e.g., losing weight through dieting), building self-efficacy in that area becomes challenging.

Vicarious performances	Involve observing the performances and experiences of individuals similar to oneself in a comparable situation. For example, someone may gain confidence in their ability to recover from a disease after witnessing successful cases among people with similar characteristics.	People often draw motivation from resonating with others facing similar challenges. However, if one struggles to find a suitable role model, building self-efficacy through this route becomes difficult.
Social persuasion	Involves verbal encouragement or discouragement that an individual receives regarding their ability to perform a task. The credibility of the source usually determines the impact it has on a person's self-efficacy. For instance, parents reminding you of the significant improvement in your painting skills over the last two years can boost your confidence to continue practicing.	This path is effective in a supportive environment, but it can be counterproductive in scenarios where the ecosystem is harmful. For instance, teenagers in economically challenged areas may face a detrimental environment, making it hard to believe in their capacity to achieve things or break out of the cycle of poverty.
Physical and emotional states	Involve how an individual experiences physical sensations and emotional states when confronted with a task or challenge. For instance, a person might feel anxious at work before a presentation to the board of directors and practice breathing exercises to regulate and calm their anxiety.	Mastery of techniques, such as controlled breathing before a meeting, is crucial. Lack of access to such training makes it challenging for individuals to practice these techniques.
Imaginal experiences	Art of visualizing yourself behaving effectively or successfully in a given situation. Relates to an individual's use of their imagination to envision success in a task. During imaginal experiences or visualization, a person strives to depict their goals as attainable. For example, climbers visualize themselves reaching the peak of a mountain, providing	Proper guidance is essential to ensure positive framing, especially given that the effectiveness is influenced by individual motivation. Challenges may arise in cases of mental health conditions like severe anxiety or trauma-related disorders, which can impede participation due to

	motivation and increased confidence to achieve that goal.	potential distress. Achieving consistency across different settings, whether educational or therapeutic, poses a challenge that requires careful consideration for uniform application.

The combination of low self-regulation skills and, consequently, the inability to develop high self-efficacy in controlling emotions and behaviors poses potential long-term consequences for psychological well-being. This underscores the critical need for therapeutic interventions that address both self-regulation skills and empowering beliefs in adults. The sources of influences on self-efficacy offer different opportunities of intervention, being Imaginal experiences the one that we consider the most promising according to the research developed in the following sections.

2.3 The concept

To develop the concept, this study explored what it means to create a connection with your future-self based on Maddux's approach. The concept involves designing a way to facilitate users in engaging in imaginal experiences to enhance their levels of self-efficacy for a specific goal. While the connection with the future is a key element, merely envisioning the future is insufficient. A vision of oneself can be confusing and abstract, as the brain tends to fantasize in a disorganized way, hindering the user from feeling that the future version is achievable and potentially leading to frustration. Therefore, it is crucial to ensure that users feel connected to their future positive version to maintain motivation for taking concrete actions to achieve it. In conceptualizing a potential digital design to facilitate this process, the three main challenges are:

1. De-bias people to be able to think about their future selves in a positive way more concretely and vividly. The process does not focus exclusively in helping users to develop a relationship with their future-self but to create a positive one,

otherwise, as shown in previous iterations, we could enhance negative feelings about the future and trigger anxiety episodes and demotivation in users.

2. Help the user to define specific areas of work where they do require more self-efficacy to achieve results. Self-efficacy is very specific to a narrowed goal, so you can have different levels of self-efficacy in different aspects in your life.
3. Provide constant feedback and clear metrics of their progress, to keep them motivated and be able to work different areas of their life

To achieve these goals, along this study I explored practices such as visualization, journaling, neurolinguistics programming and mirror therapy. These techniques are crafted to establish a positive connection with a future version of oneself. Through investigation, I examined how these practices could be iterated to assist users in focusing on concrete goals, ultimately fostering self-efficacy in an organized and specific manner. Finally, acknowledging the connection between self-efficacy and the belief system stored in the subconscious, I studied the most suggestionable moments of the brain. This exploration aimed to identify opportunities for incorporating such insights into the design.

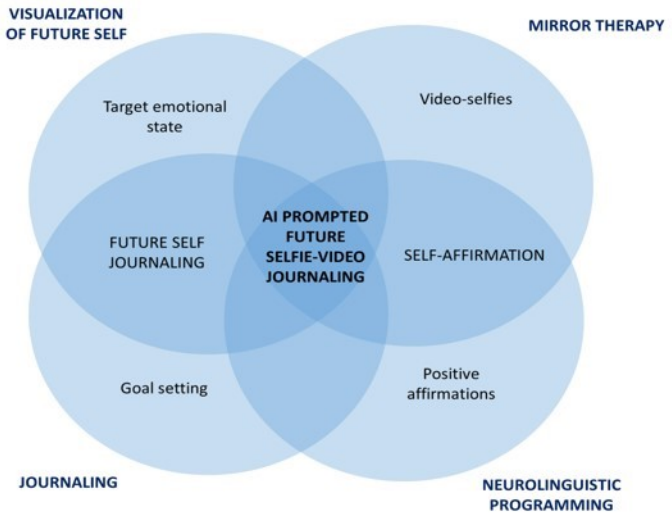


Figure 2.3: Techniques behind the concept of an AI prompted Future-self video-journaling

2.4 Cognitive elements of video-selfies to develop self-efficacy

The main features of selfies and their potential to enhance self-efficacy combine the following psychological tools: mirror therapy, self-affirmation, and neuro linguistic programming:

- **Mirror therapy**

  The self-mirroring from the video facilitates self-observations of the patient's own facial expressions, voice and body posture. The reflective nature of mirrors has positioned them as valuable tools for exploring self-awareness and self-focusing. Studies indicate that observing our own face enhances the recognition of emotional facial expressions, strongly linked to empathetic processes. Mirrors tend to magnify our internal state, often leading to self-critical inner dialogue when observed without a clear intention. Compassionate self-talk may be heightened through the use of mirrors, externalizing the object of compassion, namely the self. Additionally, mirrors can amplify the effects of positive self-talk by emphasizing eye-gaze and facial expressions, key components of empathic responses. The mirror's amplifying effect on soothing positive affect and heart rate variability (HRV) can be attributed to its 'objectifying properties,' allowing individuals to experience themselves from an external perspective, fostering objectivity and reducing bias.[13]

  Given that self-related stimuli, particularly our face, hold greater relevance to us and are inherently linked to our sense of self, looking at our own eyes and face while practicing self-compassion appears to have a more significant impact on psychophysiology than verbalizing self-compassionate phrases. In a study testing the efficacy of a mirror in enhancing compassionate self-talk, users generated phrases for self-soothing and encouragement, then engaged in three conditions: (1) repeating phrases while looking at the mirror; (2) repeating phrases without the mirror; or (3) looking at themselves in the mirror without repeating phrases.

[13] Turnaround for Children. (2020). Stress and the Brain. https://turnaroundusa.org/wp-content/uploads/2020/03/Stress-and-the-Brain_Turnaround-for-Children-032420.pdf

Results showed that those using the mirror reported higher levels of soothing positive emotions and increased HRV compared to the other conditions. Another study using immersive virtual reality demonstrated that identification with a virtual body for self-compassion increased feelings of safety in highly self-critical individuals.

These findings suggest that mirrors are effective tools for enhancing the effectiveness of compassionate self-talk, making them easily implementable in clinical practice. In this study, mirror therapy will be approached using selfies, where the selfie camera and a mirror both display the same mirrored image.

Having explored practices such as future-self journaling and mirror therapy, both aimed at influencing our mental states and self-perception, it becomes evident that these methods share a common thread in leveraging psychological processes to enhance well-being. Together, these practices offer complementary approaches toward fostering positive mental states and reinforcing a sense of self-efficacy.

- **Neuro Linguistic Programming (NLP)**

Employing Neurolinguistic Programming in therapy involves leveraging language patterns, cognitive strategies, and behaviors to help individuals reframe their thoughts and responses. In the context of self-reflection through selfies, incorporating NLP principles allows individuals to examine not only the visual aspects but also the language and internal dialogue associated with their self-image. By consciously choosing positive and empowering language while viewing selfies, individuals can reshape their cognitive patterns and reinforce constructive self-perceptions.

In essence, integrating NLP into selfie-based self-reflection aims to enhance the language we use to describe ourselves, fostering a more positive and empowering mental environment. This linguistic approach aligns with the broader objective of

NLP, which emphasizes the connection between neurological processes, language, and behavioral patterns. As individuals engage in self-reflection through selfies, incorporating NLP techniques can contribute to a more mindful and affirmative dialogue with oneself, ultimately influencing overall well-being.

- **Self affirmation**

Self-affirmation serves as a foundational motivator, nurturing an individual's self-worth and integrity and fostering a perception of oneself as virtuous and capable of influencing crucial life outcomes. Extensive research indicates that engaging in self-affirmation empowers individuals to confront challenges from both external and internal sources, promoting resilience and positive health behaviors. This psychological process enhances global self-esteem and adequacy by instigating positive feelings of self-worth after experiencing failures. Moreover, self-affirmation theory posits that individuals are inherently inclined to maintain a positive self-view. When faced with threats to perceived competence, self-affirmations act as a restorative measure by prompting individuals to reflect on their core values. In a neuroscientific study exploring the neural mechanisms of self-affirmation, participants who practiced self-affirmation demonstrated increased activity in key brain regions associated with self-processing and valuation. Specifically, this heightened neural activity was observed when contemplating future-oriented core values compared to everyday activities. The study illuminates neural pathways, particularly those in reward/valuation regions and linked to self-processing and prospection, associated with successful self-affirmation. These insights into the brain systems involved in positive valuation and self-related processing, reinforced by prospection, offer a valuable tool for future studies on self-affirmation interventions.[14] Additionally, another study

[14] Cascio, C. N., O'Donnell, M. B., Tinney, F. J., Lieberman, M. D., Taylor, S. E., Strecher, V. J., & Falk, E. B. (2016). Self-affirmation activates brain systems associated with self-related processing and reward and is reinforced by future orientation. *Social Cognitive and Affective Neuroscience, 11*(4), 621-629. https://doi.org/10.1093/scan/nsv136

revealed that self-affirmed participants reported higher self-efficacy, leading to adaptive behavior changes and the promotion of positive beliefs.[15]

Together, these practices offer a comprehensive and innovative way to promote mental well-being and bolster a positive sense of self-efficacy within selfie-based self-reflection.

2.5 Cases of the use of selfies as a therapeutic approach

The increasing acknowledgment of selfies as therapeutic tools is evident as individuals share their journeys toward greater self-love. This practice goes beyond casual snapshots, transforming selfies into intentional instruments for promoting mental health. Through self-portraiture, people engage in a therapeutic exploration of their identity, emotions, and self-perception. Taking selfies becomes a therapeutic process, enabling individuals to visually capture and express their evolving selves, fostering enhanced self-awareness and self-acceptance. Overall, this practice contributes to cultivating a more positive relationship with oneself.

- **Shelly Johnson transformative journey**[16]

  Shelly Johnson shared how "Selfie Games" become a means of grown-up play-acting, revealing new facets of expression and fostering a unique connection with oneself. She dismantled the notion of selfies as egocentric, presenting them as a genuine and unfiltered process in contrast to manipulated media images. The narrative concludes with practical tips, encapsulating Johnson's mission to empower others in their journey towards self-love through the playful art of taking selfies.

- **VideoTalk method - Patient-made videos as a tool of self-observation enhancing self-reflection in psychotherapy**[17]

[15] Pandey, R., Tiwari, G. K., & Rai, P. K. (2023). Understanding the Efficacy of Self-affirmation Intervention for Subclinical Depression Among Young Adults. *PCP, 11*(1), 23-34. Retrieved from http://jpcp.uswr.ac.ir/article-1-834-en.html

[16] Johnson, S. P. (2020, May 2). Using Selfies to Cultivate Self-Discovery and Self-Love. Shelly P. Johnson. https://www.shellypjohnson.com/good-selfies-bad-selfies-and-becoming-friends-with-our-self-about-selfie-games/

[17] Koffert, T., Luutonen, S., Niemi, P.M., et al. (2019). Patient-Made Videos as a Tool of Self-Observation Enhancing Self-Reflection in Psychotherapy. Journal of Contemporary Psychotherapy, 49, 187–195. https://doi.org/10.1007/s10879-019-09425-8

The VideoTalk method integrates selfies into a therapeutic approach, allowing individuals to document their mind states and dysfunctional schemas in a natural environment linked to everyday emotional contexts. Subsequently, the recorded video material is reviewed systematically with the therapist, serving as a tool for self-observation and reflection. This method, adaptable to various psychotherapy orientations, proves effective in activating emotions, integral to psychotherapeutic processes. While socially anxious patients may find recording themselves challenging, it has been successfully employed with young patients facing mood and/or anxiety disorders. A case involving a 24-year-old female patient with depression and social phobia showcased the benefits of self-mirroring through recorded videos. The patient's self-perception improved, particularly in situations of helplessness, and the therapeutic use of videos played a central role in enhancing her overall well-being and self-care abilities. The patient's self-affirmations captured in the videos carried more conviction than the therapist's words.

