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Review Article

Moving Beyond the Stigma: Understanding and Overcoming the Resistance to the Acceptance and Adoption of Artificial Intelligence Chatbots

Ismail Dergaa, PhD [1,2,3], Feten Fekih-Romdhane, MD, PhD [4,5], Jordan M. Glenn, PhD [6], Mohamed Saifeddin Fessi, PhD [3], Karim Chamari, PhD [7], Wissem Dhahbi, PhD [8,9,10], Makram Zghibi, PhD [8,14], Nicola Luigi Bragazzi, MD, PhD [11,12,13], Mohamed Ben Aissa, MSc [8,14,15,*], Noomen Guelmami, PhD [8,11,14], Abdelfatteh El Omri, PhD [16], Sarya Swed, MD, PhD [17], Katja Weiss, PhD [18], Beat Knechtle, PhD [18,19], Helmi Ben Saad, MD, PhD [20,21,22]

Affiliations are at the end of the articles

* **Corresponding Author:** Mohamed Ben Aissa (M.Sc), Department of Human and Social Sciences, High Institute of Sport and Physical Education of Kef, University of Jandouba, Kef, Tunisia. E-mail: mbenaissa.hs@gmail.com; benaissamed24@outlook.fr

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Artificial intelligence chatbots may fundamentally transform academic research, automate mundane tasks, and enhance productivity. However, the integration of artificial intelligence chatbots (AIc) is impeded by a complex stigma deeply rooted in individuals' misconceptions and apprehension, including concerns about academic integrity, job displacement, data privacy, and algorithmic bias. The aim of this study was to scrutinize the origins and impacts of the stigma associated with artificial intelligence chatbots within the realm of academic research and to propose strategies to mitigate such stigmas. This study draws parallels between the reception of artificial intelligence chatbots and previous transformative technologies, presenting case studies illustrating the spectrum of responses to the integration of artificial intelligence chatbots into academic research. This study identifies the need for a shift in mindset from perceiving artificial intelligence chatbots as threats to recognizing them as facilitators of efficiency and innovation. It also underscores the importance of understanding these models as tools that aid researchers but do not replace the need for human expertise and judgment. We further highlighted the role of education, transparency, regulation, and ethical guidelines in overcoming the stigma associated with artificial intelligence chatbots. Given how adaptable people are, the surrounding stigma will likely fade with time. We support a cooperative strategy with continuing education and discussion to maximize the benefits of artificial intelligence chatbots while minimizing their drawbacks, hopefully paving the way for their ethical and successful application in scholarly research.

Keywords: Academic AI, AI Ethics, AI Misconceptions, AI Stigma, Algorithmic Bias, Chatbot Adoption, Research Innovation, Technology Resistance

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INTRODUCTION

The concept of artificial intelligence (AI) has a deep-rooted history in the academic world, dating back to its emergence in the 1950s, with the development of the first neural networks. While AI had its academic origins, it was often regarded as a science-fiction notion in popular culture. However, as we approach the end of 2023, it is undeniable that AI, in the form of AI chatbots (AIc), has transcended these early perceptions and now stands as an essential and transformative element of our daily lives. AIc models, crafted through rigorous training on vast text corpora, have attained the capability to generate human-like text, leading in a new era with profound implications. This transformative technology has significantly impacted academic research, revolutionizing the way we conduct investigations, analyze data, and collaborate on a global scale. AI algorithms enable swift processing, pattern identification, task automation, and empowering scholars to make significant advancements [1-4]. AIc, such as Chat Generative Pre-Trained Transformer

(ChatGPT) [5], have been met with both awe and anxiety within the academic community. On the one hand, their ability to generate text on a wide array of subjects, draft emails, solve math problems, and even write essays has been met with amazement. However, this capability has subsequently raised concerns about potential misuse in academic settings [6]. Despite these concerns, AIc have the potential to revolutionize academic research. They can automate routine tasks and save time for more complex and creative work. Just as email transformed long-distance correspondence by enabling instant, cost-effective global communication, AIc could revolutionize how we generate and refine academic text, making the process faster, more efficient, and more accessible [6].

