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Perspectives of Speech and Language pathologists in Palestine on the Future Role of Artificial Intelligence in Speech and Language Pathology

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Abstract:
Integrating Artificial Intelligence (AI) in healthcare is transforming various fields, including speech and language pathology. Understanding the perspectives of speech and language pathologists (SLPs) on AI is crucial for identifying future developments and improvements in this domain. This study aims to provide a comprehensive understanding of how SLPs in

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Palestine view the future role of AI in their field and to inform potential developments and improvements in speech and language pathology. A questionnaire was designed and distributed to 357 SLPs across Palestine. The questionnaire assessed current AI usage, anticipated challenges and opportunities, and future and ethical considerations related to AI in speech and language therapy. The mean score for current AI usage was 27.43 (SD = 6.61) out of 45. Most respondents were familiar with AI-based speech recognition tools (73.9%) and confident in their accuracy (70%), but few followed AI developments (9.8%) or planned to adopt new AI techniques soon (14.2%). Age significantly affected AI application, with the 31-40 age groups showing higher engagement. Educational level and work experience did not show significant effects. The mean score for challenges and opportunities was 23.6 (SD = 4.32) out of 35. A majority believed AI would significantly contribute to research (73.7%) and enhance therapy efficiency (65%). Educational level significantly influenced expectations, with master's degree holders showing greater positivity. The mean score for future and ethical considerations was 27.91 (SD = 4.11) out of 40. The need for additional training was highly emphasized (86.6%), along with AI complementing SLPs in decision-making (70.3%). There was a universal concern for ethical considerations, with a positive correlation found between familiarity with AI and awareness of its challenges and ethical implications.

The findings highlight the need for targeted training programs to enhance AI adoption across all age groups and educational backgrounds in Palestine. Ethical guidelines and transparency in AI systems are critical for building trust among professionals.

Keywords: Artificial Intelligence, Speech and Language Pathologists, AI Integration, Ethical Considerations, Professional Training, Healthcare Technology.

Introduction:

Artificial intelligence (AI) is revolutionizing clinical practice by delivering innovative tools that significantly enhance patient outcomes. These technological advancements make speech therapy more efficient and effective, benefiting patients and practitioners alike. AI has brought substantial improvements to clinical documentation by automating various tasks, such as objective evaluations and documentation processes [1]

In speech therapy, AI technologies, such as automatic speech recognition for dysarthric speech, Eulerian video magnification for subtle cues, and digital phenotyping for

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continuous symptom monitoring, have revolutionized patient care. Virtual reality assists in communication practice, gamification enhances engagement, and specialized apps like Stamurai provide customized exercises for assessing emotional well-being. Evidence-based voice therapy now incorporates voice-controlled models, ensuring more efficient and dynamic patient care [2, 3].

AI is quick and accurate, greatly improving documentation and enabling the creation of customized exercises based on speech-language pathologists' (SLPs') suggestions. It excels as a data analyzer, effectively gathering and organizing data to spot changes in communication patterns and provide real-time biofeedback during speech. AI's ability to deliver client-centered care is one of its main advantages, as it can provide precise insights into each patient's needs and treatment goals [3,4]

However, integrating AI into speech therapy faces challenges, such as the need for widespread broadband internet connectivity and rigorous testing of emerging technologies. Future research should evaluate AI applications in real-world contexts, including virtual reality, to ensure their effectiveness. The adoption of telepractice is hindered by outdated licensing requirements for SLPs, but recent efforts aim to improve license portability and reduce regulatory obstacles. During the COVID-19 pandemic, the reimbursement model for home visits remains uncertain, necessitating a shift to rely on monthly payments [5,6]

Speech therapists are increasingly recognizing the transformative potential of AI, with studies highlighting its applications in speech recognition and cognitive behavioral therapy. However, ethical concerns about AI's use in identifying and framing autistic individuals raise questions about its implications. This has prompted a shift towards a more relational ethical framework in AI use [5,7].

In summary, while AI holds great promise in transforming speech therapy, addressing technical, regulatory, and ethical challenges is crucial for realizing its full potential and ultimately providing more effective and accessible care.

