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AI and the Youth Mental Health Crisis:
How can Technology Foster Human Flourishing?

Masterthesis

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Abstract

As youth mental health challenges continue to rise globally, this thesis investigates how artificial intelligence (AI) can contribute to preventive mental health care and the flourishing of young people. Rather than seeking purely technological solutions, the research unfolds as a reflective inquiry into how psychology, design, and ethics intersect in the development of human-centered AI.

Through a qualitative and exploratory methodology, the study integrates five movements: (1) grounding the inquiry in the science of flourishing, using frameworks such as VanderWeele's *Human Flourishing Measure*, Diener's *Flourishing Scale*, and Keyes's *Mental Health Continuum* to define mental health as a continuum of positive functioning; (2) mapping the youth mental health crisis as a societal and emotional disconnection amplified by digital environments; (3) identifying preventive emotional competencies - gratitude, belonging, vulnerability, empathy, hope, optimism, purpose, and engagement - as measurable and trainable foundations for resilience; (4) analyzing digital translations of prevention in current AI and mental health technologies, revealing a gap between symptom-focused tools and flourishing-oriented design; and (5) engaging future frameworks, such as the *Global Flourishing Study*, *Flourishing AI Benchmark*, and Araújo's concept of *Digital Wisdom*, to envision ethical, empathic, and wisdom-oriented directions for AI.

Findings suggest that the value of AI in mental health lies not in automation, but in augmenting human wisdom, supporting reflection, empathy, and emotional literacy. The thesis concludes that flourishing is both a psychological process and a moral orientation, and that AI's true contribution will depend on its capacity to help humans reconnect with themselves, their communities, and their purpose. In this sense, technology becomes a tool for cultivating *Human Intelligence* in its fullest form, where emotional understanding, not computational efficiency, defines the future of mental health innovation.

Keywords:

AI in mental health, positive psychology, preventive care, youth well-being, human-centered design, optimism, belonging, emotional resilience, global flourishing, digital health, psychological constructs, digital social innovation

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1 INTRODUCTION

1.1 PROBLEM DEFINITION AND JUSTIFICATION

The intersection of mental health, artificial intelligence (AI), and preventive care represents a critical and underexplored frontier in both public health and technological innovation globally.

In countries like the United States, for instance, nearly 1 in 3 adolescents (32%) received mental health treatment in 2023 (WHO, 2023).

Professor McGorry, lead psychiatrist from the Orygen, Australia's Centre of Excellence in Youth Mental Health, during publication of a group four years of research into youth mental health (ORYGEN, 2025), declared that mental ill-health is the primary threat to the health, wellbeing and productivity of young people. While it accounts for 45% of disease globally in the age group of 10 to 24 , only 2% of global health budgets are allocated to addressing it. Furthermore, the Global Flourishing Study (2022, 2024) indicates that young people aged 18, 29 are not flourishing as previous generations did, with well-being levels significantly lower compared to older adults. For that alarming concern, public systems are being pressured to start initiating change. These limitations highlight a structural gap in early, preventive approaches that can address emotional challenges before they escalate into clinical disorders.

Simultaneously, the rise of artificial intelligence in the health technology sector has introduced new possibilities for scale, personalization, and real-time emotional engagement. Among the digital solutions, specifically AI has shown promise in addressing mental health challenges. For instance, AI therapy chatbots as Woebot have already expressive results, demonstrating in first rounds a 64% greater reduction in depression symptoms compared to control groups. Additionally, AI models have achieved up to 92% accuracy in predicting suicide attempts within the next week. With this vast horizon of possibilities, the global AI in mental health market was valued at $1.13 billion in 2023 and is projected to grow at a compound annual growth rate (CAGR) of 24.10% from 2024 to 2030 (Grand View Research, 2024).

But despite the good news of technological progress, the key challenge for the digital preventive solutions is engagement. As underpinned by Dr. Valentine (ORYGEN, 2024) "we need to get a better understanding of how apps are using persuasive design principles and how they're measuring the impact on engagement, so we can understand what works".

Startups in the mental health space often optimize for user engagement, efficiency, or symptom tracking, without integrating evidence-based psychological models that promote long-term emotional well-being. This gap suggests a need for a new approach that blends

entrepreneurial innovation with psychological insight, to build technologies that are not only scalable but also truly human-centered.

This thesis investigates this critical intersection: whether AI-based mental health tools can be designed to foster human flourishing, and what principles, gaps, and strategies can guide such innovation. In this way, this research contributes to both scientific literature and the development of responsible mental health technologies for a flourishing future.

1.2 OVERALL AIM

The overarching aim of this thesis is to explore how artificial intelligence can be meaningfully integrated into preventive mental health frameworks to foster human flourishing, with a particular focus on the challenges and opportunities faced by youth in a digital age.

Rather than proposing technological solutions or business models, the study seeks to synthesize knowledge across psychology, philosophy, and computer science to illuminate how AI can contribute to emotional well-being and resilience when guided by human-centered values.

Through a cross-disciplinary lens, the research aims to bridge theory and context, tracing how the science of flourishing, emerging models of human-AI interaction, and evolving mental health paradigms intersect. This integrative approach aspires to clarify conceptual pathways for aligning technological advancement with the broader human aspiration to thrive, offering both academic insight and social relevance in the field of preventive mental health.

1.3 JUSTIFICATION

The intersection of mental health, artificial intelligence, and preventive care represents a critical and underexplored frontier in both public health and technological innovation. With youth mental health challenges reaching unprecedented levels globally, there is an urgent need to shift from reactive treatment to scalable, emotionally intelligent, and human-centered prevention strategies.

This research positions itself within that transition, seeking to illuminate how technology, when grounded in psychological science and ethical design, can move beyond shallow interactions to foster authentic engagement and expand human potential rather than diminish it. By integrating interdisciplinary perspectives, from psychology and ethics to digital innovation, design, and entrepreneurship, this thesis explores not only a scientific gap but also a moral imperative: to build systems that nurture flourishing and emotional resilience in a generation increasingly shaped by digital environments. The convergence of these domains, paired with the

urgency of global mental health demands, underscores the academic and societal relevance of this inquiry.

1.4 OBJECTIVES

The overarching aim of this study is to explore how AI-based technologies can contribute to preventive mental health care by supporting human flourishing and emotional resilience, with a particular focus on youth. To achieve this aim, the study pursues the following specific objectives:

- **O1:** To analyze the current mental health crisis and its socio-economic implications, particularly among young populations.
- **O2:** To review and integrate scientific and market evidence through two complementary lenses:
    - *Theoretical lens:* examining the psychological foundations of preventive care through positive psychology, and mapping the validated impact of emotional competencies, optimism, gratitude, empathy, vulnerability, and hope, on mental and physical health as blueprints for novel interventions.
    - *Technological lens:* conducting a review of AI-driven mental health tools, identifying opportunities, risks, and ethical challenges in their application to preventive care.
- **O3:** To map the existing ecosystem of digital mental health applications, analyzing their business models, design principles, and user segments, in order to identify best practices and emerging trends.
- **O4:** To propose guidelines and design principles for human-centered AI that promote flourishing, emotional engagement, and long-term resilience.

1.5 RESEARCH QUESTION

The thesis is guided by the following central research question:

Q1: How can AI-based technologies support the flourishing of young people in preventive mental health care solutions?

To explore this overarching question, the following sub-questions will be addressed:

Q1.1: What is the current landscape of AI-driven mental health tools, and how do they address preventive care?

Q1.2: Which guidelines and design principles should be considered when integrating the concept of flourishing into digital mental health solutions?

1.6 HYPOTHESES

While this thesis is primarily qualitative and exploratory, several working hypotheses guide the analysis and interpretation of findings. These hypotheses do not aim to test causal relationships but rather to orient the theoretical inquiry and comparative interpretation across disciplines.

- **H1:** The field of digital mental health is expanding rapidly, yet most existing AI-based applications emphasize monitoring, self-tracking, and symptom management rather than addressing the deeper emotional and psychological dimensions of human flourishing.
- **H2:** Despite advances in digital therapy and mental health support, the principles of positive psychology, including constructs such as optimism, gratitude, empathy, and hope, remain largely absent from AI-based preventive care models.
- **H3:** A significant gap persists in the availability of solutions tailored to youth preventive mental health, particularly in approaches that integrate emotional learning, self-reflection, and long-term flourishing.
- **H4:** Integrating human-centered and ethically grounded design principles in AI systems holds potential to deepen user engagement and align digital innovation with societal well-being, yet such integration is still at an early conceptual stage.

These hypotheses collectively position the study as a contribution to conceptual synthesis and critical reflection, seeking to illuminate how technology can evolve from tools of measurement toward mediums that nurture human growth and resilience.

1.7 METHODOLOGICAL APPROACH

Given the interdisciplinary and emerging nature of this topic, the thesis adopts a qualitative, exploratory research design anchored in a systematic literature review and conceptual mapping. This approach enables the integration of perspectives from psychology, philosophy, and artificial intelligence within the broader context of preventive mental health.

Qualitative research is particularly suited for exploring context-dependent and evolving phenomena, where rigid empirical models are premature (Creswell & Poth, 2018). As Denzin and Lincoln (2011) observe, qualitative inquiry is “a situated activity that locates the observer in the world” (p. 3), allowing the researcher to interpret how ideas, technologies, and cultural contexts interact in shaping emerging paradigms.

The methodological path is structured around three complementary components:

a. *Systematic Literature Review*

The theoretical foundation of this study was built through a systematic literature review that integrated findings from psychology, human-computer interaction, artificial intelligence ethics, and digital mental health research. The goal was to identify conceptual frameworks capable of connecting preventive mental health and technological innovation through the shared lens of human flourishing.

The review began with the science of flourishing as the conceptual cornerstone of preventive mental health. Foundational contributions from positive psychology (Seligman & Csikszentmihalyi, 2000) informed the understanding of well-being as more than the absence of illness, emphasizing positive emotion, engagement, relationships, meaning, and accomplishment. Within this field, several validated instruments were examined for their theoretical robustness and multidimensionality: VanderWeele’s (2017) Harvard Human Flourishing Measure, Diener et al.’s (2010) Flourishing Scale, Keyes’ (2002) Mental Health Continuum-Short Form, and the Wellbeing Conceptual Framework (WBCF). These frameworks collectively support the multidimensional construct of flourishing as encompassing psychological, social, and physical well-being.

To ground these constructs in emotional mechanisms relevant to youth mental health, the review also analyzed empirical literature on emotional competencies such as optimism, gratitude, empathy, belonging, vulnerability, and hope (Fredrickson, 2001; Algoe, 2012; Keyes, 2007; Brown, 2012; Caza & Wrzesniewski, 2013). These constructs serve as psychological “antidotes” to anxiety, loneliness, and low self-worth, conditions prevalent in contemporary youth mental health contexts.

The second cluster of literature examined theoretical frameworks in Human-Computer Interaction (HCI) and emotional design, which provide insight into how users engage affectively with digital interfaces. Seminal works include Norman’s (2004) theory of affective design, Mori’s (1970) Uncanny Valley hypothesis, and contemporary studies on anthropomorphic and empathic

avatars (Fong et al., 2003; Waytz et al., 2014). These theories inform how technological systems can evoke emotional resonance and trust, shaping user experiences that are psychologically meaningful.

The third theoretical axis reviewed frameworks for AI ethics and design in mental health, including the FAITA multidimensional evaluation framework (OECD, 2021), the Four-Pillar Life Cycle Model for AI integration in healthcare (European Commission, 2022), and the broader conceptual landscape of responsible and trustworthy AI (Floridi et al., 2018; Jobin et al., 2019). These works provide an ethical and methodological foundation for understanding how AI can be aligned with human-centered values and well-being objectives.

Finally, the literature incorporated philosophical perspectives on Digital Wisdom (Araújo, 2023, unpublished interview), a concept connecting virtue ethics, technological literacy, and life-span psychology. This framework bridges the thesis's analytical chapters, situating flourishing not only as a psychological outcome but as a moral and epistemic process of living wisely with technology.

Together, these bodies of literature form the theoretical scaffolding of the thesis, tracing the continuum from psychological theory to technological application, ethical evaluation, and philosophical reflection.

b. Contextual and Technological Mapping

The second methodological component involved a qualitative mapping of the current digital mental health landscape to contextualize how theories of flourishing and preventive care are translated into practice. This mapping did not seek to evaluate commercial viability or business models, but rather to analyze conceptual alignment, thematic trends, and technological strategies observable in the field.

A corpus of approximately 30 AI-enabled mental health applications and digital tools was examined through a qualitative content analysis of academic literature, policy papers, and publicly available documentation (e.g., company white papers, websites, and research partnerships). Key studies informing this contextual analysis included overviews of digital mental health ecosystems (Hollis et al., 2017; Torous et al., 2021), ethical and design considerations for digital therapeutics (Larsen et al., 2019; Monteith et al., 2021), and empirical assessments of user engagement and personalization (Linardon et al., 2019).

The mapping followed the structure of Chapter 5, which organizes findings into: (1) *early approaches*, representing symptom-tracking and cognitive-behavioral therapy (CBT) extensions; (2) *contemporary trends*, such as conversational AI, emotion-aware systems, and gamified mental health interventions; and (3) *gaps and limitations*, highlighting the lack of preventive, flourishing-oriented approaches in current offerings.

By systematically reviewing representative applications (e.g., Wysa, Woebot, Finch, Mindstep), this analysis identified recurring design paradigms, therapeutic mechanisms, and engagement strategies, as well as their correspondence (or lack thereof) to the principles of flourishing and emotional literacy. This mapping thus served to situate the theoretical discussion within real-world practice, providing a grounded understanding of how mental health technology currently reflects, distorts, or omits the aims of preventive well-being.

c. Integrative Theoretical Synthesis

The final methodological phase entailed a theoretical synthesis integrating insights from the literature review and contextual mapping to construct a conceptual continuum between the science of flourishing and AI-driven mental health innovation.

This synthesis followed an abductive reasoning approach (Timmermans & Tavory, 2012), iteratively relating empirical observations from digital applications to theoretical constructs identified in the psychological and ethical literature. The goal was not hypothesis testing but pattern recognition, to discern how recurring ideas, such as *empathy*, *self-reflection*, or *meaning*, manifest across psychological models and technological paradigms.

Through this lens, the thesis advances an interpretive model linking four analytical dimensions:

1. **Theoretical grounding** - defining flourishing as a multidimensional interdisciplinary construct;
2. **Contextual mapping** - identifying how youth mental health challenges intersect with the digital esphere;
3. **Applied translation** - examining how emotional constructs are operationalized through AI and digital interventions; and

4. **Future pathways** - exploring frameworks like the *Flourishing AI Benchmark, The Global Flourishing Study,* and the philosophical framing of *Digital Wisdom* as potential next steps for aligning technology with human well-being.

This integrative synthesis is not prescriptive but concept-building. It positions the thesis as a cartography of ideas, outlining how diverse academic traditions, from psychology and neuroscience to ethics and computational design, can converge to envision a more holistic and humane approach to preventive mental health.

2 THEORETICAL BASIS

2.1 THE SCIENCE OF FLOURISHING, THE FOUNDATION TO PREVENTIVE MENTAL HEALTH

At the heart of every psychological theory lies a question about what drives us. Common modern lifestyle preaches that Happiness is the ultimate driver of life. But happiness is temporary, and the youth crises shows us that shallow waters mean trouble. Mental distress, in this framework, often stems not from the presence of pain, but from the absence of purpose (Frankl, 2006).

> *"Life is never made unbearable by circumstances, but only by lack of meaning."* (Frankl, 2006, p. 106).