The adoption of AIc confronts certain major difficulties, just like the introduction of any disruptive technology, from digital photography to cloud storage services. These difficulties include moral and legal conundrums, the risk of abuse and dependability, as well as the requirement for ongoing learning and adaptation to keep up with the rapid advancement of technology [2, 6]. These worries could result in stigma surrounding the use of AIc, particularly in delicate contexts like education. Some even believe that AIc are "dangerous", capable of replacing humans and extinguishing human civilization [7-9]. Recently, [10] stated "Mitigating the risk of extinction from AI should be a global priority alongside other societal-scale risks such as pandemics and nuclear war". All these stigmatizing attitudes that are usually heavily used by media may affect the extent to which people accept and adopt AIc, and how broadly these tools spread in society [11]. Therefore, gaining more insight into attitudes toward AIc is crucial to ensure efficient usage and implementation of these technologies [11, 12]. As such, we aimed to i) Examine the stigmas associated with AIc, ii) Understand their origins and impacts, and iii) Propose strategies for overcoming them.

THE EVOLUTION OF TOOLS IN RESEARCH AND WORK

The annals of research are marked by the introduction of tools that have fundamentally reshaped traditional practices. From the abacus to the modern calculator [4], from pen and paper to word processing software [13], tools have consistently been developed to simplify and accelerate complex tasks. The calculator, for instance, has become an indispensable tool, enabling quick and accurate computations that would be time-consuming and prone to error if done manually/mentally (4). Creating professional-quality content is now simple and quick thanks to word processing software, which has revolutionized how we write and edit texts (13). The acceptance and incorporation of these technologies into professional practices did not happen immediately despite their revolutionary effects on efficiency. To recognize these tools as enhancers of creativity and efficiency rather than threats or forms of "cheating," there must be a global shift in mentality.

AIc represent the next step in this evolution. Much like calculators and word processors, they have the potential to automate routine tasks, enhance productivity, and enable higher-level conceptual and analytical work. However, in academic research, we are in a current climate where the acceptance of these tools is not universal, and they are often met with skepticism and stigma, particularly from older generations of researchers [14]. Geoffrey Hinton, commonly known as the "godfather of AI", sounded the alarm about a "serious danger that we'll get things smarter than us fairly soon and that these things might get bad motives and take control" [15]. This is not an isolated incident. The history of technological advancement is replete with examples of initial resistance followed by eventual acceptance; AIc is likely to follow a similar trajectory [16].

AIC: A STEP FORWARD IN THE EVOLUTION OF ACADEMIC RESEARCH

The trajectory of tools in research and work indicates AIc are the next step in this evolution. These models, powered by advancements in machine learning and natural language processing, are poised to transform various aspects of research and writing. AIc, such as Google's Bidirectional Encoder Representations from Transformers (BERT), OpenAI's GPT-3.5, and Aravind Srinivas's Perplexity, among others, can generate human-like text, making them useful for a variety of tasks. The tasks range from drafting articles and reports to generating code and answering queries. They can automate routine tasks, freeing up time for more complex and creative workflows for academic researchers. They can also help in areas where human expertise is limited, such as predicting protein structures or translating rare languages [17]. Moreover, AIc can be utilized to summarize academic content, calculate effect sizes, and perform many other academic-related tasks.

