

## Beyond the Prompts: Detecting the AI – Human Agency Gap and the Accumulation of Psychological Debt

### Abstract:

*As Generative AI becomes ubiquitous in professional and personal workflows, a critical ‘AI – Human Agency Gap’ is emerging. This in-progress research investigates the systemic depletion of human capabilities across five psychological domains: Cognitive, Emotional, Behavioural, Social, and Moral. The study posits that the continuous offloading of tasks to AI leads to the accumulation of ‘**Psychological Debt**’ — a structural deficit in human agency triggered by what the author defines as the transactional ‘**You-do-it**’ Syndrome. Utilizing a mixed-methods exploratory sequential design, this work aims to develop and validate a first of its kind standardized diagnostic: the **AI-Induced Psychological Debt Accumulation (AI-PDA) Scale**. By operationalizing the ‘interest rate’ of AI offloading as a measurable variable of capability erosion, the AI-PDA scale moves beyond superficial efficiency metrics to provide a predictive tool for safeguarding human sovereignty in an increasingly automated landscape.*

### 1. Introduction: The Narrative of a ‘Prompted’ Life

The world is rapidly moving towards a ‘*Prompted Life*’. A phenomenon where the boundaries between human intent and machine execution are quickly dissolving into what can be described as a ‘*frictionless fluency*’ with Generative AI. The distance between a professional’s intent and the finished output has collapsed into a single prompt. This is extensively visible in our day-to-day lives, across people from varied spheres of life, as simple acts such as:

*Software engineers asking AI to debug a critical safety system software;*

*Doctors prompting AI to draft patient’s terminal diagnosis;*

*Students utilizing AI to structure the very scaffolding of an ethical argument;*

*Parents asking an AI to design a personalized discipline plan for their child’s behavioral issues;*

*Managers prompting AI to analyze a 20-minute team video conference and list the disengaged employees.*

The adoption rate has steeply risen from 29% to 56% in a single year (APA, 2025). However, the contemporary landscape is being defined not by the tools we use, but by the 'Agency' we delegate.

## 2. The Research Problem: The Invisible Deficit of the AI - Human Interaction

As the commercial world celebrates its triumph over unprecedented productivity gains owing to the increased Gen AI usage, we are ignoring the depleting impact of our human capabilities, across all the five psychological domains: Cognitive, Behavioural, Emotional, Social and Moral / Ethical.

In each of these '*prompted*' moments, as we offload our tasks to Generative AI, there is a '*latent*' invisible transaction that occurs. While the outcomes of this transaction seems '*intoxically*' efficient, we are unknowingly incurring what I term as a 'Psychological Debt' – And yet we rarely pause to calculate its '*interest rate*'.