Selfies, like photographs, have limitations as static images may not capture all essential elements of an experience. However, video material provides more comprehensive information with movement and sound. Videos offer multi-modal insights, enabling patients to observe changing facial expressions, bodily movements, hear their voice, and potentially sense tensions in their body. Neuroimaging studies suggest that dynamic facial stimuli in videos lead to increased activation in brain regions associated with emotional processing, opening the potential of video-selfies as a therapeutic approach.

Also, it was essential to consider the patient's state, as the reviewed “VideoTalk” approach emphasizes therapist guidance throughout the process. Patients dealing with anxiety or depression may encounter difficulties if left to navigate the process independently. Insights from therapist interviews [18] underscore the importance of positioning participants in a mindset of hope and encouraging a forward-focused approach to enhance safety. Initiating the journaling process with a visualization of a positive future proved motivating for participants. They could then pinpoint beliefs and

[18] Research performing interviews to 10 therapists in United States

behaviors hindering them from realizing that envisioned future. For instance, starting journaling after visualizing a positive future facilitated the process. However, patients often struggle with narrating their past or identifying root causes of traumas or negative beliefs, especially if they are in a state of denial (a common coping mechanism erasing memories to handle stress).

2.6 Considerations for users in negative emotional states: Future-self approach

Considering that this study emphasizes a self-management approach and considering therapists feedback, it is crucial to assist users in cultivating a positive mindset through visualizing a hopeful future before starting any process of self-reflection. This exploration led to the identification of techniques that facilitate this practice:

Creating a connection with the future-self

Future self-continuity is the degree to which an individual feels connected and similar to their future self, playing a pivotal role in establishing a cohesive sense of identity across subjective time. Individuals with low future-self continuity exhibit neural activations similar to imagining a stranger when picturing their future self. This significantly influences their approach to decision-making and behavior in the present. The research conducted by Hal Ersner-Hershfield involved users ranking their connection and similarity to their future self in ten years using the seven-point "future-self continuity scale" below.[19]

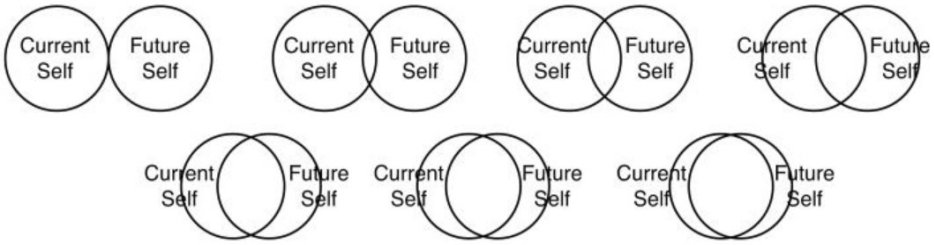


Figure 2.4: Future-self continuity scale

[19] Hershfield, H. E. (2011). Future self-continuity: How conceptions of the future self transform intertemporal choice. Annals of the New York Academy of Sciences, 1235, 30-43. https://doi.org/10.1111/j.1749-6632.2011.06201.x

Individuals who displayed a higher level of disconnection from their future selves, as assessed by the mentioned scale, exhibited brain activation patterns similar to those observed when contemplating a stranger. The research demonstrated that those feeling more detached from their future selves in a ten-year span, as gauged by the aforementioned tool, were prone to present-day procrastination, as measured by a standard procrastination assessment utilized in Blouin-Hudon's initial study.[20]

Here are some examples of how being disconnected to your future-self can impact in several aspects of life:

1. Financial: Planning for retirement

   Saving money becomes a more challenging task when you struggle to connect with the version of yourself decades into the future. For instance, instead of allocating a tax refund to a retirement fund, one might opt for a trip to Disney. However, research indicates that merely having an avatar resembling our older self can prompt us to reflect more and make better choices for our future.[21]

2. Health: Weight loss through diet

   Lacking a strong connection to your future self might lead to decisions like opting for junk food instead of starting a diet. Individuals would not engage in such behavior if they felt a heightened awareness of the risk of chronic disease, thus feeling more accountable for their future selves[22]

3. Ethics: Involvement in delinquent activities

   In a field experiment, researchers investigated whether a stronger sense of connection to the future-self motivates individuals to adopt a more future-oriented approach, subsequently reducing delinquent involvement. The results

[20] Blouin-Hudon, E.-M. C., & Pychyl, T. A. (2017). A mental imagery intervention to increase future self-continuity and reduce procrastination. *Applied Psychology: An International Review, 66*(2), 326–352. doi:10.1111/apps.12088

[21] Hershfield, H., Shu, S., & Benartzi, S. (2019). Temporal Reframing and Participation in a Savings Program: A Field Experiment. Available at SSRN: http://dx.doi.org/10.2139/ssrn.3097468

[22] Rutchick, A. M., Slepian, M. L., Reyes, M. O., Pleskus, L. N., & Hershfield, H. E. (2018). Future self-continuity is associated with improved health and increases exercise behavior. Journal of Experimental Psychology: Applied, 24(1), 72-80. doi: 10.1037/xap0000153. PMID: 29595304.

revealed that users linked to their future selves reported less delinquent involvement, with changes in the vividness of the future self mediating this effect, indicating that increased vividness correlates with lower self-reported delinquency.[23]

- **Visualization as a way to develop a better connection with your future-self**

  Visualization involves mentally imagining the things you desire within and beyond your life. Throughout this process, you concentrate on achieving these desires and contemplate the sensations associated with having already accomplished your goals. The objective of visualization is to imprint your subconscious mind with the beliefs, emotions, and a clear vision of what you want to achieve. Studies indicate that when an individual can emotionally connect with their visualization as if it were already unfolding, the intensity of the emotion reinforces the concept of the goal and primes the brain to seek ways to realize it. The two essential conditions for effective visualization are:

  - Creating a clear mental picture of what you want
  - Imagining yourself accomplishing these results with genuine feeling and emotion

  In a study conducted by Blouin-Hudon, it was demonstrated that practicing visualization, particularly through meditation, can establish a connection with one's future self, effectively reducing procrastination. One key finding suggests that diminishing the emotional aspect concerning the future, essentially neutralizing negative emotions when contemplating it, enhances the sense of connection to the future. However, when emotions become overly intense during future-oriented thoughts, procrastination tendencies resurface. This phenomenon is attributed to procrastination serving as a coping mechanism for negative emotions, such as boredom or anxiety. Therefore, visualizing future

[23] Van Gelder, J., Luciano, E., Weulen Kranenbarg, M., & Hershfield, H. (2015). Friends With My Future Self: Longitudinal Vividness Intervention Reduces Delinquency. Criminology. doi: 10.1111/1745-9125.12064.

scenarios with a positive perspective may eliminate the need for coping strategies like procrastination.[24]

- **Future-self journaling as a practice for organized visualization and goal-setting**

  Understanding the impact of emotional connections to the future, the subsequent research underscores the value of proactive habits in personal development. Delving into practices like daily goal-setting and journaling, individuals not only enhance goal attainment but also contribute to stress reduction and the cultivation of a positive mindset. This connection highlights the interdependent relationship between visualization, emotional management, and proactive habits, reinforcing the intricate interplay in fostering holistic personal growth.

  Journaling before sleeping

  Engaging in the practice of journaling and setting goals before bedtime can significantly improve sleep quality by calming the mind and preventing it from racing with thoughts about upcoming tasks. This nightly ritual contributes to enhanced mental clarity by organizing thoughts, creating mental space, and fostering a focused and efficient mindset. Journaling before bed offers an opportunity for reflection on the day, strategic planning for the next, and effective task prioritization. The cognitive activation achieved through bedtime writing plays a pivotal role in promoting overall mental clarity and productivity.

  The significance of temporal considerations in the journaling process is remarkable. To maximize the advantages for falling asleep, individuals may find it beneficial to spend five minutes before bedtime writing a highly specific to-do list, as opposed to journaling about completed activities. In a study on "The Effects of Bedtime Writing on Difficulty Falling Asleep," users who crafted more

[24] Blouin-Hudon, E.-M. C., & Pychyl, T. A. (2017). A mental imagery intervention to increase future self-continuity and reduce procrastination. Applied Psychology: An International Review, 66(2), 326–352. https://doi.org/10.1111/apps.12088

specific to-do lists experienced a faster subsequent sleep onset, contrasting with the less favorable trend observed when users wrote about completed tasks.[25]

Future self-journaling

Future-self journaling is a technique that involves writing about your future self in the present tense, visualizing and describing desired achievements as if they have already occurred. This method has been demonstrated to eliminate mental resistance and increase the likelihood of intended outcomes by convincing the mind of its achievability, making it a valuable tool for enhancing self-efficacy. The goal of future-self journaling is to access the power of the subconscious mind. Writing about your future self in the present tense communicates to the subconscious that these aspirations are already true, contributing to the reprogramming of beliefs and thoughts. This process facilitates clarity of thought, allowing for the exploration of what works and what doesn't. By documenting thoughts on paper, individuals can gain a clearer understanding of their preferences. The concept behind future-self journaling encourages starting with small changes to make the process manageable and scalable over time. To establish it as a habit, a suggested practice is to engage in it consistently for 30 days. For the goals of this study, our focus is on aiding users in the future-self journaling process, enabling them to incorporate their to-do lists for the next day. This not only reduces pre-sleep stress levels but also enhances self-efficacy by projecting the accomplishment of future goals through past-tense articulation.[26]

- **Meditation is a powerful visualization technique, although it is challenging to develop without proper guidance.**

  Visualization and connecting with one's future self are often associated with meditation and mindfulness practices. Meditation serves as a powerful tool for fostering a positive connection with the future self by accessing theta waves,

[25] Scullin, M. K., Krueger, M. L., Ballard, H. K., Pruett, N., & Bliwise, D. L. (2018). The effects of bedtime writing on difficulty falling asleep: A polysomnographic study comparing to-do lists and completed activity lists. Journal of Experimental Psychology: General, 147(1), 139-146. https://doi.org/10.1037/xge0000374

[26] True North Visionaries. (n.d.). Future-Self Journaling. Retrieved from https://www.truenorthvisionaries.com/resources/future-self-journaling

employing visualization techniques, enhancing coherence, increasing self-awareness, and reducing stress. This comprehensive approach creates an optimal internal environment for personal growth and alignment with enduring goals. Meditation facilitates entry into theta brainwave states, inducing relaxation and ideal conditions for suggestion and mental reprogramming. It allows intentional shaping of thoughts, aligning them with a positive vision of the future self. Visualization during meditation enables individuals to vividly imagine desired future scenarios, guiding actions toward envisioned outcomes. This coherence enhances decision-making congruent with long-term goals. Meditation also promotes self-awareness through reflection and heightened awareness of thoughts and emotions, crucial for recognizing and transcending limiting beliefs or behaviors. Additionally, it effectively manages stress, creating a mental space conducive to focus and better decision-making aligned with long-term aspirations.

While meditation stands out as one of the most effective ways to develop a stronger connection with one's future self, the market of wellness apps already provides that type of solution.