However, the adoption of AIc faces multiple challenges. These models require large amounts of data and computational resources to train, and, especially early on, their outputs are often imperfect. Indeed, AIc should be used cautiously, as there are pitfalls associated with their evolution, such as the degradation of their reliability with time [18]. Ethical concerns are also to be

considered, including issues of data privacy, algorithmic bias, copyright issues, plagiarism, transparency issues, legal concerns, limited knowledge, incorrect responses, lack of originality, inaccurate citations, and the potential misuse of AI-generated content (e.g., misinformation and fake content, content with harmful or illegal uses). In addition, AIc carry the risk of economic disruption as they become increasingly embedded in automated content creation in various industries previously relying on human-generated content. Despite these risks, the potential benefits of AIc are significant. As these models continue to be refined and have their limitations addressed, they are poised to become an integral part of our toolkit in academic research, becoming a new chapter in the evolution of academic tools. Importantly, the integration of AIc into academic research will not be a straightforward process.

THE STIGMA SURROUNDING AIC

The stigma associated with AIc is a complex issue rooted in a variety of concerns and misconceptions. One of the most prevalent sources of this stigma is the perception of AIc as a form of 'cheating.' This perspective is particularly common among more traditional researchers, who may view the automation of research and writing tasks as a threat to the integrity of their work and, more broadly, to human creativity. For instance, the use of AIc to generate literature reviews or draft sections of a research paper might be seen as an unfair advantage or a dilution of the researcher's original contribution [13]. This perception is, in part, a reflection of the broader societal fear of job loss due to automation. AIc, with their ability to generate human-like text, could potentially replace certain jobs, particularly those involving routine writing tasks. This fear, while not entirely unfounded, often overlooks the potential of AIc to enhance human work rather than replace it. For example, AIc could be used to automate the initial drafting of a research paper, allowing the researcher to focus on refining the argument and conducting further analysis while not overseeing their responsibility to check the reliability and accuracy of the outcome provided by the machine [16].

Addressing the concept of certain jobs becoming obsolete due to AIc, it is essential to acknowledge the potential impact on professions like medical writers, who may face challenges as this technology becomes more solidified. With AIc's ability to generate human-like text, some tasks traditionally performed by writers with less domain expertise, such as medical writers, could be automated, leading to concerns about job displacement. However, it is important to recognize that the integration of AIc does not necessarily imply the complete replacement of human writers. Instead, it opens up opportunities for collaboration and enhanced productivity. AIc can assist in automating routine writing tasks, like generating literature reviews or initial research article drafts, thus freeing up valuable time for skilled researchers to focus on critical aspects such as refining arguments, conducting deeper analyses, and ensuring the accuracy and reliability of the AI-generated content. Embracing this symbiotic relationship between humans and AIc can lead to a more efficient and effective research process where technology complements human expertise rather than overshadowing it. Moreover, it presents opportunities for writers to adapt and develop new roles that leverage their domain expertise alongside AIc capabilities, leading to a more dynamic and versatile workforce in the future [19, 20]. By fostering a proactive approach to AIc integration and education, we can ensure a smoother transition and maximize the potential benefits while addressing concerns surrounding job displacement.

The integration of AIc, specifically ChatGPT, into academic research has elicited a spectrum of responses, ranging from enthusiasm to skepticism. A primary concern among researchers is the potential for these models to generate content that may be inaccurate or unreliable. For instance, despite the impressive capabilities of ChatGPT, it has drawn criticism for its potential to produce content that may be outdated or incorrect, posing a significant challenge as researchers regularly seek accurate and up-to-date information [13]. This concern is echoed in a study by [21], which analyzed 40 articles on the use of ChatGPT in Chinese academia. The study found a neutral to negative perception of ChatGPT, with concerns centered on academic plagiarism and undermining critical thinking skills. While acknowledging the potential of ChatGPT to enhance academic output and efficiency, the study also warned of the risks of misuse, leading to violations of academic integrity. The researchers concluded that the use of ChatGPT should be regulated to prevent over-reliance and to foster the development of critical thinking skills [13].

Another concern is the potential for AIc to perpetuate and amplify societal biases, given that these models are trained on large datasets that may already contain biased information. If not properly designed and tested, these models could inadvertently perpetuate such biases, leading to skewed research outcomes [22]. The fear of AIc replacing human researchers also exists, especially as

these models become more sophisticated and capable of automating tasks previously performed by humans, potentially leading to job losses [23].