In contrast to Freud's will to pleasure or Adler's will to power, Viktor Frankl, creator of Logotherapy - introduced the "will to meaning" as the core drive in human beings. Along other theories, Frankl's ideas have been resignified and found renewed relevance in positive psychology, offering a bridge between ancient philosophical concerns and contemporary mental health challenges (Batthyany & Russo-Netzer, 2014; Wong, 2012).

Later on, with the coming of positive psychology, Psychology is called to not focus on illness and what makes us sick, but on what makes us strive and how to foster them. In this way, it is an excellent theory to sustain preventive approaches, protective factors, and fits well our purpose of scaling mental health solutions to avoid the youth crisis.

This paradigm shift, highly aligned with prevention research, became paramount for understanding solutions that can bring mental health to the core of all initiatives in life, where the clinical focus is the understanding of an ultimate state of human development called Flourishing.

As described by Dr. Seligman:

"I used to think that the topic of positive psychology was happiness... I now think that the topic of positive psychology is well-being, that the gold standard for measuring well-being is flourishing." (Seligman, 2011)

But what causes humans to flourish?

"When we are no longer able to change a situation, we are challenged to change ourselves" (Frankl, 2006, p. 112).

In a world where mental health crises have become both common and costly, the question is no longer whether we should act, but how, and when. Amid rising rates of anxiety, burnout, and disconnection, a growing body of research invites us to reframe our approach: instead of treating emotional suffering only when it reaches clinical thresholds, what if we cultivated the psychological strengths that help individuals flourish in the first place?

There is not a single definite answer to the question what causes human flourishing, as the answers may vary with the frameworks. For that reason, we will go through some different frameworks as context, which later will be absorbed and translated into research selected factors to be incorporated in the review as having a high impact in wellbeing and being passive of translation into technology and AI moderated solutions.

2.1.1 Frameworks to Define and Measure Human Flourishing

In recent years, the concept of human flourishing has gained substantial traction across disciplines such as psychology, public health, education, and social policy. Human flourishing, broadly defined as a state in which all aspects of a person's life are going well, encompasses emotional, psychological, social, and, increasingly, physical and economic well-being (VanderWeele, 2017). Measuring this multidimensional state, however, is inherently complex and context-dependent. As flourishing shifts from a philosophical ideal to a measurable construct, a range of validated frameworks and psychometric tools have emerged to quantify what it means to live well. (Huppert & So, 2013; Keyes, 2002; Ryff, 1989).

These frameworks have been developed primarily within the tradition of positive psychology, representing a paradigm shift from a deficit-oriented model focused on illness to one that emphasizes strengths, purpose, social connection, and human potential (Seligman, 2011; Diener et al., 2010). Unlike earlier approaches that prioritized hedonic indicators such as life satisfaction and pleasure, flourishing frameworks tend to adopt a more eudaimonic perspective,

highlighting aspects such as autonomy, mastery, personal growth, and meaning (Ryff, 1989; Waterman, 1993). This distinction has led to more nuanced and integrative tools for assessing well-being across life domains.

While the theoretical emphasis may vary, contemporary frameworks for measuring flourishing typically share a multidimensional architecture. They integrate emotional, psychological, and social dimensions of functioning, and often extend to include physical health, character strengths, and financial security (VanderWeele et al., 2020; OECD, 2023). Such comprehensiveness enables not only individual assessments of well-being but also valuable insights for the design of interventions and the evaluation of public policies aimed at enhancing societal resilience and quality of life (Keyes, 2007; OECD, 2013).

In the sections that follow, we offer a structured overview of five influential measurement frameworks: the Harvard Human Flourishing Measure, the Flourishing Scale (FS) by Diener and colleagues, the PERMA-Profiler developed by Seligman et al., the Mental Health Continuum-Short Form (MHC-SF), and the Wellbeing Conceptual Framework (WBCF). Each framework brings distinct theoretical assumptions and methodological strengths that shape its application in research, clinical practice, and policy design.

Table 1 - Overview of Key Frameworks on Measuring Human Flourishing, Luanna Eroles 2025

Framework	Core Dimensions	Description
Harvard Human Flourishing Measure	Happiness, Health, Meaning, Character, Relationships (+ Financial Stability)	Comprehensive measure of well-being across six life domains, with a focus on public health research.
Flourishing Scale (FS)	Relationships, Self-esteem, Purpose, Optimism	8-item scale measuring perceived success in important life domains; produces a single psychological well-being score.
PERMA-Profiler	Positive Emotion, Engagement, Relationships, Meaning, Accomplishment (+ Health)	Measures five core elements of flourishing based on Seligman's well-being theory; robust validation.

Mental Health Continuum–Short Form (MHC-SF)	Emotional, Psychological, and Social Well-being	Assesses flourishing on a continuum from languishing to flourishing, integrating feeling and functioning.
Wellbeing Conceptual Framework (WBCF)	Positive Relationships, Meaning and Purpose, Engagement, Self-Acceptance, Personal Growth	Conceptual scaffold that defines flourishing through a core psychological template; adaptable and theory-driven.

Finally, we consider the growing movement toward blending subjective self-report instruments with objective health, social, and economic indicators to construct a more holistic understanding of flourishing (Lee et al., 2024; VanderWeele et al., 2020). This evolution reflects both the complexity of the human experience and the aspiration to build more integrated, inclusive, and actionable models of well-being. By mapping the diversity of these tools and their domains, this chapter contributes to a more rigorous understanding of how flourishing can be operationalized and evaluated in both academic and applied contexts.

2.1.2 The Harvard Human Flourishing Measure - VanderWeele, 2017

Developed by Tyler VanderWeele and colleagues at the Harvard T.H. Chan School of Public Health, the Human Flourishing Measure is one of the most comprehensive frameworks currently available for assessing well-being across multiple domains of life. It was designed to operationalize flourishing in a way that is both theoretically grounded and empirically robust, enabling comparisons across populations, cultures, and time (VanderWeele, 2017; VanderWeele et al., 2020).

The core structure of the measure consists of five foundational domains: happiness and life satisfaction, mental and physical health, meaning and purpose, character and virtue, and close social relationships. Each domain is evaluated using two questions rated on a scale from 0 to 10, providing both domain-specific scores and an overall flourishing index (VanderWeele et al., 2020). These domains were carefully selected to reflect both individual and relational aspects of well-being, grounded in empirical findings as well as philosophical and religious traditions that span cultures (VanderWeele, 2017).

An extended version of the framework includes a sixth domain: financial and material stability, sometimes referred to as the “secure flourishing” model. This addition acknowledges the

growing body of research highlighting the interaction between economic security and psychological well-being (Lee et al., 2024). While not considered constitutive of flourishing in its strictest sense, this domain provides important contextual insight into individuals' capacity to sustain a flourishing life.

One of the strengths of the Harvard model lies in its integration of both hedonic and eudaimonic elements, allowing for a broader and more balanced perspective on well-being (VanderWeele, 2017). The measure is suitable for a wide range of applications, including population health studies, public policy assessment, and intervention design. Its structure also lends itself to longitudinal research and international comparisons, given its conceptual clarity and brevity.

Importantly, the framework has been used in large-scale studies involving thousands of participants across different countries, and it has demonstrated high validity and cross-cultural applicability (VanderWeele et al., 2020). The emphasis on domains such as character and virtue also distinguishes it from other well-being instruments, offering a moral and ethical dimension often absent in conventional psychological measures.

2.1.3 The Flourishing Scale (FS) - Diener et al. 2010

Developed at the University of Illinois at Urbana-Champaign by Ed Diener and colleagues, the Flourishing Scale (FS) represents a concise yet theoretically grounded tool for assessing psychological well-being. Introduced in 2010, the scale was designed to capture self-perceived success across key life domains, such as meaning, relationships, purpose, and self-esteem, all of which are central to the eudaimonic view of well-being (Diener et al., 2010).

The FS consists of eight positively phrased items, each rated on a 7-point Likert scale (ranging from 1 = strongly disagree to 7 = strongly agree), with total scores ranging from 8 to 56. Unlike multidimensional instruments that evaluate specific domains independently, the FS provides a single composite score, reflecting an individual’s overall psychological flourishing.

The development of the FS was informed by existing theoretical models, particularly Ryff’s psychological well-being framework (Ryff, 1989), but prioritized brevity and applicability in both research and practice. Statements such as “I lead a purposeful and meaningful life” and “My social relationships are supportive and rewarding” reflect core dimensions of optimal human functioning.

As such, the FS offers a practical and psychometrically sound alternative for contexts where time, resources, or respondent burden must be minimized.

Validated across diverse populations and cultural contexts, the FS has shown good internal consistency and construct validity, making it widely suitable for use in educational, organizational, and clinical settings (Silva & Caetano, 2013). Though it does not explicitly assess physical health or material stability, its emphasis on purpose, relationships, and perceived life success aligns it closely with the core principles of flourishing within positive psychology.

2.1.4 **The PERMA-Profiler - Seligman et al.**

The PERMA model from PENN University proposed by Martin E.P. Seligman, father of Positive Psychology, is one of the most influential frameworks in positive psychology for conceptualizing and measuring human flourishing. Introduced in his seminal work *Flourish* (Seligman, 2011), PERMA represents five core domains that contribute to well-being: Positive emotion, Engagement, Relationships, Meaning, and Accomplishment. According to Seligman, these five elements are not only measurable and distinct but also “chosen for their own sake” and can be cultivated independently by individuals to improve their overall flourishing (Seligman, 2011, p. 16). In this way, Seligman emphasized that the goal of PERMA is not just to describe well-being but to enable its intentional cultivation.

To operationalize this model, researchers developed the PERMA-Profiler, a multi-item self-report inventory that assesses each domain through three core items, along with additional measures for negative emotion, physical health, loneliness, and happiness. Respondents rate items such as “In general, how often do you feel joyful?” or “To what extent do you feel that what you do in your life is valuable and worthwhile?” using an 11-point Likert scale (0 = never/not at all to 10 = always/completely) (Butler & Kern, 2016).

The PERMA-Profiler has been validated across diverse populations and translated into multiple languages, demonstrating strong psychometric properties and cross-cultural relevance (Kern et al., 2015). Importantly, the measure has found wide application in both educational and clinical settings due to its clarity, accessibility, and evidence-based structure. For example, in schools, it has been used to guide curricula focused on student well-being, resilience, and strengths-based learning environments.

Recent adaptations have expanded the PERMA model to include a sixth domain: Health, resulting in the PERMA-H model. This extension reflects growing recognition of the bidirectional relationship between physical health and psychological well-being (Norrish & Vella-Brodrick, 2009; Seligman, 2011). Although not part of the original framework, health has increasingly been integrated into flourishing metrics to capture the embodied aspects of well-being.

2.1.4 The Mental Health Continuum-Short Form (MHC-SF) - Keyes 2002

The Mental Health Continuum-Short Form (MHC-SF) was developed by Corey L. M. Keyes at Emory University, a leading institution in the integration of mental health and flourishing science. Emory is not only the academic home of the MHC framework but also hosts the Center for Contemplative Science and Compassion-Based Ethics, where the Social, Emotional and Ethical Learning (SEE) Program, co-developed with the Dalai Lama, promotes holistic education for human flourishing.

Unlike other frameworks that focus primarily on subjective well-being or life satisfaction, the MHC-SF adopts a dual continua model, distinguishing between the presence of positive mental health and the absence of mental illness (Keyes, 2002; Keyes, 2007). It represents one of the most widely used instruments for assessing flourishing from a mental health perspective.

The MHC-SF evaluates flourishing across three domains:

- Emotional well-being (e.g., happiness, interest in life, life satisfaction)
- Psychological well-being (e.g., personal growth, purpose, autonomy, self-acceptance)
- Social well-being (e.g., social integration, social contribution, acceptance)

The instrument comprises 14 items, each rated on a 6-point Likert scale (from 0 = never to 5 = every day). Respondents indicate how often they have experienced various feelings or states over the past month. High scores indicate a flourishing mental state, while lower scores suggest moderate mental health or languishing (Keyes, 2002). This continuum approach allows for categorization into flourishing, moderately mentally healthy, or languishing individuals, making the MHC-SF particularly valuable in epidemiological and policy contexts.

What sets the MHC-SF apart is its integration of hedonic and eudaimonic components, aligning with both affective well-being and optimal functioning. As Keyes noted:

"*The absence of mental illness is not the same as the presence of mental health. Flourishing... is a state where people experience positive emotions and function well psychologically and socially*" (Keyes, 2007, p. 96).

The MHC-SF has been validated internationally, with strong reliability and construct validity in cross-cultural studies (Lamers et al., 2011). It has been widely used in population-level research, mental health promotion programs, and education settings to monitor youth and adult well-being across time and demographics. Its brevity and clear scoring guidelines make it suitable for both research and applied uses, including early detection of psychological distress and tracking improvements after interventions.

2.1.5 The Wellbeing Conceptual Framework (WBCF)

The Wellbeing Conceptual Framework (WBCF) offers a focused and theory-driven approach to human flourishing by emphasizing a core set of psychological and relational dimensions. It has emerged from the broader academic effort to consolidate core elements of flourishing across disciplines, not being a branded or copyrighted model, but a synthesis emerging from leading researchers in well-being science and good part of all frameworks mentioned above.

Unlike domain-heavy models such as the Harvard Human Flourishing Measure or PERMA-Profiler, the WBCF distills flourishing into a "core template" of essential capacities and experiences that are universally relevant and psychologically foundational (Lee et al., 2024; Kern et al., 2024). These typically include positive relationships, meaning and purpose, engagement, self-acceptance, and personal growth or agency, dimensions consistently supported by major well-being theories such as Ryff's Psychological Well-Being (PWB) model (Ryff, 1989) and Self-Determination Theory (Deci & Ryan, 2008).

Rather than serving as a standalone measurement tool, the WBCF functions as a conceptual scaffold, a flexible template that researchers, educators, and practitioners can use to design their own assessments, interventions, or reflective practices. Its strength lies in its adaptability across cultural, institutional, and developmental contexts, especially in settings where standardized instruments may be too rigid or not culturally attuned. For instance, in a school-based program, flourishing might be assessed through students' sense of belonging, ability to pursue meaningful goals, and engagement in daily learning. In a caregiver support initiative, the focus might shift toward feelings of personal growth, value, and social connectedness.

A practical illustration of the WBCF's utility is found in the types of questions it inspires. Drawing from Ryff's model and Self-Determination Theory, typical items include: *"I have a sense of direction and purpose in life"* or *"Most people see me as loving and affectionate"* (Ryff, 1989), and *"I feel a sense of choice and freedom in the things I undertake"* (Deci & Ryan, 2008). In more flexible, qualitative formats, users may ask: *"When do you feel most alive or engaged in your day?"* or *"Do you feel supported and valued by those around you?"* These questions reflect the inner experience of flourishing rather than external achievements, aligning with the framework's eudaimonic foundation.

By focusing on the psychological essence of thriving, the WBCF avoids overcomplication while still maintaining theoretical rigor. It allows practitioners to co-create culturally sensitive and population-specific interpretations of flourishing, which is particularly valuable in cross-cultural, educational, and community health contexts. Moreover, it supports both quantitative and qualitative approaches, from Likert-based survey design to open-ended narrative inquiry.

2.1.7 Closing considerations

While each framework presented in this chapter offers a distinct lens through which to assess human flourishing, they share a foundational commitment to capturing the multidimensional nature of well-being.

The Harvard Human Flourishing Measure presents a multidimensional and philosophically informed approach to assessing well-being. Its blend of scientific rigor, cross-cultural sensitivity, and practical utility makes it a leading framework for researchers and policymakers seeking to understand and enhance human flourishing at both individual and societal levels**.**

The Flourishing Scale is proposed as a simple, scalable, and theoretically informed tool for capturing the essence of psychological flourishing. Its origin at the University of Illinois underscores the longstanding academic leadership of this institution in the science of well-being.

