Applications of Qhali-Bot in Psychological Assistance and Promotion of Well-being: A Systematic Review

Sebastián Ramos-Cosi[1], Daniel Yupanqui-Lorenzo[2], Enrique Huamani-Uriarte[3], Meyluz Paico-Campos[4], Victor Romero-Alva[5], Claudia Marrujo-Ingunza[6], Alicia Alva-Mantari[7], Linett Velasquez-Jimenez[8]

Image Processing Research Laboratory (INTI-Lab), Universidad de Ciencias y Humanidades, Lima, Perú.[1, 3, 5, 6, 8]
E-Health Research Center, Universidad de Ciencias y Humanidades, Lima, Perú.[2, 7]
Faculty of Engineering, Universidad de Ciencias y Humanidades (UCH), Lima, Perú[4]

***Abstract*—Social robots have emerged as efficient tools in the field of psychological assistance and well-being promotion, especially known as Qhalibot in prominent areas such as mental health, education and work environments. The aim of this study is to provide a comprehensive overview of their application in these contexts, through a systematic review based on the PRISMA methodology and a bibliometric analysis. To this end, 41 articles obtained from databases such as Scopus, IEEE Xplore, Web of Science, and JSTOR were evaluated. The findings reveal that social robots offer significant benefits, such as improved adherence to therapeutic treatments, real-time emotional support, and reduced stress levels in various groups of people. These benefits have shown a positive impact on users, especially towards those facing mental health conditions or high-stress situations, improving their overall well-being. However, significant challenges were encountered, including user acceptance of these technologies, personalization of interactions to meet individual needs, and integration of these systems into pre-existing environments. Furthermore, it is identified that most of the studies have been carried out in controlled environments, which limits the transferability of the findings to real-world situations. As future lines of research, it is suggested to explore new methodologies for the implementation of these systems in uncontrolled environments, the development of innovative tools that facilitate human-robot interaction, and the evaluation of the long-term impact of these systems in diverse populations. These investigations are crucial to better understand the effectiveness and applicability of social robots in broader and less controlled contexts, which could lead to a more effective integration into daily life.**

***Keywords*—Qhalibot; robot; psychological assistance; well-being; review**

I. Introduction

Today, mental health represents a growing global challenge [1]. The World Health Organization estimates that depression and anxiety disorders are some of the leading causes of disability globally, affecting more than 280 million people [2], [3]. Some factors such as the fast pace of life [4], high workload [5], and excessive use of technology [6] have contributed to increased stress and other psychological problems. In this context, the search for innovative solutions for psychological assistance and comprehensive well-being is crucial [7]. In the existing literature, various strategies have been explored, from cognitive-behavioral therapies [8] to mindfulness-based interventions [9]. However, access to these activities is limited due to geographical [10] and economic factors [11].

The traditional approach to mental and physical well-being has been grounded in conventional psychological therapies [12], corporate wellness programs [13], and supervised physical activities [14]. Current alternatives, such as face- to- face therapy [15] and mobile meditation [16], [17] or self-help applications [18], have shown effectiveness in reducing stress and improving quality of life. However, these strategies usually need constant human interaction, are mostly not personalized [19] and in many cases depend on the user's motivation for their continuous use.

Faced with these limitations, alternative approaches based on Artificial Intelligence (AI) [20] and robotics [21] have emerged, with the aim of offering accessible, interactive and personalized solutions. Social robots have proven to be viable tools in improving psychological well-being [22], facilitating emotional assistance and promoting healthy habits [23]. In this context, the potential of these devices in the field of mental health is highlighted, as they improve compliance with psychological therapies and promote physical activity through recreational and guided interactions [24].

Likewise, various studies have shown the positive impact of AI and robotics on mental health [25], [26], [27]. An example of this is the robots that have been used in interventions with patients with anxiety, depression and autism, achieving favorable results in the reduction of symptoms and improvement of social interaction [22]. In addition, AI platforms have proven their effectiveness in the early detection of psychological disorders through behavioral and language pattern analysis [28], [29]. These findings support the need to continue exploring technological tools in psychological assistance and well-being.

Despite the advances in this field, the existence of gaps in research on the integration of social robots in work and educational environments [30] as promoters of integral well- being is corroborated. This is because most research has focused on clinical populations or older adults, leaving aside its application in daily situations of high stress. In addition, the lack of evidence on the combination of psychological assistance

and promotion of well-being through robotics is highlighted, which justifies the performance of this systematic review.

Based on the above, this study seeks to answer the following research questions: What are the technologies used for psychological assistance and the promotion of integral well-being? What are the main challenges and opportunities in the implementation of robots in work environments to improve the quality of life of users? What are the main challenges and opportunities in the implementation of robots in educational environments to improve the quality of life of users?

The structure of the article is organized as follows: in the methodology section, the process of searching for and selecting studies for systematic review is described. Then, in the results and discussion section, the main findings on the effectiveness and applications of robots in psychological assistance and well- being are presented together with the analysis and comparison with previous literature in order to raise future implications. Finally, in the conclusions section, the key findings are synthesized and future lines of research are proposed to improve the application of these technologies in the field of well-being.

