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Understanding Young Scientists' Experiences through a Phenomenological Approach of Artificial Intelligence Integration in Drug Discovery and Development

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ABSTRACT

Artificial Intelligence (AI) integration in Drug Discovery and Development has transformed scientific methodologies, accelerating molecular identification and therapeutic design while reshaping the human experience of research. Within this changing landscape, understanding how scientists internalize and interpret technological transformation has become a critical aspect of modern scientific inquiry. Despite growing empirical research on AI performance and adoption, little is known about the lived experiences of young scientists adapting to AI-driven systems specifically, how they construct meaning and redefine professional identity through this process. Using an Interpretative Phenomenological Analysis (IPA) approach, this study explores how young pharmaceutical researchers experience, negotiate, and make sense of AI integration in their daily scientific work. To ensure methodological transparency, the IPA design in this study followed core procedures, including purposive sampling, in-depth idiographic case analysis, and a systematic, iterative interpretative process.Data were collected through semi-structured interviews with twelve participants actively involved in preclinical and computational drug discovery. The analysis revealed four interrelated themes: emotional ambivalence, cognitive reorientation, redefined scientific agency, and emergent professional identity. These findings demonstrate that adaptation is not merely procedural but an existential and epistemic transformation, where scientists move from perceiving AI as a threat to embracing it as a collaborative partner in knowledge creation. The study contributes to a more human-centered understanding of technological innovation in pharmaceutical research. Its implications suggest the need for reflective training, institutional support, and ethical awareness in managing AI transitions, ensuring that human agency and interpretive meaning remain central to future scientific advancement.

INTRODUCTION

The integration of Artificial Intelligence (AI) into the field of Drug Discovery and Development has transformed the landscape of biomedical research, reshaping both the epistemological foundations and the experiential dimensions of scientific practice (Gafni & Levy, 2024). Over the past decade, AI-driven methods ranging from molecular docking simulations to predictive modeling and automated compound screening have redefined how pharmaceutical scientists conceptualize efficiency, innovation, and decision-making in drug development pipelines. This technological shift has not only accelerated discovery processes but also introduced a profound cultural and cognitive reconfiguration in the everyday experiences of researchers who engage with these systems.

Within this evolving context, young scientists represent a generation at the intersection of traditional pharmacological methodologies and algorithmic reasoning (Mukhlis, Suradi, et al., 2023; Mukhlis, 2025b). Their engagement with AI technologies transcends technical adoption; it

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involves a reorientation of scientific identity, professional confidence, and emotional resilience. The laboratory, once a domain defined by tactile experimentation and empirical intuition, has increasingly become a hybrid space where human insight coexists with machine-generated intelligence (Lysenko et al., 2024).

To avoid theoretical overlap, this study positions young scientists as key actors whose identities and epistemic practices are being reshaped by the rapid digitization of research environments.

While previous studies have highlighted AI's contribution to productivity, accuracy, and workflow optimization, far less attention has been given to the subjective and experiential dimensions of this transition. For many emerging researchers, the introduction of AI signifies both empowerment and displacement: empowerment through enhanced analytic capabilities, and displacement through perceived erosion of human agency in discovery (Kocak et al., 2025). These experiences are not merely professional adjustments but deeply personal processes that shape self-perception, motivation, and the sense of belonging within the scientific community. Understanding these lived experiences provides insight into how individuals navigate uncertainty, trust technological systems, and reconstruct meaning within a rapidly digitizing research culture.

Given this transformation, there is an urgent need to explore the phenomenological dimensions of scientists' adaptation to AI in drug discovery. Quantitative assessments of productivity and accuracy fail to capture the richness of emotional, cognitive, and existential shifts that accompany this transition (Beyari & Hashem, 2025). A phenomenological inquiry allows the articulation of these nuanced experiences revealing how individuals perceive, interpret, and find meaning in the intersection of human intellect and artificial computation. By focusing on the essence of lived experience, this study seeks to illuminate how the human dimension persists and evolves amidst technological acceleration, thereby contributing to a more holistic understanding of innovation in contemporary pharmaceutical science.