Problem of the Study:

The research problem arose due to the rapid technological development that has entered into all areas of our lives, which, with its development in the field of speech, has led to a change in the role of the speech and language therapist.

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With the increasing development of technology and the emergence of new daily devices, it has become very difficult to dispense with them. At the same time, the profession of a speech pathologist requires keeping up with any small development in society so that it can perform its job better. Failure to keep up with these developments leads to a reduction in the quality of services, in particular. Artificial intelligence plays a large and important role in solving some problems and improving performance in diverse aspects of life, encompassing rehabilitation and healthcare services, this includes speech and language therapy.

Significance of the Study:

This study is significant as it aims to enhance the quality of speech and language therapy services in Palestine by being the first of its kind to explore the perspectives of local Speech and Language Pathologists (SLPs) on the integration of artificial intelligence (AI). By understanding SLPs' viewpoints, the research seeks to shape the direction of technological advancements in diagnosing and treating speech and language disorders, supporting continuous professional development and informing policy and strategic planning. This exploration holds the potential to inform the development of AI-driven tools and interventions, providing culturally relevant insights, addressing ethical and practical considerations, and highlighting innovative solutions like tele practice. Ultimately, this study bridges the gap between technological advancements and clinical practice, ensuring that AI integration enhances therapy effectiveness and aligns with the professional needs of Palestinian SLPs, thereby consistently improving services in speech and language pathology.

Objectives:

- Investigate the current application and future perspectives of Artificial Intelligence by Speech and Language Pathologists in Palestine, including their awareness, knowledge, and training needs.
- Identify the challenges and opportunities in integrating Artificial Intelligence into Speech and Language Therapy in Palestine, considering cultural and contextual factors.
- Evaluate ethical considerations related to the use of Artificial Intelligence in speech and language therapy, ensuring responsible and beneficial implementation.

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 Assess the accessibility and affordability of AI technologies for Speech and Language Pathologists in Palestine, addressing potential barriers.

 Provide recommendations for the development and implementation of Artificial Intelligence in Speech and Language Pathology in Palestine, aimed at enhancing the effectiveness and efficiency of therapy, and improving job satisfaction for Speech and Language Pathologists.

Purpose of the Study:

Provide a comprehensive understanding of how speech and language pathologists in Palestine view the future role of artificial intelligence in their field and to inform potential developments and improvements in this domain.

The current study attempted to answer the following questions:

Questions of the Study:

1.How are Speech and Language Pathologists in Palestine currently using Artificial Intelligence in their practice, and what technologies are they utilizing?

2.What challenges and opportunities do Speech and Language Pathologists in Palestine anticipate in integrating Artificial Intelligence into Speech and Language Therapy in the future?

3.How do Speech and Language Pathologists in Palestine see Artificial Intelligence shaping the future of their field, and what ethical considerations do they emphasize in this context?

Methodology:

Study Design:

This study employed a descriptive survey design to explore the perspectives of Speech and Language Pathologists (SLPs) in Palestine regarding the future role of Artificial Intelligence (AI) in their field. The primary tool for data collection was a meticulously developed questionnaire designed by the researchers based on extensive review of previous studies and educational literature.

Instrumentation:

The questionnaire (See Appendix 1) underwent several stages of scrutiny and refinement to ensure its validity and reliability:

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1. **Initial Development**: The initial draft of the questionnaire was created by the researchers, referencing existing studies and educational resources related to AI and speech-language pathology.

2.**Expert Review**: The draft questionnaire was then presented to a committee of experts in the field for arbitration. Feedback from this committee was incorporated to refine the questions and structure.

3.**Pilot Testing**: Before final distribution, the questionnaire was pilot-tested with a small group of SLPs to identify any ambiguities or issues. Adjustments were made based on their feedback.

4.**Final Form**: The final version of the questionnaire was prepared for distribution, ensuring clarity and comprehensiveness.

Questionnaire Structure:

The final questionnaire consisted of three dimensions:

- Dimension 1: AI Techniques in the Practice of Speech and Language Science in Palestine (9 questions)
- Dimension 2: Challenges and Expectations of SLPs in Palestine in Integrating AI into Speech and Language Therapy (7 questions)
- Dimension 3: Vision of SLPs in Palestine About the Future of AI and Ethical Considerations (8 questions)

Each question in the questionnaire utilized a five-point Likert scale to measure respondents' attitudes and perceptions, ranging from "Strongly Disagree" to "Strongly Agree".