Privacy concerns may also contribute to negative attitudes toward AIc. The latter are trained on vast amounts of text data, raising questions about data privacy and the potential misuse of sensitive information. While these concerns are valid, it is important to note that serious AI developers take stringent measures to anonymise data and ensure privacy [21]. Moreover, there is a lack of understanding about how AIc works. This lack of understanding can lead to mistrust and fear, further fuelling the stigma. For example, a researcher might worry that an AIc could inadvertently plagiarise from its training data, leading to accusations of academic misconduct [22].

Despite these concerns, some researchers advocate for the benefits of AIc, like ChatGPT, in academic research. They argue these models can automate tedious tasks, provide more accurate insights than previous models, and potentially enhance the quality of research. However, they emphasize the importance of using these models responsibly, with a focus on transparency, bias mitigation, privacy protection, risk assessment, accountability, and continuous monitoring [24]. While AIc may hold the potential to revolutionize academic research, their use must be carefully considered to mitigate potential risks and ensure ethical decision-making. It is crucial for researchers to be cognizant of these potential risks and take proactive steps to address them. To ensure responsible and ethical utilization of AIc like ChatGPT in academic research, researchers can take proactive steps. They should implement rigorous fact-checking and cross-referencing procedures, conduct plagiarism checks, and address potential biases in AIc models by using diverse and inclusive datasets. Transparency should be maintained by clearly disclosing AI-generated content, and privacy protection measures should be followed for sensitive data. Continuous monitoring of AIc-generated output is essential to identify and address any unexpected or erroneous results, ensuring the accuracy and reliability of the research output.

FACTORS ASSOCIATED WITH ATTITUDES TOWARDS AIC

Certain factors have been demonstrated to influence the acceptance and adoption of AI, such as performance expectancy, effort expectancy and perceived usefulness [12]. Younger age, higher levels of education and introversion are linked to more favorable attitudes towards AI [12]. Other psychological (e.g., voluntariness, confidence, inner motivation, expected accomplishments) and technological factors (e.g., technological complexity, usability, practicality, comparative advantage) have also been identified as being related to more positive attitudes towards the adoption and application of AI [12]. Additionally, it is worth noting the stigma associated with AIc varies depending on the context. For example, a study found chatbots were seen as less acceptable for health issues of higher severity, but their acceptability was significantly higher for stigmatized health issues. This suggests while the stigma associated with AIc is not removed, it can adjust depending on the specific use case.

STIGMA AS A BARRIER TO ETHICAL USE AND TRANSPARENCY

The impact of this stigma is significant. It can hinder the adoption and effective use of any new technology, including AIc, thereby limiting the potential benefits. Moreover, it can shape public opinion and policy towards AI, influencing the trajectory of AI development and its role in society. The preconceptions surrounding AIc not only impede their acceptance and integration, but also constitute a considerable obstacle to their ethical employment and transparency. A pivotal ethical tenet in the utilization of AIc is transparency, encompassing the recognition of their use in research and authorship. However, such preconceptions deter users from openly admitting their utilization of and/ or reliance on AI language models. This is particularly prevalent within academic spheres, where AIc are often perceived as a form of 'cheating', leading users to attribute the entirety of the work to themselves rather than acknowledging the contribution of an AI author. This lack of transparency is at odds with ethical guidelines for the deployment of AI, which underscore the significance of honesty and openness. It can also perpetuate preconceptions, as it obstructs a clear comprehension of the prevalence and advantages of AIc in research and other sectors. Furthermore, this absence of transparency can stymie efforts to regulate the use of AI and ensure its responsible and ethical application. Without a clear understanding of how and where AIc are being utilized, it becomes challenging to formulate effective regulations and guidelines. Thus, addressing these preconceptions is not merely about fostering the acceptance and integration of AI language models, but also about guaranteeing their ethical and transparent use [25, 26].