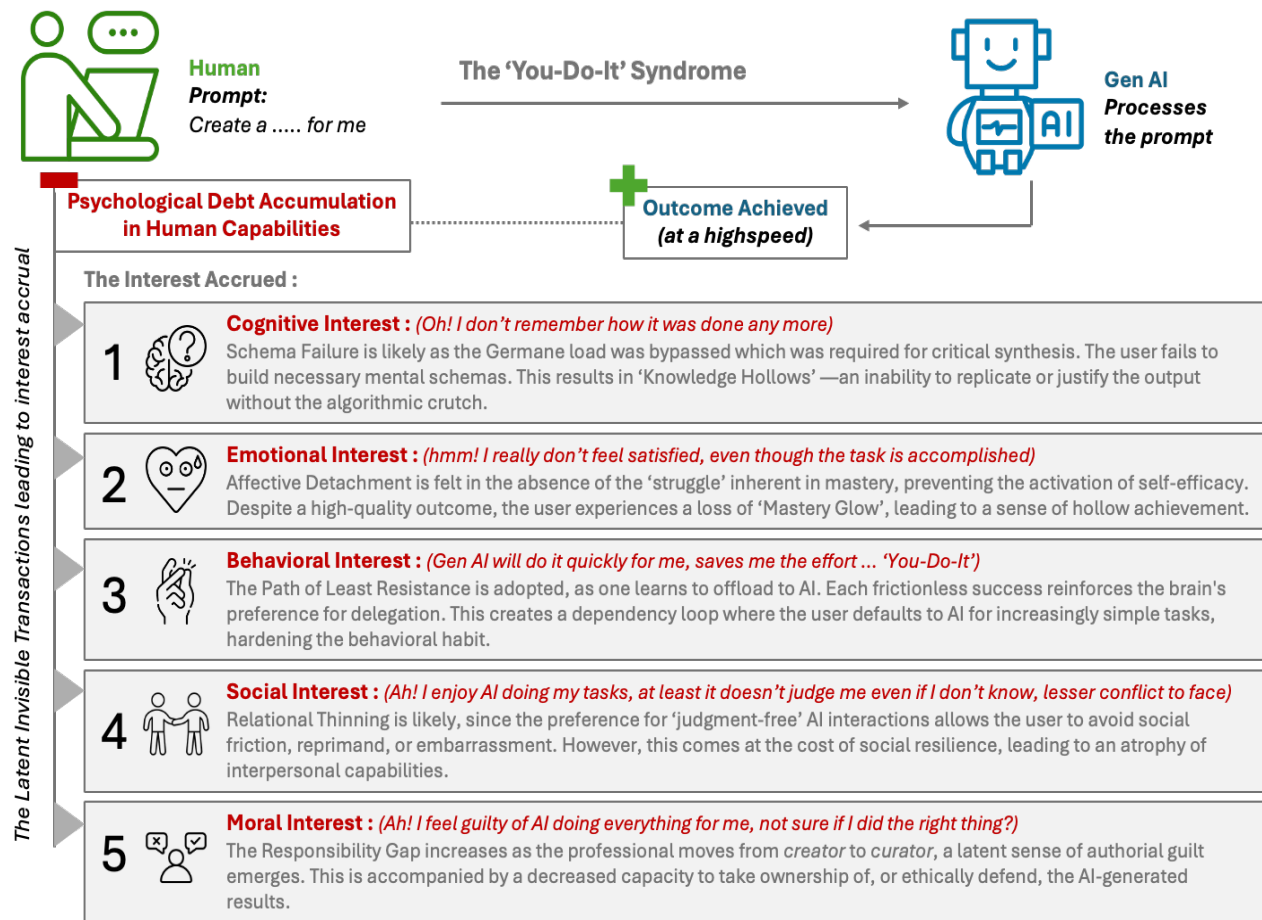
Eventually, the cost of independent domain engagement is likely to exceed the perceived benefits of offloading the efforts to an AI agent. This psychological imbalance is likely to trigger, what I call – a transactional '*You-do-it*' Syndrome of the human agency, where the path of least resistance leads to a bypass of the germane load necessary for skill retention, setting the stage for the accumulation of latent Psychological Debt.

### 2.1 The Operational Scenario: Calculating the Interest Rate

We are currently living through an imperceptible revolution of 'Psychological Debt Accumulation', unknowingly borrowing from our future human capabilities, across domains to pay for today's hyper-productivity.

The accumulation of Psychological Debt is best observed in the micro-transactions of daily Human - AI interactions. When a user defaults to the 'You-do-it' Syndrome, the immediate, fast outcomes masks a series of domain-specific capability depletions. These depletions function as the 'interest' accrued on the Psychological Debt, leading to capability erosion over time. The figure 1.0 explain the operational scenario and the latent transactions across domains.

Figure 1.0



These operational scenarios, clearly augment the need to methodically measure the Psychological Debt accumulated. If left unmeasured and unmanaged, this debt may lead to a terminal Agency Gap, a state where the human user gradually loses the capacity for independent cognitive, social, behavioral, emotional and or moral / ethical actions.