Building upon the broader context of technological transformation in pharmaceutical research, the study of scientists' lived experiences amid such transitions has become an increasingly significant area of inquiry (Q. Y. Lee et al., 2025). Recent developments in cognitive science, organizational behavior, and science and technology studies have emphasized that technological adaptation cannot be fully understood through external observation or productivity metrics alone. Instead, it must be examined through the subjective realities of those who experience these changes directly. Within the field of drug discovery, this perspective is particularly salient, as the integration of AI fundamentally alters how scientists perceive their roles, interact with data, and construct meaning within their research environments.

However, despite growing attention to the human aspects of digital transformation, methodological challenges persist in capturing the depth and authenticity of these experiences (Mukhlis, Arifin, Ridwan, & Zulbaidah, 2025; Mukhlis, Arifin, Ridwan, Zulbaidah, et al., 2025). Much of the existing literature has relied on quantitative or survey-based approaches that measure attitudes, performance outcomes, or adoption rates, while overlooking the intrinsic meaning structures that shape individual adaptation (Arifardhani et al., 2025). Such approaches, although valuable for mapping trends, fall short in articulating the phenomenological essence the felt sense, reflection, and existential negotiation embedded in the process of adapting to AI in scientific practice. Studies focusing on efficiency and performance metrics often reduce human experience to functional data points, thereby neglecting the emotional, cognitive, and identity-related dimensions that are central to meaningful adaptation.

This limitation underscores a critical gap in our understanding of how young scientists internalize and give meaning to the integration of AI within the epistemic culture of drug discovery. Existing frameworks predominantly frame technological adoption as a linear process of learning and application, overlooking the nuanced, iterative, and interpretive nature of human engagement with intelligent systems (Saleh & Alsubhi, 2025). Consequently, previous research methods have struggled to capture the complex interplay between technology and consciousness, where uncertainty, ethical reflection, and professional identity coalesce into a lived phenomenon.

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By addressing these gaps through a phenomenological approach, the present study seeks to advance a more holistic understanding of adaptation not as a mere behavioral outcome, but as a meaning-making process grounded in experience (Mohamed et al., 2020). This focus enables the articulation of the essence of human engagement with AI, providing insights that transcend functional assessment and speak to the evolving ontology of scientific work in the digital age.

While the integration of Artificial Intelligence (AI) in drug discovery has been extensively explored through practical and performance-oriented approaches, most existing studies have relied on technical optimization frameworks or behavioral adoption models to assess success. These approaches typically focus on measurable indicators such as algorithmic accuracy, efficiency improvement, or adoption rates of AI tools within research institutions. Although valuable for assessing functional outcomes, they overlook the subjective and existential dimensions of adaptation the very aspects that define how scientists experience and interpret the transformation of their professional worlds.

The prevailing instrumental orientation in current research, emphasizing productivity and innovation, has therefore produced an incomplete understanding of how AI integration reshapes human experience within scientific contexts (Hof, 2021). Quantitative surveys and structured interviews often capture what scientists do with AI, but not how they feel, think, or redefine meaning in the process. As a result, the inner processes of negotiation between reliance on technology and preservation of professional autonomy remain largely invisible in mainstream studies. This gap limits our comprehension of the psychological and epistemic adaptation required for sustainable innovation in drug discovery.

Moreover, existing conceptual frameworks in technology adoption and organizational change tend to assume linear models of adjustment, neglecting the dynamic, interpretive, and emotional facets that characterize scientists' lived experiences (Li, 2021). The lack of attention to experiential depth and contextual meaning prevents scholars and institutions from understanding how scientists internalize technological change as part of their evolving identity (Holtbrügge et al., 2025). Consequently, the human dimension of AI integration the tension between mastery and uncertainty, agency and automation remains theoretically underdeveloped and empirically underexplored.