Data Collection:

Given the current circumstances and the difficulty of reaching specialists across different parts of the country, the questionnaire was distributed online. This approach facilitated widespread participation and convenience for respondents.

Participants:

The study targeted SLPs practicing in Palestine. The total number of respondents who participated in the study was 357 specialists. Participation was voluntary, and informed consent was obtained from all respondents.

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Ethical Considerations:

Ethical approval for the study was obtained from the Institutional Review Board (IRB). (See Appendix 2) The study adhered to ethical standards, ensuring the confidentiality and anonymity of the participants' responses.

Data Analysis:

Data collected from the questionnaires (See Appendix No.2 and No.3) were analyzed using descriptive statistics to summarize the responses. Frequencies, percentages, means, and standard deviations were used to interpret the data. Further statistical analysis, such as chi-square tests or ANOVA, may have been employed to examine the relationships between the study variables and the dimensions of the questionnaire.

Study Limitations:

The limitations of this study include human, temporal, and spatial factors:

- **Human Limitations**: The study was restricted to Speech and Language Pathologists in Palestine, limiting the generalizability of findings to other regions or countries.
- **Temporal Limitations**: Data collection occurred during the academic year 2023-2024, and perspectives may evolve with advancements in technology and changes in clinical practices over time.
- **Spatial Limitations**: The study was confined to Speech and Language Pathologists practicing in Palestine, potentially impacting the diversity of perspectives from a broader international context.

The study acknowledges potential limitations, such as the reliance on self-reported data and the challenges of online distribution, which may affect the response rate and representativeness. However, the large sample size of 357 participants provides a robust dataset for analysis.

Results:

Demographic Characteristics:

About 357 speech-language pathologists participated in the current study. The majority of them (95.2) were aged 20-30 years old, nearly 91% held a bachelor's education, and 86% had less than three years of work experience. Other related information is shown in Table1.

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Table 1: **Demographic Characteristics of participants** (**n = 357**).

Variable	Frequency	Percent
Age		
20-30 Years old	340	95.2
31-40 Years old	11	3.1
41-50 Years old	6	1.7
Education Level		
Diploma	15	4.2
Bachelor	326	91.3
Master	14	3.9
Doctorate	2	.6
Work Experience		
0-3 Years	307	86.0
4-10 Years	40	11.2
11-20 Years	8	2.2
21-30 Years	2	.6

Results of question one: **How are Speech and Language Pathologists in Palestine currently using Artificial Intelligence in their practice**, **and what technologies are they utilizing?**

This section has nine items. The mean score was 27.43 (SD = 6.61) out of 45. The highest agreed question (Figure 1) was about having sufficient familiarity with artificial intelligence-based speech recognition tools to assess and treat speech and language (73.9%) disorders followed by the feeling of being confident in the accuracy and reliability of artificial intelligence-based tools for assessing speech and language (70%). The lowest agreement was about following developments in the field of artificial intelligence and its use in treating speech and language disorders in Palestine (9.8%), followed by adopting new artificial intelligence techniques in your practice of therapeutic plans soon (14.2%). All other details are listed in Table 2.

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The application of AI was given mostly moderate agreement (38.1%), about 33.1% low agreement, and 28.6% high agreement.

Table 2: **Responses related to Applications and Techniques of Artificial Intelligence Technologies in the Practice of Speech and Language Pathology in Palestine** (**n = 357**).