Visualizing and placing the user in a future moment through various techniques such as journaling could offer significant benefits for therapeutic purposes. However, this process can be challenging, particularly during periods of uncertainty or mental health issues like anxiety or depression. Consequently, guided assistance becomes crucial, opening up the potential of AI as a guiding mechanism in this visualization process

2.7 Other considerations: Theta brain waves activated when waking up offers a key suggestible moment for self-affirmations

In understanding the human brain, it's essential to recognize that the impact of brain waves extends across various aspects of well-being, influencing everything from mood to concentration. The brain consists of billions of neurons, specialized cells responsible for transmitting information. The simultaneous signaling of these neurons generates extensive electrical activity within the brain, resulting in synchronized electrical pulses

known as 'Brainwaves.' These brain waves represent the electrical impulses flowing through the brain, creating distinct patterns of activity measured in cycles per second, denoted as hertz (Hz). There are five primary types of brain waves:

Table 2.2 : Primary types of brain waves

Brainwave Type and function	Frequency Range	Function/State Description	Associated Mental Health Conditions
Gamma “High performance ”	40 Hz to 100 HzX 	Processing intricate tasks, supporting cognitive function, crucial for learning, memory, and processing, binding mechanism for assimilating new information	Anxiety and stress (elevated levels), Depression, ADHD, and learning issues (diminished levels).
Beta “Alert & Focused”	12 Hz to 40 Hz 	Predominant during conscious states, including cognitive reasoning, calculation, reading, speaking, or thinking. Consumed by common stimulants like caffeine, associated with awake and alert individuals	Anxiety and stress (elevated levels). Depression, Poor cognitive ability, Lack of attention (diminished levels)
Alpha “Relaxed”	8 Hz to 12 Hz 	"Frequency bridge" between conscious thinking (Beta) and the subconscious (Theta) mind. Calming effects,	Excessive daydreaming (elevated levels). OCD, Anxiety symptoms, Heightened stress (diminished levels)

		promotes deeper relaxation, sense of contentment, contributes to network coordination and communication	
Theta "Deeply relaxed"	4 Hz to 8 Hz 	Prevalent during trance or hypnotic state, associated with suggestibility, more susceptible to hypnosis and therapeutic interventions, commonly associated with daydreaming or sleep	Excessive daydreaming (elevated levels). OCD, Anxiety symptoms, Heightened stress (diminished levels)
Delta "Asleep"	0 Hz to 4 Hz 	Linked to profound relaxation and restorative sleep, slowest recorded brain waves, prevalent in young children. Regulates unconscious bodily functions, including cardiovascular and digestive systems	Brain injuries, Learning problems, Difficulty thinking, Severe ADHD (elevated levels). Inability to rejuvenate the body or revitalize the brain, Poor sleep (diminished levels)

In adulthood, our beliefs are primarily stored in the subconscious, governing approximately 95% of our decisions and behaviors. The subconscious is predominantly shaped during childhood, as the developing brains of children are highly susceptible to absorbing information, particularly when operating in Theta waves.[27]

Theta waves play a crucial role in unlocking the beliefs stored in the subconscious mind. The transition from delta to theta waves is associated with awakening, with the brain spending a short period in this frequency, lasting about 5-15 minutes upon waking. Despite its brevity, this time frame presents an opportunity to harness the power of theta waves in your morning routine. Research indicates that theta waves are active during the

[27] Gymshark Central. (n.d.). Rise and Shine: How to Tap into Your Brain Waves for an Effective Morning. Retrieved from https://central.gymshark.com/article/rise-and-shine-how-to-tap-into-your-brain-waves-for-an-effective-morning

transitional phase between sleep and wakefulness, a moment when consciousness is pliable, and intuition is heightened. Consequently, the brain is highly suggestible upon waking, offering a unique chance to introduce positive information and reprogram beliefs stored in the subconscious mind.

Table 2.3: Nine main steps that the user would be expected to accomplish using an app

I hypothesize the main challenges for this process are in the following aspects:

Onboarding

Maddux's complementary approach to enhancing self-efficacy through imaginal experiences involves leveraging imagination, a natural faculty of every individual, to visualize positive accomplishments and overcoming challenges. However, envisioning a positive future may be more challenging for individuals dealing with negative experiences, depression, or anxiety. Depression can lead to a loss of motivation and avoidance of future thoughts, while anxiety tends to paint a negative and uncontrollable future. Cultivating self-efficacy becomes particularly challenging in these cases. Therefore, AI offers the potential to guide users in this process by providing tailored support and encouragement.

Training

The idea is to train the user in a gamified manner on how the app works and to practice self-affirmation for their journaling and video recording tasks. This phase would be developed in another study to test various gamified approaches to training.

Self-video recording 5 days:

The user is required to create a video-selfie at night, recording activities planned for the next day and narrating them as if they have already happened, focusing on the emotions they want to feel during the day. The ultimate vision is to integrate the AI-powered

assistant with the user's schedule, enabling more personalized guidance and facilitating this process.

In the first week, users are expected to perform this activity for five days to become familiar with the practice and receive feedback from the AI-powered assistant. Afterward, users can adjust the frequency weekly, monthly, or as needed. The primary challenge in this phase is making users feel comfortable with the practice and helping them understand the benefits of regular participation. In this study, we guide users to record themselves using their smartphones, with the option to send a picture if they prefer the AI-powered assistant to generate a generative AI video.

Feedback:

In this phase, the vision is for the AI-powered assistant to offer users feedback on the improvement in their language based on interactions with the bot and analysis of the videos (ensuring privacy). Subsequently, a post-completion test would be conducted to assess whether there is improvement in the user's self-efficacy and future self-continuity regarding the selected goal to work on. The study aims to evaluate the user's comfort level with these metrics and identify signals of improvement in these skills.

Therefore, this study will help us to validate if these challenges are accurate and gain insights of how to face them (see section 3.1: Goal of the study)**:**

2.8 Challenges of the model

Envisioning a digital solution for a future self video-selfie online therapy approach through an app, the user would be expected to accomplish the following process (Figure 2.5) accomplishing nine main steps (Table 2.2).

Figure 2.5: Envision of digital solution for a future video-selfie online therapy approach

1.Exercise to envision your future self to identify goals you want to work on **2.** Pre-evaluation to measure self-efficacy and self-continuity perceptions about specific goal	**3.** Gamified training of the process. How does it work and why does it work? **4.** Learning how to talk to yourself setting tactical and emotional goals to record the video	**5.** AI prompts to guide you. Ask questions based on your agenda and specified goals. **6.** Recording messages from the future self of tomorrow at night, assuming that the next day has already occurred. **7.** Setting up alarm to re-watch video at the beginning of the day	**8.** Feedback according to the goals established during the onboarding and self-talking insights **9.** Post-evaluation to measure self-efficacy and self-continuity perceptions about specific goal

2.9 Design choices for the AI-powered assistant

In the case of VideoTalk[28] described in section 1.6, users had the assistance of therapists to facilitate self-reflection. As this is a self-management approach, users will rely on AI assistance. The decisions made in designing an AI system are pivotal in shaping users' comprehension of its predictions, impacting their motivation, and fostering a sense of empowerment. This emphasizes the significance of adopting a responsible, human-centered approach to AI design, emphasizing the need for a balanced assessment of information and a dedicated commitment to personalized care. Online mental health

[28] Koffert, T., Luutonen, S., Niemi, P.M., et al. (2019). Patient-Made Videos as a Tool of Self-Observation Enhancing Self-Reflection in Psychotherapy. Journal of Contemporary Psychotherapy, 49, 187–195. https://doi.org/10.1007/s10879-019-09425-8

support encounters specific challenges where AI can play a fundamental role described in Table 2.3:

Table 2.4: Main challenges in mental health support and AI opportunities[29]

Challenges in Mental Health Support	AI Opportunities
Understanding Patients: Assessing mental health problems, risks, progress, and barriers.	- AI can analyze large datasets to identify patterns and risk factors. - Natural Language Processing (NLP) can help extract insights from patient messages. - Machine learning algorithms can assist in personalized treatment recommendations based on patient profiles.
Patient Engagement with Internet-based Cognitive Behavioral Therapy (iCBT): Tailoring support based on engagement patterns and addressing challenges.	- AI-driven chatbots can provide proactive engagement, encouraging regular participation. - Sentiment analysis in communication can gauge patient satisfaction and tailor responses. - AI can analyze engagement data to predict potential drop-out risks.
Evaluating Patient Progress: Assessing how well patients understand and use program contents.	- NLP can analyze patient messages for indicators of learning progress or struggles. - AI algorithms can provide insights into patient language use, indicating mental health states and behavior changes. - Data analytics can facilitate the identification of effective program components for specific conditions.
Extracting Relevant Patient Information: Gathering and responding to patient information under time constraints.	- AI can assist in extracting relevant information from patient messages through NLP. - Smart algorithms can prioritize and summarize key patient information for quick review. - Machine learning can help detect patterns in patient data to aid in decision-making.
Forming a Therapeutic Alliance: Establishing a personalized connection with	- AI-driven chatbots can simulate personalized interactions, creating a sense of connection. - Natural language understanding can enhance chatbot

[29] Thieme, A., Hanratty, M., Lyons, M., Palacios, J., Marques, R. F., Morrison, C., & Doherty, G. (2023). Designing Human-centered AI for Mental Health: Developing Clinically Relevant Applications for Online CBT Treatment. ACM Transactions on Computer-Human Interaction, 30(2), Article 27. https://doi.org/10.1145/3564752

patients.	responses to convey empathy and understanding. - AI can assist in personalizing support based on **individual** patient preferences.

The fundamental motivation behind the development of artificial intelligence tools is not inherently geared towards assisting individuals. Instead, the focus lies on the customization and pre-design of these tools to align with specific needs. In the context of employing a Large Language Model (LLM), it serves as a potent tool with the capability to perform a wide array of tasks. However, the key lies in ensuring that the LLM is directed to generate the desired outcomes. This necessitates a meticulous understanding of the model, its structure, and the application it serves.

To effectively utilize the LLM, it is imperative to accurately define the problem at hand. Taking an example in the mental health context, a simple query about a person's well-being may not suffice. Instead, understanding the individual's mental health history, current emotional state, and specific challenges they are facing becomes crucial. Identifying three key elements—the model itself, its structure, and the application—plays a pivotal role in guiding the training process. This approach ensures that the LLM is tailored to address specific mental health challenges and provide meaningful solutions.

For example, while ChatGPT excels in predicting the next token (word) based on statistical data, it falls short in comprehending the underlying reasons behind its actions.
Statistical information alone is insufficient to capture the depth of interpersonal dynamics. The objective is to move beyond statistical predictions and delve into the 'why' behind the model's responses. This 'why' factor becomes the guiding principle, emphasizing the need for a metric that measures the quality of answers generated by the AI model.

To enhance the effectiveness of the LLM, a nuanced approach involves training the model universally and subsequently fine-tuning it for each individual based on their unique mental health experiences. This personalized adaptation ensures that the LLM not only

understands general patterns but also caters to the intricacies of individual mental health preferences and perspectives.

Understanding how to perform these tasks is crucial for optimal AI-powered assistant training. In this study, to comprehend the 'why' behind the model's responses, I played the role of a simulated AI chatbot through WhatsApp, and this testing phase will be instrumental in gaining insights to design an AI-powered assistant in the following aspects:

Guidance

- Assistance to users in defining their vision and goals, pinpointing areas for improvement in self-efficacy.
- Use of guided selfie video journaling with prompts to assess users, enhancing language for self-affirmation and improving goal-setting during video recording.
- Tone of the chat and effectiveness in assessing to complete task of recording video-selfies.

Tracking of progress

- Track user progress to foster engagement and motivation, including tasks such as recording at night, re-watching the video in the morning and occasional checks to track mood states.

Chapter 3

Study Design

3.1 Goal of the study

The study aims to gain insights into five main aspects, each with a specific research goal described in Table 3.1:

1. Performance of the simulated AI chatbot to help the development of a future AI-powered assistant.
2. Process of onboarding to define areas to work on.
3. Ease and effectiveness of the video-recording and journaling.
4. Evaluation of the "future-self" concept: Insights into whether self-continuity and self-efficacy are metrics that can help users make progress.
5. User-feedback for the design of the app.

Table 3.1: Aspects of research and goal of user test

Aspect		**Goal of user test**
Simulated AI chatbot (Whatssapp wizard of oz)	**Guidance**	1. Assistance to users in defining their vision and goals, pinpointing areas for improvement in self-efficacy.
		2. Use of guided selfie video journaling with prompts to assess users, enhancing language for self-affirmation and improving goal-setting during video recording.
		3. Tone of the chat and effectiveness in assessing to complete task of recording video-selfies.

	Tracking of progress	4. Track user progress to foster engagement and motivation, including tasks such as recording at night and reviewing in the morning).
Onboarding		5. Explore two approaches to guide users to define specific work areas in a week
Video-recording and journaling		6. Evaluate the ease of performing journaling and video recording tasks
		7. Evaluate the potential positive impact of the video-recording and journaling process on self-affirmation and self-reflection
Metrics		8. Evaluate if metrics of perceptions of self-efficacy and self-continuity could offer users feedback to track their progress
Design features		9. User experience with the system
		10. Identify user pain points to facilitate the process through an easy-to-use design.