II. Background: Definition, Concepts and Previous Applications

AI-based psychological assistance involves the use of computational systems to provide emotional support [31], guide self-care processes, and promote mental well-being [32]. In recent years, AI has proven to be an effective resource for the early detection of psychological disorders [33] and digital intervention, with applications in therapeutic chatbots [25], virtual assistants and social robots [34]. Various technologies have been used to provide emotional support and reduce symptoms of anxiety and depression [35], offering an accessible alternative to traditional therapy. In addition, in the work and educational environment, the use of technological solutions to promote well-being, such as guided active breaks, has gained importance as a preventive strategy to reduce stress [36], [37] and improve the quality of life of users.

In this context, reference is made to social robots, which are mostly used for different stages of life, an application of them are the PARO (Therapeutic Robot for Older Adults) [38] and NAO (used in education and therapy) systems [39], which have shown a positive impact on reducing stress and increasing emotional commitment in people who use them. However, allusion is made to the different ages of its consumers, as it shows a clear distinction in the use of technology.

On the other hand, psychological assistance through digital platforms has transformed the way people access emotional support [40], [41]. Tools such as Qhali-bot have enabled more accessible and effective care [42], overcoming the barriers of time and space that traditionally limited access to mental health services. These systems provide ongoing support in everyday situations of stress, anxiety, or sadness [43], providing emotional guidance in times of need [44].

AI-assisted virtual therapies have emerged as an innovative solution to complement traditional psychological care [45]. By using advanced natural language processing and machine learning algorithms, these systems provide users with immediate and personalized emotional support. This approach has proven especially useful in situations where access to therapists is restricted or in times of crisis, ensuring that individuals can get the support they require in a timely manner.

III. Gaps in the Literature

Despite advances in research on social robots and their implementation in psychological assistance, there are limitations in the existing literature. One of the main constraints is the lack of longitudinal studies examining the long-term effects of robot use on mental well-being and adherence to therapies. In addition, numerous studies have been conducted with small samples or in highly controlled environments, making it difficult to generalize the results to diverse and representative situations of the general population. Likewise, a geographical bias in scientific production has been identified, with a greater concentration of studies in countries with advanced access to technology [54], [55], excluding countries with more limited technological infrastructure and resources [56].

In this sense, a deeper exploration of the integration of robots in work and educational contexts [73], [77] is required, addressing ethical and sociocultural aspects that influence their acceptance and effectiveness. Therefore, it is necessary to broaden the research focus towards the interaction between humans and robots in dynamic environments [69], [70], where the adaptability of these technologies is evaluated in real situations. Likewise, it is recommended to carry out comparative studies between different robotic platforms to identify the specific characteristics that contribute to a better response in psychological assistance and well-being. In this context, these lines of research will improve the current understanding of the impact of robots on mental health and optimize a design and application to maximize their benefits in the various areas.

IV. Materials and Methods

While interest in AI in healthcare is on the rise, studies on the impact of holistic wellness robots on psychological support and wellness promotion remain limited. Most research focuses on mental health chatbots or social robots for specific populations, such as children with autism or older adults. However, there is a gap in the literature on the integration of psychological assistance and active breaks in work and educational settings using robotics and AI, which highlights the need for a systematic review that synthesizes and evaluates the existing findings.

To address this gap in research, a systematic review based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol has been chosen. This approach ensures transparency and rigor in the collection, selection and analysis of existing scientific literature [46]. To do this, multiple indexed databases will be searched, using bibliometric tools to analyze trends and relationships between studies. The use of PRISMA in systematic reviews has been established as an effective methodological strategy to minimize bias and improve the replicability of findings. PRISMA has been widely used in studies on technological interventions in mental health, demonstrating its validity in the identification

and evaluation of relevant literature. In addition, compared to other methodologies such as narrative reviews or scoping reviews, PRISMA allows a more detailed analysis on the quality and relevance of the selected studies, which guarantees the robustness of the synthesis of the information.

A. Review Approach

High-impact scientific databases such as Scopus, IEEE Xplore, Web of Science and JSTOR will be searched, with the aim of ensuring broad and multidisciplinary coverage. In addition, bibliometric analysis tools such as VOSviewer and Bibliometrix will be used to identify trends in the literature, collaborative networks and thematic clusters within the framework of AI research applied to mental health and well- being. The selection of these databases is based on their recognition within the scientific community and their indexing of peer-reviewed articles in technology, psychology, and health. SCOPUS provides a global perspective on the impact of research at a global level [47], while IEEE Xplore allows for a more technical approach to the implementation of AI and robotics in health. On the other hand, Web of Science and JSTOR expand the scope to Social Sciences and applications in educational and work environments [48].