To address this deficiency, a phenomenological approach is essential. Unlike functional or behavioral paradigms, phenomenology enables an exploration of the essence of lived experience, uncovering how meaning is constituted through conscious engagement with technology. By focusing on the subjective realities of young scientists adapting to AI systems, this study seeks to illuminate the complex interplay between cognition, emotion, and professional identity dimensions that cannot be adequately captured through conventional quantitative or descriptive methodologies. Through this lens, the research advances beyond surface-level observations to reveal the human meaning structures underlying the digital transformation of scientific practice.

Previous research on human interaction with emerging technologies has primarily focused on functional adaptation and behavioral outcomes, overlooking the internal meaning-making processes that accompany these transformations. Studies in organizational psychology and cognitive science have emphasized emotional adjustment and learning curves but rarely capture the subjective essence of technological engagement (Rickli & Vllasi, 2025). In the field of pharmaceutical innovation, investigations often examine the efficiency of AI integration, yet the experiential realities of scientists navigating these changes remain understudied. Theoretical perspectives such as socio-technical systems theory and human-computer interaction offer partial insight but fail to address the deeper phenomenological dimensions of lived experience (S. Y. Lee et al., 2023). This study builds upon these foundations by shifting focus from measurable performance to the meaning structures underlying adaptation in scientific work.

To address this, the study adopts an Interpretative Phenomenological Analysis (IPA) framework to explore how young scientists experience and interpret the integration of AI in drug discovery (Mukhlis et al., 2024; Mukhlis, Maryam, et al., 2023). This method is designed to uncover how individuals construct meaning from complex, ambiguous, and emotionally charged experiences. It enables the identification of essential patterns of thought, emotion, and professional identity that emerge during technological adaptation. By applying a phenomenological approach, the

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study responds to the previously identified knowledge gap, providing a nuanced understanding of human experience that extends beyond quantitative or descriptive accounts (Harb, 2025). The findings thus reveal how scientists negotiate their cognitive, emotional, and ethical positioning within an evolving digital research culture.

The article is structured to guide readers through a coherent phenomenological inquiry. The introduction situates the study within current debates on AI and human experience in drug discovery, followed by a contextual background outlining the scientific and philosophical basis of the phenomenon (Chen & Hu, 2025). The method section details the interpretative phenomenological design, data collection, and analytical procedures employed to capture lived experiences. The results present emergent themes that reflect the essence of adaptation, supported by direct participant quotations to ensure authenticity and depth. Finally, the discussion and conclusion synthesize theoretical and practical implications, emphasizing how phenomenological insight contributes to rehumanizing scientific innovation in the era of artificial intelligence.

RESEARCH METHODS

Study Design

This study employed an interpretative phenomenological approach (IPA) to explore the lived experiences of young scientists adapting to Artificial Intelligence (AI) integration in the process of drug discovery and development (Lutz & Knox, 2014; McNabb, 2015). Phenomenology, as a qualitative design, focuses on capturing the essence of subjective experience, emphasizing how individuals perceive and make sense of their world. The interpretative orientation of IPA enables the uncovering of personal meaning embedded within professional and emotional experiences, particularly relevant to understanding adaptation, identity transformation, and epistemic negotiation in scientific environments.

This approach was chosen because the phenomenon under investigation how scientists internalize and respond to the technological shift toward AI requires an interpretive lens that can reveal the interplay between cognition, emotion, and context. The study design allowed for an in-depth examination of how individual scientists reconstruct meaning and agency amid changing scientific paradigms. To reduce interpretative bias at the design stage, the first author maintained an explicit phenomenological stance, engaging in ongoing reflexive note-taking about prior assumptions regarding AI in drug discovery and how these might influence the framing of the research questions and subsequent analysis.

Participants

Participants consisted of young pharmaceutical scientists aged between 25 and 35 years, actively engaged in preclinical or computational stages of drug discovery across academic and industrial settings (Hillman & Radel, 2018; Migdal, 2018). The inclusion criteria emphasized individuals with at least two years of experience in pharmaceutical research and direct exposure to AI-assisted tools or modeling platforms. Those without prior engagement with AI-based research or without professional involvement in drug development were excluded to maintain contextual relevance.