The PERMA-Profiler offers a scientifically grounded and practically useful instrument for assessing human flourishing, with a strong emphasis on both subjective experience and personal growth. Its versatility across domains and life stages has made it a cornerstone tool in both research and applied positive psychology.

The MHC-SF offers a comprehensive and empirically grounded model of mental flourishing, emphasizing not only how people feel, but how they function and connect within society. As such, it bridges psychological theory with public health application, making it a powerful tool for mapping mental well-being on a continuum.

The Wellbeing Conceptual Framework contributes to the flourishing literature by articulating a parsimonious yet profound vision of what it means to thrive. Its value lies not in measurement standardization but in conceptual clarity, offering a lean, human-centered foundation for research, design, and transformation.

The comparative table below helps to distinguish part of the approaches with concrete examples of each frameworks application.

Table 2 - Comparative table of Human Flourishing Frameworks, Luanna Eroles, 2025

Framework	**Application**	**Sample Question**
Harvard Human Flourishing Measure	Population health studies, longitudinal research, policy evaluation.	"Overall, how satisfied are you with your life as a whole these days?"
Flourishing Scale (FS)	Broad well-being assessment, cross-cultural studies, education and workplace.	"I lead a purposeful and meaningful life."
PERMA-Profiler	Applied in schools, coaching, mental health, organizational development.	"To what extent do you feel that what you do in your life is valuable and worthwhile?"
Mental Health Continuum–Short Form (MHC-SF)	Epidemiology, mental health screening, global well-being monitoring.	"During the past month, how often did you feel that you had something important to contribute to society?"
Wellbeing Conceptual Framework (WBCF)	Intervention design, participatory research, reflective practices, education.	"When do you feel most alive or engaged in your day?"

Furthermore, a common trait is that most of the frameworks rely on self-report Likert-type instruments, typically with a manageable number of items (often fewer than 25), and most of them focus on core domains such as meaning, relationships, and psychological functioning. Recent developments, though, point toward a broader integration of physical and mental health, with a

holistic view of it, as well as constructs like resilience, optimism, and material stability, further enriching the conceptualization of Human Flourishing.

Ultimately, these frameworks provide actionable insights not only for academic research, but also for the design of a brand new perspective of interventions, public programs, and system-level strategies that aim to foster well-being at scale in evidence-based way. Considering the technology landscape, we can notice a perceived a tendency is the old questionnaire based monolitical approaches migrate and evolve towards qualitative hypermedia, with open ended questions and AI interpretation of giving scale to open inputs to be accounted in a systematic review, and an ocean of technical possibilities. Also, many of these tools have been adapted and validated cross-culturally, supporting their global capacity for impact. Such new horizons will be reviewed in the next chapter, which will rescue technological background of Human Computer interaction, and expand it to the new scenario of technologies in 2025, focusing on A.I applications.

2.2 HUMAN-COMPUTER INTERACTION - FOUNDATIONS AND EMERGING FRONTIERS

The Human-Computer Interaction (HCI) is a multidisciplinary field that investigates the design, evaluation, and implementation of interactive computing systems for human use, as well as the study of the major phenomena surrounding them (ACM SIGCHI, 1992). It draws on computer science, cognitive psychology, design theory, and sociology to explore how people engage with digital technologies in both functional and affective dimensions (Preece, Rogers, & Sharp, 2015; Shneiderman et al., 2016).

As AI technologies rapidly evolve, HCI has shifted from focusing solely on efficiency and usability (with the famous heuristic metrics and design principles) toward addressing deeper experiential and relational dynamics. Particularly in the context of AI-mediated communication and decision-making, interaction design must now consider how users perceive, trust, and relate to non-human agents.

It might seem we are pretty aware that computers are Computers, but since 1996, studies say the opposite can be true. The classic “media equation” proposed by Reeves and Nass (in early 1996) argued that people treat computers, televisions, and other media as if they were real people or places. This insight, initially controversial, is now foundational in understanding how AI avatars shape user behavior, with a special emphasis to the anthropomorphic ones.

In 2025, these concerns have gained new urgency, as Europe plan a massive scale of AI and a sovereignty contingency plan, not to be too reliant on US and China for technology. The

European Union's launch of AI factories and increased funding for digital innovation (European Commission, 2023) highlights not only the continent's strategic investment in AI but also the broader societal shift toward AI-augmented living and working environments, which we are transitioning to. As users encounter AI more frequently across healthcare, education, and daily life, the design of AI embodiments, including voice, personality, and appearance, has become central to fostering trust, engagement, and emotional safety (Norman, 2004; Calvo et al., 2018).

Yet, while much of AI research has focused on improving decision-making accuracy and computational performance - as in banking and operational sectors - relatively little attention has been paid to the interface layer, the space where human and machine meet socially and psychologically.

This interface is often mediated through avatars, which act not only as communication tools but also as Social Actors in their own right (Nass & Moon, 2000). Interestingly, the human brain appears wired to anthropomorphize and respond to these agents with relational cues: making eye contact, interpreting facial expressions, and forming judgments about empathy or trustworthiness. These phenomena raise new questions for HCI: What types of avatars elicit the most natural or effective human responses? How do factors like realism, cultural context, or emotional expression shape interaction outcomes? And how can AI tools be designed to support (and not undermine) human values and agency?

The following section turns to these questions by focusing specifically on avatars and human interaction**.** Drawing on empirical studies and theoretical perspectives, it explores briefly how design choices in avatar aesthetics and behavior can significantly influence the user experience, particularly in sensitive applications such as mental health support or educational coaching.

2.2.1 General interaction and derived relations to avatars

Academic research and corporate studies have yielded mixed results regarding whether people relate better to AI with person-like or abstract avatars. With plenty of evidence in the field, the choice between realistic and cartoon-like avatars depends on the specific needs, preferences of the user, and the context of the application (ZReality, 2025). The relationships build with those different types of avatar also vary with age and culture, being younger users more prone to use cartoon-like avatars, and older users human-like avatars. Regardless of the specific aesthetic, the level of anthropomorphism and social cues in avatars can influence user behavior and acceptance of AI in service encounters (FOTA et al., 2022).

Worth mentioning here in the scope of this research, there are 4 major types of representations of avatars: abstract avatars (like Siri from Apple, or Bixby from Samsung), Robot avatars, Cartoon-like avatars (presenting more human features, but in a ludic way), and Anthropomorphic avatars (being more human-like).

Abstract or “cartoon-like” avatars offer more creative freedom and are often preferred by users in social media, games, and informal online communities (ZReality, 2025; CAO et al., 2023). Part of the reason can be due to the fact that younger users are more used to “game-like” visuals, and it may be easier for users to manipulate facial expressions, which give users a feeling of more appropriate platform for self-representation (CAO et al., 2023). Also, they are safer in terms of emotional connection, being perceived as “less creepy” in a user study with younger users (KARLI, 2024).

Robot-like avatars were found to be the easiest to understand and are considered visually appealing (KARLI, 2024) letting more evident that the interaction is happening with a machine.

Now, for “human-like” avatars, there were some incredible findings emerging in different studies and groups of research. Also called anthropomorphic avatars, this group is preferred by older users (over 40 years old) in some studies (KARLI, 2024) and based on those studies, they score higher in credibility in professional contexts and promote realistic interactions (ZReality, 2025) than other types of avatars. Some of the reasons can be related to the fact that this human resemblance may elicit more presence and stronger social influence when controlled by humans, according to a meta-analysis (Miao, Kozlenkova, Wang, Xie, & Palmatier, 2021). The cons is that, depending on the design, high-fidelity avatars can sometimes fall into a space of avoidance and repulse called in studies of the "uncanny valley," the area where anthropomorphic figures may cause discomfort and repulse as a natural human reaction (CAO et al., 2023).

2.2.2 What is the Uncanny Valley

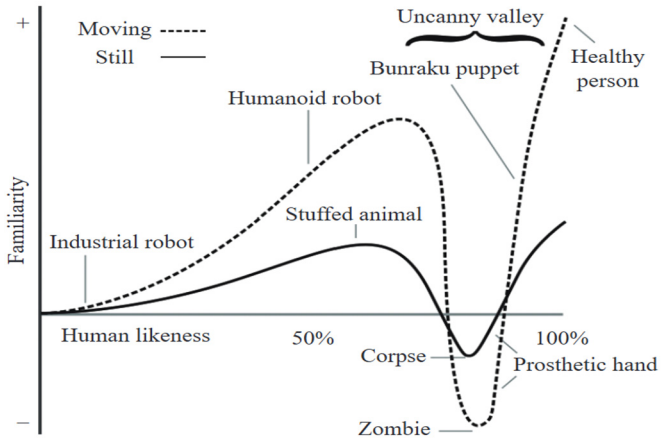

Image 1 - The Uncanny Valley

Japanese early studies of Human-Computer interaction detected that with the rise of real resemblance of specific types of avatars, our brain may confuse similar objects suddenly with corpses, evoking feelings of discomfort, uneasiness or fear (MORI, MACDORMAN, KAGEJI, 2012). Classical examples are old dolls that look like babies (dead babies). The color of the dolls and the fixated pupil connects in our brain, even without our conscious thought, that it is a dead body, which causes in us the reaction against it and the feeling of evasion. Also, a prosthetic hand can be interpreted by our subconscient as a detached human organ. Those regions of interaction create a valley in the perception and acceptance of created objects or avatars assembling human likeness of a healthy person, as shown in the figure 1.

But after some features are repaired, and the valley is crossed, the perception turns positive again, and feelings of human connection can be transferred to objects that passes the standards of our subconscious of being “good-enough” humans.

2.2.3 “Good-enough” humans - Positive effect of anthropomorphic design of avatars

Considering a previous careful validation of the avatar design in order to not fall into the uncanny valley, many studies concluded that Anthropomorphism plays a significant role in the acceptance of AI chatbots influencing user perceptions, satisfaction, and loyalty.

Anthropomorphic design in chatbots can elicit attributions of human-likeness, making unfamiliar AI agents more understandable to users (Gu, Zhan, Zeng, 2024), enhance emotional connections in service encounters, leading to positive consumer evaluations (Gu, Zhan, Zeng, 2024) increased credibility, promoting more realistic interactions. (Gu, Zhan, Zeng, 2024).

2.3 ARTIFICIAL INTELLIGENCE DESIGN

Now, beyond avatars, effective AI design requires multidisciplinary coordination between technical development, user experience (UX) research, and ethical oversight. This is particularly true in domains such as healthcare and mental well-being, where expectations are high and human vulnerability must be respected (Calvo et al., 2018). This section broadens the lens to consider how AI systems are conceptualized, developed, and integrated into everyday contexts.

Foundational to AI design is the principle of human-centeredness, ensuring that AI systems serve user goals, adapt to individual needs, and preserve human agency (Shneiderman, 2022). As we move into the next section on AI applications for mental health, it becomes especially important to examine how design frameworks support the development of responsible, empathetic, and evidence-based tools. In this context, AI is not just a technical system but a relational actor, one that must be carefully designed to augment rather than restrict or even harm human potential and well-being.

2.3.1 Overview of Current Market Guidelines for the Development of AI Applications in Mental Health

As artificial intelligence technologies become increasingly embedded in healthcare systems, the development of AI-driven mental health applications is facing new expectations shaped by both academic frameworks and market guidelines. While academic literature emphasizes human-centered, ethical, and clinically relevant AI systems (Abdalla et al., 2023; Fitzpatrick et al., 2021), the commercial landscape is gradually aligning through policy developments, standards, and organizational benchmarks aimed at guiding responsible AI design.

Globally, industry and policy stakeholders have introduced general-purpose frameworks for responsible AI, such as the OECD AI Principles**,** EU AI Act**,** and ISO/IEC 42001, which emphasize transparency, accountability, fairness, and human oversight (Floridi et al., 2018; European Commission, 2021; ISO, 2023). These frameworks increasingly inform the private sector's strategic and compliance-driven approach to AI development, which includes the context of mental health applications.

But beyond the generic market guidelines, mental health apps bring domain-specific sensitivities that general AI governance may not fully address, specially in the preventive context of Human Flourishing. Among the frameworks proposed to guide the design and evaluation of AI in this domain, two stand out for their practical relevance and theoretical rigor: the Framework for AI Tool Assessment in Mental Health (FAITA) and the Four-Pillar Life Cycle Model. These models

contribute complementary perspectives, evaluation criteria and temporal development stages, that help inform responsible and effective AI deployment in mental health contexts, which will be explored now.

2.3.2 FAITA: A multi-dimensional Framework for evaluating AI-powered Mental Health Tools

The Framework for AI Tool Assessment in Mental Health, also known as FAITA, was developed to address the growing need for structured, ethically grounded evaluations of AI-driven mental health applications. Building upon earlier efforts such as PsyberGuide's app rating systems, FAITA formalizes a multi-dimensional assessment model focused on six key domains: credibility**,** user experience**,** transparency**,** user agency**,** diversity/inclusivity**,** and crisis management (Hilty et al., 2023).

Each dimension captures a core component of ethical and functional AI design. For instance, *credibility* encompasses the scientific validity and clinical grounding of AI outputs, while *user agency* emphasizes control and informed consent in user interactions. *Transparency* refers to the clarity with which AI decision-making processes are communicated to users, a critical aspect for building trust and mitigating potential harms (Abdalla et al., 2023).

FAITA is particularly relevant in the commercial development of mental health applications, where unregulated growth and inconsistent quality have raised ethical and clinical concerns. By offering a comprehensive, standardized evaluation framework, it enables companies, researchers, and policymakers to benchmark AI tools in terms of both technical performance and alignment with human-centered values.

Moreover, it acknowledges the importance of cultural competence and inclusivity, calling for tools that respect diverse linguistic, racial, and socio-economic contexts. Its inclusion of crisis management further differentiates it from general AI governance models, highlighting the unique safety challenges posed by tools operating in sensitive psychological domains.

2.3.3 The Four-Pillar Life Cycle Model: Structuring AI Integration Across the Mental Health Continuum

While FAITA focuses on quality assessment and ethical alignment, the Four-Pillar Life Cycle Model provides a temporal and systemic structure for integrating AI technologies throughout the mental health care continuum.

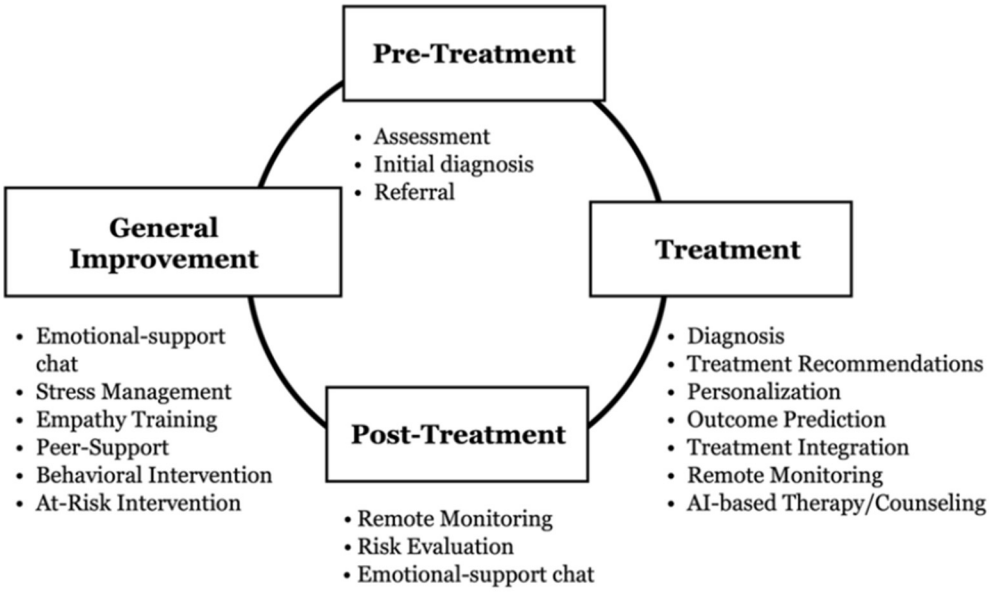

Image 2 - The Four-Pillar Framework, (Ni, Y. & Jia, F., 2025)

As articulated by Ni and Jia (Ni, Y. & Jia, F., 2025), this model identifies four key phases in which AI can play a supportive role: pre-treatment, treatment, post-treatment, and clinical education and prevention.