No	Item	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)
1)	Have you ever used artificial intelligence techniques in treating speech and language disorders?	27 (7.6)	119 (33.3)	119 (33.3)	70 (19.6)	22 (6.2)
2)	Do you have sufficient familiarity with artificial intelligence-based speech recognition tools to assess and treat speech and language disorders?	70 (19.6)	194 (54.3)	64 (17.9)	25 (7)	4 (1.1)
3)	Do you believe that artificial intelligence can enhance the efficiency of assessing speech and language disorders and improve the effectiveness of therapeutic interventions?	20 (5.6)	98 (27.5)	126 (35.3)	91 (26.1)	20 (5.6)
4)	Does the speech and language pathologist have sufficient understanding of how to use artificial intelligence in treating various speech and language problems?	13 (3.6)	87 (24.4)	110 (30.8)	109 (30.8)	38 (10.6)
5)	Do you follow developments in the field of artificial intelligence	4 (1.1)	31 (8.7)	50 (14)	179 (50.1)	93 (26.1)

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	and its use in treating speech and language disorders in Palestine?					
6)	Have you received training in using artificial intelligence techniques in the practice of speech and language?	10 (2.8)	85 (23.8)	170 (47.6)	71 (19.9)	21 (5.9)
7)	Are you confident in the accuracy and reliability of artificial intelligence-based tools for assessing speech and language?	50 (14)	200 (56)	67 (18.8)	27 (7.6)	13 (3.6)
8)	Do you believe that artificial intelligence can significantly contribute to personalized therapy plans for individuals with speech and language disorders?	37 (10.4)	189 (52.9)	92 (25.8)	27 (7.6)	12 (3.4)
9)	Do you think you will adopt new artificial intelligence techniques in your practice of therapeutic plans in the near future?	8 (2.2)	43 (12)	58 (16.2)	174 (48.7)	74 (20.7)

One-way ANOVA test was used to compare the effects of different age categories on Applications and Techniques of Artificial Intelligence Technologies in the Practice of Speech and Language Pathology in Palestine. An analysis of variance showed that the effect of age was significant, $F(2,354) = 3.675$, $p = .026$. Post hoc analyses using the Tukey HSD indicated that age group 31-40 years had higher mean score compared to 20-30 years old (31.18 ± 4.45, 27.26 ± 5.6, respectively). However, when comparing educational level, there was not statistically significant effect $F(3,353) = 1.604$, $p = .188$. Similarly, work experience was not statistically significant $F(3,353) = 1.825$, $p = .142$.

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Results of question two: What challenges and opportunities do Speech and Language Pathologists in Palestine anticipate in integrating Artificial Intelligence into Speech and Language Therapy in the future?

Table 3: Responses related to Artificial Intelligence Challenges and Expectations of Speech and Language Pathologists in Palestine (n = 357).

No.	Item	Very High n (%)	High n (%)	Moderate n (%)	Low n (%)	Very Low n (%)
1)	I feel concerned about the potential loss of human intervention in therapy sessions when integrating artificial intelligence techniques.	63 (17.6)	124 (34.7)	87 (24.4)	64 (17.9)	19 (5.3)
2)	I trust in the safety and privacy of data when using artificial intelligence techniques in speech and language therapy.	25 (7)	134 (37.5)	124 (34.7)	57 (16)	17 (4.8)
3)	Overall, I believe that artificial intelligence enhances the efficiency of speech and language therapy services by improving assessment and intervention processes.	36 (10.1)	196 (54.9)	91 (25.5)	23 (6.4)	11 (3.1)
4)	I strongly anticipate that artificial intelligence will have the ability to provide personalized interventions and procedures tailored to each individual's condition and specific speech and language problems.	36 (10.1)	152 (42.6)	105 (29.4)	54 (15.1)	10 (2.8)
5)	I consider artificial intelligence to be a good means to enhance speech and language disorder services and address deficiencies in some areas of Palestine.	32 (9)	192 (53.8)	90 (25.2)	36 (10.1)	7 (2)
6)	I believe that artificial intelligence will significantly contribute to progress in research and understanding speech and language disorders.	47 (13.2)	216 (60.5)	65 (18.2)	22 (6.2)	7 (2)
7)	I believe that we should cease using artificial intelligence techniques in the field of speech and language therapy.	20 (5.6)	45 (12.6)	110 (30.8)	149 (41.7)	33 (9.2)

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The mean score of responses was 23.6 ± 4.32 out of 35. The highest expectation (Figure 2) was about believing that artificial intelligence will significantly contribute to progress in research and understanding speech and language disorders (73.7%), followed by believing that artificial intelligence enhances the efficiency of speech and language therapy services by improving assessment and intervention processes (65%). However, the lowest expectation was about believing that we should cease using artificial intelligence techniques in the field of speech and language therapy (18.2%). More details are available in Table 3.