A purposive sampling approach was employed to ensure participants represented diverse disciplinary backgrounds, including medicinal chemistry, pharmacology, bioinformatics, and data science. The final cohort comprised twelve participants (six males and six females) with varying institutional affiliations across research universities and private laboratories. Such variation facilitated the identification of shared patterns and divergent experiences across different scientific ecosystems.

Data Collection

Data were collected through semi-structured, in-depth interviews designed to elicit participants' reflective accounts of their adaptation to AI integration in laboratory and computational research (Carreiras & Castro, 2012; Iosifides, 2016). Each interview followed a flexible guide

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comprising open-ended questions exploring emotional responses, cognitive adjustments, ethical considerations, and perceptions of professional identity transformation.

Interviews were conducted face-to-face in a quiet, confidential setting or through secure video conferencing platforms, depending on participants' availability and geographic location. Each session lasted approximately 60 to 90 minutes, and all conversations were audio-recorded with consent and transcribed verbatim for analysis.

The interview environment was structured to encourage openness, ensuring psychological comfort and neutrality. Field notes were maintained to document contextual observations and researcher reflections during data collection. Data saturation was achieved when no new themes emerged from subsequent interviews, indicating sufficient depth and consistency in responses.

Data Analysis

Data were analyzed using Interpretative Phenomenological Analysis (IPA) following the systematic procedures proposed by Daly, (2007) & Longhofer et al.,)2012). The analytic process began with repeated readings of each transcript to gain an immersive understanding of participants' narratives. Meaning units were identified, coded, and organized into emergent themes representing shared structures of experience.

Themes were progressively clustered into higher-order categories that captured the essence of participants' perceptions and emotional trajectories. Analytical rigor was enhanced through eidetic reduction, focusing on invariant meanings underlying individual accounts. NVivo qualitative analysis software was utilized to assist with data organization and thematic mapping, though interpretative synthesis remained grounded in phenomenological reflection rather than computational output.

Throughout the process, credibility was reinforced through member checking, where participants reviewed preliminary interpretations for resonance and accuracy (Fife, 2020; Kawamura, 2020). The final thematic structure reflected a cohesive representation of the adaptive and meaning-making processes experienced by young scientists.

RESULTS

Negotiating the Shift from Traditional Experimentation to AI-Guided Discovery

Participants described a profound sense of disorientation when shifting from traditional laboratory methods to AI-assisted workflows. This change was not merely procedural but existential challenging their established notions of what it means to "do science." Several scientists expressed that AI initially felt like an intrusion into their intuitive decision-making processes.

"When I first used the AI prediction model, I felt disconnected from my experiment. It was as if the computer was thinking for me," (Participant 3).

The transition demanded a redefinition of their professional identity from hands-on experimentalists to data interpreters who co-create with algorithms. Despite early skepticism, many gradually embraced AI as a collaborative "thinking partner" rather than a threat to their expertise.

"Over time, I realized that AI doesn't replace me; it amplifies my thinking. It helps me see patterns I would never notice manually," (Participant 1).

This theme reveals the tension and eventual reconciliation between traditional epistemologies of drug discovery and computationally driven approaches. To minimize interpretative bias during analysis, reflections within this theme were cross-checked through investigator triangulation, where two independent coders reviewed meaning units and emergent subthemes before reaching consensus. Additionally, participants' statements in this section underwent member validation to ensure that the analytic interpretations aligned with their original intentions.