The keyword group used to check the title, abstract, and keywords of articles collected in the Scopus database: (TITLE-ABS-KEY (robot) OR TITLE-ABS-KEY (virtual AND assistant) AND TITLE-ABS-KEY (mental AND health) OR TITLE-ABS-KEY (psychological AND assistance) OR TITLE-ABS-KEY (therapy) OR TITLE-ABS-KEY (counseling) OR TITLE-ABS-KEY (psychology) AND TITLE-ABS-KEY (well-being) OR TITLE-ABS-KEY (emotional AND support))

The keyword group used to check the title, abstract, and keywords of articles collected in the IEEE Xplore database: ("Document Title":robot) AND ("Abstract":virtual) AND ("Abstract":assistant) AND ("Abstract":mental) AND ("Abstract":health) AND ("Abstract":p sychological) AND ("Abstract":well-being) OR ("Abstract":emotional) AND ("Abstract":support)

The keyword group used to check the title, abstract, and keywords of articles collected in the Web of Science database: ((TI= ("robot" AND "virtual" AND "assistant" AND ("mental" AND "health" OR "psychological" AND "assistance"))) OR (AB= ("robot" AND "virtual" AND "assistant" AND ("mental" AND "health" OR "psychological" AND "assistance"))) OR (AK= ("robot" AND "virtual" AND "assistant" AND ("mental" AND "health" OR "psychological" AND "assistance"))))

The keyword group used to check the title, abstract, and keywords of the articles collected in the JSTOR database: ((((((ti:"robot") AND (ab:"virtual")) AND (ab:"assistant")) AND (ab:"mental")) AND (ab:"health")) OR (ab:"psychological")) AND (ab:assistance)

Fig. 1 shows a flowchart that describes the various stages of the information selection process. The initial search yielded 454 Scopus publications, 132 IEEE Xplore publications, 359 Web of Science publications, and 120 JSTOR publications, making a total of 1,065 documents across all databases. In addition, a filtering by thematic area was carried out, which favored the inclusion of studies related to the analyzed topic. Next, the search criteria were limited to journal articles and systematic reviews. This is because journal articles are peer- reviewed and have greater support than other types of research. Likewise, the inclusion of the systematic reviews included in this analysis corresponds to the importance of their scope and information provided [49]. For this reason, other types of documents such as conference papers, book or patent chapters, editorial notes, letters and surveys were discarded, since they contribute very little to the results in the direction of this topic. The selected items do not have a time specification. After the search filter based on predefined inclusion and exclusion criteria, the number of relevant papers was 61 articles in Scopus, 90 articles in IEEE Xplore, 82 articles in Web of Science, and 44 articles in JSTOR. Subsequently, the titles and abstracts of each document obtained were examined to determine their relevance in the scope of this study. Finally, with a distribution of 27 from Scopus, 4 from IEEE Xplore, 7 from Web of Science and 3 from JSTOR; screening of titles and abstracts of these studies resulted in a total of 41 papers. The next stage of filtering involved using Mendeley, a reference manager, to remove duplicate articles. It was found that there were no duplicate documents and in such a case, the 41 relevant documents were retained for the in-depth review.

The selected databases allowed access to high-impact literature in different areas of knowledge. Likewise, the use of different databases was largely relevant for this study, since it allowed obtaining articles collected from different databases, not limiting themselves to a single one, nor following only one line of research. This is because SCOPUS provides citation metrics and impact analysis [47], while IEEE Xplore specializes in technology and computing. Web of Science expands access to emerging literature [48] and JSTOR offers psychology and social science studies. On the other hand, for bibliometric analysis, VOSviewer is used for the visualization of co-occurrence networks in keywords, co-authorship and collaboration by countries, while Bibliometrix will allow the quantitative analysis of trends and patterns in the reviewed literature.

As a result, a systematic review in this field is essential due to the diversity of research in multiple disciplines such as psychology, technology, and health sciences. The application of PRISMA will ensure a thorough analysis of the literature, allowing the identification of patterns, trends and gaps in research on the use of AI and robotics in psychological assistance and the promotion of well-being. This synthesis will contribute to the design of future research and the development of more effective and accessible technological solutions for stress management and mental health.

