

## Original Research Article

# ROLE OF ARTIFICIAL INTELLIGENCE AND CLINICAL PSYCHOLOGY IN ASSESSING BODY DYSMORPHIC CONCERNS AMONG MALES WITH GYNECOMASTIA

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### ABSTRACT

**Background:** Gynecomastia is a common benign enlargement of male breast tissue that may significantly affect psychological well-being, self-esteem, and body image perception. This study aimed to evaluate the role of Artificial Intelligence and clinical psychology in assessing body dysmorphic concerns among males with gynecomastia

**Materials and Methods:** This cross-sectional analytical study was conducted at UA Aesthetics, Lahore, Pakistan from March 2023 to September 2025, included 325 male participants diagnosed with gynecomastia. Participants were recruited using non-probability consecutive sampling. Demographic and clinical information were recorded using a structured proforma.

**Results:** The mean age of participants was  $24.8 \pm 6.3$  years, and Grade II gynecomastia was the most frequent severity grade observed in 148 (45.5%) participants. Body dysmorphic concerns were present in 201 (61.8%) participants. Moderate anxiety symptoms were identified in 118 (36.3%), while moderate depressive symptoms were observed in 84 (25.8%) participants. Psychological assessment scores increased significantly with increasing gynecomastia severity ( $p < 0.001$ ). Awareness regarding AI mental health chatbots was reported by 214 (65.8%) participants, while 187 (57.5%) participants felt comfortable discussing body image concerns through AI-assisted systems. AI chatbot-assisted assessment demonstrated sensitivity of 83.2%, specificity of 83.6%, positive predictive value of 87.0%, negative predictive value of 79.1%, and overall accuracy of 83.4% when compared with clinical psychology assessment.

**Conclusion:** Body dysmorphic concerns and psychological distress are highly prevalent among males with gynecomastia. Artificial Intelligence-assisted chatbot systems demonstrated good supportive screening performance and were well accepted by participants for discussing sensitive psychological concerns.

**Keywords:** AI, Chatbots, Awareness, Gynecomastia, Dysmorphic, Patients.

## INTRODUCTION

Artificial Intelligence (AI) has become a crucial part of people's daily lives in recent years, with rapid advances in this field.<sup>[1]</sup> The ultimate vision is to create increasingly sophisticated AI systems that can learn, plan, reason, and comprehend language across a variety of tasks. AI systems can be thought of as a

combination of various components working together to accomplish a complex task.<sup>[2]</sup> They are based on a series of mathematical approaches used to teach AI to process data and make decisions, thereby increasing efficiency, analytics, and automation capabilities.<sup>[3]</sup> Gynecomastia occurs when benign glandular tissue develops in males and is closely associated with an imbalance between the hormones

testosterone and estrogen. The prevalence rate has been reported to range from 32% to 65%. Although rarely fatal, gynecomastia can significantly impact the psychological well-being and social functioning of the affected person, leading to depression, anxiety disorders, and reduced self-confidence.<sup>[4]</sup> Surgery is warranted when conservative measures fail, when the gynecomastia causes physical discomfort, or when it causes severe psychological distress. This condition involves sensitivity around body image and privacy. Studies show that 20% of patients find it embarrassing to visit the clinic, and 28% feel embarrassed to interact with other patients during clinic visits, leading many to avoid direct consultation with health care professionals.<sup>[5]</sup>

In today's world, the connection between physical appearance and psychological well-being has become increasingly significant, driven by the pervasive nature of social media, unattainable beauty ideals, and constant exposure to digital images.<sup>[6]</sup> The media has often been used to showcase images of the ideal male body that emphasize muscularity, lean physique, and chest contour, which can increase body dissatisfaction in males with gynecomastia. Comparing one's body to socially constructed ideals can increase feelings of inadequacy and alter one's perception of it.<sup>[7]</sup> It has been proposed that there are barriers to discussing body image dissatisfaction among men due to social norms of masculinity and emotional expression. As a result, many patients have not been assessed or counseled psychologically in a way that is appropriate to their symptomology and are suffering silently. Clinical psychology offers vital resources in sensing and controlling these unsuspected psychological loads.<sup>[8]</sup> Clinicians can use standardized tools, like the Body Dysmorphic Disorder Questionnaire (BDDQ), Body Image Disturbance Questionnaire, Beck Depression Inventory, and anxiety scales to measure the level of emotional disturbance that can stem from gynecomastia.<sup>[9]</sup> Psychological treatments such as cognitive behavioral therapy, counseling, stress management, and psychoeducation have proven to be beneficial in decreasing anxiety and coping strategies for those with body image issues. Therefore, the use of a multidisciplinary approach, as this is a combination of surgeons, endocrinologists, psychiatrists and clinical psychologists, might enhance treatment outcome and patient satisfaction.<sup>[10]</sup>

AI's ability to process vast amounts of data, identify hidden patterns, and build predictive models efficiently has been instrumental in its rapid growth in the healthcare sector. The application of AI systems in radiology, dermatology, psychiatry, endocrinology and behavior sciences is growing.<sup>[11]</sup> Machine learning models can detect anxiety, depression, and body image disorders in mental health research by analyzing questionnaires, speech patterns, facial expressions, social media data, and digital behavioral data.<sup>[12]</sup> AI-powered tools could offer quick, objective, and scalable screening for

mental health disorders, particularly in areas where mental health practitioners are scarce. AI technologies can help with both the physical and psychological evaluation in patients with gynecomastia.<sup>[13]</sup> AI tools for computer vision and image processing can measure the level of gynecomastia, its size, the level of asymmetry and the shape of the chest wall, while AI models for psychology can simultaneously assess emotional distress and body image dissatisfaction.<sup>[14]</sup> One of the advantages of such systems could be that they would aid clinicians in determining if patients were in need of early intervention in mental health to prevent symptoms escalating into severe levels of anxiety, depression, or body dysmorphic disorder.<sup>[15]</sup>

### **Objective**

This study aimed to evaluate the role of Artificial Intelligence and clinical psychology in assessing body dysmorphic concerns among males with gynecomastia.