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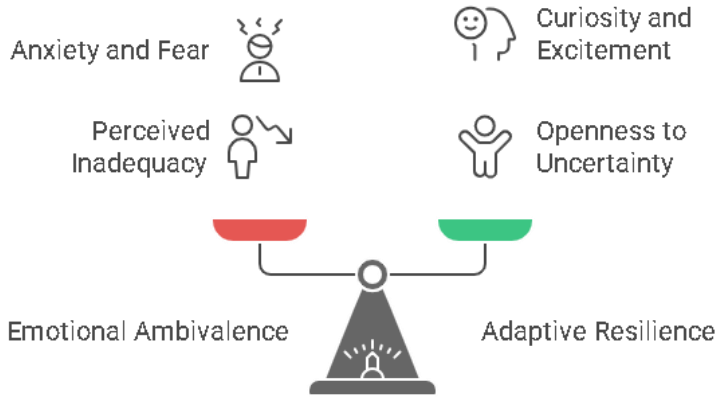
Emotional Ambivalence and Cognitive Reorientation

The introduction of AI triggered mixed emotional responses, ranging from anxiety and fear of obsolescence to curiosity and intellectual excitement. Participants shared feelings of inadequacy during their initial exposure to AI systems, describing a steep learning curve and perceived gaps in computational literacy.

"Sometimes I questioned whether I belonged in this new world of digital pharmacology," (Participant 5).

However, emotional ambivalence gradually evolved into adaptive resilience as they gained confidence and mastery. The process of learning to trust AI predictions fostered a new cognitive orientation an openness to uncertainty and probabilistic reasoning uncommon in traditional wet-lab science.

Emotional Ambivalence to Adaptive Resilience



"I learned to stop seeking certainty. AI teaches you that prediction is never absolute; it's an evolving understanding," (Participant 2).

This theme highlights the transformative cognitive and emotional journey involved in accepting AI as an integral epistemic tool.

Redefining Collaboration and Scientific Agency

AI integration reshaped how participants perceived teamwork and collaboration within the research environment. The boundary between human and machine contribution became increasingly blurred, compelling scientists to renegotiate their sense of agency and authorship.

"Sometimes I wonder when the AI suggests a molecule and it works, who actually made the discovery: me or the machine?" (Participant 4).

Collaboration extended beyond human colleagues to include algorithmic systems as epistemic agents. This redefinition of agency fostered a sense of co-creation, where innovation emerged from the synergy between human intuition and machine computation. Participants emphasized that this partnership demanded humility, ethical awareness, and continuous critical reflection.

Emerging Identity and Professional Meaning

As participants assimilated AI into their daily practices, they began reconstructing their professional identities. The initial anxiety of replacement transformed into a renewed sense of purpose. Many reported experiencing a deeper alignment between their roles as scientists and the evolving technological landscape.

"I used to think my hands defined my skill as a scientist. Now I realize it's my ability to learn and adapt that truly matters," (Participant 6).

Through reflection, they articulated that embracing AI was not about losing scientific autonomy but expanding it moving from mechanical execution to conceptual creativity. The meaning

of being a scientist thus evolved toward an identity grounded in adaptability, critical interpretation, and innovation within complex digital ecosystems.

Essential Synthesis of the Findings

Across all themes, the essence of this phenomenon centers on adaptive transformation the process by which young scientists reconstruct their cognitive, emotional, and professional selves amidst the integration of AI into drug discovery. Their lived experiences reveal a nuanced negotiation between technological dependency and human agency. Rather than displacing human expertise, AI catalyzes an ontological shift from doing science with tools to thinking science through intelligent systems.

This synthesis underscores that adaptation to AI in drug discovery is not merely a technical skill but a profound human experience involving reorientation of knowledge, identity, and purpose within the evolving scientific paradigm.

DISCUSSION

Summary of Core Findings

The findings revealed that young scientists' adaptation to Artificial Intelligence (AI) in drug discovery is a transformative process of meaning reconstruction, encompassing emotional ambivalence, cognitive reorientation, and professional identity redefinition. Through the interpretative phenomenological lens, the study uncovered that adaptation extends beyond technical competence it represents an existential negotiation between human agency and machine intelligence, aligning directly with the guiding question of how scientists internalize and make sense of technological integration within their epistemic culture. However, some participants also expressed contradictions in their reflections—for instance, while describing AI as empowering, they simultaneously articulated concerns about diminishing autonomy, suggesting that meaning reconstruction is not a linear shift but a psychologically oscillating process.