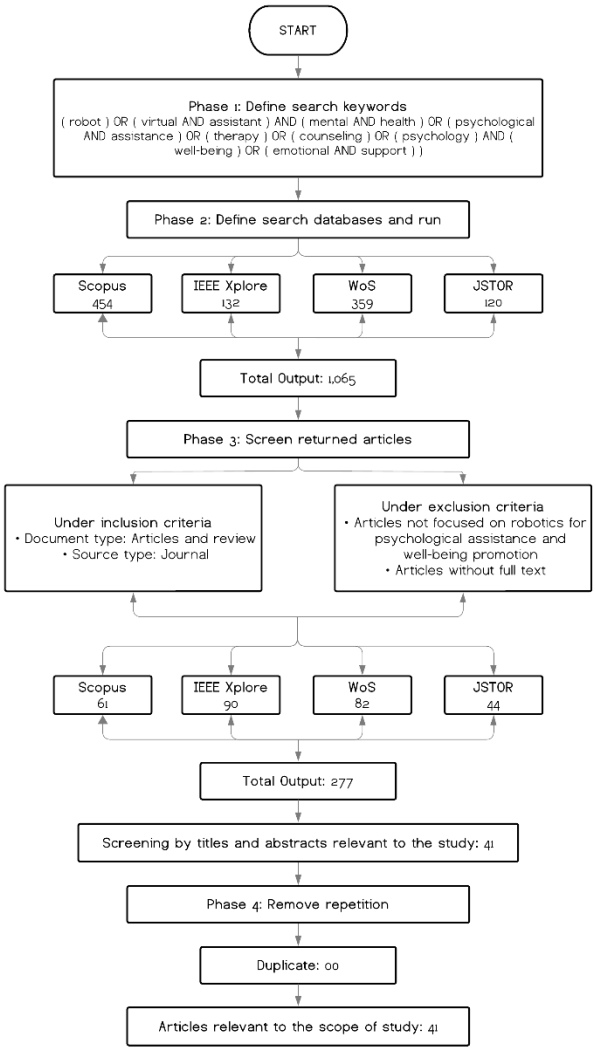

Fig. 1. PRISMA-based flowchart.

B. Analysis

The initial phase of the analysis consisted of the observation of the bibliometric data obtained from the selected databases. The frequency of publication of articles according to the year, the geographical location of the studies, the journals in which they were published and the research methods used were analyzed. Early findings suggest an increase in scientific output related to AI applied to mental health. The publications focus mainly on technology and psychology journals. Geographically, the studies come mainly from countries with a high development in AI and digital health, such as the United States and China. In terms of methodology, empirical studies based on controlled experiments and systematic reviews predominate, with a growing number of studies integrating biometric data analysis into well-being interventions.

To ensure a rigorous analysis of the included articles, the methodological approaches used in the literature were contrasted with the findings of this systematic review. Studies focused on chatbots [25] for mental health, digital therapies [45] and social robots [22], [23] were identified, highlighting the use of natural language processing techniques and biofeedback as main intervention strategies. Existing literature has explored approaches such as AI-assisted cognitive behavioral therapy [8], gamification in active breaks, and the use of biometric sensors to measure stress, supporting the rationale for the study. However, a lack of research combining psychological assistance and promotion of physical well-being through robotics was detected, which positions this systematic review as a key contribution to identify opportunities and gaps in the integration of these technological approaches in work and educational environments.

V. Results and Discussion

Bibliometric analysis of records obtained from Scopus, IEEE Xplore, Web of Science, and JSTOR facilitated the identification of key trends in AI research applied to psychological assistance and well-being. We examined the frequency of publications per year, the geographical distribution of studies, the most commonly used keywords and co-authorship networks between researchers. The results show an increase in scientific production in this field, with a significant peak in recent years. The United States and China stand out as the main contributors to the literature, and the most recurrent words include "robotics," "human," and "social robots." The analyses of co-authorship and international collaboration show consolidated research networks, with specific clusters of collaboration. This bibliometric analysis is considered an essential tool in systematic tools, as it allows evaluating the evolution of an area of study, identifying gaps in the literature and understanding the dynamics of scientific production, in order to provide an empirical basis for future research and technological developments in the area of well- being.

A. Bibliometric Analysis

Bibliometric analysis is a quantitative method that analyzes scientific production through indicators such as publications, citations, and collaboration networks, revealing trends and evaluating the impact of disciplines in the academic literature. To perform these analyses, specialized tools such as VOSviewer, Bibliometrix, CiteSpace and Gephi are used, which simplify the visualization of co-authorship networks, the co-occurrence of keywords and international collaboration. In the framework of this study, VOSviewer was used to visualize the relationships between keywords and authors [50], and Bibliometrix, implemented in R, to process large volumes of data and identify trends and citation patterns in the literature [51]. These tools make it possible to acquire a structured vision of the evolution of knowledge in a specific area, facilitating informed decision-making and strategic organization in information.

1) Keyword co-occurrence map: A keyword co-occurrence map is a graphical representation that shows the connections [52] and frequency with which some terms are found in the scientific literature, such as the titles, abstracts, and keywords of articles obtained from databases such as Scopus, IEEE Xplore, Web of Science, and JSTOR. These maps, created using clustering algorithms, facilitate the identification of the central themes of a field of study [50], and in turn, allow us to

understand the evolution and interconnection of concepts over time. This co-occurrence analysis is relevant in bibliometric reviews, especially in areas such as AI in health, where it helps to identify booming trends and gaps in research. In addition, this approach makes it easier to track the evolution of specific terms, as it highlights their growing relevance in fields such as digital psychology.

With the use of VOSviewer and a minimum of 3 keyword co-occurrences; 357 keywords co-occurred, and 3 significant clusters were identified. Fig. 2 shows a network visualization map of the 3 groups of co-occurring keywords with 27 elements, 166 links, and a total link strength of 298. The keywords that have the highest number of links are understood to be the most impactful and remarkable. The keywords with clearly larger nodes than the rest are "social robots", "robotics", "human" and "psychology". The size of a keyword shows the number of times it has been mentioned as an author keyword in research papers, while keywords close to it show its co- occurrence in research papers. Clusters are represented by colors and are indicators of keywords most often. In this case, the keywords "social robots", "well being", "human robot interaction", "mental health" and "socially assistive robots" are represented by the color red, which indicates that they are terms that co-occur frequently. This information can guide researchers when choosing the appropriate keywords in their papers, as it ensures more effective indexing and retrieval of research.