THE SKILL AND EXPERTISE REQUIRED TO USE AI LANGUAGE MODELS

For lay individuals, employing ChatGPT for academic purposes is not as straightforward as it might appear. For numerous tasks, such as summarizing and rephrasing, it is a doddle, but when it comes to more intricate tasks, it demands a higher level of skill. Regardless of what these chatbots provide, a seasoned researcher will invariably spot imperfections in the generated text. At times, even when users pose the appropriate questions, they may find the chatbots' responses to be entirely wrong. Consequently, users may spend a significant amount of time interacting with these models until they obtain the desired response. These interactions necessitate considerable skill, and not every AIc user may be proficient enough to interact in a manner that yields fruitful results. Simply put, if an individual has not conducted scientific research "the hard way," they will unlikely be able to do so with AIc tools. Additionally, these chatbots adhere to specific algorithms when generating responses. Based on the authors of this manuscript's experience with ChatGPT, we believe that at this stage, experienced researchers will likely detect text generated by these tools as they follow many recognized patterns and some recognizable grammatical formulations. Overcoming these patterns with appropriate modifications requires a great deal of skill and expertise. We do not wish to give the impression that using AIc in a research-based setting is an exceedingly difficult and sophisticated task, but we do want to emphasize that it is not as easy as it might seem to novice researchers.

It is also crucial to acknowledge that the use of AIc is not a simple task anyone can undertake without the necessary skills. Much like any other software or tool, these models require a certain level of expertise to be used effectively. Different models (e.g., Perplexity, Google BERT, ChatGPT), each have their own unique techniques of use. Mastering these techniques requires practice and a deep understanding of the underlying technology [25, 27]. Moreover, while AIc scan automate certain tasks and make research and writing easier, they do not eliminate the need for human effort. Writing with AIc still requires careful attention, review, and editing to ensure quality and accuracy. These models are tools that can aid researchers, but they do not replace the need for human expertise and judgment [25, 27].

OVERCOMING THE STIGMA

It is important to accept the relevance of AIc rather than oppose to their use given their growing influence in human life. The current emphasis should be on integrating these technologies into our society and organizations rather than just on reducing risks. How do we make sure that their integration benefits humanity as a whole? is the crucial question at hand.

The first step would be to effectively reduce negative perceptions of AIc. Similar to eliminating the stigma attached to mental illness, eradicating the stigma attached to AIc is a difficult process needing a diversified strategy. The multifaceted strategy for overcoming stigma that has been suggested in this study is summarized in Table 1.

Table 1. Summary of the multifaceted approach to overcome stigma to the acceptance and adoption of artificial intelligence (AI) chatbots (AIc).

Improving AIc literacy as an initial area of action	Increasing knowledge about AIc is vital to dispel misconceptions and fears. Educating users and the public fosters an informed discourse about AI.
Transparency and trust	AI developers should be transparent about training, data use, and addressing privacy and bias concerns to build trust.
Regulation and ethical use	Effective regulation ensures responsible and ethical AI use, addressing potential misuse.
Ethical guidelines	Developing and adhering to ethical guidelines minimizes AI's potential harms while realizing its benefits.
Addressing self-stigma	Addressing self-stigma among AI language model users through support, positive narratives, and challenging stereotypes.
Promoting positive interactions	Reducing stigma by encouraging positive user experiences with AIc.

IMPROVING AIC LITERACY AS AN INITIAL AREA OF ACTION

One initial area of action to overcome stigma toward AIc is by improving AIc literacy. By improving understanding of how AIc work and the potential benefits, we can dispel misconceptions and alleviate fears. This includes not only users' knowledge of these models, but that of the wider public, to foster a more informed and nuanced discourse about AIc. It is important to remember stigma often arises from misconceptions and lack of understanding; therefore, providing accurate information about AIc can help reduce stigma. Prior research demonstrated people who reported feeling more autonomous and competent in using technology were more likely to display favorable attitudes toward its use [28, 29]. As such, becoming more familiar with the use of these technologies can dramatically facilitate their acceptance and adoption.