## 2.2 The Architecture of the Agency Gap: A Four-Stage Conceptual Framework

This research proposes a formal framework that delineates the trajectory of agency depletion, providing the theoretical foundation for the AI-PDA scale. These four constructs shown in figure 2.0 represent a causal progression from an initial behavioral habit to a terminal structural failure:

Figure 2.0

	<b>Construct</b>	<b>Analytical Definition</b>	<b>Theoretical Role</b>
1.	<b>'You-do-it' Syndrome</b>	A transactional behavioral pattern where the user consistently prioritizes the path of least resistance, offloading complex tasks to AI.	<b>The Trigger</b> (Behavioral Habit)
2.	<b>Human Capability Erosion</b>	The active process of domain-specific decay (e.g., Cognitive or Social Erosion) resulting from the systemic bypass of human effort.	<b>The Process</b> (Mechanism)
3.	<b>Psychological Debt</b>	The cumulative latent deficit of human agency. It represents the ' <b>interest rate</b> ' incurred by borrowing from future capability.	<b>The State</b> (Debt Accumulation)
4.	<b>AI–Human Agency Gap</b>	The structural discrepancy where machine capability fundamentally exceeds the user's independent capacity for sovereign action.	<b>The Outcome</b> (Structural)

## 2.3 The Research Imperative: Auditing the Human Ledger

This study posits that Psychological Debt represents the latent 'interest rate' of the Generative AI era—a cumulative liability incurred through the systemic outsourcing of high-friction tasks to artificial agents. The urgency of this investigation lies in the 'ledger

of the human self', questioning whether the depletion of Psychological Equity is transforming the professional from an autonomous agent into a curator of artificial outputs.

To address this, the current work moves beyond superficial usage metrics to develop and validate the AI-Induced Psychological Debt Accumulation (AI-PDA) Scale. By providing a standardized diagnostic for **Capability Erosion**, this instrument will offer the empirical evidence required to identify the threshold of the AI–Human Agency Gap, enabling a strategic reclamation of human sovereignty, before the debt becomes irredeemable.

### **3. Context and Rationale: Theoretical and Empirical Foundations for the AI-PDA Scale**

The central argument of this research is not to resist technological advancement, but to evaluate its psychological trade-offs. The objective is to ensure that digital tools remain aiding mechanisms rather than dominating forces. As Gen AI becomes the default professional standard, the AI-PDA Scale serves as a diagnostic necessity — positioning the preservation of the 'Human Sovereign' as the primary lens for measuring psychological well-being and personal development against systemic capability erosion.

The AI-PDA Scale is grounded in the understanding that Human Capability Erosion is a cross-domain process where the depletion of one faculty accelerates the accumulation of Psychological Debt in others.

#### **1. Cognitive Erosion (The Foundation):**

Cognitive Load Theory (Sweller, 1988) warns that bypassing 'Germane Load' leads to schema failure. Recent neuroimaging by Kosmyna et al. (2025) revealed that users relying on AI for synthesis showed significantly weaker alpha / beta connectivity and reduced P300 amplitude during unaided follow-up tasks

— neural markers that persisted for four months. Furthermore, a systematic review by Rokhsari (2025) reported a pooled effect size of ( $g = -0.28$ ) for delayed-recall tests, with the deficit increasing to ( $g = -0.41$ ) for conceptual - transfer items, proving that the bypass of mental effort results in a hollowed-out knowledge base.

## 2. Behavioral Erosion (The Habit):

This cognitive bypass directly fuels a transition from Self-Regulation to AI dependency. According to Self-Determination Theory (Deci & Ryan, 1985), autonomy and competence are fundamental to human motivation. When AI shifts from a 'co-pilot' to a 'captain', the individual's sense of self-directed action erodes into Learned Algorithmic Helplessness. This is empirically supported by Fan (2024), who demonstrated in a study of 117 students, AI-reliance triggers 'Metacognitive Laziness', hindering the ability to self-regulate. When AI short-circuits the cycles of conflict monitoring essential for Self-Efficacy (Bandura, 1991), the 'You-do-it' Syndrome becomes the default behavioral response, hardening into a dependency loop.

## 3. Emotional Erosion (The Mastery Deficit):

Beyond simple fatigue, users experience a loss of 'Mastery Glow'. When agentic tools handle the '*heavy lifting*', users are deprived of the mastery experiences required for professional identity. Data from the Generative-AI Dependence Scale (GADS) (N = 586) indicates that high dependence predicts 24% higher morning cortisol levels and 17% lower Heart Rate Variability (HRV), suggesting that the '*intoxicating efficiency*' of AI creates a state of chronic physiological stress and emotional exhaustion.