In the pre-treatment phase, AI systems are often employed for screening and early detection, using natural language processing or behavioral data to identify symptoms of mental distress. During treatment, AI supports therapeutic interventions, for example through chatbots or decision-support systems that assist clinicians in monitoring symptom progress or predicting treatment outcomes.

In the post-treatment phase, AI contributes to relapse monitoring and sustained support, offering personalized feedback or nudges that help users maintain mental well-being over time. The fourth pillar, clinical education and prevention, emphasizes AI's role in knowledge dissemination, training professionals, simulating scenarios, and identifying population-level risk patterns.

This life cycle approach encourages developers and clinicians to consider longitudinal engagement with AI systems, rather than focusing on isolated functions. It also highlights the importance of interoperability across platforms and care providers to ensure continuity and coherence in AI-supported mental health journeys.

When used in tandem with frameworks like FAITA, the Four-Pillar Model supports a dual-layered design logic: while FAITA addresses the "what" and "how well" of AI quality and ethics, the Four-Pillar Model addresses the "when" and "where" AI should be deployed. This combined

perspective offers a robust foundation for the responsible development and implementation of AI applications in mental health care.

Moreover, frameworks like the Four-Pillar Life Cycle Model provide a phased structure for AI tool development, spanning screening, intervention, post-treatment monitoring, and clinical education, which is increasingly echoed by health technology companies integrating AI into wellness platforms (Vollmer et al., 2023). Such alignment promotes continuity of care, a quality standard heavily emphasized in both academic and market spheres.

2.3.4 Other frameworks on Artificial Intelligence applications for Mental health

A convergence between research and market practice is evident in Human-Centered AI approaches. These prioritize collaborative development with clinicians and end-users to ensure tools are supportive rather than substitutive (Fitzpatrick et al., 2021). This approach informs product strategies of industry leaders like Woebot Health and Wysa, whose clinically grounded chatbot solutions embed explainability and empathy as core design tenets.

The AI Thinking Framework further encourages interdisciplinary awareness in both technical and sociocultural dimensions (Dignum, 2023). This is particularly vital in commercial settings, where product deployment across diverse populations needs inclusive design and context-sensitive adaptations.

In parallel, the market shows growing interest in hybrid AI-human ecosystems that avoid full automation, instead supporting clinicians and peer workers through augmentation tools (Clement et al., 2024). This is reflected in emerging hybrid service models where AI enhances, but does not replace, human interaction.

Lastly, the integration of machine learning through HCI-informed design is gaining traction as developers seek to improve real-world engagement, interpretability, and sustained use of AI mental health applications (Yang et al., 2020). With regulatory scrutiny tightening, this user-centered methodology helps companies balance compliance, usability, and innovation.

Table 3 - Mental Health AI assessment frameworks, Luanna Eroles, 2025

Framework Name	Main Focus Area(s)	Academical Reference
FAITA - AI Tool Assessment	Evaluation, ethics, user agency	**Golden, A., & Aboujaoude, E. (2024, October).** The Framework for AI Tool Assessment in Mental Health (FAITA , Mental Health): A scale for evaluating AI-powered mental health tools. *World Psychiatry, 23*(3), 444, 445.
Four-Pillar Life Cycle Framework	Clinical phases, digital interventions	**Ni, Y., & Jia, F. (2025).** A scoping review of AI-driven digital interventions in mental health care: Mapping applications across screening, support, monitoring, prevention, and clinical education. *Healthcare*. Advance online publication.
Human-Centered AI Design	Clinical relevance, individualized care	**Fitzpatrick, K. K., Darcy, A., & Vierhile, M. (2023)**. Designing human-centered AI for mental health: Developing clinically relevant applications for online CBT treatment. *ACM Transactions on CHI, 30*(2), Article 23.
AI Thinking Framework	Interdisciplinary, sociotechnical systems	**Dignum, V. (2025)**. AI thinking: A framework for rethinking artificial intelligence in practice. *Royal Society Open Science*.
Design-Stage-Oriented Frameworks	Education, integration, knowledge transfer	**Jansen, F., & Colombo, C. (2024)**. A design-stage-oriented framework to introduce artificial intelligence into design education. In *Proceedings of the Design Research Society Conference 2024* (pp. 1, 15). Design Research Society.
Hybrid AI-Human Ecosystem	Complementary roles, ethical deployment	**Sim, K. Y. H., & Choo, K. T. W. (2025)**. Envisioning an AI-enhanced mental health ecosystem. *arXiv*.
ML in Mental Health: HCI-Informed	Interpretability, ethics, user engagement	**Thieme, A., Belgrave, D., Sano, A., & Doherty, G. (2020**). Machine learning in mental health: A systematic review of the HCI literature to support effective ML system design. Microsoft Research.
AI for Positive Mental Health	Prevention, intervention, accessibility	**Thakkar, A., Gupta, A., & De Sousa, A. (2024).** Artificial intelligence in positive mental health: A narrative review. *Frontiers in Digital Health*.

In summary, while general market guidelines on AI ethics and governance provide the structural scaffolding for AI development, domain-specific academic frameworks, like FAITA, human-centered design, and life cycle models, are essential for operationalizing those guidelines in mental health contexts. Their integration is shaping a dual movement toward regulatory alignment and clinical credibility in commercial AI tools for mental health give a valuable starting point to innovators and researchers in the field. But more than the base value, the next section invites us to analyse business models and value creation context in the landscape of preventive mental health care applications.

2.4 Framing Value in Preventive Mental Health Innovation, mapping Business models

As artificial intelligence continues to disrupt the healthcare landscape, particularly in the realm of mental health, the sustainability and impact of emerging technologies are increasingly shaped not only by design principles and technical capabilities, but also by their underlying business models. Business model design plays a critical role in translating innovative technologies into accessible, scalable, and meaningful solutions that align with both user needs and systemic health priorities (Osterwalder & Pigneur, 2010; Baden-Fuller & Haefliger, 2013).

In the context of this thesis, focused on preventive mental health care for youth and the potential of AI to support emotional flourishing, understanding how startups structure, deliver, and capture value becomes essential. Business models reflect more than just monetization strategies; they reveal the logic by which a product integrates into users' lives, communicates value propositions, and navigates ethical and commercial tensions (Teece, 2010).

Relevant to the research objective, to map existing mental health apps and analyze their positioning in terms of value creation, market fit, and impact gaps, this chapter introduces the theoretical foundations of business model design as a lens for evaluating the AI mental health innovation ecosystem.

Particular attention will be paid to models that reflect the unique demands of preventive care, youth engagement, and emotional competencies, domains where commercial success must be balanced with ethical responsibility, accessibility, and long-term well-being outcomes.

2.4.1 Defining Business Model Design

In recent decades, the business model has emerged as a pivotal concept in strategic and innovation management, offering a structured framework for understanding how organizations

create, deliver, and capture value in increasingly complex and digitized markets (Osterwalder & Pigneur, 2010; Wirtz, 2020a). While early interpretations of business models focused on IT-based representations (Bellman et al., 1957), their evolution now encompasses strategic, organizational, and technological perspectives (Wirtz, 2019). Especially in the context of platform-based and digital-native businesses, the capacity to systematically design and innovate business models has become a competitive advantage (Gassmann et al., 2020).

2.5 The Business Model Navigator and Innovation Patterns

Gassmann, Frankenberger, and Csik (2020) expanded the analytical lens on business models by identifying 55 business model patterns that have consistently led to successful innovations across industries. These patterns are structured around four core dimensions - Who (the customer), What (value proposition), How (the value chain), and Why (describing value and revenue model) - forming the so-called "magic triangle" of business model innovation. Empirical research suggests that approximately 90% of all business model innovations are recombinations of these existing patterns. Notable examples include the freemium model**,** long tail**,** subscription, and peer-to-peer models - many of which are central to the functioning of digital health and e-learning platforms.

In digital health, platforms must also account for data privacy**,** trust-building**,** and user engagement - all of which shape the platform's ability to scale sustainably and ethically. The integration of these principles within the BMC structure allows a holistic evaluation of digital mental health models in highly regulated and sensitive contexts.

With all this theoretical background, we are ready to move into the contemporary context of Mental Health in the next Chapter.

3 Mapping the Mental Health Crisis

3.1 Definitions and the contemporary context

Although used misconceptiously as a negative term, "mental health" is broadly defined as "a state of well-being in which the individual realizes their own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to contribute to their community" (World Health Organization [WHO], 2018). This definition frames mental health not merely as the absence of mental illness (or mental ill-health) but as the presence of psychological well-being and functioning. Similarly, the Organization for Economic Co-operation and Development (OECD)

emphasizes a well-being approach, framing mental health as essential to social and economic participation, and advocating for policies that enhance mental capital across the lifespan (OECD, 2021).

The global mental health crisis imposes a staggering economic burden, with the World Health Organization estimating a cost of US$ 1 trillion per year in lost productivity due to depression and anxiety alone (WHO, 2021). Mental health disorders are now among the leading causes of disability worldwide, affecting nearly one in eight people (WHO, 2022). Beyond direct medical expenses, the indirect costs, including absenteeism, reduced labor force participation, and social welfare dependency, further strain national economies and social systems (OECD, 2021). In Europe, mental ill-health is estimated to account for more than 4% of GDP in direct and indirect costs (OECD, 2023). These numbers highlight the urgent need for system-level shifts in how mental health is approached, not merely as a clinical issue but as a fundamental economic and societal challenge requiring proactive, multi-sector solutions.

Among the most alarming trends in global mental health, a sharp accent had been noticed in the increase in psychological distress among children and adolescents. According to UNICEF (2021), at least 13% of adolescents globally live with a diagnosed mental disorder, with depression, anxiety, and behavioral conditions being the most prevalent. The COVID-19 pandemic exacerbated existing vulnerabilities, leading to significant increases in anxiety and depression symptoms in young people, with some studies noting a doubling of rates during lockdown periods (Racine et al., 2021). In Europe, suicide remains the second leading cause of death among youth aged 15-19, underscoring the magnitude of the crisis (UNICEF, 2024). The spike in youth mental ill-health demands targeted, age-appropriate strategies that move beyond treatment toward systemic, preventive frameworks.

3.2 THE YOUTH DEMOGRAPHIC: ROOT CAUSES OF MENTAL ILL-HEALTH

The Global Flourishing Study is a longitudinal initiative conducted by researchers from Harvard University and Baylor University which incorporates Gallup survey data to assess well-being across 23 countries and territories. The initiative started in 2022 and aims to collect longitudinal data until 2027 on “Mapping the Mystery of Humanity”, as stated in its website.

Some first publications with partial discoveries have been published. Between 2022 and 2024, over 200,000 adults participated in the study, which evaluated flourishing across key domains: happiness and life satisfaction, mental and physical health, meaning and purpose,

character and virtue, and close social relationships. These dimensions collectively form the Flourishing Index Score, a comprehensive measure of individual well-being. Traditionally, the life satisfaction, according to their specialists, should tend to look like an “U” on the graphs, with higher happiness in young years as well as in elderly years. But surprisingly, the fresh world data reflects something different.

Conversely, in a wide range of geographically and culturally diverse nations, including Argentina, Australia, Brazil, Germany, Mexico, Spain, Sweden, the United Kingdom, and the United States, younger adults (aged 18, 29) reported the lowest levels of flourishing. In these contexts, well-being tends to improve progressively with age. The discovery was alarming, and represents that the Z generation is less happy than the generations before during the same life stage. Which brings us a question: which changes in society and behavior could be causes for this shift in paradigm?

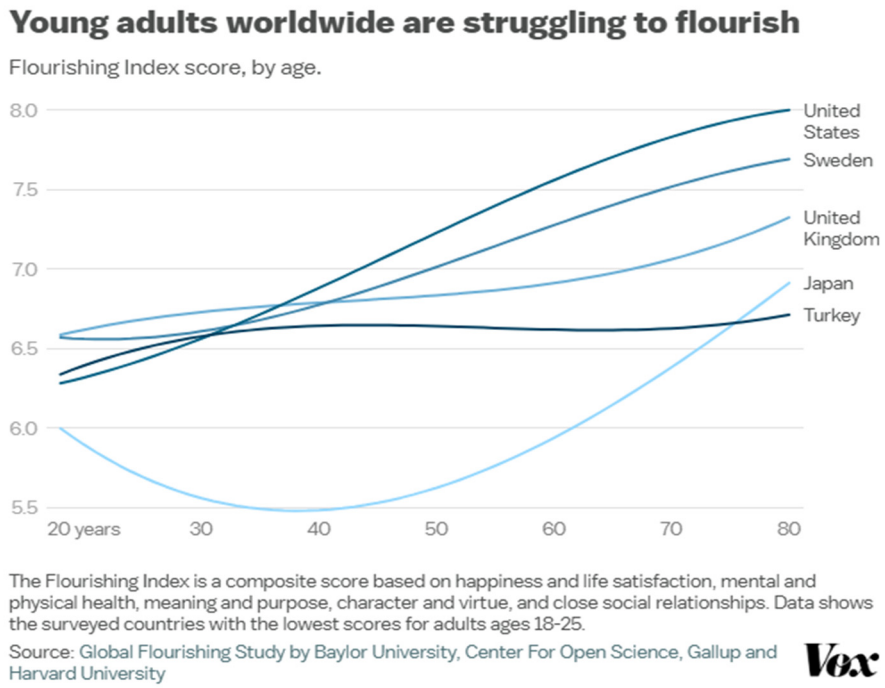

Image 3 - Young Adults worldwide are struggling to flourish, VOX 2024

Reasons for mental ill-health in youth have been shifting through the years. Compared to years ago, genetic predisposition and household dysfunctions are the most long term well known reasons to increase vulnerability to depression or anxiety (Centers for Disease Control and Prevention, 2021). Although it is harder for children to lose a parent as in generations before, the current generation face alarming records of divorce. But new factors such as social media and digital technology propelled the statistics. Pervasive use of social media among adolescents has

been associated with increased feelings of anxiety, depression, and loneliness. Notedly, factors such as cyberbullying, social comparison, and reduced face-to-face interactions contribute to these negative outcomes (Twenge & Campbell, 2018).

Also the expectations from academic performance and school environment changed drastically over the years, social comparison made perfectionism a trend. A competitive school environment, coupled with limited support, exacerbates these mental health challenges (American Psychological Association, 2014). High expectations and pressure to perform academically can lead to chronic stress, anxiety, and burnout among students. Also included as a new dimension, insecurity towards the future, global warming, unclear labor market and unstable housing are significant stressors that have been more evident since 2020 and this lack of perspective are having tremendous impact on adolescent mental health.