When categorizing the challenges and expectations, about 39.5% had a moderate positive agreement, about 35% low, and 25.5% had a high positive agreement.

Analysis of variance was used to compare the effects of different age categories on AI Challenges and Expectations of Speech and Language Pathologists in Palestine. The results showed that the effect of age was not statistically significant $F(2,354) = 1.384$, $p = .252$.

The educational level showed a statistically significant effect $F(3,353) = 3.600$, $p = .014$. Post-hoc tests were conducted using Tukey's HSD procedure to determine which groups had significantly different means. The adjusted alpha level used to control for Type I error was .05. Results showed that master holders had a significantly higher mean ($M = 26.57$, $SD = 4.03$) than Diploma holders ($M = 22.13$, $SD = 5.77$; $p = .028$). Also, there was a significant difference in means between master holders and bachelor holders ($M = 23.51$, $SD = 4.21$; $p = .045$). However, work experience did show statistically different effect $F(3,353) = 2.405$, $p = .067$.

Results of question three: **How do Speech and Language Pathologists in Palestine see Artificial Intelligence shaping the future of their field**, **and what ethical considerations do they emphasize in this context?**

The mean score related to AI future and ethical considerations in using AI was 27.91 (SD = 4.11) out of 40. As shown in Figure 3, participants gave the highest score to the item "For the effective integration of artificial intelligence into speech and language disorders in Palestine, there will be a need for additional training and education for specialists" (86.6%), followed by AI should complement the role of speech and language pathologists in decision-making processes rather than replacing them (70.3%). The lowest score on agreements was that AI systems used for treating speech and language disorders should

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prioritize transparency and explanation to ensure trust among professionals (43.1%). Other related information is shown in table 4.

About 41.5% had low positive agreement regarding future and ethical considerations of AI, followed by 33.6% for moderate, and 24.9% for high positive agreement.

Table 4: **Responses related to future of Artificial Intelligence and Ethical Considerations in the Use of Artificial Intelligence in Speech and Language Disorders Therapy** (**n = 357**).

No.	Item	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)
1)	Artificial intelligence could potentially represent a promising future for the field of speech and language disorders in Palestine.	42 (11.8)	189 (52.9)	92 (25.8)	28 (7.8)	6 (1.7)
2)	You have a great deal of optimism about the potential positive contributions of artificial intelligence in the field of speech and language disorders in Palestine?	43 (12)	178 (49.9)	100 (28)	32 (9)	4 (1.1)
3)	For the effective integration of artificial intelligence into speech and language disorders in Palestine, there will be a need for additional training and education for specialists?	158 (44.3)	151 (42.3)	35 (9.8)	11 (3.1)	2 (.6)
4)	There is significant concern about potential biases in artificial intelligence algorithms that affect the assessment and treatment of individuals from diverse cultural and linguistic backgrounds.	45 (12.6)	161 (45.1)	121 (33.9)	27 (7.6)	3 (.8)

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No.	Item	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)
5)	Artificial intelligence systems used for treating speech and language disorders should prioritize transparency and explanation to ensure trust among professionals?	26 (7.3)	127 (35.8)	152 (42.6)	47 (13.2)	5 (1.4)
6)	Artificial intelligence techniques should respect privacy and confidentiality when applied in the treatment of speech and language disorders?	30 (8.4)	166 (46.5)	119 (33.3)	35 (9.8)	7 (2)
7)	Artificial intelligence should complement the role of speech and language pathologists in decision-making processes rather than replacing them?	88 (24.6)	163 (45.7)	53 (14.8)	35 (9.8)	18 (5)
8)	I benefit greatly from the suggestions and recommendations of artificial intelligence in making my clinical decisions in the treatment of speech and language disorders.	36 (10.1)	136 (38.1)	127 (35.6)	46 (12.9)	12 (3.4)

Analysis of variance was used to compare the effects of different age categories on Future of AI and Ethical Considerations in the Use of AI in Speech and Language Disorders Therapy. The results showed that the effect of age was not significant $F(2,354) = 1.951$, $p = .144$. In addition, the education level was not statistically significant $F(3,353) = 2.527$, $p = .057$. Similarly, work experience was not significant $F(3,353) = 1.412$, $p = .239$.