3.2 Participants

The experimental study was conducted online and involved a total of 16 participants aged between 30 and 77 years old (7 Female and 9 Male). Participants, who were from Peru (Spanish-speaking) and the United States (Figure 3.1), were attempting to address various challenges in different life areas. These challenges included issues such as anxiety, work-related stress, depression, chronic diseases, organizational difficulties, the need for inspiration for new ideas, and meeting specific work deadlines.

3.3 Methodology

Wizard of Oz[30]

The study aims to understand how the AI-powered assistant can effectively assist participants, with the overarching goal of improving the LLM. This involves universal training followed by individual fine-tuning based on unique experiences. The research methodology utilized a Wizard of Oz approach, simulating a chatbot through WhatsApp for an online experimental study. The primary objective was to comprehend user reactions to the process, providing valuable insights for future design enhancements.

Pre-completion and post-completion surveys

The participants filled pre-completion and post completion surveys through google form to measure their perception about:

- Self-efficacy: Their capacity to accomplish goals in their life and also in the specific goal they were working during the testing period.
- Future self-continuity: How connected they feel to their future-self in their life and also in the specific goal they were working during the testing period.
- User experience: To rate their experience with the simulated AI bot

Post-completion User Interviews

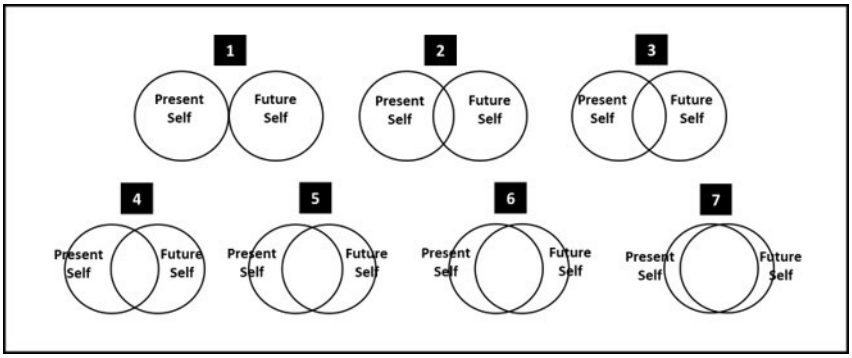
Interviews done by phone calls to have more in depth details about their overall experience.

3.4 Measure

The participants took an online survey through google forms. The description of measure for self-efficacy, future self-continuity and user experience is described in Table 3.2:

[30] Wizard of Oz Experiment. (n.d.). In Wikipedia. Retrieved from https://en.wikipedia.org/wiki/Wizard_of_Oz_experiment#:~:text=The%20phrase%20Wizard%20of%20Oz%20%28originally%20OZ%20Paradigm%29,and%20intercepting%20all%20communications%20between%20participant%20and%20system%29.

Table 3.2: Pre-completion and Post-completion surveys

Pre-completion (Appendix A)
Perceived general self-efficacy based on the General Self Efficacy Scale (GSE).[31]
Perceived Future Self-Continuity in 10 years: the Future Self-Continuity Measure is the index of future self-continuity featured two questions on a 7-point scale marked at each point by two circles that ranged from depicting no overlap to depicting almost complete overlap. Participants selected the circle pair that best described how similar and how connected they felt to a future self ten years from now.[32]  *Figure 3.1: Future self-continuity scale*
Perceived Future Self-Continuity in 10 years:
Perceived Future-Self continuity about the specific task they were working on during the testing period
Post-completion (Appendix B)
Perceived general self-efficacy based on the General Self Efficacy Scale (GSE).[33]
Perceived Future Self-Continuity in 10 years

[31] Chen, G., Gilad, B., & Gully, S. M., & Eden, D. (2001). Validation of a New General Self-Efficacy Scale. *Organizational Research Methods*, 4. https://doi.org/10.1177/109442810141004

[32] Ersner-Hershfield, H., Garton, M. T., Ballard, K., Samanez-Larkin, G. R., & Knutson, B. (2009). Don't stop thinking about tomorrow: Individual differences in future self-continuity account for saving. *Judgment and Decision Making*, 4(4), 280-286. PMID: 19774230; PMCID: PMC2747683.

[33] Chen, G., Gilad, B., & Gully, S. M., & Eden, D. (2001). Validation of a New General Self-Efficacy Scale. *Organizational Research Methods*, 4. https://doi.org/10.1177/109442810141004

User experience based in the System Usability Scale (SUS).[34]
Interview: ● Name ● What was the goal to work on these 5 days? ● What was your overall experience? ● Based on your experience, what did you think the process should involve? ● Did you find all the steps important? Why? ● Now that I have clarified the scientific elements behind each activity, has your perception of the utility of this system changed? ● What did you think of the bot's tone? Too friendly, too cold? How would you like it to be? ● Did you feel that this process helped you recognize things about yourself? ● Did you feel that this process helped you become more aware of how you reaffirm yourself? ● Did you identify with your video? ● Did you identify with the video generated by the system? ● Would you use this system again? Why? ● Would you recommend it?

3.5 Procedure

The testing was conducted exclusively online, preventing participants from having face-to-face interactions with the person guiding the wizard of oz through WhatsApp. This is the procedure that the participants followed:

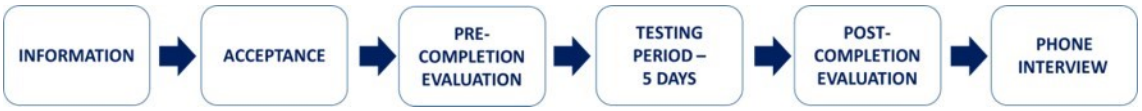


Figure 3.2: Procedure followed by participants to perform testing

[34] Usability.gov. (n.d.). System Usability Scale (SUS). Retrieved, from https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html

1. Information: Participants were informed that the study aimed to test the interaction with a simulated AI wellness app chatbot through WhatsApp called “FutureSelf”, focusing on enhancing self-efficacy for specific goals. Participants were also informed that the process would involve creating video-selfies stored on their cellphones, and videos were not going to be collected.
2. Acceptance: Participants signed their acceptance through the form acknowledging that their information was going to keep private.
3. Pre-completion evaluation (Appendix A): Participants filled the evaluation in two moments (See section 3.4).
    - Before starting the connection with the simulated AI whatsapp bot to measure perception of general self-efficacy and future self-continuity.
    - During the connection with the simulated AI whatsapp bot to measure perceived self-efficacy and future self-continuity in the specific goal they were working on.
4. Testing period - 5 days: participants were instructed to record themselves daily for five days and replay the recordings the next morning upon waking. Acknowledging the personal nature of these recordings and the potential limitation if participants felt someone else might review them, participants were asked to keep the recordings on their own cellphones.
5. Post-completion evaluation (Appendix B): Participants filled the same evaluation as in the pre-completion (See section 3.6).
    - Before finishing the process with the simulated AI whatsapp bot to measure perceived self-efficacy and future self-continuity in the specific goal they were working on.
    - When finishing the interaction with the simulated AI whatsapp bot to measure perception of general self-efficacy, future self-continuity and user experience.
    - Interview: 30 minute interview

3.6 User testing

Participants were required to complete the pre-completion survey (Appendix B). Afterward, they were added to a group chat in whatsapp, named “FutureSelf - [Name]”, where they were guided to complete the following process described in Figure 3.5:

1. Welcome: Introduction and two options to define their prefer area of work
2. Selection of work area: The bot offers two options:
    a) Seven pre-determined options to work on: Anxiety, Depression/sadness, PTSD, Unresolved trauma, Chronic illness, Work-related stress or Inspiration for an idea
    b) Help to define an area to work on .
3. a) User selected one pre-defined option and moves to step 4

    b) User was provided with the following lost of life aspects to rank them according to the following scale and then choose one area that ranks below 3.
        1. This area is a liability in my life; I need to work a lot on it.
        2. This area makes me feel dissatisfied; it's ideal to make changes and think about how to improve.
        3. This area functions, but I feel it still needs improvements.
        4. This area works adequately, but I would like to take it to the maximum level.
        5. This area is an asset in my life; I am at ease and don't want to focus on this point.

	Life aspect	Description
1	Health and physical well-being	Your physical well-being
2	Spirituality	Your connection with divinity or a higher power
3	Mental health	Includes our emotional, psychological, and social well-being
4	Character	Ego, your values, beliefs, and intrinsic traits
5	Financial life	Your relationship with money and assets
6	Career	Professional pursuits and ambitions
7	Purpose	Your long-term goals
8	Community	Contributions to society
9	Love relationships	Romantic connections
10	Social life	Your relations with friends and the community
11	Family	Relationships with children and relatives

Figure 3.3: Division of 11 life aspects

4. Define main challenges and thoughts: The user was asked to articulate the primary emotions and thoughts associated with the given problem, goal, or life aspect.
5. Description of self-perception: The user was prompted to visualize and communicate their thoughts on how they would feel and think if they successfully overcame the challenges related to this problem, goal, or life aspect.
6. The user was asked to complete tests assessing self-efficacy and future self-continuity. These tests aimed to gauge the user's initial beliefs regarding their capability to achieve the goal and their connection to their future selves after overcoming it. The specific questions used in these tests are detailed in section 3.4.

- Self- continuity How connected do you feel to this future version of yourself? Select an option:

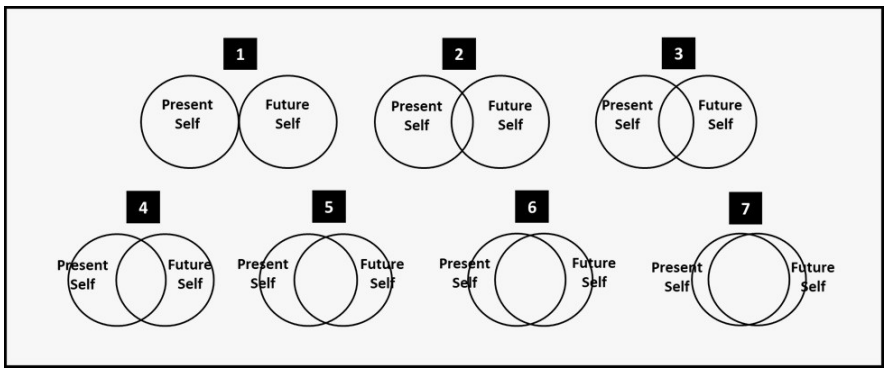


Figure 3.4: Future self-continuity scale

- Self- efficacy: How connected do you feel to this future version of yourself? Select an option:

  What do you think about the following statements regarding your challenge. Use the following scale to rate each option (1 = totally disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = totally agree).

  1. I will be able to achieve most of the goals I have set [*detailed task*].
  2. I believe I can succeed in [*detailed task*].
  3. I am confident that I can perform effectively in this task/life area.
  4. Even if things are tough, I can perform quite well in this task/life area.

7. Suggested goal of the week: The user was provided with a suggested goal for the week based on their previous answer. Generally it was a two sentence affirmation, detailing in the first one how they feel achieving their goals and in the second one the challenges they are overcoming. If the participants agree, that become the key goal of the week.

   Here is an example:

   "[sentence 1]: *I am enjoying my work because I look to feel proud of myself and that is perceived by others.* [sentence 2]: *This allows me to expand my productivity and creativity feeling more at ease*"

8. Description of process to record the video: he simulated bot simply offered a suggested script for recording the video at night (refer to Appendix C for more details). Afterward, the user established a time to review their activities before sleeping.

   In the night, thinking that you're at the end of the next day, you'll record a 2-minute selfie following the following structure:

   1. *TARGET EMOTION: Today, I feel "....."*
   2. *NARRATE THE MAIN ACTIVITIES OF YOUR DAY AND HOW YOU FELT PROUD OF YOURSELF AT THE END OF EACH OF THEM "…."*
   3. *REALISTIC POSITIVE CLOSURE: "The day wasn't perfect, and that's okay; the important thing is that I identified areas for improvement. Tomorrow, I'll make more progress, and I'm on track to achieve my goal of '…'. I'm highly focused on enhancing '… area of my life,' and I know I'll turn it into an asset for myself."*

   ********** REPEAT FIVE DAYS **********

9. Review of activities of the next day: The simulated bot reminded the user to check and share their activities

10. Suggestion of potential script for video:The simulated bot provided feedback to phrase it better before the user could record the video. If the user agreed, the next step was to record the video
11. The bot suggested two options to finish this task:
    a) Record themselves: The user had to record the selfie with their smartphone.
    b) Allow the simulated bot to prepare the video[35]: The user was requested to send a picture and an audio.
12. Notification to watch the video in the morning: The simulated bot sent a reminder and video (when applicable) everyday at the time the user wanted to wake up.
13. Define time to review activities: The bot sets a new time to review activities based on participants preference.