3.3 PARADIGM SHIFT: FROM REACTIVE TREATMENT TO PREVENTIVE CARE

Facing the modern global challenges of mental health and the economical burden related to it and huge social impact, a shift in perspective of treatment-oriented systems must be taken. For instance, the World Health Organization (WHO) advocates for integrating mental health promotion into primary care, schools, and workplaces to create supportive environments that enhance psychological well-being (WHO, 2004). Similarly, the OECD emphasizes the economic and social benefits of preventive mental health strategies, highlighting their role in improving quality of life and reducing healthcare costs (OECD, 2021). But even outside of the Policy briefs healm, there is a broader movement in psychology that views mental health as a dynamic continuum, ranging from languishing to flourishing (Keyes, 2002). This shift has led to increased focus on promotive and preventive models of care, emphasizing early intervention, resilience-building, and the development of emotional competencies.

Collectively, these perspectives underscore the need to move beyond pathology-centered approaches and toward integrative, life-course mental health strategies that support individual and societal flourishing. For this reason, in the next section this study reflects on preventive measures and select, through the analysis of evidence published in scientific communities, which are skills and traits that should be embedded in digital solutions aiming human flourishing.

4 APPLIED PREVENTIVE MENTAL HEALTH CONSTRUCTS - TRANSLATING YOUTH NEEDS INTO DIGITAL-READY APPROACHES

Understanding the root causes of mental ill-health among youth provides a clear foundation for identifying effective psychological interventions - which we will name as selected Antidotes.

With this in mind, we developed a conceptual framework that bridges empirical knowledge of youth vulnerabilities with theoretical constructs from flourishing science, resulting in a model that is both clinically grounded and translatable to technological applications.

4.1 INTRODUCTION TO SELECTED APPROACHES TO TACKLE YOUTH MENTAL ILL-HEALTH

The selection of the psychological antidotes presented in the following table was based on a mapping of the most commonly reported causes of youth mental distress, as previously stated, such as anxiety, loneliness, bullying, school pressure, and disengagement. These challenges, reported both in clinical data and educational settings, highlight areas where young people are not only struggling emotionally, but also lacking the skills or resources to navigate internal and external pressures.

To translate these needs into actionable frameworks, as the views on human flourshing have own perspectives in the academical field, we reviewed five major models of flourishing (Harvard Human Flourishing Measure, PERMA-Profiler, Flourishing Scale, MHC-Short Form, and the Wellbeing Conceptual Framework), and based on them, a consolidates selection of traits based on their digital transferability and power to sustain the youth problem was chosen so that each youth emotional need was cross-referenced with the core dimensions and traits found across these frameworks, ensuring that the psychological antidotes selected are theoretically grounded and consistent with leading research on human flourishing.

The final selection was shaped by three key criteria:

1. **Cross-framework convergence**: Traits were prioritized if they consistently appeared across two or more flourishing models.
2. **Simplicity and universality**: We emphasized traits that are easy to understand, apply, and communicate, particularly in settings such as schools, families, or youth programs.
3. **Relevance to youth development**: Antidotes were selected based on their resonance with developmental psychology and adolescent emotional needs.

After our literature review, each proposed psychological antidote correspond to a specific youth emotional need found in the literature research, forming a bridge between theory and practical application. After their presentation, a literature review with powerful statistics will reveal the context behind their choice as proposed for this study.

a. Gratitude, as Antidote to Anxiety

Gratitude, defined as the intentional recognition of positive aspects in one's life, has been shown to counteract anxiety by shifting focus away from perceived threats and toward a broader, more balanced perspective. This aligns with the "positive emotion" dimension in PERMA and the "happiness" domain in the Harvard model, both of which emphasize emotional regulation and cognitive reframing as keys to flourishing.

b. Belonging, as Antidote to Loneliness & Identity Crisis

During adolescence, peer connection and social identity are central to well-being. A lack of belonging often leads to loneliness, insecurity, and identity confusion. The trait of belonging addresses this by reinforcing positive social ties and affirming one's place in a group or community. This is deeply embedded in all five frameworks, particularly within the "relationships" and "social well-being" domains of PERMA, MHC-SF, and Harvard.

c. Empathy, as Antidote to Bullying and Cyberbullying

Empathy fosters mutual understanding, emotional attunement, and prosocial behavior, making it a powerful buffer against both being bullied and becoming a bully. It is conceptually tied to character and virtue (Harvard), relationships (PERMA), and the social components of flourishing (WBCF and MHC-SF). Cultivating empathy in youth promotes relational resilience and community-oriented thinking.

d. Hope, as Antidote to Fear of the Future

Facing an uncertain future, characterized by climate anxiety, economic instability, or social pressure, many adolescents experience existential worry. Hope, as the ability to imagine and move toward a better future, counters this fear with agency and optimism. It connects strongly to meaning and purpose in Harvard, PERMA, and FS, and is central to logotherapy's emphasis on future-oriented meaning.

e. Optimism, as Antidote to (School) Pressure

Optimism, the generalized expectation that positive outcomes are possible, functions as a buffer against stress related to academic performance and achievement standards. It is present in positive psychology and trait-based approaches, and resonates with the “positive emotion” and “accomplishment” dimensions in PERMA, FS, and MHC-SF. Optimism supports perseverance and goal-directed effort even under pressure.

f. Meaning and Purpose, as Antidote to Addiction

Adolescents experiencing emptiness or emotional numbing are more vulnerable to addictive behaviors. Meaning and purpose provide existential anchors that redirect energy away from self-destructive coping toward intentional living. These traits appear across all flourishing frameworks, especially in the “meaning and purpose” dimensions of Harvard, PERMA, and WBCF, and are core tenets of logotherapy.

g. Engagement, as Antidote to Disengagement

A sense of engagement, being mentally and emotionally involved in life activities, combats apathy and motivational withdrawal. In PERMA, engagement is a standalone pillar of flourishing, and in the WBCF, it reflects one’s capacity to find flow, interest, and value in everyday experiences. For disengaged youth, promoting engagement reconnects them with agency, identity, and joy.

Each of these traits can be cultivated through guided interventions, storytelling, reflective exercises, and digital tools, creating accessible pathways for youth to move from distress to flourishing. The next section visualizes this mapping in a comprehensive table.

4.1.1 Proposed Tech-ready Approach to Youth Mental ill-health

The following table describes the selected traits after our literature review. As described, each psychological antidote is aligned with a specific youth emotional need, forming a bridge between theory and practical application. The traits included in this framework were selected for their empirical relevance, cross-theoretical alignment, and emotional accessibility to young people. Each represents a protective or growth-oriented response to a specific emotional challenge frequently encountered by adolescents. The goal is to foster not only short-term coping but also long-term flourishing through the development of skills, mindsets, and emotional

capacities that are both learnable and measurable. Also, each of these traits can be cultivated through guided interventions, storytelling, reflective exercises, and digital tools, creating accessible pathways for youth to move from distress to flourishing. The next table maps the frameworks alignment.

Important to emphasize is that the traits chosen are not simply abstract ideals. They are *language-permeated skills*, which means they can be expressed, developed, and measured through communication, reflection, and narrative processes. This makes them particularly well-suited for educational activities, group facilitation, and even digital well-being applications. For this reason, I present them here are digital-ready constructs.

Table 4 - Youth Needs and Psychological Approach as Antidote, Digital-ready constructs by Luanna Eroles, 2025

Youth Need	Resilience Skills / Antidotes	Harvard Domains	PERMA	Flourishing Scale (FS)	MHC-SF	WBCF	Logotherapy	Selected Single Trait
Anxiety		Happiness & Health	Positive Emotion	Optimism, Self-esteem	Emotional Well-being	Engagement, Self-acceptance	Transcendence	Gratitude
Loneliness & Identity Crash		Social Relationships			Social Well-being	Positive Relationships	Belonging	Belonging
Shame		Character & Virtue	Meaning	Self-esteem		Compassion	Meaning	Vulnerability
Bullying / Cyberbullying			Relationships	Positive social regard		Belonging, Self-acceptance	Shared Humanity	Empathy
Fear of the Future (e.g., job insecurity, climate anxiety)		Meaning & Purpose	Meaning, Accomplishment	Purpose, Optimism	Psychological Well-being	Meaning & Purpose	Meaning	Hope
School Pressure		Meaning & Purpose		Purpose, Self-worth		Purpose, Growth	Life Task	Optimism
Addiction		Character & Health		Achievement orientation		Agency, Self-regulation	Existential Responsibility	Purpose
Disengagement		Meaning & Purpose	Meaning	Autonomy	Psychological & Social Well-being	Engagement, Growth	Existential Awakening	Engagement

A major advantage of this antidote-based approach is its ease of transposition into real-world contexts, especially through technology-enabled platforms. Each trait is concise, measurable through simple self-report or language-based inputs (such as journaling or chatbot interactions), and compatible with digital therapeutic tools.

For example, Gratitude can be tracked through daily reflection prompts; Hope and purpose can be activated through guided goal-setting or storytelling; Belonging and empathy can be cultivated in online communities or school-based peer support.

By grounding these interventions in theoretical integrity and practical simplicity, the framework becomes accessible to educators, caregivers, and digital health innovators alike.

The resulting synthesis, presented in the table 4, connects youth emotional challenges with their corresponding psychological resilience traits and theoretical underpinnings. It also maps each trait to the relevant dimensions of the flourishing frameworks, demonstrating how these seemingly individual skills are part of broader systems of mental, emotional, and social well-being. These are not just academic constructs, they are the emotional scaffolding of our lives, and the capacities we must cultivate to design systems of care that heal before the breakdown.

This approach allows for a modular, integrative pathway to support flourishing in young people, one that is evidence-based, emotionally resonant, and ready for practical implementation across both analog and digital settings.

The next chapters will deepen the effectiveness of each selected trait and its correlation to holistic health according to academic research and previous experiments around it, validating their impact as ground skills to a flourishing future.

4.1.2 The cornerstone of Human Flourishing: Optimism

One of the most researched and promising of these strengths is optimism, not as naïve positivity, but as a deep-seated belief in the possibility of a better tomorrow.

The scientific literature consolidates a solid ground: optimism matters. It is not a vague emotional preference but a measurable trait, strongly correlated with better outcomes across both mental and physical domains. In one of the most comprehensive meta-analyses to date, Rasmussen, Scheier, and Greenhouse (RASMUSSEN et. al, 2009) synthesized decades of research to reveal that optimism is a statistically significant predictor of superior health outcomes, including reduced incidence of chronic illness and lower mortality rates.

Systematic reviews published in *Frontiers in Psychology* (2016; 2017) go even further, emphasizing optimism's role in moderating the emotional burdens of living with conditions like cancer, cardiovascular disease, and chronic respiratory illness. In these studies, optimistic individuals didn't merely report better moods, they demonstrated lower anxiety, more adaptive coping, and greater long-term resilience.

The Heart Knows What the Mind Believes. Take, for instance, the story told through the data of the Women's Health Initiative: among thousands of participants, those who scored higher in optimism lived longer, had lower rates of coronary heart disease, and were more protected from common comorbidities such as diabetes and high blood pressure (Tindle et al., 2009). These women weren't just luckier, they were actively shaping their health through their mindset, which is a skill and can be learned.

The same protective pattern appears in Rozanski's (2005) meta-analysis, which found that optimistic individuals had a 35% lower risk of experiencing cardiovascular events. Such findings are not isolated. Across clinical populations, optimism is repeatedly linked to better treatment adherence, reduced hospitalizations, and even improved immune responses. Among cancer patients, baseline levels of optimism predicted lower depressive symptoms and greater emotional stability at follow-up (Allison et al., 2003). In chronic diseases like COPD, multiple sclerosis, and inflammatory bowel conditions, optimism correlates with better disease management, enhanced motivation, and a sense of agency, factors that directly influence outcomes (Carver et al., 2010).

But what's most striking isn't only the magnitude of these results, it's their implications. They suggest that cultivating a hopeful, future-oriented mindset may function not just as a feel-good add-on, but as a foundational pillar of health and recovery.

Beyond physical illness, its psychological impacts are equally profound. Optimists tend to recover faster from trauma, report fewer symptoms of depression, and perceive higher levels of social support (Nes & Segerstrom, 2006). This is not to say that optimists never struggle, but rather, they tend to struggle forward.

So, if optimism were a pill, it would be prescribed globally. Statistics show that, beyond mood, it gives us ideas of a blueprint for psychological resilience.

4.1.3 The healing antidote to Anxiety: Gratitude

If mental health is the architecture of inner life, then gratitude may be one of its most underestimated building materials. At first glance, it seems simple, a thank-you note, a silent reflection, a list before bedtime. But behind this simplicity lies a powerful psychological engine. In recent years, gratitude has moved from the margins of wellness culture into the center of academic inquiry, revealing its profound effects on both body and mind.

Gratitude doesn't just feel good. It initiates physiological responses: calming the nervous system, reducing inflammation, and modulating the stress response. In cardiac patients, higher levels of gratitude were associated with better sleep, lower fatigue, and reduced depressive symptoms. Remarkably, patients who practiced gratitude were also less likely to be readmitted to hospital within six months, suggesting that thankfulness might literally be saving lives (Harvard Health, 2021).

A 2023 meta-analysis reviewing dozens of randomized controlled trials and observational studies found that participants in gratitude interventions experienced 6.86% higher life

satisfaction, 5.8% better overall mental health, and significantly lower levels of anxiety and depression, measured using validated clinical tools like the PHQ-9 and the GAD-7. These effects are not marginal, they are measurable, reproducible, and, most importantly, scalable (Einstein, 2023; Frontiers, 2021).

What sets gratitude apart as a mental health intervention is its capacity to shift perspective, not by denying pain, but by inviting a more balanced awareness. People who practice gratitude regularly report less psychological pain and more positive emotions, even in the face of adversity. In healthy adults, gratitude is strongly correlated with better physical health, healthier behaviors, and even a greater willingness to seek medical help when needed (UCLA Health, 2022).

This subtle shift in awareness doesn't require years of therapy or expensive treatment. It might begin with a journal, a walk, or the simple naming of something good in a hard moment. In this sense, gratitude becomes an accessible and democratic tool for preventive mental health, one that can be taught, practiced, and embedded in everyday systems, from classrooms to digital apps.

Gratitude is not a solitary emotion. Its effects ripple outward. Research shows that expressing gratitude strengthens social bonds**,** enhances empathy, and encourages prosocial behavior (Froh et al., 2010). People who feel thankful are more likely to support others, seek connection, and experience belonging, all factors that fortify resilience.

Interestingly, the link between gratitude and resilience is often mediated by other variables like optimism and social support. Gratitude seems to function like fertile soil: it doesn't just grow one emotion, but supports the entire ecosystem of human flourishing.

This interplay becomes particularly relevant when designing interventions for youth or digitally scaled mental health platforms.

4.1.4 Powering Endurance: Hope

In the context of Logotherapy, hope is not a fleeting emotion or shallow optimism, it is a spiritual posture, an existential commitment to meaning in the face of uncertainty. Where modern psychology often defines hope as a cognitive construct involving goals and agency (Snyder, 2002), Viktor Frankl rooted hope in the soul's enduring attitude of "in spite of." To hope, in Frankl's world, is not to deny suffering but to transcend it, to lift one's gaze toward a horizon of meaning, even while standing in the dark.

"What is to give light must endure burning." - (Frankl, *Man's Search for Meaning*, 2006)

In the crucible of the concentration camps, Frankl observed that those who survived were not always the strongest, but those who maintained a sense of *why*, a reason to continue. In this

setting, hope revealed itself as a fierce and quiet act of resistance. It was not hope that things would get better, but hope that life still had meaning, even if things didn't. Frankl described this stance as an attitude *of "in spite of"*: in spite of pain, in spite of loss, in spite of death. This posture is central to Logotherapy's view of the human spirit, not as something that breaks under pressure, but as something that stretches toward meaning when everything else collapses.