A Pearson correlation coefficient was computed to assess the linear relationship between Current Applications and Techniques of AI and challenges and expectations, and

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perspectives and ethical considerations. There was a positive correlation between the [current applications and techniques of AI] and [challenges and expectations], r(355) = .583, p = .000. Additionally, there was a positive correlation between the [current applications and techniques of AI] and [perspectives and ethical considerations], r(355) = .533, p = .000. Also, there was a positive correlation between the [challenges and expectations] and [perspectives and ethical considerations], r(355) = .707, p = .000 (Table 5).

Table 5: **A Pearson correlation coefficient of the outcome variables** (**n = 357**).

Variable	[1]	[2]	[3]
[1] Artificial Intelligence Technologies in the Practice of Speech and Language Pathology in Palestine: Current Applications and Techniques	1		
[2] Challenges and Expectations of Speech and Language Pathologists in Palestine Regarding the Integration of Artificial Intelligence in Speech and Language Therapy in the Future	.583**	1	
[3] Perspectives of Speech and Language Pathologists in Palestine on the Future of Artificial Intelligence and Ethical Considerations in the Use of Artificial Intelligence in Speech and Language Disorders Therapy	.533**	.707**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Discussion:

Discussion of the result of the first question: How are Speech and Language Pathologists in Palestine currently using Artificial Intelligence in their practice, and what technologies are they utilizing.

The results indicate that while there is moderate to high familiarity and confidence among Speech and Language Pathologists (SLPs) in Palestine with AI-based speech recognition tools, there is limited engagement in following developments and adopting new AI techniques. This contrasts with studies from more technologically advanced regions where SLPs exhibit higher rates of AI adoption and continuous professional development in AI applications. The significant impact of age, with the 31-40 age groups showing greater engagement, aligns with research suggesting that mid-career professionals are more adept at integrating new technologies compared to younger practitioners who may lack experience or older ones who may resist change [8, 9]. The lack of significant

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differences based on educational level or work experience suggests that familiarity with AI is more influenced by individual exposure and interest rather than formal training, corroborating findings from similar studies in other contexts. This indicates a need for targeted training programs to enhance AI adoption across all demographic groups in Palestine [10, 11].

Discussion of the result of the second question: **What challenges and opportunities do Speech and Language Pathologists in Palestine anticipate in integrating Artificial Intelligence into Speech and Language Therapy in the future?**

The findings reveal that while SLPs in Palestine have high expectations for AI's potential to advance research and enhance therapy efficiency, there is still a minority skeptical about its utility. The lack of a significant age-related effect aligns with research suggesting that enthusiasm for AI may be broadly distributed across different age groups. However, the significant impact of educational level, with master's degree holders showing greater positivity towards AI, supports studies indicating that higher education levels often correlate with greater openness to and understanding of advanced technologies [12, 13]. The non-significant impact of work experience contrasts with some literature that suggests more experienced practitioners might be more resistant to new technologies due to entrenched practices. These results highlight the need for continuous education and targeted AI training programs to bridge the gap across different educational backgrounds in Palestine [14].

Discussion of the result of the third question: **How do Speech and Language Pathologists in Palestine see Artificial Intelligence shaping the future of their field**, **and what ethical considerations do they emphasize in this context?**

The findings indicate that while there is a strong consensus on the need for additional training for effective AI integration and a belief that AI should support rather than replace SLPs, there is less agreement on the importance of transparency and explanation in AI systems. This aligns with previous studies that highlight a general apprehension about AI transparency and its ethical implications in healthcare. The lack of significant differences based on age, education level, or work experience suggests **that views on AI's future**

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and ethical considerations are broadly consistent across demographic groups, which is consistent with some research indicating that concerns about AI ethics and the need for education are universal among professionals. The positive correlations between current AI applications, challenges and expectations, and ethical considerations suggest that those more familiar with AI's practical use are also more cognizant of its potential challenges and ethical issues, reflecting findings in the broader AI ethics literature that experience with AI often heightens awareness of its complexities and ethical dimensions [15,16,17].