#### 4. Social Erosion (Relational Thinning):

Reliance on ‘judgment-free’ AI leads to an atrophy of unscripted relational resilience. A longitudinal study by Wang et al. (2024) showed that daily AI interaction exceeding 90 minutes was associated with a (0.42 SD) decline in empathic-accuracy scores and a (0.38 SD) rise in loneliness. This indicates that as transactional efficiency replaces genuine social presence, users trade relational depth for algorithmic ‘pseudo-intimacy’.

#### 5. Moral Erosion (The Responsibility Gap):

The terminal stage of erosion is Moral Disengagement (Bandura, 1999). As the user moves from author to curator, a ‘moral-responsibility dilution effect’ occurs Santoni de Sio & Mecacci (2021). When algorithms deliver a moral hierarchy of choices, individuals experience a measurable reduction in ‘felt personal accountability’— a state where the professional is no longer the sovereign author of their ethical actions.

### 3.2 The Necessity for a Multidimensional Diagnostic – The AI-PDA Scale

Existing literature has largely documented these depletions in isolation. However, the AI-PDA Scale is imperative because it addresses the interdependence of these domains. For example, the bypass of cognitive ‘germane load’ is the direct mechanism that destroys behavioral ‘competence’.

While existing metrics prioritize *usage intensity*, the rapid shift toward agentic delegation necessitates a shift toward measuring Capability Erosion. The AI-PDA Scale fills this methodological void by providing a validated, multi-domain instrument designed to:

- a. **Quantify Depletion:** Shift the focus from digital enhancement to digital dependency, creating a measurable metric for Psychological Debt.

- b. **Integrate Domains:** Bridge siloed research by evaluating the interdependence of the Cognitive, Behavioral, Emotional, Social, and Moral faculties.
- c. **Provide Diagnostic Utility:** Identify the threshold at which routine delegation transitions into a terminal AI–Human Agency Gap, enabling intervention before capability loss becomes irreversible.
- d. **Aid and Inform Policy:** Supply empirical data to quantify the long-term consequences of AI-reliance for educators, policymakers, and industry leaders.

Ultimately, this research positions the AI-PDA Scale as a diagnostic necessity. By identifying the onset of Agency Foreclosure, the scale provides the primary lens through which to measure and mitigate the erosion of the sovereign human agent.

#### **4. Proposed Research Design and Methodology**

This study proposes to employ an Exploratory-Sequential Mixed-Methods Design to develop and validate the AI-PDA Scale. The development process strictly operationalizes the DeVellis and Thorpe (5<sup>th</sup> Ed., 2022) 9-Step Model to move the construct of Psychological Debt from a theoretical premise to a validated psychometric instrument.

##### **4.1 Scope and Analytical Objectives**

To ensure the instrument provides actionable diagnostic data, the research design incorporates three distinct analytical layers:

- a. **Descriptive Element:** To quantify the current state of Capability Erosion across diverse professional and academic cohorts.

- b. **Correlational Element:** To examine the statistical relationship between Usage Intensity (frequency/duration of AI interaction) and the cumulative accumulation of Psychological Debt.
- c. **Predictive / Causal-Comparative Element:** To construct a model that identifies the specific threshold at which routine AI delegation converts into terminal Agency Foreclosure.

#### 4.2 The AI-PDA Development and Validation Framework

This study follows a systematic psychometric lifecycle, (*Using DeVellis and Thorpe 9-Step Model, 5<sup>th</sup> Ed., 2022*), while integrating a rigorous data collection and sampling strategy across three operational phases to ensure the final scale is both theoretically grounded and statistically robust.