This bibliometric analysis shows that the study focuses on the development and use of robotic technology to enhance people's quality of life and mental health, in turn, it explores the complexity of the interaction between humans and robots in the recognition of emotions. The connection and size of the nodes in the analyses suggest an important interconnection between human-robot interaction, emotion recognition and quality of life, underscoring the relevance of a comprehensive approach in this emerging area.

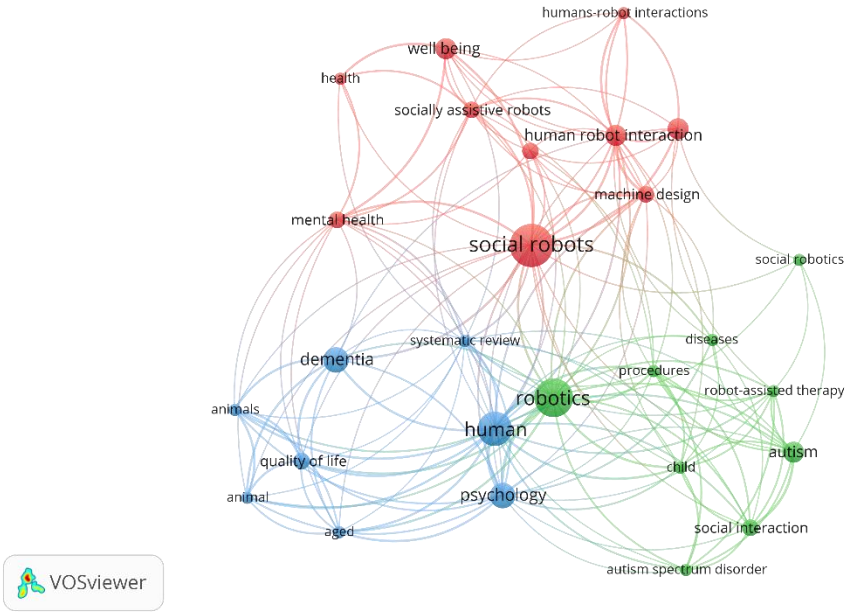

Fig. 2. Keyword co-occurrence map in VOSviewer.

2) International co-authorship map: Co-authorship analysis facilitates the identification of collaboration networks between researchers, revealing the structure of scientific production in an area of study [53]. This approach allows us to understand the formation of research communities and identify the influence of authors in the area.

The minimum number of documents identified in VOSviewer per author was set at 1 to filter the maximum co- authorship range, and in turn, analyze possible improvements in that aspect. This generated 189 authors, including the lead author and his co-authors. The largest set of connected articles was 13 documents. These connected elements generated 39 clusters and 499 links. The visualization co-authorship network in Fig. 3 shows researchers Aymerich- Franch L. and Moshayedi, A. J. as the most frequent collaborations. This co-authorship network represents an improvement in the collaborative capacities of a network of researchers at an international level, which means a great advance in the different areas.

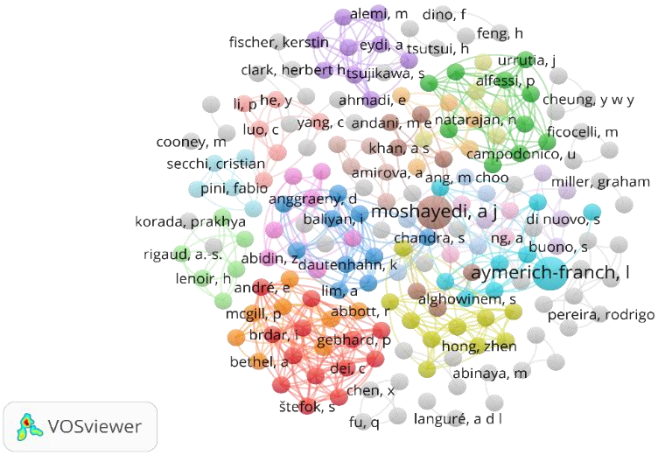

Fig. 3. Co-authoring map in VOSviewer.

3) Country collaboration map: The analysis of collaboration between countries facilitates the identification of scientific production at the global level, showing the leading countries in research in that field, and in turn, shows their minor representation of the subject.

Using the VOSviewer tool, the number of documents from a country was set at 3 documents, in order to maximize country analysis for further sustained identification. The number of countries detected by the VOSviewer software was 40 countries, of which 10 met the established criteria. Fig. 4 shows the countries active in research on robots for psychological assistance and promotion of well-being. These connected elements resulted in 5 clusters, 12 links, and a total bond strength of 15. As can be seen, the largest nodes represent China, the United States, the United Kingdom, and Italy. This indicates that researchers from these countries have contributed the most to studies on robotics in the application of psychological assistance and promotion of well-being.