Conclusion:

The study explored the current use, expectations, and ethical considerations of Artificial Intelligence (AI) among Speech and Language Pathologists (SLPs) in Palestine, revealing several key insights. SLPs demonstrate moderate familiarity and confidence in AI-based tools, particularly speech recognition systems, but show limited engagement in staying updated with AI advancements or adopting new techniques. Age significantly impacts AI application, with the 31-40 age groups showing higher engagement, while educational level and work experience do not show significant effects. These findings underscore the necessity for targeted training programs to boost AI adoption across all age groups in Palestine. In addition, SLPs have high expectations for AI's potential to advance research and enhance the efficiency of speech and language therapy services, though a minority remains skeptical about its utility. Educational level significantly influences these expectations, with master's degree holders showing greater positivity towards AI, while age and work experience do not. This suggests that higher education correlates with greater openness to AI, emphasizing the importance of continuous education to foster a positive outlook towards AI among all educational backgrounds.

To conclude, while there is strong agreement on the need for additional training and the complementary role of AI in decision-making, there are fewer consensuses on the importance of transparency in AI systems. The study found no significant differences in views on AI's future and ethical considerations based on age, education level, or work experience, indicating consistent concerns across demographic groups. The positive correlations between current AI applications, challenges and expectations, and ethical considerations highlight that familiarity with AI's practical use increases awareness of its

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potential challenges and ethical implications. Overall, these results highlight the importance of tailored educational programs and ethical guidelines to facilitate the effective integration of AI in speech and language pathology in Palestine.

Limitations:

- The sample may not fully represent all SLPs in Palestine, potentially limiting the generalizability of the findings.
- Data based on self-reported measures might introduce bias, as participants may overestimate or underestimate their familiarity and confidence with AI.
- The fast pace of AI development means that findings may quickly become outdated as new technologies and practices emerge.
- Differences in access to AI technologies and resources across various regions of Palestine may affect the applicability of the findings.

Recommendations:

- Implement continuous education and training programs tailored to different age groups and educational levels to enhance AI adoption.
- Encourage SLPs to stay updated with AI advancements through workshops, seminars, and professional courses.
- Develop comprehensive ethical guidelines that address transparency, accountability, and trust in AI systems used in speech and language therapy.
- Ensure equitable access to AI technologies and resources across all regions to minimize disparities and enhance the effectiveness of AI integration.
- Foster collaborations between SLPs, AI developers, and researchers to create AI tools that are practical, reliable, and ethically sound.
- Advocate for policies that support the integration of AI in speech and language pathology, including funding for research and development and support for ongoing professional education.

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Appendices

Appendix 1

An-Najah National University
Faculty of Medicine & Health Sciences
Institutional Review Board

جامعة النجاح الوطنية
كلية الطب و علوم الصحة
لجنة اخلاقي البحث العلمي

Ref:H.S.P. Feb. 2024/5

IRB Approval Letter

Title of Research:

Perspectives of Speech and language pathologist in Palestine on the future Role of Artificial Intelligence in speech and language therapy

Submitted by:

Mohammad Alfaqeh, Kareem Baniodeh, Noor Sharabati, Nadeen Jubran, Malak Hussein, Mohammad Hamadeh

Supervisor:
Hala Jarrar

Approved:
5th Feb.. 2024

Your Study Title "**Perspectives of Speech and language pathologist in Palestine on the future Role of Artificial Intelligence in speech and language therapy.**" reviewed by An-Najah National University IRB committee and was approved on 5th Feb. 2024.

Hasan Fitian, MD

IRB Committee Chairman

IRB Institutional Review Board

Nablus - P.O Box :7 or 707 | Tel (970) (09) 2342902/4/7/8/14 | Faximile (970) (09) 2342910| E-mail : IRB@najah.edu

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Demographic data:

Please tick (V) in the box that represents your answer.

- **Lifetime:**

☐ 20-30 years ☐ 31-40 years ☐ 41-50 years

- **Gender:**

☐Male.