<p><b><i>Phase I: Instrument Construct and Item Generation (DeVellis Steps 1–6)</i></b></p> <p><i>This phase encompasses the genesis of the AI -PDA Scale – the item pool and its preliminary qualitative testing</i></p>	
<b>STEP 1</b>	<p><b>Construct Determination:</b></p> <p>Defining the latent nature of Psychological Debt across five specific domains: Cognitive, Behavioral, Emotional, Social, and Moral.</p>
<b>STEP 2</b>	<p><b>Item Pool Generation:</b></p> <p>Generating an initial pool of ~75 items (~15 per domain) sourced from a deductive analysis of core psychological theories and inductive observations of AI workflows.</p>

<p><b>STEP 3</b></p>	<p><b>Format Selection:</b></p> <p>Adopting a 6-point forced-choice Likert-type scale (1 = <i>Strongly Disagree</i>, 2 = <i>Disagree</i>, 3 = <i>Slightly Disagree</i>, 4 = <i>Slightly Agree</i>, 5 = <i>Agree</i>, and 6 = <i>Strongly Agree</i>).</p> <p>This eliminates the <i>Neutrality Bias</i> common in self-assessments of latent capability loss.</p>
<p><b>STEP 4</b></p>	<p><b>Expert Panel Review:</b></p> <p>An expert panel (N=8) representing Psychology, AI Ethics, L&amp;D, Education, Technology and HCI will evaluate the items.</p> <p>Metric: Item-level CVI (I-CVI) threshold must be &gt; 0.78 and the Scale-level CVI (S-CVI / Ave) threshold must be &gt; 0.90.</p>
<p><b>STEP 5</b></p>	<p><b>Cognitive Interviewing:</b></p> <p>Conducting Think-Aloud Interviews (N=20). This qualitative layer ensures the terminology (e.g., '<i>Agency</i>' and '<i>Delegation</i>') are interpreted consistently across both Digital Natives and Established Experts before large-scale testing.</p>
<p><b>STEP 6</b></p>	<p><b>Inclusion of Validation Items:</b></p> <p>Integrating established measures (e.g., <i>General Self-Efficacy Scale</i>) to evaluate Convergent and Discriminant Validity against the new AI-PDA construct.</p>

**Phase II: Sampling Strategy and Data Collection Protocol**

Before the final validation occurs, a rigorous sampling protocol will be established to ensure the scale's diagnostic utility across the modern global workforce.

**Sampling Rationale:**

A Stratified Purposive Sampling strategy will be deployed to investigate the Differential Impact Hypothesis.

- **Inclusion Criteria:**

Participants must meet a  $\geq 3$  months of consistent AI interaction threshold to ensure data reflects habitual reliance rather than novelty effects.

- **The 18–55+ Cohort Strategy:**

Data will be captured from Digital Natives (Age 18–25) to identify Developmental Foreclosure and Established Experts (Age 35–55+) to identify Skill Atrophy.

- **Cohort Stratification:**

Data will be captured from Digital Natives (Age 18–25) and Established Experts (Age 35–55+), ensuring representation from different educational backgrounds and professional norms.

- **Cultural Generalizability:**

Recruitment will target a global pool (North America, EMEA, and APAC regions). This diversity is critical for ensuring that the 'Psychological Debt' construct is not culturally biased but reflects a universal human-AI interaction phenomenon.

- **Linguistic Boundary:**

The initial validation will be conducted exclusively in English. However, the item pool is developed with '*Translatability*' in mind, avoiding localized idioms to facilitate future cross-cultural adaptation.

- **Recruitment:**

Systematic outreach via professional networks and academic forums, targeting high-stakes sectors such as IT, Banking Finance, Insurance, Healthcare, Engineering and Education Institutions.

- **Ethical Considerations:**

- Before the initiating data collection, Ethical Research Committee (ERC) approval will be taken.
- All participants will be provided a Digital Informed Consent form, that will explicitly outline the purpose of the study, the voluntary nature of participation, and the right to withdraw at any time without penalty.
- Data will be collected via a secure online psychometric platform, ensuring compliance with GDPR and international data privacy standards.