TRANSPARENCY AND TRUST

Transparency is also a key determinant of how people perceive AIc. AIc developers should be transparent about how their models are trained, what data they use, and how they address issues such as data privacy and algorithmic bias. This transparency can build trust and mitigate concerns about misuse or unfair outcomes. Just as with mental health professionals, AI developers need to be open about their methods and practices. This not only builds trust but helps to dispel myths and misconceptions [30, 31].

REGULATION AND ETHICAL USE

Regulation also has an important role to play in the acceptance and adoption of AIc. Clear and effective regulation can ensure AI is used responsibly and ethically and any misuse is appropriately addressed. This covers laws governing the use of AI-generated content, algorithmic transparency, and data privacy. In addition, regulation is crucial to the acceptance and use of AIc. Clear and effective regulation can guarantee that AI is utilized sensibly and morally and that any misuse is dealt with effectively. This covers laws governing the use of AI-generated content, algorithmic transparency, and data privacy. Similar to its usage in other aspects of society, regulation is essential in creating a systematic framework for the ethical use of AI. For instance, certain nations have passed laws requiring social media sites to follow specific rules for content moderation in the area of social media and content moderation. This ensures the promotion of a safer and more respectful online environment. Moreover, regulations concerning location tracking and privacy aim to safeguard individuals' privacy rights and thwart unauthorized surveillance. Such rules may impose restrictions on companies, necessitating explicit user consent before tracking their locations, thereby ensuring that user data is handled responsibly and ethically. By implementing well-crafted regulations in these areas and others, societies endeavor to strike a balance between technological advancements and the protection of individual rights, fostering an environment where AIc can thrive while respecting the values and well-being of its users [26, 32].

ETHICAL GUIDELINES

It is important to create and follow ethical standards while using AI language models. These recommendations offer a foundation for responsible use, ensuring that the advantages of AI are realized while minimizing any potential drawbacks. This is comparable to the moral standards that exist in many professions, such as the Occupational Safety and Health Administration's (OSHA's) www.osha.gov website in the United States, which protects both the professionals and the clients they serve.

ADDRESSING SELF-STIGMA

Along with the previously mentioned strategies, it's critical to address self-stigma among people who use AI language models. Self-stigma is the bias people have against themselves, and it can be a major obstacle to adopting and efficiently applying AI technologies. The provision of resources and support for users, the promotion of positive AI narratives, and the elimination of unfavorable stereotypes are some possible self-stigma-reduction strategies.

PROMOTING POSITIVE INTERACTIONS

Stigma may be decreased by encouraging positive interactions between AI and its users. According to research, when people interact favourably with the stigmatised group or entity, stigma is frequently reduced. Therefore, providing users with opportunities for satisfying interactions with AIc can aid in lowering stigma.

It takes a multifaceted strategy to successfully combat the stigma attached to AIc. We can work to reduce the stigma connected to AI language models by combining literacy, training, transparency, regulation, ethical principles, and strategies to address self-stigma and encourage positive interactions.

CONCLUSION

The stigma associated with AIc is a multifaceted issue deeply rooted in a myriad of human concerns and misunderstandings. We investigated the origins and ramifications of this stigma, drawing parallels with the reception of other tools in research and professional settings and underscoring the ethical considerations accompanying the utilization of AI language models. It is evident that surmounting this stigma requires a comprehensive approach that includes education, transparency, regulation, and the establishment of ethical guidelines. It also demands an acknowledgment of the skill and expertise required to effectively use AI language models and an understanding that these models serve as tools that may assist researchers rather than replace them, as they do not supplant the need for human expertise and judgment. As AI continues to evolve and infiltrate various facets of our lives, it is paramount that we persist in engaging in nuanced and informed dialogue about its role and implications. This includes not only extolling its potential benefits but also