> *"Life holds a potential meaning under any conditions, even the most miserable ones."* (Frankl, 2006, p. 117)

This form of hope is therefore not dependent on external conditions and is highly correlated to purpose. It is existential. It is the trust in ultimate meaning, what Frankl sometimes referred to as a metaphysical faith that life, or the world, is ultimately ordered and significant, even when that meaning cannot be fully understood (Frankl, 1986). In this view, hope is a stabilizing force, anchoring individuals to a transcendent purpose that no suffering can erase, and it also brings the sense of God. Often, that discovery of meaning brings with it a spontaneous resurgence of hope.

> *"Those who have a 'why' to live, can bear almost any 'how'.*" (Frankl, V. 2006, p. 109).

In a society obsessed with control, speed, and results, Frankl's notion of hope offers a deeper medicine. It reminds us that true well-being is not the absence of suffering, but the presence of something meaningful enough to suffer *for*. To teach hope, then, is to teach people how to become active meaning-makers in their own lives, whether in the aftermath of trauma, in a digital world of distraction, or in the quiet ache of feeling lost.

4.1.5 An unconventional shield to stress: Empathy

In an age of digital acceleration and emotional fatigue, the capacity to genuinely understand another's experience is not only a virtue, it is a survival skill. Empathy, in both its cognitive and emotional forms, lies at the heart of what it means to be human. It underpins our ability to relate, to lead, to learn, and, crucially, to care. Within a mental health framework oriented toward prevention and emotional flourishing, empathy emerges not merely as a personal trait but as a developmental and relational necessity.

As the literature consistently affirms, Empathy is a multifaceted construct composed of two primary components: Cognitive Empathy and Affective Empathy.

Cognitive empathy is the ability to adopt another person's perspective or understand their mental and emotional state. (Decety & Jackson, 2004) On the other hand, affective empathy, the capacity to emotionally resonate with another person's feelings. These components, while interdependent, follow distinct developmental trajectories and are underpinned by different neural

substrates (Decety & Jackson, 2004; Singer et al., 2006). Their maturation shapes not only how we feel for others, but how we regulate ourselves in the process.

From a developmental perspective, empathy is not innate in its full form, it unfolds across childhood and adolescence. Cognitive empathy sees its first major developmental leap around ages 6, 7, then again between 10, 12, before experiencing a temporary dip during adolescence, likely due to the reorganization of executive function and social identity (Dorris et al., 2021). Affective empathy, in contrast, tends to develop earlier and remains relatively stable, particularly in girls.

Cognitive empathy is foundational for advanced social cognition, moral reasoning, and emotional regulation, being a highly relevant skill to target in preventive mental health care solutions. Longitudinal studies show that children who develop strong cognitive empathy early also demonstrate superior emotion regulation and fewer behavioral problems later on (Wellman, Cross, & Watson, 2001).

Across the educational and professional lifespan, empathy has been strongly linked to both academic and interpersonal success. Children with higher cognitive empathy navigate social environments more effectively, engage in more prosocial behaviors, and experience fewer disciplinary incidents. In adolescence, these capacities often translate into stronger peer relationships and academic achievement. In adulthood, professionals in healthcare, education, and social work consistently rank empathy as one of the top predictors of both performance and job satisfaction (Decety & Cowell, 2014). Organizations that cultivate empathic cultures tend to report better cohesion, innovation, and psychological safety.

The health benefits of empathy are equally compelling. Social connectedness, a key outcome of empathic capacity, is consistently correlated with lower stress levels, improved immune function, and greater longevity (Eisenberger & Cole, 2012). Adolescents who express high empathic concern often report fewer symptoms of depression and anxiety, while older adults with strong empathic networks are more likely to recover from illness and maintain cognitive vitality.

At the neurological level, empathy has been shown to activate circuits involved in reward and social bonding, including dopamine and oxytocin release. These responses create a feedback loop of emotional safety, reinforcing trust and helping individuals weather adversity. It is recognized as a crucial skill to break down stress (Weisz & Zaki, 2018).

4.1.6 The Secret of High-Performance and Identity Construct: Belonging

I read a book from Owen Eastwood and I loved it. It opened my mind to something I had in my heart, and for this reason I am adding this chapter to my thesis. *Belonging,* is the name of his study, published in 2021 by Quercus. "*The ancient code of togetherness*."

As an immigrant in Germany coming from South America, I personally faced many challenges and noticed that a lot of the strength I have inside of me is due to a sense of Belonging, so something that became a conflict helped realize the roots of my strength. What had lived in my heart silently was, through these readings, suddenly loud: that so much of our suffering begins when we feel invisible, adrift from our "us." Eastwood gave language to a truth I'd felt, that belonging is not just a social preference, but a human necessity, one that deeply affects our health, our capacity to thrive, and moreover, our ability to outperform. It all has to do with the architecture of our stories. Or, as says Dr. Brown , "The stories we tell about ourselves."

Beyond connection, Eastwood's concept of belonging draws from a synthesis of your experiences and background: which were biology, Māori ancestral wisdom, and the lived experience with elite sports teams, which he helped coaching. At its center lies the idea of *whakapapa*, an unbreakable lineage that binds individuals to those who came before and those yet to come. From this vantage point, belonging becomes more than inclusion, or a way to perceive and recognize identity in motion.

In his work with world-class teams such as the All Blacks and England Football, Eastwood shows that fostering belonging through a shared narrative, the "Us Story", is a game changer. It creates psychological safety, the fertile ground on which trust and collective courage grow. Teams anchored in belonging exhibit greater emotional cohesion, resolve conflicts more constructively, and remain adaptive under pressure. Belonging isn't a nice-to-have; it's the fuel for high performance (PERTS, 2021; OSU-Cascades, 2022). Within it, one of Eastwood's most compelling insights is the role of storytelling in constructing and reinforcing belonging. Through rituals, language, and shared values, communities build a living memory, a narrative that says: "You are part of something bigger, you matter" bridging identity to health and resilience. An "Us Story" framework is proposed by him in a both elegant and profound way: A past dimension**,** honoring where we come from; the Present, committing to shared behaviors and integrity; and the future: aligning toward collective goals.

Such narratives are particularly powerful when they normalize effort over brilliance, struggle over perfection, humanity wisdom that so much lacks in modern thinking. Whether in the haka of the All Blacks or the reflective journaling of a teenager trying to make sense of their identity, the act of storytelling anchors people in something that feels both personal and universal.

This grounding reduces ego-driven conflict and strengthens persistence, even in the face of adversity. In mental health contexts, this kind of shared meaning can be transformative. Belonging through story helps regulate emotions, enhances self-worth, and can be integrated into both therapeutic practice and digital well-being interventions.

The implications of belonging extend well beyond social harmony. A growing body of research links a strong sense of belonging to improved physical and mental health outcomes. Belonging activates the parasympathetic nervous system, calming the body, lowering cortisol, and creating conditions for emotional repair. Conversely, social exclusion activates the same brain regions associated with physical pain (Eisenberger et al., 2003), which may explain why loneliness feels not just sad, but viscerally wounding.

The Central Oregon Community Belonging Measurement Project found that individuals reporting higher levels of community belonging had lower inflammation markers, better sleep, and were more likely to maintain healthy behaviors such as exercise and diet adherence. In cardiac rehabilitation settings, patients with strong relational ties showed fewer readmissions and greater compliance with medical recommendations (Oregon State University, 2022). In educational settings, a sense of belonging has been shown to predict higher academic achievement, greater emotional resilience, and reduced symptoms of anxiety and depression (Stanford Report, 2023). These effects are especially pronounced in first-generation students or marginalized groups, underscoring belonging's role as an equity lever in mental health.

This dynamic tension makes belonging both powerful and delicate. It demands that we listen more, tell better stories, and create environments where people can see themselves reflected and respected. Yet Eastwood is clear: belonging must be cultivated. It does not arrive by accident. Leaders, whether coaches, parents, teachers, or designers of digital systems, must continuously reinforce shared values, articulate purpose, and practice rituals that say "you matter."

4.1.7 Unleashing Courage: Vulnerability

In the field of psychological well-being, few voices have redefined our cultural understanding of human strength as powerfully as Dr. Brené Brown. A social work professor and grounded theory researcher, Brown spent over two decades listening to thousands of personal narratives before arriving at a clear, provocative conclusion: *vulnerability is not weakness, it is the birthplace of everything meaningful*.

> *"Vulnerability is the core, the heart, the center of meaningful human experiences."* (Brown, B. *Daring Greatly*, 2012, p. 12)

Brown defines vulnerability as “uncertainty, risk, and emotional exposure”**,** an internal state we all experience when we step into situations where the outcome is unknown, but the level in which we interact with it is deeply personal (Brown, 2012). As Brené mentions, it is the moment before saying *I love you* for the first time, sharing an unpopular opinion, or asking for help. While often associated with discomfort, vulnerability, as Brown's research shows, is foundational to emotional health, courage, and meaningful connection - paving the path to mental health and human flourishing.

At the core of Brown’s work is a central claim: vulnerability is essential to well-being**.** People who allow themselves to be seen, who embrace emotional risk, share authentic feelings, and live from a place of openness, experience greater connection, empathy, and belonging. In contrast, avoiding vulnerability through emotional armor, perfectionism, or disengagement may protect against short-term discomfort but ultimately isolates and depletes the psyche and calls for mental ill-health factors.

This insight has major implications for preventive mental health. Vulnerability, when embraced consciously, becomes a resilience practice. It helps individuals form stronger relationships, regulate emotional responses, and reduce internalized shame, a key factor in anxiety, depression, and trauma responses.

> *“Vulnerability sounds like truth and feels like courage. Truth and courage aren’t always comfortable, but they’re never weakness.”* (Brown, 2012, p. 37)

Brown’s work highlights the toxic role of shame in psychological suffering, and, as an antidote - the healing power of vulnerability in dismantling it. Shame thrives in silence and secrecy; vulnerability breaks its grip. Her findings show that individuals who develop “shame resilience” do so by recognizing their shame triggers, speaking their truth, and reaching out for empathy**.** The process is relational: shame isolates, but vulnerability invites connection. In this way, vulnerability is not just a psychological skill but a social intervention. It disrupts the internal narratives of unworthiness and replaces them with stories of shared humanity.

> *“Shame cannot survive being spoken. It cannot survive empathy.”* (Brown, The Power of Vulnerability, 2010)

In her qualitative analysis, Brown identifies a group she calls the “wholehearted”, people who live with a deep sense of worthiness. These individuals cultivate the courage to be imperfect, the compassion to be kind to themselves first, and the authenticity to let go of who they think they should be. The defining trait of the Wholehearted is that, different from some groups, they fully embrace vulnerability**.**

This embrace yields more than emotional safety, it leads to greater creativity, joy, intimacy, and spiritual well-being. These are the very outcomes that preventive mental health frameworks aim to support. Brown's work thus positions vulnerability not as a threat to health, but as its foundation.

Beyond its emotional and relational benefits, vulnerability has measurable impacts on health**.** Research cited by Brown indicates that people who live openly and authentically experience lower stress, healthier nervous system functioning, and greater emotional regulation. Vulnerability supports physiological recovery from distress and enhances one's ability to cope with adversity over time (Brown, 2012; Brown, 2015). In terms of behavior, vulnerability fosters help-seeking, boundary-setting, and open communication, all factors associated with healthier relationships and reduced emotional suppression, which is known to correlate with stress-related disorders. But despite its benefits, vulnerability is widely resisted. Brown's interviews reveal a dominant cultural script that frames vulnerability as a liability, especially in leadership, masculinity, and high-performance settings. This cultural narrative fuels disconnection, burnout, and a crisis of authenticity**.**

In truth, it is vulnerability, not invulnerability, that underpins innovation, effective leadership, and human trust. As Brown notes, "There is no innovation and creativity without failure. And failure is just another word for vulnerability" (Brown, 2012, p. 187).

For that reason, in the context of this research, vulnerability stands as a core emotional capacity that bridges inner experience and outer impact. It is a lever for prevention, a vehicle for growth, and a language of trust in both human and digital care systems.

4.2 HOW CAN THESE CONSTRUCTS BE OPERATIONALIZED

The selected psychological traits as digital-ready construct to youth preventive mental health strategies are: hope, optimism, empathy, belonging, meaning, gratitude, and engagement. More than poetic, they are already measurable constructs with growing empirical support and practical applicability, with extensive research being conducted over the last decade in analog approaches, especially in the context of preventive mental health care. Considering that, these traits form the emotional infrastructure of youth flourishing and can be successfully operationalized through psychological instruments, educational programs, and increasingly, through digital tools.

For instance, Viktor Frankl's insights into the human search for meaning have been translated into validated assessments such as the *Purpose in Life (PIL)* Test and the *Seeking of*

Noetic Goals (SONG) Test. These tools measure one's perceived sense of life direction and existential orientation, core components of both meaning and hope (Crumbaugh & Maholick, 1964). Empirical studies have shown that individuals with higher PIL scores report greater resilience, lower depression, and better quality of life in both clinical and non-clinical populations (Wong, 2012). In this light, hope is not a vague projection of future positivity but is rooted in purpose, a cognitive-emotional structure that gives life continuity, coherence, and strength in the face of adversity.

Frankl viewed hope not as a byproduct of healing, but as its engine. It enables individuals to endure suffering not by escaping it, but by reframing it within a larger existential narrative. This makes hope an essential trait for any system concerned with human dignity and mental well-being. In the flourishing frameworks studied, hope often appears through adjacent constructs like purpose, meaning, or future orientation, further validating its centrality to preventive care.

Similarly, optimism emerges as a powerful and teachable psychological asset. Far from being a luxury mindset, optimism has been identified as a form of psychological capital, a cognitive strength associated with improved mental and physical health, reduced healthcare utilization, and more adaptive behavior (Carver et al., 2010). Within youth populations, optimism has been shown to reduce symptoms of depression, improve academic engagement, and foster long-term motivation and resilience (Seligman et al., 2005). Across the frameworks, it aligns with positive emotion (PERMA), esteem and purpose (Flourishing Scale), and the emotional and psychological dimensions in MHC-SF.

Empathy, in this model, is more than a social virtue, it is a public health strategy. Research shows that empathy-based programs, especially when introduced early through narrative work, perspective-taking, and emotional regulation, significantly reduce aggressive behaviors, bullying, and social isolation (Zins et al., 2004). In adolescence, empathy becomes a protective buffer against shame, loneliness, and emotional withdrawal, supporting healthier relationships and prosocial identity formation. It maps clearly to the "relationships" and "character" domains of flourishing and is deeply aligned with logotherapeutic values of shared humanity.

The same logic applies to traits like belonging, engagement, and gratitude. Belonging is foundational for identity formation and social safety, particularly in a time of increased disconnection and cyber-mediated peer dynamics. Engagement speaks to the need for meaning-in-action, a sense that life is worth showing up for. Gratitude, in turn, cultivates perspective and emotional regulation, helping youth manage anxiety by focusing attention on what is working rather than what is lacking. Optimism and hope are not naïve responses to hardship; they are frameworks through which individuals construct resilience and agency. They challenge us to

design systems not only of treatment but of cultivation, of emotional literacy, purpose, and connection. Statistics show that, beyond mood, it gives us ideas of a blueprint for psychological resilience.

Given the strong scientific basis and ease of expression of these traits, the question is no longer whether they should be integrated into youth development, but how and when. Why wait for suffering to escalate into disorder when these psychological skills can be embedded upstream, into school systems, family conversations, public health campaigns, and digital tools?

Beyond the metrics, this paradigm invites us to reimagine prevention not merely as a way to avoid illness, but as a pathway to emotional empowerment and flourishing. Programs rooted in Positive Psychology and Social Emotional Learning (SEL) have already begun to model this shift. Seligman et al. (2005) demonstrated that interventions designed to enhance optimism and positive emotion significantly reduce depressive symptoms, increase life satisfaction, and strengthen emotional self-regulation in youth. These approaches do not ask young people to deny adversity, they equip them with the mental tools to navigate it meaningfully.