These results are consistent with studies that have shown a geographical concentration of scientific production in countries with higher levels of investment in technology and innovation [54]. It found that nations in North America, Western Europe, and East Asia are leading the adoption of developing technologies [55], while places like Africa and Latin America face significant challenges due to limitations in infrastructure and financing [56].

On the other hand, research in countries such as China has been shown to be instrumental in the implementation of robotics in psychological care [57], with innovative approaches combining AI and robotic-assisted therapy [58]. However, the low representation of other countries in collaboration maps indicates the need to promote international collaboration and strengthen equitable access to these developments [59].

In summary, the strong concentration of research power in a few countries highlights the importance of promoting international cooperation projects [60] that facilitate the reduction of inequalities in access to technology and knowledge. Identifying these inequalities can guide funding policies and collaborative strategies that promote more equitable [61] and globally representative research on the use of robotics for psychological assistance and well-being.

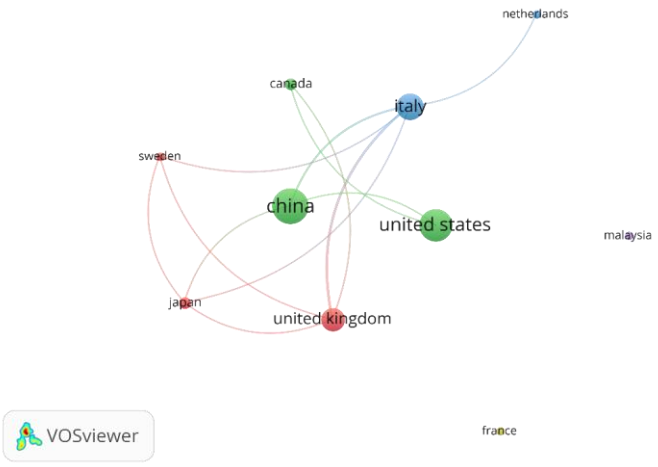

Fig. 4. Country co-occurrence map in VOSviewer.

4) Distribution of publications by year: The analysis of the distribution of publications over time allows us to identify trends and crucial moments in the evolution of an area of study.

Fig. 5 shows the number of articles published on the subject of robots for psychological assistance and promotion of well-being. It is observed that the number of articles published in 2015 was only one, which represents a minimum of interest in this type of topic. It is also observed that in the range from 2021 to 2023 there was a growth in terms of relevant investigations, with an average of 6. However, there is a boom in papers in 2024, with 10 publications, indicating an expected interest in this area, as emerging technologies are aligned with robotics and AI in conjunction with research.

This trend could be linked to the rapid advancement of smart technologies and their application in the mental health and wellness sector [62], [63]. In particular, the introduction of new AI-based tools has generated greater interest in the scientific community [64], as it represents efficient novelties in their daily lives, which drives their growth in this area. In addition, the boom shown in 2024 indicates greater investment in research and development, promoted by academic institutions or international organizations that aspire to strengthen the integration of robotics in psychological care.

On the other hand, the evolution of the number of publications over time reflects the impact of external factors, such as the COVID-19 pandemic, which accelerated the digitization of health services [65] and impacted the acceleration of the search for technological solutions for emotional well-being [66]. As the scientific community continues to explore the applications of robotics in this field, it is likely that the trend of publications will continue to grow, highlighting the need to generate interdisciplinary collaborations and supporting policies that facilitate the development and implementation of these technologies at a global level.

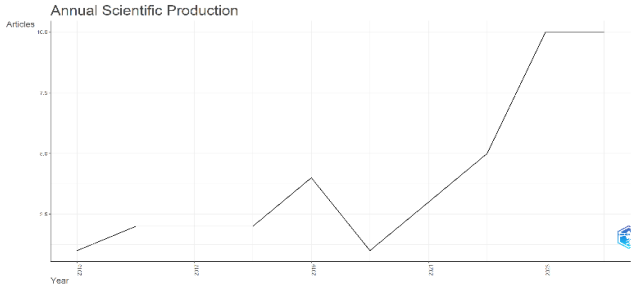

Fig. 5. Distribution of publications by year.

5) Distribution of publications by journals: The analysis of the distribution of publications by journals allows us to understand the disciplines that contribute to an area of research and their predominant approaches.

Fig. 6 shows the distribution of the articles included in the analysis by journal titles. It can be seen that the leaders in journaling in this area are Frontiers In Robotics And AI and IEEE Access with a total of four publications each, followed by ACM Transactions on Human-Robot Interaction, International Journal of Social Robotics and Journal Of Autism And Developmental Disorders with two publications each. The remaining journals in the analysis show one article each.