    ********** FINISH OF TEST **********

14. Tests: The user repeated the same process as in step 6.

[35] The videos were elaborated in the following platform: https://replicate.com/cjwbw/sadtalker/versions/3aa3dac9353cc4d6bd62a8f95957bd844003b401ca4e4a9b33baa574c549d376)

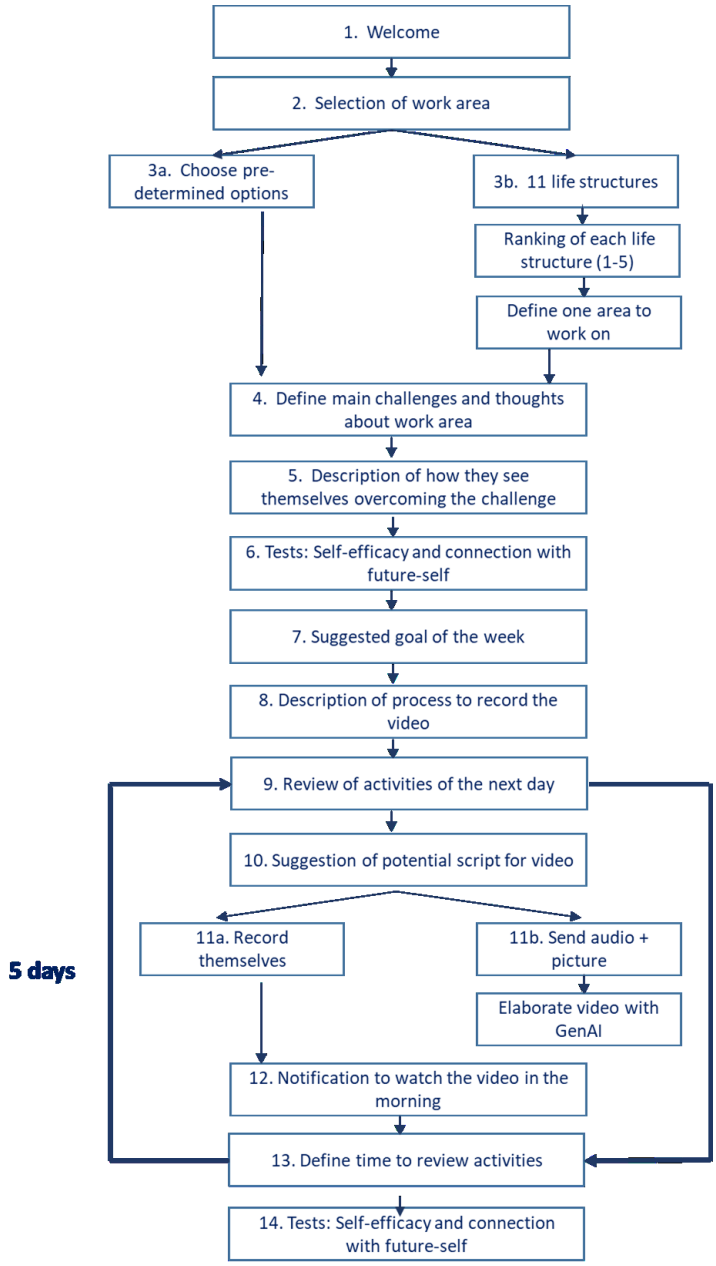


Figure 3.5: Process of interaction with simulated whatsapp chatbot. See complete pre-determined AI chatbot guidance in Appendix A.

Chapter 4

Results

As outlined in Section 3.1 (Table 3.1), the study aimed to acquire insights into five key aspects: the effectiveness of simulated AI chatbot guidance, onboarding process effectiveness, ease of the video-recording process, and insights for enhancing the overall design. Participants completed both pre-completion and post-completion surveys, in addition to a 30-minute interview (refer to Section 3.4).

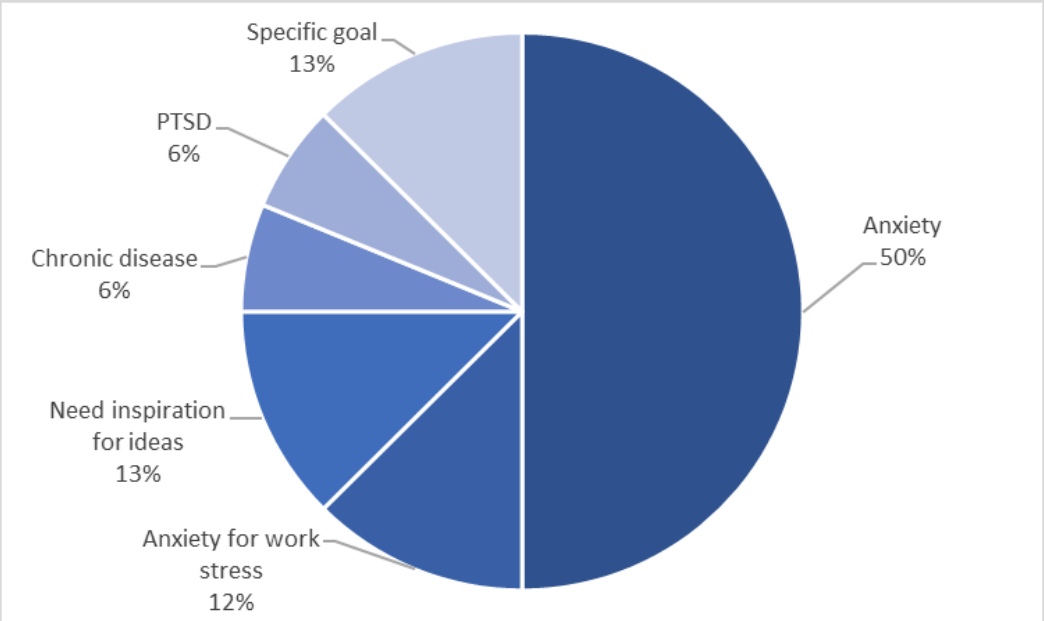
For the analysis of the results the sample was 80% concentrated in people between 24-40 years, with the majority located in the United States (see Table 4.1).

Table 4.1: Sample of participants

		24-40 years	40-50 years	>50 years
Peru 38%	Female	2		2
	Male	1	1	
USA 62%	Female	3		
	Male	7		

For this study, the use cases per individual were diverse, since it was not intended to target a specific condition. Approximately 60% experienced moderate anxiety, with 12% specifically attributing it to work-related factors. The remaining participants expressed a desire for workplace improvements, emphasizing areas such as inspiration for ideas, pursuit of specific work goals, and addressing chronic conditions like PTSD or other long-term health issues (see Figure 4.1).

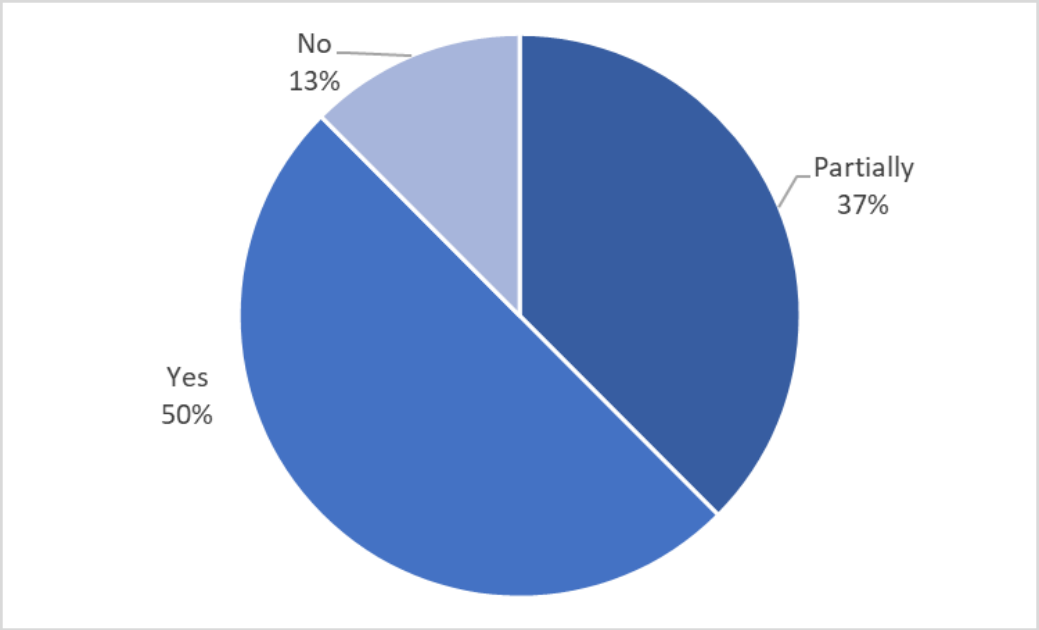
Figure 4.1: Distribution of sample by use case



The participants were expected to complete 5 days of interaction with the simulated AI bot, practicing making a video-selfie recording narrating their activities and the target emotion of the next day as if they had already happened (description in section 3.5). Only 50% of the sample was able to complete the activity; 37% participated partially (1-3 days), and the rest dropped it (Figure 4.2).

The individuals who dropped the challenge were experiencing severe PTSD and high levels of work stress. Those who participated partially had established very specific work-related goals, were seeking inspiration, or were dealing with personal circumstances that led them to some level of depression, demotivating them to look at themselves through a selfie. The people who found value in the practice were experiencing controlled levels of anxiety, mainly due to personal issues or facing a chronic disease.

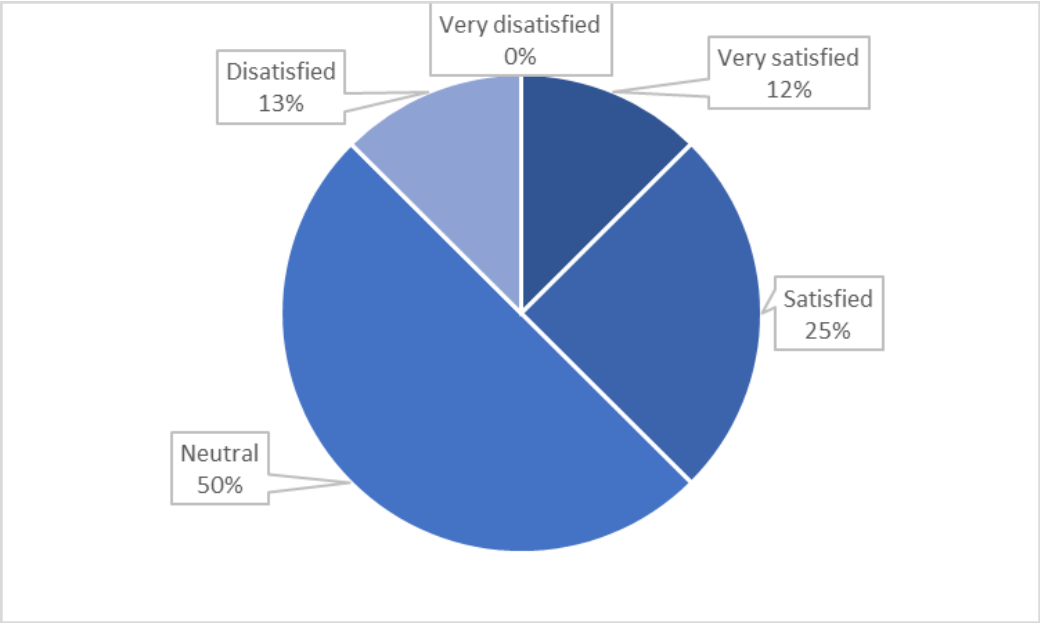
Figure 4.2: Completion rate



User experience

User experience with the system played a key role in their decision to keep engaged with the practice. After the completion of the 5 days, participants were asked to filled 9 questions from the System Usability Scale survey (see section 3.4), with one of five responses that range from "Strongly Agree" to "Strongly disagree". To the general question of how satisfied were they with the overall experience 50% of participants rated as neutral and another 12% dissatisfied (see Figure 4.3).