☐ Female.

- **Academic Level:**

☐diploma

☐Bachelor

☐Master

☐Doctor

- **Years of Experience:**

☐ 0-3 years

☐ 4-10 years

☐11–20 years

☐21–30 years

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Appendix 2

Questionnaire Paragraphs

A. Artificial Intelligence Technologies in the Practice of Speech and Language Pathology in Palestine: Current Applications and Techniques.

	Item	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1)	Have you ever used artificial intelligence techniques in treating speech and language disorders?					
2)	Do you have sufficient familiarity with artificial intelligence-based speech recognition tools to assess and treat speech and language disorders?					
3)	Do you believe that artificial intelligence can enhance the efficiency of assessing speech and language disorders and improve the effectiveness of therapeutic interventions?					
4)	Does the speech and language pathologist have sufficient understanding of how to use artificial intelligence in treating various speech and language problems?					
5)	Do you follow developments in the field of artificial intelligence and its use in treating speech and language disorders in Palestine?					
6)	Have you received training in using artificial intelligence techniques in the practice of speech and language?					
7)	Are you confident in the accuracy and reliability of artificial intelligence-based tools for assessing speech and language?					
8)	Do you believe that artificial intelligence can significantly contribute to personalized therapy plans for individuals with speech and language disorders?					
9)	Do you think you will adopt new artificial intelligence techniques in your practice of therapeutic plans in the near future?					

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B. Challenges and Expectations of Speech and Language Pathologists in Palestine Regarding the Integration of Artificial Intelligence in Speech and Language Therapy in the Future.

	Item	Very High	High	Moderate	Low	Very Low
10)	I feel concerned about the potential loss of human intervention in therapy sessions when integrating artificial intelligence techniques.					
11)	I trust in the safety and privacy of data when using artificial intelligence techniques in speech and language therapy.					
12)	Overall, I believe that artificial intelligence enhances the efficiency of speech and language therapy services by improving assessment and intervention processes.					
13)	I strongly anticipate that artificial intelligence will have the ability to provide personalized interventions and procedures tailored to each individual's condition and specific speech and language problems.					
14)	I consider artificial intelligence to be a good means to enhance speech and language disorder services and address deficiencies in some areas of Palestine.					
15)	I believe that artificial intelligence will significantly contribute to progress in research and understanding speech and language disorders.					
16)	I believe that we should cease using artificial intelligence techniques in the field of speech and language therapy.					

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C. Perspectives of Speech and Language Pathologists in Palestine on the Future of Artificial Intelligence and Ethical Considerations in the Use of Artificial Intelligence in Speech and Language Disorders Therapy.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
17)	Artificial intelligence could potentially represent a promising future for the field of speech and language disorders in Palestine.					
18)	You have a great deal of optimism about the potential positive contributions of artificial intelligence in the field of speech and language disorders in Palestine?					
19)	For the effective integration of artificial intelligence into speech and language disorders in Palestine, there will be a need for additional training and education for specialists?					
20)	There is significant concern about potential biases in artificial intelligence algorithms that affect the assessment and treatment of individuals from diverse cultural and linguistic backgrounds.					
21)	Artificial intelligence systems used for treating speech and language disorders should prioritize transparency and explanation to ensure trust among professionals.?					
22)	Artificial intelligence techniques should respect privacy and confidentiality when applied in the treatment of speech and language disorders?					
23)	Artificial intelligence should complement the role of speech and language pathologists in decision-making processes rather than replacing them?					
24)	I benefit greatly from the suggestions and recommendations of artificial intelligence in making my clinical decisions in the treatment of speech and language disorders.					

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In any area of speech and language therapy services you see the use of artificial intelligence techniques as effective:

Note: Choose whatever you find appropriate

- Diagnosis of the condition.
- Report Writing
- Correspondence with specialists, professionals and various work teams.
- Propose goals appropriate to the situation.
- Propose treatment plans and methods of implementation.
- Follow-up of the latest methods of treatment and intervention.
- In the field of scientific research and conducting studies in the field of speech and language.
- All of the above.
- I do not prefer to use intelligence techniques in any field of speech and language therapy services.

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