This analysis highlights the importance of certain journals in the dissemination of knowledge about robotics applied to psychological care. The journals with the largest number of publications have contributed significantly to the progress of the field, offering platforms for the exploration of new methodologies and technological applications. This pattern indicates that interest in robotics for psychological care is mainly driven by disciplines such as AI [67], [26], human-robot interaction [68], and mental health [27], which find in these journals an appropriate channel to disseminate their findings. In addition, the diversity of journals in the analysis reflects the interdisciplinary nature of this field of study, which points to the importance of cooperation between specialists from different areas to enhance future research and practical applications.

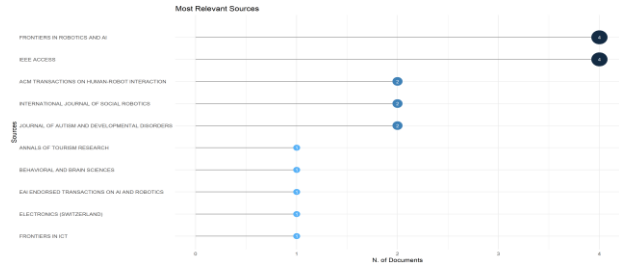

Fig. 6. Distribution of articles published by journal titles.

B. Content Review

The final analysis included 41 documents selected using the PRISMA methodology, covering studies on the use of social robots in psychological assistance and integral well-being. The selection focused on publications that investigated the technologies used, implementation in work and educational environments, as well as the associated challenges and opportunities. The thematic distribution reflected a predominance of research in computational psychology, AI applied to health, and social robotics, which allowed for a focused view of the problem. This approach allowed the review to be organized around three main questions, each in a well-founded manner.

- What are the technologies used for psychological assistance and the promotion of integral well-being?
- What are the main challenges and opportunities in the implementation of robots in work environments to improve the quality of life of users?
- What are the main challenges and opportunities in the implementation of robots in educational environments to improve the quality of life of users?

The above points focus on the design of a content review structure illustrated in Fig. 7 to guide a detailed, deductive, and systematic review of each document. This approach was explored in subsections, which offer a comprehensive overview of the state of robotics in psychological assistance and well-being promotion, related challenges, research gaps, and directions for future research.

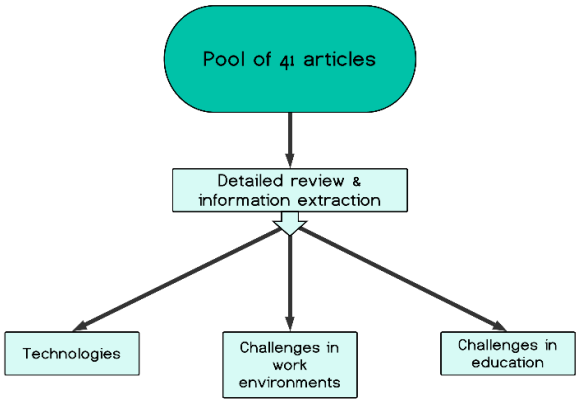

Fig. 7. Structure of the systematic content review.

1) Technologies used: Fig. 8 shows the distribution of 23 articles on technologies. This analysis of the filters obtained suggests a growing interest in the design of robots with social capabilities. Human-robot interaction highlights the importance of optimizing these interactions to improve the functionality and acceptance of the technology [69], [70]. On the other hand, the lower number of publications on robotic assistants in an applied way suggests that even in this area, although relevant, it is less explored, suggesting an opportunity for future research. Given this, it is considered necessary to promote interdisciplinary collaboration to ensure accessibility worldwide [71], in order to elevate advances in social robotics and turn them into adoption tools in psychological assistance and well-being. Taken together, these findings indicate that social robotics is expanding [72] and the multidisciplinary approach is essential to advance the integration of everyday life technologies.

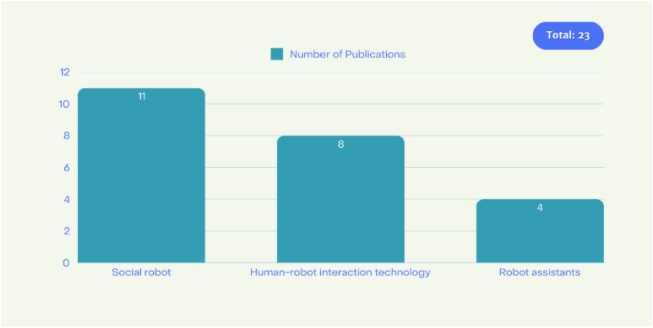

Fig. 8. Distribution of articles by technologies.

2) Challenges and opportunities in the implementation of robots in work environments: Deploying robots in work environments presents both challenges and opportunities [73]. One of the most significant challenges is the adaptation of workers to the integration of these systems [74], as resistance to change and the perception that robots could replace jobs in some industries have been identified [75]. However, automation and the use of robots in the workplace also offer multiple opportunities, such as improving worker safety by reducing exposure to hazardous environments and optimizing repetitive tasks to increase operational efficiency.

Fig. 9 shows an analysis indicating that robots in personal healthcare have proven to be particularly relevant in the care of patients with reduced mobility or chronic diseases, facilitating continuous monitoring of vital signs and providing support in daily activities. On the other hand, mental wellbeing coaches have been investigated as psychological support tools, offering AI-based therapies that have been shown to be effective in reducing stress and anxiety.