Figure 4.3: Distribution of answers to the question how satisfied are you with your experience using "FutureSelf"?



In Table 4.2, we can find the results of the complete survey, where the main cause of disengagement appears to be a lack of training and understanding of how the system operates. Another 43% reported that they did not find the system easy to use. Additionally, 57% indicated that they were not likely to use this system frequently. In the in-depth interviews, participants offered more detailed insights into the overall concept. They conveyed that a clearer understanding of the science and rationale behind the entire concept, along with the importance of following all the steps, increased their eagerness to use the system more frequently.

Table 4.2: Results System Usability Scale (SUS) survey

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	I think that I would like to use this system frequently.	-	14%	43%	14%	29%
2	I found the system unnecessarily complex.	14%	43%	14%	29%	-
3	I thought the system was easy to use	14%	-	29%	57%	-
4	I thought there was too much inconsistency in this system.	29%	43%	14%	14%	-
5	I would imagine that most people would learn to use this system very quickly.	-	-	43%	43%	14%
6	I found the system very cumbersome to use.	14%	57%	29%	-	-
7	I felt very confident using the system.	-	14%	14%	71%	-
8	I needed to learn a lot of things before I could get going with this system.	-	29%	14%	14%	43%

All interaction occurred with the simulated bot, as one of the primary objectives of this study was to gain insights into how an AI-powered assistant could facilitate users in this process. Generally, participants perceived the chatbot's tone as gentle and more helpful at the beginning. However, there is a need for increased customization after the second day to gather more insights into how the person is feeling; otherwise, it becomes repetitive.

Additionally, participants emphasized the delicate balance between being gentle and overly friendly. They recognized the bot as simulated, and while some users valued a super-friendly and approachable demeanor, others perceived it as artificial and preferred a more objective approach with clear reminders. Preferences varied; some users expected a bot to be friendly, but not necessarily to behave like a real friend asking about their day. The challenge lies in understanding the user's profile and mood of the day to adapt the tone accordingly. It is also crucial to consider their preferences, as some users prefer direct and clear instructions, while others lean towards a more friendly approach. Achieving the right balance in these aspects is essential for enhancing the overall user experience effectively. This is vital for user engagement, as highlighted by a participant who pointed out that the bot's excessive friendliness and inquiries about their day, rather than providing specific reminders, led to the decision to discontinue the video-making activity.

Almost half of the participants did not feel that the chatbot helped them define goals to work on. Participants were anticipating more customization, hoping the bot could gain deeper insights into the problem by seeking additional information about the severity of the issues they were dealing with. It's worth clarifying that they did not expect the bot to sound like a therapist. Over 50% (refer to Table 4.3) did not have a clear understanding of why the bot needed to guide them through the video creation process. However, this rationale became more apparent to some participants after a few days when they recognized that the primary goal was to foster a positive mindset at the end of the day, even in situations where activities did not unfold as expected. They emphasized the necessity of improving the onboarding and training processes to provide a clearer understanding of the overall system functionality.

Table 4.3: Performance of the simulated AI chatbot- Guidance and tracking

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	The "FutureSelf" chatbot helped me identify and define the goals I want to work on.	0%	14%	29%	29%	29%
2	The "FutureSelf" chatbot effectively guided me through visualizing my future self.	0%	14%	29%	29%	29%
3	The "FutureSelf" chatbot chat's encouragement to acknowledge imperfections in the video was helpful.]	0%	14%	43%	29%	14%

Video-recording: Self-reflection and self-affirmation

Among the participants who completed the activities, whether in full or partially, 72% opted for creating a video recording. Another 12% utilized the generated video, while the remaining participants chose audios or readings. Recording the video was deemed manageable by over 70%, with the primary challenge being the training to focus on the desired emotion for the future. This challenge is reflected in questions 3 to 5 in Table 4.4, where participants were queried about the impact of creating and replaying the video on their mood for the day. On average, 50% were not sure about a positive impact of the process of self-affirmation through the video on their mindset. However, more than 70% expressed that the process helped them identify areas of improvement, making it a potential tool for self-reflection. In-depth interviews revealed that doing the recording in the first two days was uncomfortable for them, and they did not want to record if they did not feel they looked good, providing another reason to discontinue the activity.

Table 4.4: Results video-selfies impact in self-reflection and easiness to make them

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	Writing my activities and recording the video selfie helped me reflect on my emotions.	0%	29%	29%	14%	29%
2	Recording and watching my video allowed me to identify areas for improvement.		29%	0%	57%	14%
3	Watching the video in the morning had a positive impact on my mindset for the day.	0%	0%	43%	29%	29%
4	I felt aligned with the target emotion while watching the video.	0%	0%	57%	14%	29%
5	Aligning activities with the target emotion positively influenced my daily tasks.	0%	0%	57%	43%	0%
6	Creating the video was an easy and manageable task.	0%	14%	14%	43%	29%

Measure: Future self-continuity and self-efficacy

The fundamentals of the proposed approach (see section 1.4) focus on enhancing a positive emotional connection with the version of your future-self that has accomplished a goal to enhance self-efficacy, which, in turn, boosts decision-making and motivation to take action (Figure 1.3). Therefore, the proposal should be able to provide feedback to users on their progress in these two aspects. In this study, we focused on identifying whether the Future-Self Continuity Scale and the General Self Efficacy Scale (see section 3.4) could offer users feedback about their progress. However, it is important to highlight that further research on a larger scale would be needed to validate these metrics.

Future-Self continuity

Participants were asked to rate how connected they felt with their future version on a scale from 1 to 7 (see section 3.4). The results, shown in Figure 4.4, represent the sum of the scores of all participants' perceptions.

Overall results show that participants who created the video or engaged in the process partially increased their perception of getting closer to the future version of themselves accomplishing their goals. Participants who completed the 5-day training with the videos showed more improvement. In interviews, they highlighted that the main reason lies in the self-reflection that the process induced. They mentioned that, in general, they were trying to complete goals, but they did not realize how they would feel about that. Since the process involved focusing on the emotions, it made them more conscious, thereby impacting their perception of getting closer to that accomplishment. However, this did not impact their overall perception of being connected with a desired version of their future in a 10-year timeline. Although, it is important to highlight that in the case of older populations this metric would not have the same effect, since their perception of the future is different.

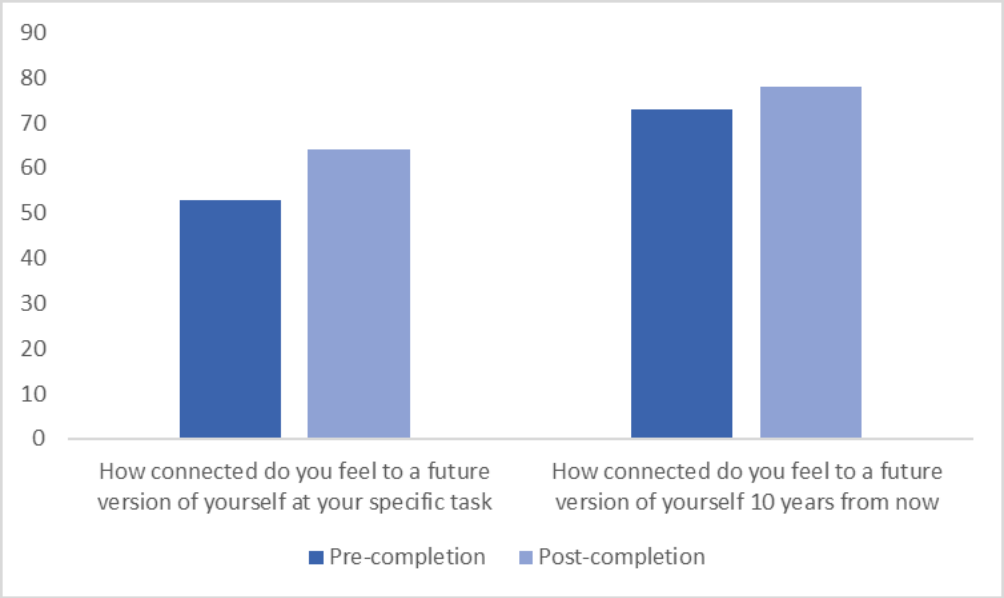


Figure 4.4: Future self-continuity at a specific task and 10 years from now

Self-efficacy

Participants were asked to rate statements regarding their belief in their capacity on a scale from 1 to 5 (see section 3.4). The results, depicted in Figure 4.5 and 4.6, represent the sum of the scores reflecting all participants' perceptions.

On the other hand, in relation to self-efficacy, the results demonstrate that the improvement in participants' belief in their capacity to accomplish the task positively impacts their general perception of their ability to achieve various goals (see Figure 4.6 “I will achieve most of the goals I have set for myself”). In interviews, participants mentioned that the process prompted them to reflect on the emotion or reason behind their pursuit of the task. However, they were often too focused on the activities they needed to accomplish the next day, rather than concentrating on the emotional goal they had established. This sometimes led to frustration, as some participants felt a lack of accountability when unable to complete all the defined activities.

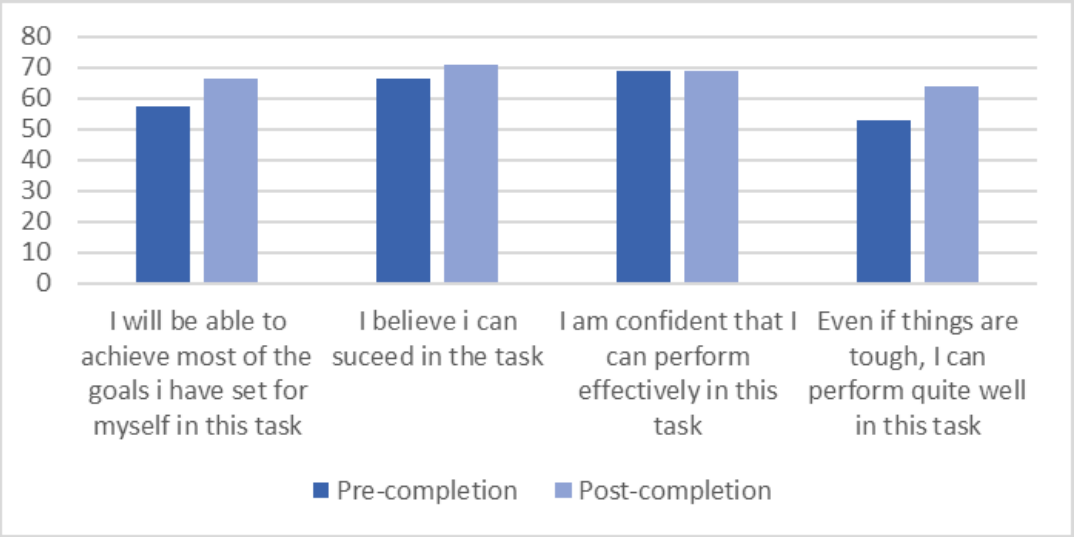


Figure 4.5: Self-efficacy in the specific task

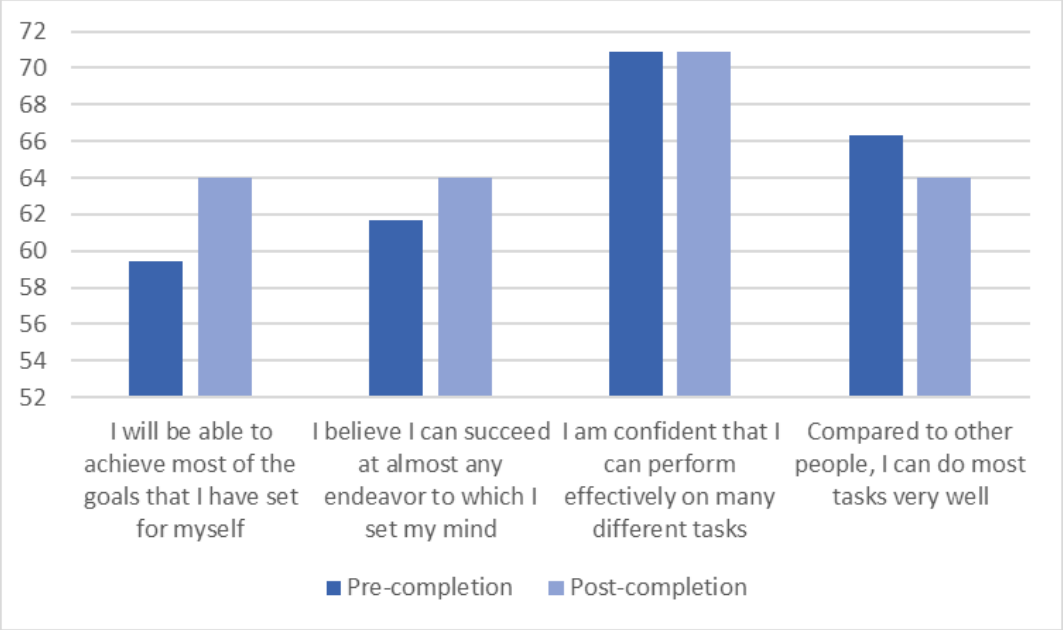


Figure 4.6: Self-efficacy in general

Chapter 5

Conclusions and future work

- The results validated several of the challenges hypothesized in section 2.8, mainly on the onboarding to understand the "why" of the process and assessing users in defining goals to work on to keep engaged with the practice.