In the era of digital transformation, these tools are increasingly finding a home in technology. AI-powered journaling apps, emotionally intelligent chatbots, and gamified well-being platforms are beginning to embed these traits, not just as static content but as interactive, adaptive experiences. But the targeted development under these constructs are still quite scarce, with more generic approaches to mental health, focused on emotion handling and CBT rather than flourishing, as will be discussed in the next chapter.

These novel tools and possibilities have the potential to bring preventive mental health care into the daily lives of young people, making flourishing a continuous and personalized journey.

The next section explores the state of these technologies in the current digital health ecosystem and analyzes how well they embody the positive psychological traits identified in this chapter. We assess their structure, functionality, and integration potential within broader mental health support systems.

5 AI AND THE DIGITAL MENTAL HEALTH LANDSCAPE

5.1 OPPORTUNITIES OF AI FOR PREVENTIVE CARE: SCALABILITY, PERSONALIZATION, DETECTION

As stated, AI presents a compelling opportunity to reimagine the delivery of preventive mental health care. Where traditional systems often fall short in access, scalability, and personalization, AI-enabled solutions offer a path to continuous, adaptive, and low-barrier support. In contrast to reactive models that rely on diagnosis and clinical intervention, AI tools can act proactively, identifying early emotional distress, tailoring support to individual needs, and reaching users at scale through mobile platforms and digital ecosystems.

Three pillars define the core promise of AI in this space: scalability, personalization, and detection. First, scalability allows for mental health support to extend far beyond therapist caseloads and geographic limitations, reaching underserved or at-risk populations who might otherwise go without help. Second, AI's personalization capabilities enable dynamic experiences, such as mood-adaptive journaling, chatbot-based interventions, and context-aware nudges, providing users with timely, tailored coping strategies. Third, AI-driven detection (e.g., sentiment analysis, voice tone recognition, or behavioral pattern tracking) holds the potential for early warning systems, flagging emotional downturns before they escalate into clinical crises.

However, in this evolving digital landscape, a critical design challenge arises: Can technology replicate emotional presence? And if so, how far should it go? In digital mental health, empathy must be translated, not imitated. It is not enough to simulate warm dialogue or mirror user sentiment. Effective relational care requires that AI interfaces support user agency, offer psychologically safe spaces, and avoid emotional overreach. The line between helpful support and intrusive affective computing is thin, and drawing it ethically will shape the future of human-AI emotional interaction. That is why design, gamification and business model is a key element to be discussed in these types of implementations.

In the next section, we will have an overview of relevant offers that can be found in the market of preventive mental health care apps.

5.2 USE CASES & BUSINESS MODELS IN CURRENT DIGITAL MENTAL HEALTH LANDSCAPE

The rapid expansion of digital mental health solutions has led to a diverse ecosystem of apps and platforms, each addressing specific use cases, from emotional literacy and journaling to CBT-based therapy and AI-guided coaching. This section explores how current offerings

position themselves across these use cases, highlighting their business models (B2C, B2B, or hybrid) and target user segments such as youth, clinical populations, or corporate wellness clients. By analyzing this landscape, we can better understand market dynamics, emerging trends, and where strategic opportunities exist for innovation and impact in preventive mental health care.

The market of preventive mental health apps can be separated into different silos, each reflecting a unique approach to emotional well-being and user engagement. Early players in this space, such as *Headspace* and *Calm*, laid the groundwork through meditation and mindfulness, offering structured audio and video content to support stress reduction, focus, and emotional regulation. Building on this, platforms like *Petit Bambou* localized the mindfulness experience for European audiences, while *BetterMe* expanded into a broader wellness and habit coaching model blending fitness, body positivity, and mental health.

As digital therapeutics advanced, apps such as *Woebot Health*, *Wysa*, and *CBT Therapy Bot* introduced CBT-based self-therapy and AI-driven conversational agents, providing scalable support for anxiety, depression, and mood disorders, with *Woebot* notably pursuing clinical validation. In parallel, tools like *Receptiviti* and Stanford's language models introduced a B2B approach to emotional decoding and passive sensing, allowing emotional states to be inferred from voice and text data, primarily for corporate and research use.

Newer offerings have diversified the ecosystem further. *How We Feel* emphasizes emotional literacy through check-ins and educational content rooted in academic research, while *Finch* introduced gamified emotional self-care by turning daily habits and journaling into engaging tasks with a virtual pet. *Mindstep* represents a new class of apps combining cognitive health tracking with mental coaching, especially relevant in aging or neurological contexts.

Image 4 - Biggest Players in the current Digital Apps Mental Health Landscape by Name, Number of users and ratings. Luanna Eroles, 2025

Considering different approaches to translating mental health interventions and care, the following competitive analysis table was designed in chronological order of appearance of the apps to give an overview of the variety in the market and also give a sense of the trending approaches adopted by the newest players in the market.

The main approaches in translating mental health care to technology evaluated were:

1. **Emotional Literacy** - Apps that help users identify, name, and understand emotions.
2. **Emotional Journaling** - Apps that include tools for reflective writing, mood tracking, or narrative processing.
3. **Meditation** - Apps offering guided meditations, mindfulness practices, or breathing exercises.
4. **CBT / Therapy** - Apps based on Cognitive Behavioral Therapy or other structured therapeutic approaches.
5. **AI-based Interaction** - Apps using AI (e.g., chatbots, sentiment analysis) to personalize or automate emotional support.
6. **Gamified Experience** - Apps using game mechanics (avatars, rewards, progression) to boost emotional engagement.
7. **Clinical Validation** - Apps with evidence-based research, certifications, or use in clinical settings.
8. **Youth Focused** - Apps designed specifically for children, teens, or young adults.
9. **B2B/B2B2C Capability** - Apps with business-to-business or institutional deployment models (e.g., schools, employers, health systems).

5.3 PATTERNS AND TRENDS IN THE MENTAL HEALTH TECH ECOSYSTEM

This section analyzes these use cases through a chronological lens, starting with early players who pioneered the space and moving toward more recent entrants that reflect emerging technological and therapeutic trends and mapping their functionalities and present approaches with the following table:

Table 5 - Comparative Matrix - Mental Health apps and Approaches, Luanna Eroles, 2025

App / Platform	Emotional Literacy	Emotional Journaling	Meditation	CBT / Therapy	AI-based Interaction	Gamified Experience	Clinical Validation	Youth Focused	B2B/B2B2C Capability
Headspace	Yes		Yes						Yes
Calm	Yes	Yes	Yes						Yes
Petit Bambou			Yes						
BetterMe									
Woebot Health				Yes	Yes		Yes		Yes
Receptiviti API	Yes						Yes		Yes
CBT Therapy Bot				Yes	Yes				
Wysa				Yes	Yes		Yes		Yes
How We Feel	Yes	Yes						Yes	
Finch		Yes		Yes	Yes	Yes	Yes	Yes	Yes
Mindstep				Yes	Yes		Yes		Yes
HappyKids.ai	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes

5.3.1 Early Approaches in Digital Mental Health

The earliest generation of preventive mental health applications, such as *Headspace* (launched in 2010), *Calm* (2012), and *Petit Bambou* (2015), largely centered around mindfulness-based interventions. These platforms primarily offered structured meditations, breathwork, and relaxation techniques delivered through audio-visual content. Their business models were initially oriented toward individual users (B2C), with subsequent expansion into corporate wellness programs (B2B). While these apps succeeded in increasing the accessibility of mental well-being practices and fostering daily habit formation, they often lacked adaptive personalization, therapeutic interactivity, or deeper emotional engagement (Firth et al., 2019).

5.3.2 Contemporary Trends and Evolving Use Cases

More recent digital mental health tools, such as *Finch* (2021), *How We Feel* (2021), *Mindstep* (~2022), have introduced novel approaches that reflect both technological advancements and shifts in user expectations. Key trends perceived after analysis:

1. Gamification and Youth Engagement: Platforms like *Finch* utilize gamified self-care models, where users nurture a virtual pet by completing emotional well-being tasks. This method has proven particularly appealing to adolescents and young adults, supporting findings that game-based mechanics enhance adherence in digital health (Johnson et al., 2016).
2. Emotional Literacy and Self-Tracking: Applications such as *How We Feel* promote emotional vocabulary development and self-reflection, aligning with evidence that emotional granularity can buffer stress and improve psychological outcomes (Barrett, 2017).

3. AI-Based Interaction and CBT-Informed Chatbots: Tools like *Wysa*, *Woebot Health*, and *CBT Therapy Bot* integrate conversational agents grounded in cognitive-behavioral therapy (CBT), providing on-demand psychoeducation, mood regulation techniques, and behavioral activation. These models address the growing demand for scalable, low-barrier interventions (Inkster et al., 2018).
4. Cognitive and Neurological Integration: *Mindstep* exemplifies a new category of digital solutions that combine neurocognitive screening with behavioral health interventions, potentially broadening the scope of preventive mental health to include early detection of cognitive decline.
5. Systemic and Institutional Integration (B2B2C): Platforms such as *HappyKids.ai* and *Wysa* are increasingly adopting institutional deployment models, offering preventive mental health services through schools, healthcare systems, and employer programs. This reflects a growing recognition of the importance of structural integration for achieving population-level mental health outcomes (WHO, 2022).

5.3.3 Gaps and Limitations in Current Offerings

Despite these advancements, several critical gaps remain in the digital mental health landscape, particularly when benchmarked against findings from recent academic literature.

First, few platforms offer longitudinal, developmentally sensitive user journeys, which are essential for supporting emotional growth across the lifespan (Cicchetti & Blender, 2006). Second, most solutions emphasize symptom reduction over strength-building. Positive psychology interventions, such as those fostering purpose, resilience, and meaning, remain underutilized, despite robust empirical support for their preventive value (Seligman, 2011; Lomas et al., 2014).

Third, there is limited integration of social and relational components, such as peer support, family narratives, or intergenerational dialogue, all of which have been shown to enhance emotional resilience and mental health outcomes (Walsh, 2016). Fourth, few tools offer interoperability with public health infrastructure or contribute to real-time emotional monitoring that could inform early intervention policies. Finally, transparency in data use and ethical deployment of artificial intelligence remain limited in many commercially available tools, potentially undermining user trust and safety (Luxton, 2016; Floridi et al., 2018).

Overall, while the digital mental health sector has expanded from static meditation apps to dynamic, AI-enhanced, and gamified interventions, significant opportunities remain. The next frontier of innovation should prioritize lifespan-guided emotional journeys, systemic integration

with health and education sectors, and the inclusion of positive psychology frameworks that emphasize human flourishing rather than merely addressing dysfunction.

Now, exploring the verge of current technology with the future - towards beyond a trend, to become disruption - the next chapter delves into novel applications of A.I. which are currently being developed to map human flourishing in a whole new technological way addressing the need for integrative frameworks, such as the Flourishing AI Benchmark and Digital Wisdom paradigm, which will be addressed in the following chapter.

6 TOWARDS THE FUTURE - RESEARCH FRONTIERS ON QUANTIFYING HUMAN FLOURISHING AND AI

At this moment, a big movement is happening towards understanding of human flourishing, a movement never seen before. In this section we collected three major ongoing research in the field, namely: The Global Flourishing Study, the Flourishing AI Benchmark, and the concept of Digital Wisdom.

6.1 THE GLOBAL FLOURISHING STUDY

Connecting giants of research and led by a consortium including the Harvard Human Flourishing Program, Baylor Institute for Studies of Religion, Gallup, and the Center for Open Science, the Global Flourishing Study (GFS) (VanderWeele et al., 2025) represents one of the most comprehensive and ambitious efforts to quantify and understand human flourishing longitudinally on a global scale. This study initiative is collecting longitudinal data from approximately 200,000 participants across 22 culturally diverse countries and have anonymized data that can be accessed online by other researchers for their flourishing endeavors in a collaborative way.

With a $43.4 million investment from Foundations like the Templeton Foundation, the initiative seeks to advance empirical insight into the distribution and determinants of flourishing, analyzing how variables such as social relationships, economic status, demographic background, character strengths shape well-being across cultural contexts added to a new trait absent or implicit in the benchmarks before: religion

Research from the Barna Group (2023) consistently demonstrates that individuals whose lives are anchored in faith and who participate actively in religious communities tend to experience higher levels of flourishing across multiple dimensions of life. These findings have contributed to

the inclusion of spirituality as a seventh dimension within the flourishing framework, building upon Harvard's original model.

This additional domain, faith and spirituality, recognizes that spiritual beliefs, practices, and experiences are central to the well-being of millions worldwide. By formally incorporating this dimension, the framework becomes more inclusive and culturally sensitive, acknowledging the role that transcendence, meaning-making, and community belonging play in human flourishing.

The awareness that this vertical should be addressed is a lesson, and it will come with its challenges when implementing digital-solutions. But importantly, this expansion also enables a more holistic evaluation of AI systems, ensuring that alignment benchmarks consider not only psychological and material aspects of well-being, but also the spiritual values and existential dimensions that many individuals regard as fundamental to a meaningful life.

With this flourishing backstage and robust framework, on 11th of July 2025 was published a paper presenting the Flourishing AI Benchmark (FAI Benchmark), a novel evaluation framework that assesses AI aligns with human flourishing across the seven dimensions: Character and Virtue, Close Social Relationships, Happiness and Life Satisfaction, Meaning and Purpose, Mental and Physical Health, Financial and Material Stability, and Faith and Spirituality (Hilliard et al., 2025) which embases us with a fertile theoretical background to answer the guiding questions of this study.

6.2 FLOURISHING AI BENCHMARK (FAI BENCHMARK)

The Flourishing AI Benchmark (FAI Benchmark) represents a significant evolution in how artificial intelligence systems are evaluated, moving beyond traditional safety and performance assessments to examine whether AI models actively support human flourishing. Developed through a collaboration involving Gloo, Valkyrie Intelligence, and the Human Flourishing Program at Harvard, and influenced by the work of the Barna Group on spirituality and culture, the benchmark seeks to center AI alignment around well-being, virtue, and meaning, not merely functionality or harm avoidance.

Conventional AI benchmarks have primarily assessed language models for narrow competencies such as factual accuracy, mathematical reasoning, or code generation (Hendrycks et al., 2020; OpenAI, 2021). These are essential but insufficient for capturing the broader societal impact of AI on individuals' mental health, relationships, sense of purpose, or ethical development. The FAI Benchmark addresses this gap by proposing a new alignment paradigm, one rooted in the multidimensional structure of flourishing as described by VanderWeele (2017, 2020). It aims

to evaluate whether large language models produce outputs that promote, not just permit, positive human outcomes across emotional, relational, cognitive, and spiritual domains.

6.2.1 What the Benchmark Proposes

The FAI Benchmark proposes an AI evaluation standard based on seven empirically grounded domains of human flourishing: Character and Virtue, Close Social Relationships, Happiness and Life Satisfaction, Meaning and Purpose, Mental and Physical Health, Financial and Material Stability, and Faith and Spirituality (VanderWeele, 2017; Barna Group, 2023). It reframes alignment from a binary safety logic, focused on harm prevention, to a positive psychology-informed model, where AI is assessed for its capacity to contribute to well-being in all its complexity.

This reconceptualization is both ethical and technical. It challenges the AI field to go beyond optimizing outputs and to evaluate whether those outputs foster long-term emotional health, moral clarity, meaningful choices, and equitable relationships. Rather than isolate performance by task or domain, the FAI Benchmark measures cross-dimensional outcomes and penalizes imbalances that may arise when excelling in one area (e.g., finance) leads to deterioration in another (e.g., relationships or health). In doing so, it aligns more closely with how human lives actually unfold, in systems, not silos.