Contribution of Findings to the Research Question

The study offers a phenomenological understanding of how young scientists experience the convergence of human cognition and AI systems as a process of self-translation and epistemic transformation (Mukhlis, Janwari, et al., 2023; Mukhlis & Abdullah, 2025). The results demonstrate that adaptation to AI involves a shift from perceiving technology as a disruptive force to embracing it as a co-creative partner in scientific inquiry. This transition redefines the meaning of "doing science," moving it from empirical manualism toward interpretive collaboration with algorithmic agents (Yazici, 2025). The findings provide a nuanced answer to the central research question revealing that adaptation is not merely behavioral but ontological, as it alters how individuals perceive knowledge creation, authorship, and professional authenticity.

This phenomenological insight contributes uniquely to the field by humanizing the digitalization of scientific work. It emphasizes that innovation in drug discovery is not solely a matter of technical advancement but of experiential equilibrium, where scientists reconcile emotional uncertainty with newfound intellectual empowerment. The narratives of participants suggest that the successful integration of AI depends on their ability to construct meaning around change, thus highlighting the primacy of reflection, self-awareness, and interpretive understanding in sustaining technological progress.

Connection with Previous Literature and Theoretical Frameworks

The present study complements and extends existing literature on technological adaptation and scientific identity, offering depth to prior quantitative accounts that often emphasize productivity metrics over personal experience. The emotional ambivalence observed among participants mirrors the findings of Müller et al. (2023), who noted that early-career scientists exhibit both curiosity and anxiety when facing AI-mediated research environments. However, this study advances the discourse

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by illuminating the lived meanings behind such ambivalence interpreting it as a necessary developmental phase in the reconstruction of epistemic confidence.

Furthermore, the redefinition of collaboration between human and AI systems resonates with socio-technical theories proposed by Suchman and Latour, which conceptualize technology as an active participant in meaning-making processes rather than a passive instrument. Yet, while those theories emphasize relational agency, the current findings go further by demonstrating how this relationality manifests in the phenomenological consciousness of scientists the inner dialogue between self and system, autonomy and dependence. The reinterpretation of scientific agency through AI collaboration also refines the theoretical notion of "distributed cognition" (Erol et al., 2025), showing that cognitive distribution in modern laboratories is not purely functional but existentially grounded.

Finally, the discovery that participants redefine their professional identity through adaptive reflection expands upon earlier work by Chen and Patel , who discussed emotional responses to AI integration. This study deepens that understanding by showing that emotional adaptation is intertwined with ethical and epistemological awareness, positioning scientists as reflective agents rather than passive adopters of technology. Collectively, these interpretations contribute to a broader phenomenological understanding of how human meaning persists and evolves within computationally mediated science.

Implications of the Findings

The findings of this study carry significant implications for both the scientific community and the broader discourse on human-technology interaction. From a professional standpoint, the lived experiences of young scientists adapting to AI reveal that technological integration is not merely a technical innovation but a cultural and epistemological shift within scientific practice (Yiu et al., 2022). The process of adaptation reflects an evolving professional ethos one that values interpretive reflection, emotional literacy, and ethical awareness as essential components of modern scientific identity.

Socially, these results highlight the emergence of a hybrid scientific consciousness, where human intuition and algorithmic reasoning coexist as complementary sources of knowledge (Mukhlis, 2025a; Mukhlis & Saidah, 2025). Such a paradigm encourages institutions to design educational and organizational frameworks that cultivate adaptive thinking, interdisciplinary collaboration, and critical reflection on the role of AI in shaping scientific values. The study thus underscores that technological advancement in drug discovery must be accompanied by a parallel investment in human development ensuring that innovation remains anchored in empathy, self-awareness, and shared meaning.