In Table 5.1 the main insights of the main 5 aspects (subdivided in 10 topics) to evaluate design considerations for the proposed solution of an AI-prompted "Future-Self" video journaling tool:

Table 5.1: Key Insights for Each Aspect of the Research Goal

Aspect		**Goal of user test**
AI chatbot **(Whatssapp wizard of oz)**	**Guidance**	***1. Assistance to participants in defining their vision and goals, pinpointing areas for improvement in self-efficacy.***
		Users need a clear description of how the system works and the role of the AI-powered assistant in advance to avoid creating mistaken expectations and, consequently, discontinuing their engagement. Customizing the tone of the bot according to user preferences and mood of the day is crucial. While participants appreciate engaging with the bot for goal definition and self-reflection, they express a desire for clearer guidance in selecting areas and understanding the purposes of the exercises.

		2. Use of guided selfie video journaling with prompts to assess participants, enhancing language for self-affirmation and improving goal-setting during video recording.
		Specify the process of self-affirmation clearly to the user and set expectations regarding how the AI-powered assistant will guide them throughout the process. Allow users to choose a preferred timeline for training. Consider offering a structured option with full guidance for the initial days, allowing users to stabilize, and then let them decide on the level of involvement they want from the AI-powered assistant. Including a teleprompter functionality would facilitate the self-recording process.
		3. Tone of the chat and effectiveness in assessing to complete task of recording video-selfies.
		It is essential to identify the user's preferred tone, as preferences vary; some users appreciate a super-friendly and approachable bot, while others prefer a more objective and clear interaction without unnecessary friendliness. Adapting the tone as the user progresses is crucial, as participants may find the tone repetitive without a human-like component, highlighting the importance of maintaining a dynamic and evolving interaction.
	Tracking of progress	***4. Track user progress to foster engagement and motivation, including tasks such as recording at night and reviewing in the morning).***
		Reminders and the structure for planning the next day need to be continuously adapting and changing to avoid feeling repetitive; otherwise, the experience becomes less humanized.

		Users should have the option to choose their preferred way of communication from the beginning, whether through WhatsApp or the app. Notifications providing suggestions for reinforcing positive feelings and expressing gratitude based on your goals throughout the day would further enhance the process.
Onboarding		***5. Explore two approaches to guide participants to define specific work areas in a week***
		It is necessary to clearly explain the science behind how this works so that the user understands the importance of completing all the steps. Additionally, provide guidance on how to use this method properly and specify the cases in which it can and cannot be applied. While 81% of users preferred the method with specified work areas, they expressed a need for more guidance and a more interactive way to define goals. The second method, subdivided into 11 life aspects, was not clear enough, indicating the need for further research to test this and other modalities to assess user preferences.
Video-recording and journaling		***6. Evaluate the ease of performing journaling and video recording tasks***
		Including a teleprompter functionality would facilitate the self-recording process. Offer of different modalities to perform the exercise, such as audio, written, and physical ones. Additionally, suggest the user practice it in front of a mirror. Users require clearer guidance on the primary focus of the exercise, emphasizing that it aims to train them in setting emotional goals and using daily activities as a means of projecting their future. It is crucial to clarify that this is not an accountability exercise. Even if users don't accomplish all their planned activities or encounter

	challenges during the day, the key is to remain focused on achieving a positive emotional state by the end of the day.
	7. Evaluate the potential positive impact of the video-recording and journaling process on self-affirmation and self-reflection
	The most significant impact of the process appears to be in aiding users to engage in more self-reflection, although further research is needed to validate this observation. Users require detailed information on how the process works to derive more value from the self-affirmation process. A participant understood it as self-suggestion tool, therefore did not perceive it as a reliable method. Emphasizing that the primary purpose of the exercise is to focus on the desired emotional state rather than the activities is crucial to prevent users from losing perspective or confusing it as an accountability activity. Additionally, obtaining more context about users' moods and backgrounds is essential for effective self-reflection.
Metrics	***8. Evaluate if metrics of perceptions of self-efficacy and Future self-continuity could offer participants feedback to track their progress***
	Results indicate that the process could enhance self-reflection, consequently impacting participants' perception of self-efficacy. Additionally, there was an increase in the perception of the connection with their future selves. Further research at a larger scale is necessary to validate whether these metrics can be reliably provided to users as feedback and consider testing a metric for self-reflection.
Design features	***9. User experience with the system***
	Survey results indicate that, while the system is generally perceived as easy to use, the primary issue leading to disengagement is a lack of understanding of the rationale behind each step in the process.
	10. Identify user pain points to facilitate the process through an easy-to-use design.

	Consider customized design features for each use case. Individuals dealing with conditions like ADHD, anxiety, and chronic diseases expressed eagerness to try and adhere to this system. However, they require a process that helps them stay engaged to avoid losing focus. Address privacy concerns regarding where the videos would be stored, especially when using a platform. Offer more exercise options, such as audio or reading, and explicitly mention the system's ability to generate a video based on your photo. Reminders throughout the day about your emotional goal could enhance the impact.
Additional insights	Users between 24 and 40 years found the system easier to use, suggesting the need for a different design for the older population due to differences in their perception of the future. There were no significant differences between male and female populations. Main use cases should be approached based on specific conditions and age groups. While the AI assistant plays a crucial role throughout the process and provides effective tracking tools, introducing a human component at some point in the process could be beneficial. Participants did not exhibit a consistent timeline for completing this process, ranging from 3 days to 30 days. Therefore, it should be customizable by the user to a preferred frequency that aligns with their individual needs. The AI-powered assistant could provide suggestions based on their progress.

- **Future work**

  The primary focus for further research should center on individuals under 40 years of age. This study suggests potential use cases for those experiencing moderate anxiety, moderate ADHD or PTSD, as well as individuals dealing with chronic diseases. It is important to note that a distinct approach may be required for a population with work-

related mental health goals. Additionally, targeting minorities is crucial, given the current imperative to improve access to mental health services.[36]

To validate the accuracy of future self-continuity and self-efficacy metrics, further research must be conducted with a larger sample to determine whether these metrics can provide users with precise feedback about their progress.

In future research and testing, an advanced GPT-based language model will be employed, featuring enhanced adaptive tones, educational features, and refined assessment methods. These adjustments are intended to better articulate and define specific goals, ultimately contributing to the continuous improvement and optimization of chatbot-based interventions across diverse domains.

[36] Approaches to Treating Mental Health Symptoms Among Disadvantaged Populations: A Comprehensive Review. *Journal of Alternative and Complementary Medicine, 22*(2), 115-124. https://doi.org/10.1089/acm.2015.0038

Appendix A - Simulated AI chatbot guidance

MY "FUTURE SELF 'BOT

Hello [name]!

We're very pleased that you're joining the challenge of my 'FutureSelf.' We are always in a process of personal improvement, and we want to accompany you on this journey.

In my "FutureSelf", you are the protagonist of your change! Nothing is more powerful than seeing your future version telling you what you have achieved!

In this process, your "FutureSelf" will be guiding you, so we need to ensure that we are a good guide to ourselves. The way we talk to ourselves is crucial, so the key to this whole process is to train this new version of ourselves to help us define the goals we want to work on and, above all, how to express ourselves as our best friend!

Trust the process; achieving goals takes time, but the most important thing is to enjoy each step, learn, and improve at every step. Practice makes perfect!

I'll be here to guide you and help you with any questions you may have. Let's get started!

What would you like to work on in these first 5 days? Please choose one of the following options:

A. I have a specific issue with:

- Anxiety
- Sadness / depression
- Post-traumatic stress disorder
- Unresolved trauma
- I have a chronic illness
- I have a lot of work-related stress
- I need inspiration for an idea

B. I'm not sure; I'd like a bit more help defining this.

Table 5.2: Conversation guiding two different processes to define a goal to work on

[participant SELECTS A] What is the specific topic?	[participant SELECTS B] No problem, let's define a goal that you want to work on in

[User reply]

I'm sorry that you're going through this, but we're going to work on improving this aspect of your life! What are the recurring thoughts or emotions you have regarding this issue?

[User reply]

Try to get details of the thoughts

It's natural for these thoughts to come to you. Let's use imagination for a moment. Take 1 minute to think about how your life would be if you had overcome this. Smile, and while doing so, you can close your eyes and imagine how liberated you would feel from overcoming this. What would you be doing? What would you be achieving?

some aspect of your life. Think about these aspects of your life:

	Life aspect	Description
1	Health and physical well-being	Your physical well-being
2	Spirituality	Your connection with divinity or a higher power
3	Mental health	Includes our emotional, psychological, and social well-being
4	Character	Ego, your values, beliefs, and intrinsic traits
5	Financial life	Your relationship with money and assets
6	Career	Professional pursuits and ambitions
7	Purpose	Your long-term goals
8	Community	Contributions to society
9	Love relationships	Romantic connections
10	Social life	Your relations with friends and the community
11	Family	Relationships with children and relatives

Figure 5.1: Life aspects

You will give it a value from 1 to 5, with 1 meaning this area needs a lot of work, and 5 meaning you are completely satisfied with this aspect of your life and don't see many opportunities for improvement right now.

(1) This area is a liability in my life; I need to work a lot on it.

(2) This area makes me feel dissatisfied; it's ideal to make changes and think about how to improve.

(3) This area functions, but I feel it still needs improvements.

(4) This area works adequately, but I would like to take it to the maximum level.

(5) This area is an asset in my life; I am at ease and don't want to focus on this point.

You can copy this text and send it with your answers.

1. Health and physical well-being:
2. Spirituality:
3. Mental health:
4. Character:
5. Financial life:
6. Career:
7. Purpose:
8. Community:

	9. Love relationships: 10. Social life: 11. Family: [User reply] Great! Of the aspects that have a ranking of 3 or less, which one would you like to focus on this week?

[User reply]

Great! Now it's important to be honest in this step and recognize if we truly believe this is possible. If we consider it difficult and improbable, that's normal. The important thing is to be honest without judging ourselves.

How connected do you feel to this future version of yourself? Select an option:

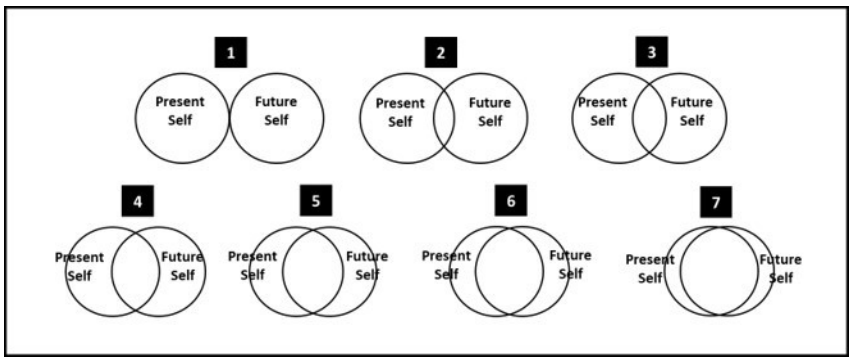


Figure 5.2: Future-self continuity scale

[User reply]

Great! What do you think about the following statements regarding your challenge:

1 = totally disagree;

2 = disagree;

3 = neither agree nor disagree;

4 = agree;

5 = totally agree.

1. I will be able to achieve most of the goals I have set for myself [to finish the report].
2. I believe I can succeed in finishing [to finish the report].
3. I am confident that I can perform effectively in this task/life area.
4. Even if things are tough, I can perform quite well in this task/life area.