**Phase III: Quantitative Evaluation and Scale Optimization (DeVellis Steps 7–9)**

<b>STEP 7</b>	<p><b>Scale Administration:</b></p> <p>Distributing the instrument to a stratified purposive sample of N = ~500 –600. Inclusion requires ≥ 3 months of consistent interaction with AI tools. Digital Survey Tools with in-built security and privacy protocols will be adopted to administer the AI-PDA Scale to the sample (e.g. Qualtrics, LearnCue etc.)</p>
<b>STEP 8</b>	<p><b>Item Evaluation</b></p> <p>Using the first half of the dataset (N = ~300), an Exploratory Factor Analysis (EFA) will be conducted to identify how the items naturally group into the five domains. Any questions that do not ‘load’ strongly onto their intended factor (score &lt; 0.40) will be removed to ensure the scale remains sharp and relevant.</p>
<b>STEP 9</b>	<p><b>Scale Optimization</b></p> <p>The second, independent half of the dataset (N = ~300) will undergo a Confirmatory Factor Analysis (CFA). This acts as the final ‘<i>Stress Test</i>’ to prove that the five domains work together as a unified measure of Psychological Debt. Standard statistical ‘Fit Indices’ will be used to confirm that the scale is both scientifically valid and reliable for global use.</p>

### 4.3 The Rigor and Robustness for AI-PDA Scale

Ultimately, this three-phase methodology ensures that the AI-PDA Scale is both theoretically anchored and statistically robust. By moving from qualitative genesis to global quantitative validation, the protocol provides a scientifically sound framework for identifying the exact threshold where routine AI reliance converts into terminal Agency Foreclosure across the modern workforce.

### 4.4 Hypothesis Testing and Predictive Modelling

Once the AI-PDA Scale is validated, the study will shift from instrument development to hypothesis testing. This stage will utilize advanced predictive modelling to confirm the real-world mechanics of Psychological Debt and 'point of no return'.

#### a. The Dosage-Effect Analysis:

Using Multiple Regression and ANOVA, the study will evaluate the Agency Spectrum. This determines if there is a statistically significant correlation between Usage Intensity (frequency / duration) and Capability Depletion, proving that higher AI delegation serves as a direct precursor to debt accumulation.

#### b. Structural Path Analysis (Inter-Domain Interdependency):

To explore the *Cascade Effect*, Structural Equation Modelling (SEM) will be employed to identify directional pathways between domains. This analysis will test if Cognitive Delegation (the trigger) drives Behavioral Habituation, which then mediates Emotional Demotivation. Most critically, it will investigate if these domains ultimately lead to Skill Atrophy, signalling a transition from reversible debt to permanent foreclosure.

**c. Identification of the Critical Threshold:**

Through ROC Curve Analysis (Receiver Operating Characteristic), the study will pinpoint the *Point of No Return* — the specific cumulative debt score where healthy AI augmentation transitions into Pathological Dependency.

**d. The Differential Impact Hypothesis:**

To determine if age and experience act as moderating variables, Multi-Group Invariance Testing will be conducted. This will reveal if Psychological Debt manifests differently as Developmental Foreclosure in younger cohorts (Age 18–25) versus Skill Atrophy in established professionals (Age 35–55+).

**5. Pracademic Reflections: Piercing the Veneer of AI Productivity**

With over 25+ years of navigating global technological shifts — from the first wave of digitization to cloud integration — I have observed that the Generative AI transition is fundamentally different. It does not merely change *how* we work; it alters *who* is doing the psychological heavy lifting.

The *intoxicating speed* of AI-driven output creates a feedback loop of instant gratification that often masks a latent Psychological Debt. As an action researcher, my primary challenge is piercing this ‘*veneer of productivity*’ to examine the underlying atrophy. We are currently witnessing a *Frictionless Trap* where professionals and students are becoming comfortable as passive observers of their own expertise.

Transitioning from a practitioner focused on immediate solutions to a doctoral researcher has been a humbling exercise in reflective practice. It requires moving beyond the ‘You-do-it’ Syndrome — a perennial comfort trap of continuous offloading — to defining the Agency Spectrum. This research is born from a singular, vital

question: *If the AI performs the psychological functions previously held by the human, what remains of the professional?*

## 6. The Practical Utility of the AI-PDA Scale: Beyond the Efficiency Trap

The ultimate goal of this research is not simply to document a decline, but to provide a diagnostic *mirror* that allows for course-correction before reaching the *Point of No Return*. Once validated, the AI-PDA Scale will move industries from a focus on mere AI Literacy to Human-AI Sustainability.