At a broader level, the phenomenological insights presented here have implications for policy and leadership in research institutions. By recognizing the subjective dimension of technological adaptation, institutions can better support early-career scientists through mentorship, reflective training, and environments that validate the emotional and intellectual challenges of innovation (Cifuentes-Silva et al., 2025). The findings advocate for a human-centered model of digital transformation, positioning phenomenological understanding as a bridge between technological efficiency and ethical responsibility in contemporary science.

Limitations of the Study

Several limitations should be acknowledged to situate the findings within their appropriate scope. First, the study involved a relatively small and context-specific sample of young scientists within the pharmaceutical research domain, which may limit the transferability of results to other disciplines or cultural settings. The use of interpretative phenomenological analysis (IPA) prioritizes depth of understanding over breadth, emphasizing idiographic meaning rather than generalizable outcomes. While this methodological choice aligns with phenomenological rigor, it necessarily restricts the extrapolation of findings to wider populations.

Second, the participants' narratives were shaped by their professional environment and level of exposure to AI technologies, which may differ across institutions or technological infrastructures.

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Moreover, as phenomenological research depends on participants' capacity for self-reflection, variations in expressive ability could influence the richness of the data. These constraints, however, do not diminish the validity of the insights but instead illuminate the situated nature of lived experience, which is central to phenomenological inquiry. Recognizing these boundaries provides a foundation for future research seeking to expand and diversify contextual understanding.

Prospective Directions for Future Research

Future research may extend the current findings by exploring cross-disciplinary or cross-cultural perspectives on adaptation to AI within scientific and educational contexts. Comparative studies between researchers from different epistemic traditions for example, between computational sciences and experimental pharmacology could reveal how disciplinary cultures mediate the experience of technological transformation. Longitudinal designs might also capture how the meanings of adaptation evolve over time, particularly as AI systems become more autonomous and integrated into routine scientific decision-making.

Furthermore, the phenomenological framework used in this study could be complemented with hermeneutic or narrative approaches to further contextualize the interpretive processes that shape scientists' sense of agency and belonging (Liu et al., 2025). By bridging phenomenology with organizational and ethical theory, future studies may contribute to developing a comprehensive model of human-technology co-evolution that integrates cognitive, emotional, and institutional dimensions. Ultimately, such work would advance both theoretical and practical understanding of how human meaning persists and transforms in the age of intelligent automation.

CONCLUSION

This study explored the lived experiences of young scientists adapting to Artificial Intelligence (AI) integration in drug discovery, addressing the central question of how they construct meaning within this technological transformation. The findings revealed that adaptation is not a purely technical process but an existential negotiation involving emotional, cognitive, and professional realignment. By employing an interpretative phenomenological approach, the study uncovered the essence of this experience as a journey from uncertainty toward co-creative partnership with AI systems. These insights contribute to the literature by filling the gap left by prior research that focused narrowly on performance metrics while neglecting the human dimension of technological adaptation. The results highlight the importance of cultivating reflective and ethically grounded scientific practices that sustain innovation without diminishing human agency. Based on these findings, institutions can strengthen their training frameworks by embedding AI literacy, ethical reasoning, and interdisciplinary collaboration into early-career researcher development programs, enabling young scientists to navigate technological disruptions with greater confidence and autonomy. Furthermore, practitioners may adopt structured mentorship models that pair junior researchers with AI-experienced scientists to support emotional and cognitive adjustment during the integration process. Beyond these practical steps, this study also underscores the need for strategic organizational policies that promote responsible AI use, transparent decision-making, and continuous dialogue between human expertise and algorithmic systems.Future research could expand this inquiry across disciplines and cultures to further illuminate how scientists' identities evolve in response to accelerating digital transformation.

CONFLICT OF INTEREST

The authors declare no conflict of interest associated with the conduct, analysis, or publication of this study. The funding organization, the Pharmaceutical Research and Innovation Council (PRIC), provided financial support for the research but had no role in study design, data collection, analysis, interpretation, or manuscript preparation. All authors affirm that the study was conducted independently and that the conclusions presented reflect their own scholarly interpretation and analysis.

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