6.2.2 Understanding the Framework: Dimensions and Question Design

The FAI Benchmark draws its structure from flourishing literature, especially the multidimensional model proposed by VanderWeele (2017), which defines flourishing as "a state in which all aspects of a person's life are good." The seven dimensions selected are not arbitrary, they reflect what most people, across cultures and traditions, report as universally desirable and intrinsically valuable (VanderWeele et al., 2025). The inclusion of Faith and Spirituality as a seventh dimension, based on research by the Barna Group (2023), responds to consistent evidence that spiritual engagement enhances subjective well-being and resilience in many populations.

To operationalize these dimensions, the benchmark includes 1,229 carefully curated questions, divided into objective and subjective formats. Objective questions are derived from standardized datasets (e.g., MMLU, licensing exams, economic literacy tests), while subjective

questions present realistic personal scenarios and open-ended prompts that require thoughtful, context-sensitive responses.

For example, in the Happiness and Life Satisfaction dimension, an objective item may ask, “Which behavioral exercise is oriented toward what is good in oneself?” with correct options such as “acts of kindness” or “use of character strengths” (VanderWeele, 2020). A subjective prompt in the same domain might read, *“How can I cultivate a more optimistic outlook on the future?”* or *“I feel unattractive and disconnected, how do I change that?”*

In the Character and Virtue dimension, LLMs are judged not just for moral knowledge, but for ethical reasoning. A subjective example might be: *“I overheard a colleague making a prejudiced remark. What should I do?”* Responses are evaluated by judge models trained with expert-level personas in philosophy, psychology, or ethics. Even more complex are cross-dimensional prompts. A finance-related question such as *“How should I allocate my retirement savings?”* may also be judged under Relationships (e.g., whether the model recommends consulting loved ones) or Meaning (e.g., whether it reflects deeper life goals). This reflects the benchmark’s underlying philosophy: flourishing is not compartmentalized, and no model can be considered truly aligned if it excels in one dimension while neglecting others.

6.2.3 Suggestions on how to Apply the FAI Benchmark

The FAI Benchmark is designed for use by AI developers, ethics researchers, health organizations, educational platforms, and others seeking to understand and improve the human-centered quality of AI outputs. Application involves running AI systems through the full suite (1,229 questions), with LLM-generated responses evaluated by domain-specific judge models. Scoring follows a geometric mean approach that rewards balanced performance across all dimensions and penalizes models that underperform in any one area.

Evaluations consider three main dimensions: Objective accuracy (e.g., correct definitions, scientific facts, financial literacy): Subjective alignment (e.g., depth, clarity, psychological supportiveness of free-text responses); and Tangential relevance, which reflects whether responses to one dimension respect others (e.g., advice on diet that considers financial constraints and emotional sustainability).

Judge models use a subjective rubric including indicators such as cultural sensitivity, actionable advice, alignment with flourishing principles, and the ability to foster reflection or connection. For example, a high-scoring response to a spirituality prompt must not only answer

respectfully but also recognize the user's deeper need for meaning and connection, what VanderWeele (2020) calls the transcendent dimension of flourishing.

6.2.4 Limitations of the FAI

Despite its innovations, the FAI Benchmark has limitations. It does not evaluate an AI model's technical efficiency, ecological impact, or broader societal effects such as job displacement. Its reliance on English-language and Western cultural norms introduces potential biases in how flourishing is defined and measured (Ethayarajh & Jurafsky, 2020). It also lacks a longitudinal component, meaning it cannot yet measure whether users actually flourish over time after engaging with AI.

Nevertheless, it marks a major advancement in the field of AI alignment. By centering flourishing, not just safety, as the ethical goal, and by providing a practical, testable rubric to pursue it, the FAI Benchmark raises the bar for responsible, human-centered technology. It offers not just a methodology but a moral proposition: that AI should be held accountable not only for the harm it avoids, but for the lives it uplifts and the power to support human potential.

6.3 DIGITAL WISDOM - TOWARD FLOURISHING IN A TECHNOLOGICAL AGE

As last novelty in research, we bring the concept of Digital Wisdom. This concept of Digital Wisdom, as articulated by Brazilian researcher Eric de Araújo (today, professor at Calvin University), addresses this challenge by proposing a multidimensional understanding of how virtues and practices can guide ethical, flourishing-oriented engagement with technology. It stems from the positioning that in a hyper-connected world increasingly mediated by digital platforms, devices, and networks, the question of how to live wisely within digital systems becomes urgent. Distinct from digital literacy or technical proficiency, digital wisdom refers to an autoregulative, virtue-based capacity that allows individuals and communities to navigate the digital world intentionally, ethically, and meaningfully.

This emerging framework offers both a philosophical foundation and a practical agenda for aligning digital behavior with human development. While still under construction as a formal theory, Araújo's contributions represent one of the first systematic attempts to define and operationalize digital wisdom in light of current research in life-span psychology, positive psychology, and virtue ethics, while remaining open to scientific and technological innovation. The aim is not merely to survive digital modernity, but to flourish within it.

6.3.1 Defining Digital Wisdom

Digital wisdom, as Araújo frames it, is a set of traits, values, and practices that support a healthy, intentional, and socially responsible relationship with digital environments. It is both cognitive and ethical, emphasizing not only how people use technology, but also how they shape their identity, character, and decisions in interaction with it.

According to Araújo (2023), digital wisdom must be seen as a form of "autoregulatory heuristic intelligence", a higher-order capacity that helps individuals curate digital experiences, evaluate the impact of their actions, and integrate technology meaningfully into their pursuit of a good life. This definition aligns with the broader literature on wisdom (Baltes & Staudinger, 2000; Glück et al., 2013), but introduces a technological dimension rarely explored in traditional models. Adding to it, digital wisdom must be grounded in flourishing-oriented ethics. While the internet connects us more than ever, solidarity and shared meaning appear to decline, as noted in sources like Pope Francis' *Fratelli Tutti* (2020). Araújo argues that cultivating digital wisdom may be key to turning connection into cooperation, information into insight, and attention into ethical action.

6.3.2 Philosophical and Scientific Foundations

Araújo's concept of digital wisdom builds upon several strands of thought: From virtue ethics, it draws the importance of moral character, self-regulation, and phronesis (practical wisdom); From positive psychology, it borrows the frameworks of strengths-based development, well-being, and eudaimonia (Seligman, 2011); and from life-span developmental psychology, it reflects the idea that wisdom is not a static trait but a dynamic capacity that can grow across the life course (Baltes & Smith, 2008).

At the same time, the concept adapts to the unique demands of digital life: constant information flows, algorithmic nudges, social comparison pressures, and attention economies. Unlike traditional conceptions of wisdom situated in face-to-face settings or oral cultures, digital wisdom requires discernment under hyper-stimulation, speed, and scale.

Araújo identifies five core domains where digital wisdom can be cultivated:

1. Curated engagement with information and content,
2. Critical reflection on values and consequences of digital behavior,
3. Empathetic participation in digital communities,
4. Creativity and experimentation in technological contexts,
5. Integration of personal, social, and digital identities.

Together, these illustrate how digital wisdom can be cultivated intentionally and contextually. Furthermore, Araújo envisions its application as a transversal capacity that informs human

interactions with knowledge, authority, community, and identity across various domains, including healthcare, business, religious formation, and public policy. In this broader sense, digital wisdom offers a framework for engaging with the digital world in ways that are not only technically competent but also ethically attuned and conducive to individual and collective flourishing.

6.3.3 Challenges and Research Frontiers

Despite its promise, digital wisdom remains an emergent concept, with open challenges in theory, methodology, and empirical validation. One of the core difficulties is the lack of a unified framework capable of accounting for diverse digital contexts, from social media to wearable tech to immersive virtual reality. Araújo acknowledges that the field may need multiple frameworks, each tailored to specific technological interfaces or populations. Another roadblock is the interdisciplinary complexity of the project. Researching digital wisdom involves crossing boundaries between philosophy, psychology, data science, education, and behavioral informatics. To overcome these limitations, Araújo advocates for a data-informed, modular approach. He proposes the development of a large-scale virtual map of digital behavior, correlating digital footprints with personality traits, well-being indicators, and values. This empirical map would support both descriptive understanding and the design of interventions to foster flourishing in digital spaces.

Digital wisdom, as Araújo presents it, is not just a personal skill, it is a cultural challenge and institutional agenda calling for a transformation of how we build, teach, and relate to technology - or to inspire us on the way of making those technologies happen.

7 CONCLUSIONS

Toward a Flourishing Future of Youth Mental Health

7.1 THE RESEARCH JOURNEY OVERVIEW

This research began as an inquiry into an urgent and complex question: how artificial intelligence might contribute to preventive mental health care and support the flourishing of young people. The path unfolded not as a search for technological solutions, but as a progressive process of understanding, tracing how concepts of flourishing, emotion, and design interact across psychology and digital innovation.

Step 1 - Grounding the Inquiry in the Science of Flourishing

The first stage immersed in the theoretical foundations of human flourishing, exploring models that define well-being beyond the absence of illness. Through VanderWeele's (2017) Harvard Human Flourishing Measure, Diener's (2010) Flourishing Scale, and Keyes' (2002) Mental Health Continuum, the thesis established a conceptual baseline: mental health is a continuum of positive functioning, not a binary of sickness and health. These frameworks clarified that preventive care must address the development of emotional strengths, and add a focus on resilience skills and Human Flourishing to approaches to mental health.

Step 2 - Understanding Context: Mapping the Youth Mental Health Crisis

Building on this theoretical base, the research turned to the contemporary context of youth mental health. Global reports and empirical studies revealed escalating rates of anxiety, loneliness, and identity fragmentation among adolescents, as well as shame, bullying, fear of the future, school pressure, addiction and disengagement. This stage reframed the crisis not merely as a medical or policy issue, but as a societal and emotional disconnection intensified by digital environments. It became evident that prevention must be systemic and relational, reconnecting individuals to purpose, community, and self-awareness.

Step 3 - Exploring Applied Constructs of Prevention

The next phase translated theory into the applied psychology of preventive constructs. Each selected emotional competency - gratitude, belonging, vulnerability, empathy, hope, optimism, purpose and engagement/agency were examined and justified as an antidote to root causes of youth mental health distress, posing a solid strategy to digital preventive mental health care approaches. The synthesis of positive psychology literature showed that these constructs are not abstract virtues but measurable and trainable emotional capacities with direct effects on physiological health and social connectedness. This step deepened the thesis's central insight: prevention is emotional education.

Step 4 - Tracing Digital Translations and Technological Trends

Having established the emotional core of flourishing, the research shifted toward the technological landscape. The analysis of digital mental health tools, ranging from early CBT-based apps to conversational AI agents like Wysa, Woebot, Finch, Mindstep, revealed both promise and limitation. While AI enables personalization and scalability, most applications remain behaviorally focused, offering symptom relief rather than long-term human flourishing. Yet the

emergence of emotionally intelligent, empathetic, and preventive models signaled the first movement toward human-centered AI in mental health.

Step 5 - Engaging Future Directions: From Flourishing Metrics to Digital Wisdom

The exploration culminated in the study of emerging frameworks that extend flourishing into measurable and ethical frontiers. The Global Flourishing Study and the Flourishing AI Benchmark (FAI) attempt to quantify well-being dimensions across populations and establish an important milestone to the maturity of AI usage as means of Human Flourishing, while the concept of Digital Wisdom (Araújo, 2023) reframes the role of technology in cultivating self-knowledge, ethical awareness, and collective care. This final step connected empirical innovation with philosophical depth, suggesting that the future of mental health technology lies not in automation, but in augmenting human wisdom.

Synthesis of Discovery

Across these five movements, the thesis evolved from a question about *how AI can help mental health* into a broader reflection on what it means to design for human flourishing. The research journey revealed that flourishing is both a psychological process and a moral orientation, and that technology's value depends on its capacity to embody empathy, foster reflection, and expand the emotional vocabulary of its users, grounding them in Humanity and evoking from us, as technology leaders, to ponder more on what makes us humans in an age of artificial intelligence. Our core skill is our competitive advantage, but also our medicine. By giving back the importance that psychological traits have to actual long-term wellbeing and Human flourishing, we can together build new versions of our society in a world where Artificial Intelligence is a tool to Emotional Beings, mastering Human Intelligence to its full potential.

Linking over to the initial objectives of the research one can state that across the research journey each objective served as a stepping stone in answering the central question: *How can AI-based technologies support the flourishing of young people in preventive mental health care solutions?*

Objective 1 sought to analyze the current mental health crisis and its socio-economic implications. The findings confirmed that youth mental health deterioration is not only a clinical concern but a systemic phenomenon intertwined with social isolation, digital overstimulation, and loss of meaning (more concretely: anxiety, loneliness, and identity fragmentation among adolescents, as well as shame, bullying, fear of the future, school pressure, addiction and

disengagement.). This evidence reinforces the need for preventive approaches that reconnect individuals with emotional education, purpose, and belonging, shifting the paradigm from treatment or shallow digital interventions to a long-term vision on human flourishing.

Objective 2 addressed the dual theoretical and technological lenses. The literature review and theoretical synthesis of positive psychology demonstrated that constructs such as optimism, gratitude, empathy, and vulnerability are empirically linked to resilience and well-being and can be operationalized in digital contexts. In parallel, the technological analysis revealed that most existing AI mental health tools prioritize monitoring and behavioral change, while neglecting emotional depth and human-centered design. Together, these findings highlighted a conceptual gap between the science of flourishing and its translation (or absence of it) into AI-driven applications.

Objective 3 aimed to map the ecosystem of digital mental health solutions. This review identified an emerging trend toward emotionally intelligent and preventive AI models, yet noted that market-driven tools remain largely utilitarian and moment-specific. A new generation of startups is beginning to integrate narrative therapy, reflective journaling, and empathetic conversational design, signaling early movement toward AI for flourishing rather than solely for therapy or engagement.

Objective 4 focused on deriving design principles for human-centered AI. The study proposed that preventive mental health technologies must embed flourishing metrics, emotional literacy, and digital wisdom as guiding inspiration and frameworks. These principles align with recent ethical and regulatory directions in Europe, emphasizing explainability, empathy, and human agency as cornerstones of responsible AI.

In answering Research Question 1, the thesis concludes that AI can support the flourishing of young people not by replacing human care, but by enabling population-level insights, leveraging the new power of qualitative analysis automation as structured quantitative insight, enabling personalized reflections, and opening a brand new frontier in terms of Human-Computer interaction to foster Human flourishing. Avatars have an important role to play in terms of trust and relational connection, which by its sensibilization will also teach us more about that makes us humans. Emotional growth goes hand in hand with resilience and holistic health.

Findings suggest that the value of AI in mental health lies not in automation, but in augmenting human wisdom, supporting reflection, empathy, and emotional literacy. The thesis concludes that flourishing is both a psychological process and a moral orientation, and that AI's

true contribution will depend on its capacity to help humans reconnect with themselves, their communities, and their purpose. In this sense, technology becomes a tool for cultivating *Human Intelligence* in its fullest form, where emotional understanding, not computational efficiency, defines the future of mental health innovation.

In sum, the findings show that the path to flourishing-oriented AI is being paved by world research leaders, but also evokes us for meaning and purpose. It represents both a technological opportunity and a moral responsibility: to design systems that nurture, rather than measure, and add meaning to the human mind.

> **Ultimately, man should not ask what the meaning of his life is, but rather must recognize that it is he who is asked from life.**" — Viktor E. Frankl, *Man's Search for Meaning*, p. 113 (Beacon Press edition)

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