### a. Corporate Strategy: From Literacy to Agency Quotient (AQ)

Current talent management is over-indexed on AI adoption speed, often overlooking the emergence of Shell Professionals. These are individuals who produce high-quality output but lack the internal cognitive architecture to defend, replicate, or troubleshoot that work, should the system fail. The AI-PDA Scale allows leaders to:

- **Measure Agency Retention:** Prioritizing '*Human Resilience*' over '*Speed of Outcome*'.
- **Develop AQ:** Shifting the focus from how well a person uses AI to how much agency they retain while using it.

### b. Education: Safeguarding the 'Germane Load'

As AI becomes embedded in higher education, we risk a cognitive atrophy — graduating professionals who have bypassed the '*messy middle*' of learning. The AI-PDA Scale benefits the educational sector by:

- **Preventing Agency Foreclosure:** Distinguishing between Augmented Achievement (using AI to learn) and Foreclosure (letting AI do the learning).

- **Measuring Cognitive Health:** Providing universities with a metric to ensure graduates remain robust, independent thinkers rather than mere '*proficient prompters*'.

### c. Professional Wellness: Reclaiming Meaning and Mastery

Offloading human tasks will eventually lead to 'Identity Atrophy', where the professional loses their sense of 'Self – Efficacy' and 'Mastery Glow' because the psychological muscles are no longer being exercised. The AI-PDA Scale will serve as a 'Reflective Mirror' for professionals to:

- **Mitigate the Redundancy Trap:** Identifying where self-efficacy is eroding before it leads to burnout or detachment.
- **Reclaim Mastery:** Providing a roadmap for professionals to intentionally keep '*high-friction*' tasks that provide fulfilment, protecting their long-term psychological wellness.

## 7. Research Limitations and Preliminary Scope

As an exploratory, in-progress study, the AI-PDA Scale may face several inherent constraints that define its current scope and future trajectory:

### a. Conceptual and Empirical Novelty:

There is currently a significant scarcity of multi-domain literature addressing the specific intersection of AI delegation and psychological erosion. As a result, this research acts as a foundational 'genesis' project. The scale's initial validity is based on theoretical synthesis rather than a long history of empirical evidence, requiring iterative testing as the field matures.

### b. Linguistic and Cultural Boundaries:

While the sampling strategy is global, the current phase is conducted exclusively in English. This limits the findings to Western-centric or Anglophone professional

contexts. Future research must evaluate how different cultural attitudes toward AI trust and 'Human-in-the-Loop' requirements impact the accumulation of Psychological Debt.

c. **Subjectivity of Self-Report Measures:**

The reliance on self-reporting introduces potential Social Desirability Bias, where participants may under-report AI dependency to maintain an image of professional autonomy. Additionally, individuals experiencing Skill Atrophy may lack the self-awareness to accurately gauge their own capability loss (the Dunning-Kruger effect).


d. **The Temporal 'Snapshot' Effect:**

Given the exponential evolution of Agentic AI, this study provides a cross-sectional snapshot. The 'Point of No Return' identified today may shift as AI systems become more seamless and 'invisible' in the daily workflow.

## 8. Conclusion: The Research Imperative

This research is the need of the hour to provide a vital framework for measuring and mitigating Psychological Debt Accumulation . We stand at a unique crossroad in human history where the '*path of least resistance*' is also the path of '*human capability erosion*'. The Human-AI Agency Gap is not an inevitability; it is a choice. By validating the AI-PDA Scale, we move from being passive recipients of technological '*intoxication*' to active '*stewards*' of our own psychological capability and its progressive enhancement. The Psychological Debt Accumulation cannot be ignored; it is a much-needed instrument to proactively safeguard the human sovereign.

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**Author 's Note:** My journey from 25+ years of professional practice to doctoral research is driven by a desire to ensure our transition into the AI era remains human-centric. If the concepts of **AI – Human Agency Gap** and **Psychological Debt Accumulation** resonate with your work or if you would like to participate in the upcoming validation phase, I invite you to connect with me directly at:  [asefa@essential5.co.in](mailto:asefa@essential5.co.in)

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