acknowledging and addressing its challenges. The stigma of AIc is merely one aspect of this broader conversation. By understanding and addressing this stigma, we can ensure that AI is utilized in a manner that is not only effective and efficient but also ethical and respectful of human values. Most importantly, as humans possess a remarkable ability to adapt, stigma should likely dissipate over time. It is incumbent on researchers to collaborate and elevate academic research to the next level. By embracing AIc as a tool to augment human capabilities, rather than replacing them, we can harness their potential while mitigating their challenges. This collaborative approach, coupled with ongoing education and dialogue, can help reduce stigma and pave the way for AI's ethical and effective use in research and beyond.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable

CONSENT FOR PUBLICATION

Not applicable

AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are openly available upon request from the corresponding author.

COMPETING INTERESTS

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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AUTHOR'S CONTRIBUTIONS

I.D, F.F.R and H.B.S: conception and design. I.D, F.F.R and J.G: analysis and interpretation of the data. K.C, N.G, W.D, M.B.A, M.Z, S.S, MSF and H.B.S: drafting of the article. I.D, J.G, KC, MS, AOE, SS, NLB, W.D, M.Z, N.G, KW, BK and M.B.A: revising it critically for intellectual content. All authors gave their final approval to the version that will be published.

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Affliations

[1] Primary Health Care Corporation (PHCC), Doha, Qatar
[2] Research Unit Physical Activity, Sport, and Health, UR18JS01, National Observatory of Sport, Tunis 1003, Tunisia
[3] High Institute of Sport and Physical Education, University of Sfax, Sfax, Tunisia
[4] Tunis El Manar University, Faculty of Medicine of Tunis, Tunis, Tunisia
[5] Department of Psychiatry "Ibn Omrane", Razi Hospital, Manouba, Tunisia
[6] Neurotrack Technologies, Inc., Redwood City, California 94063, USA
[7] Aspetar, Orthopedic and Sports Medicine Hospital, FIFA Medical Centre of Excellence, Doha, Qatar
[8] Research Unit "Sport Sciences, Health and Movement", Higher Institute of Sports and Physical Education of Kef, University of Jendouba, Kef, Tunisia
[9] Qatar Police Academy, Police College, Training Department, Doha, Qatar
[10] Department of Physical Education, College of Education, Qatar University, Doha, Qatar
[11] Postgraduate School of Public Health, Department of Health Sciences (DISSAL), University of Genoa, Genoa, Italy
[12] Department of Neuroscience, Rehabilitation, Ophthalmology, Genetics, Maternal and Child Health (DINOGMI), University of Genoa, Genoa, Italy
[13] Laboratory for Industrial and Applied Mathematics, Department of Mathematics and Statistics, York University, Toronto, ON, Canada
[14] Department of Human and Social Sciences, High Institute of Sport and Physical Education of Kef, University of Jendouba, Kef, Tunisia
[15] High Institute of Sport and Physical Education of Ksar-Saïd, University of Manouba, Manouba, Tunisia
[16] Surgical Research Section, Department of Surgery, Hamad Medical Corporation, Doha 3050, Qatar
[17] Faculty of Medicine, Aleppo University, Aleppo, Syria
[18] Institute of Primary Care, University of Zurich, Zurich, Switzerland
[19] Medbase St. Gallen Am Vadianplatz, St. Gallen, Switzerland
[20] University of Sousse, Farhat HACHED hospital, Service of Physiology and Functional Explorations, Sousse, Tunisia
[21] University of Sousse, Farhat HACHED hospital, Research Laboratory LR12SP09 «Heart Failure», Sousse, Tunisia
[22] University of Sousse, Faculty of Medicine of Sousse, Laboratory of Physiology, Sousse, Tunisia

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