In interaction in industrial environments, robots have been used to increase safety in high-risk tasks, such as handling hazardous materials or working in extreme conditions [76]. Despite these advantages, there is still a need to address ethical and regulatory aspects in the application of these technologies, in order to ensure that their adoption is equitable and does not cause inequalities in access to automated tools in different work sectors. In this sense, the growth in research on robots in work environments shows a continuous interest in their ability to transform different industries. However, the effective implementation of these technologies requires a balanced approach that considers challenges and associated benefits, with the aim of promoting technological development that improves the quality of work and ensures the ethical and sustainable integration of robots in the workplace.

Fig. 9. Distribution of items by challenges in work environments.

3) Challenges and opportunities in the implementation of robots in educational environments: The use of robots in educational contexts presents challenges and opportunities that suggest that they should be addressed quickly [77], given the importance of education in the global aspect. In this sense, one of the main challenges is the acceptance of these technologies in the school and university environment, since their implementation requires a process of adaptation for both teachers [78] and students [79]. Fig. 10 shows an analysis in which robots have proven to be valuable tools in various areas, including improving the health and well-being of students, supporting the early identification of mental disorders, and promoting emotional health.

In the health and wellbeing sector, robots have been used as assistants in teaching strategies to cope with stress and anxiety [34], providing support to students in periods of high academic

load. Likewise, the identification of mental disorders using AI- equipped robots has made it possible to identify patterns of behavior linked to disorders such as depression and anxiety [28], [29], which promotes early and timely interventions.

In the area of emotional health, robots have been used in educational contexts as facilitators of social interaction [22], particularly in students with communication problems. In addition, it has been identified that these devices can generate a positive impact on the emotional management of students and promote the acquisition of social skills for their integral development. While the integration of robots into educational environments offers numerous benefits, challenges remain to be addressed in terms of user accessibility from a psychological perspective, ethical considerations regarding data use, and student data privacy. Accordingly, research in this field continues to advance, so it is essential to ensure an inclusive approach that maximizes the potential of these technologies for the well-being and education of future generations.

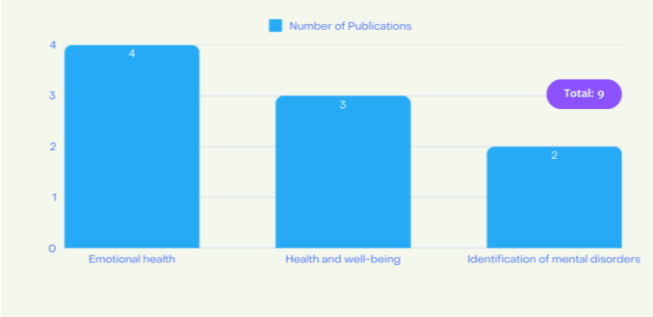

Fig. 10. Distribution of articles by challenges in educational settings.

VI. Conclusion

This study's analysis revealed a steady increase in the number of publications on the topic since 2020, indicating growing interest and considerable investment in research related to robotics and AI in the context of mental health, driven by technological advances and the need for innovative solutions in a critical field such as psychological well-being.

The studies analyzed identified the United States and China as the main contributors to this literature, showing a geographic concentration that highlights inequalities in scientific production. The review also notes that the most frequently used keywords were "robotics," "human," and "social robots," reflecting the central themes prevailing in current studies and offering guidance for future research. Furthermore, the collaboration between authors such as Aymerich-Franch L. and Moshayedi A. J. points to a strengthening of the collective dynamic, essential for the advancement of knowledge. This collaborative approach is essential to addressing the ethical and practical challenges associated with the implementation of robotic technologies in workplace and educational settings.

These results indicate that, while significant progress has been made, there are still underexplored areas that require attention, such as the design of robots with more advanced social capabilities and their effective integration into work and educational settings. In this sense, this bibliometric analysis provides a structured perspective on the evolution of knowledge in the field of AI applied to psychological assistance and establishes a framework for future research.

Finally, it is crucial to continue researching the ethical and practical implications of the use of these technologies, ensuring that their development is carried out in an inclusive and equitable manner. As we move towards a future where robotics and AI play a greater role in our daily lives, it is crucial to promote interdisciplinary collaborations that strengthen the positive impact of these innovations on human well-being.

VII. Considerations for Future Research

- Consider comparing the effectiveness of different types of robots and AI technologies in various environments and populations.
- Investigate the efficiency of different interaction modalities, such as virtual exposure therapy or social skills training tailored to each person's specific needs.
- To develop innovative tools to assess the performance and acceptance of robots in psychological care.
- Evaluate the impact of AI-based robots compared to traditional methods, such as therapies or self-help apps.
- Explore the integration of technologies such as Augmented Reality and biometric feedback to improve human-robot interaction.
- Investigate factors that contribute to acceptance and trust in robots, as therapists, the potential risks and ethical challenges associated with their use.

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