[User reply]

The most important thing about this is to determine the target emotion for this week. The clearer you are, the easier it will be for your mind to align. Now, let's try to identify what you want to work on. Imagining that this problem is resolved, what would be the thoughts and emotions you would have this week?

[User reply]

Now, let's try to identify what you want to work on. How about if your target emotion for this week is:

“Today I feel proud about the work I’ve done together with the team, feeling excited to celebrate that we are close to present a high quality report”.

Does that sound good to you?

[User reply]

Great! The goal now is to help improve our language, learn to communicate in a positive yet realistic way, and, above all, focus on the fact that we can choose how to feel, regardless of the results.

Remember, this is not an exercise to validate how many activities you completed in your day but to achieve the central emotion at the end of the day. We'll try to align your activities with this, but the goal is for you to take more control of your emotions regardless of how your activities turned out. Let's get started!

We have to learn to create the habit of visualizing ourselves and speaking to ourselves positively, reminding our brain that this is our new self. Every night, you'll record a 2-minute selfie with your phone, narrating your activities for the next day as if they have already happened. Then, you'll watch your recording as soon as you wake up the next day. Don't worry! I'll guide you through this process ☺

In the evening, you'll review your calendar and think about the activities you have to do the next day. Try to imagine the challenges you might face but envision how you manage to feel good at the end of each activity. Imagine it's already the end of the day, and your goal is to feel [insert your target emotion].

In the night, thinking that you're at the end of the next day, you'll record a 2-minute selfie following the following structure:

1. TARGET EMOTION: Today, I feel "....."

2. NARRATE THE MAIN ACTIVITIES OF YOUR DAY AND HOW YOU FELT PROUD OF YOURSELF AT THE END OF EACH OF THEM "…."

3. REALISTIC POSITIVE CLOSURE: "The day wasn't perfect, and that's okay; the important thing is that I identified areas for improvement. Tomorrow, I'll make more progress, and I'm on track to achieve my goal of '…'. I'm highly focused on enhancing '… area of my life,' and I know I'll turn it into an asset for myself."

HERE ARE SOME EXAMPLES:

Example 1: Area to work on - Anxiety

1. TARGET EMOTION: "Today, I feel more in control of myself and can regulate anxiety levels."
2. MAIN ACTIVITIES
   - I woke up early, exercised, and it helped me feel like I started the day well.
   - I had work meetings, one, in particular, worried me because it was going to be uncomfortable with my boss, but I'm proud that I could stay calm and express my ideas calmly.
   - I also managed to meet with Laura; we needed to discuss what bothered me about her attitude last week. I'm proud that I could express my feelings clearly and concisely.
   - I had to finish accumulated work; it was challenging, but I'm glad I could work at a good pace.

3. REALISTIC POSITIVE CLOSURE: "The day wasn't perfect, and that's okay; the important thing is that I identified areas for improvement. Tomorrow, I'll make more progress, and I'm on track to achieve my goal of FEELING MORE IN CONTROL OF MYSELF BY REDUCING ANXIETY. I'm highly focused on improving MY MENTAL HEALTH, knowing that I'll turn it into an asset in my life."

Example 2: Area to work on - Need ideas for designing an important project

1. TARGET EMOTION: "Today, I feel very inspired, and I'm grateful for all the ideas that come to me from different sources."
2. MAIN ACTIVITIES

- I woke up early, exercised, and it helped me feel like I started the day well.

- I had work meetings, one, in particular, worried me because it was going to be uncomfortable with my boss, but I'm proud that I could stay calm and guide a good conversation to think of solutions.
- I also managed to meet with my team for feedback. It was challenging, but I'm proud that I was direct and positive, and it was well received by the team. Now, we're focused on improving our communication.
- I had to finish accumulated work; it was challenging, but I'm glad I could work at a good pace and stay relaxed to get inspired.

3. REALISTIC POSITIVE CLOSURE: "The day wasn't perfect, and that's okay; the important thing is that I identified areas for improvement. Tomorrow, I'll make more progress, and I'm on track to achieve my goal of FEELING INSPIRED AND HAVING CLARITY TO CREATE THIS IMPORTANT PROJECT. I'm highly focused on designing this project in the best way, knowing that I'll turn it into an asset in my life."

And that's it!

What time would you like to start your first video today? Don't worry, I'll be your assistant to make sure you don't forget ☺

NIGHT REMINDER

Hello! Are we ready to record our selfie?

[User reply]

Perfect! Review your calendar, and think about the activities you have to do tomorrow. Try to imagine the challenges you might face, but envision how you manage to feel good at the end of each activity. Imagine it's already the end of the day, and your goal is to feel [insert your target emotion]. Now, thinking that you're at the end of the next day, record a selfie of up to 2 minutes following this structure:

1. TARGET EMOTION: Today, I feel "[insert your target emotion]"
2. NARRATE THE MAIN ACTIVITIES OF YOUR DAY AND HOW YOU FELT PROUD OF YOURSELF AT THE END OF EACH OF THEM
3. REALISTIC POSITIVE CLOSURE: "The day wasn't perfect, and that's okay; the important thing is that I identified areas for improvement. Tomorrow, I'll make more progress, and I'm on track to achieve my goal of "[insert your target emotion]". I'm highly focused on

improving "[insert your target emotion] area of my life," and I know I'll turn it into an asset for myself."

Great! What time will you set your alarm tomorrow? [RESPOND] Ready! Tomorrow, you'll watch your FutureSelf recording! Rest well!

MORNING REMINDER

Hello! We're ready to start the day focused! Watch your video! Did you see it? Great! What time would you like to record the next one?

[User reply]

Don't worry; you can also write your activities here, and I'll take care of the rest so that you have your video ready tomorrow! [RESPOND] Review your calendar, and think about the activities you have to do the next day. Try to imagine the challenges you might face, but envision how you manage to feel good at the end of each activity. Imagine it's already the end of the day, and your goal is to feel [insert your target emotion]. Now, thinking that you're at the end of the next day, write your day as if it had already happened:

1. Today, I feel "[insert your target emotion]"
2. NARRATE THE MAIN ACTIVITIES OF YOUR DAY AND HOW YOU FELT PROUD OF YOURSELF AT THE END OF EACH OF THEM [insert your target emotion]
3. REALISTIC POSITIVE CLOSURE: "The day wasn't perfect, and that's okay; the important thing is that I identified areas for improvement. Tomorrow, I'll make more progress, and I'm on track to achieve my goal of "[insert your target emotion]". I'm highly focused on improving "[insert your target emotion] area of my life," and I know I'll turn it into an asset for myself." Great! What time will you set your alarm tomorrow? [RESPOND] Ready! Tomorrow, you'll see the recording of your FutureSelf! Rest well!

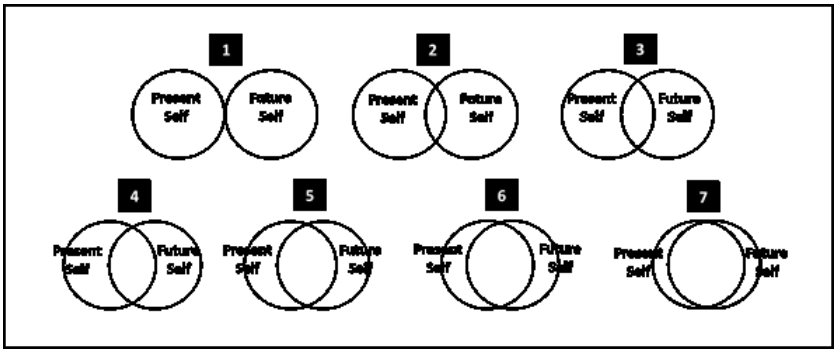
Hello! We're ready to start the day focused! Watch your video! Did you see it? Great! What time would you like to record the next one?"

Appendix B - Pre completion survey

1. Research participation consent
2. Name and Last Name
3. Age
4. Based on the following scale, please respond:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I will be able to achieve most of the goals that I have set for myself					
I believe I can succeed at almost any endeavor to which I set my mind					
I am confident that I can perform effectively on many different tasks					
Even when things are tough, I can perform quite well					

5. How similar are you to your future self ten years from now?

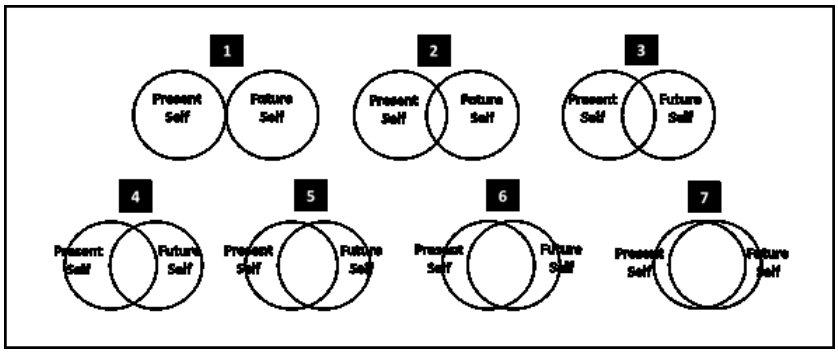


Appendix C - Post completion survey

1. Name and Last Name
2. Based on the following scale, please respond:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I will be able to achieve most of the goals that I have set for myself					
I believe I can succeed at almost any endeavor to which I set my mind					
I am confident that I can perform effectively on many different tasks					
Even when things are tough, I can perform quite well					

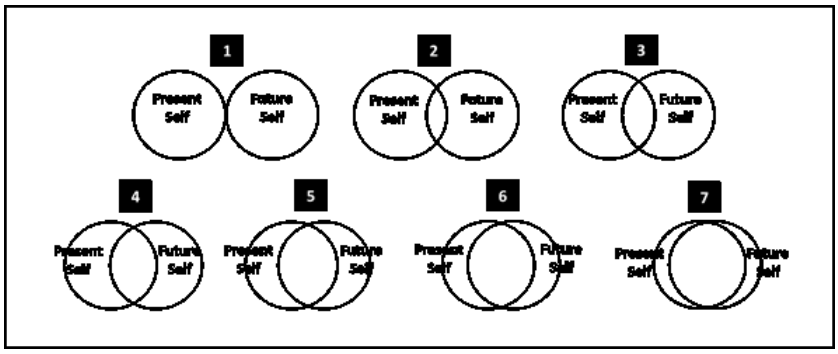
3. How similar are you to your future self ten years from now?



4. Based on the following scale, please respond:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I will be able to achieve most of the goals that I have set for myself					
I believe I can succeed at almost any endeavor to which I set my mind					
I am confident that I can perform effectively on many different tasks					
Even when things are tough, I can perform quite well					

5. How similar are you to your future self ten years from now?



6. Did you completed 3 -5 days of the training setting daily activities? Yes / No
7. How satisfied are you with your experience using “FutureSelf”?

Very Unsatisfied	1	2	3	4	5	Very Satisfied

8. Based on the following scale, please respond:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I think that I would like to use this system frequently.					
I found the system unnecessarily complex.					
I thought the system was easy to use.					
I thought there was too much inconsistency in this system.					
I would imagine that most people would learn to use this system very quickly.					
I found the system very cumbersome to use.					
I felt very confident using the system.					
I needed to learn a lot of things before I could get going with this system.					
The “FutureSelf” chatbot helped me identify and define the goals I want to work on.					
The “FutureSelf” chatbot effectively guided me through visualizing my future self.					

9. Did you do the video selfie recording? Yes/No
10. If yes, please answer the following questions based on your experience:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Writing my activities and recording the video selfie helped me reflect on my emotions.					
Recording and watching my video allowed me to identify areas for improvement.					
Watching the video in the morning had a positive impact on my mindset for the day.					
I felt aligned with the target emotion while watching the video.					
Creating the video was an easy and manageable task.					
Aligning activities with the target emotion positively influenced my daily tasks.					
The “FutureSelf” chatbot chat's encouragement to acknowledge imperfections in the video was helpful.					

11. If no, did you use any of these options? Audio / Text / None
12. If you used audio or text, did you use any of these options?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Writing/Listening my activities helped me reflect on my emotions.					
Writing and/or listening reflection allowed me to identify areas for improvement.					
Reviewing my activities in the morning had a positive impact on my mindset for the day.					
I felt aligned with the target emotion while reviewing my activities					
Creating my list of activities was an easy and manageable task.					
Aligning activities with the target emotion positively influenced my daily tasks.					
The “FutureSelf” chatbot chat's encouragement to acknowledge imperfections in the video was helpful.					

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