## **MATERIALS AND METHODS**

This was a cross-sectional analytical study conducted at UA Aesthetics, Lahore, Pakistan from March 2023 to September 2025. A total of 325 male participants diagnosed with gynecomastia were included in the study. The sample size was calculated using the WHO sample size formula,  $n = Z^2P(1 - P)/d^2$ , using a 95% confidence interval ( $Z = 1.96$ ), an assumed prevalence of body dysmorphic concerns of 30%, and a margin of error of 5%. The calculated sample size was 323 participants rounded to 325 participants. Eligible participants were recruited using non-probability consecutive sampling technique. The study was conducted on male participants aged 15-40 years, who had clinically diagnosed gynecomastia and confirmed by a qualified clinician. Those who agreed to give informed written consent, could read and fill out psychological assessment questionnaires and were interested in participating in AI-guided screening sessions with a chatbot were included. Participants who had a prior diagnosis of severe psychiatric disorders prior to gynecomastia or breast malignancy, previous breast surgery, severe endocrine or neurological disorders that affect the psychological status, current use of psychiatric medications, or completed only part of the questionnaires were excluded from the study.

### **Data Collection**

Participants were identified and recruited by consecutive sampling from the outpatient departments; informed written consent was obtained. Demographic and clinical data such as age, educational status, marital status, occupation, BMI, duration of gynecomastia, history of obesity and use of medications, as well as other medical conditions were collected using a structured and predesigned proforma. The diagnosis was confirmed by a qualified clinician through physical examination, and

the gynecomastia grading system was used to assess the severity of gynecomastia. Anthropometric measurements, such as height and weight, were taken in standardized method and body mass index (BMI) was calculated. Afterwards, all participants were psychologically evaluated by a clinical psychologist. The Body Dysmorphic Disorder Questionnaire was used to test body dysmorphic concerns, and body image dissatisfaction, anxiety and depression symptomology were measured using valid psychological assessment scales.

Participants also participated in AI Chatbot Screens with AI tools like ChatGPT, Google Gemini, Microsoft Copilot, Woebot, Wysa, and Youper to evaluate the impact of Artificial Intelligence on psychological assessment. These chatbot systems were employed as psychological screening tools in a supportive role to assess emotional distress, embarrassment, body dissatisfaction, anxiety symptoms, social avoidance, and psychological consultation willingness. Structured conversations with the chatbot were held and their responses were analyzed for patterns that could be indicative of body dysmorphic concerns. Psychological risk assessments were created by the chatbot and were reviewed and compared to the psychologist assessments. Only supportive screening tools with the aid of AI were utilized, and not diagnostic replacements. The respondents were also queried about their knowledge of AI Chatbots, comfort in discussing sensitive psychological concerns with the help of an AI-based system, satisfaction level with the interaction with the chatbot, and preference for a blended evaluation by an AI and a clinical psychologist. All the information gathered was confidential and anonymous, with coded participant identification numbers. The main findings of the study were the prevalence and intensity of body dysmorphic thoughts for males who have gynecomastia. Secondary outcomes comprised assessment of anxiety, depression, body image dissatisfaction, association of severity of gynecomastia with psychological distress, and perception of the AI chatbot assistance in the

assessment of gynecomastia vs clinical psychology assessment performance.

#### Data Analysis

All the collected data was entered and analyzed by SPSS version 29.0. Data for the quantitative variables such as Age, BDI-II scores, Anxiety scores, Depression scores, BMI, and Body image dissatisfaction scores were reported as mean  $\pm$  SD. The qualitative variables such as the severity of the grade of gynecomastia, body dysmorphia, anxiety categories, depression categories, awareness of the AI chatbot, satisfaction and psychological classification by the AI chatbot were presented as frequencies and percentages. Normality of quantitative data were tested by Shapiro–Wilk test. The association of categorical variables such as body dysmorphic concerns with clinical characteristics was established using chi-square test. Sensitivity, specificity, positive predictive value and negative predictive value were computed to assess the screening performance of AI-assisted chatbot assessment with the gold standard of clinical psychologists assessment. Throughout the study all p values  $<0.05$  were considered statistically significant.

## RESULTS

Data were collected from 325 participants, with a mean age of  $24.8 \pm 6.3$  years. Most participants were aged 21–30 years, 154 (47.4%), followed by 15–20 years, 88 (27.1%), and 31–40 years, 83 (25.5%). Regarding BMI, 136 (41.8%) participants were overweight, 112 (34.5%) had normal BMI, and 77 (23.7%) were obese. The duration of gynecomastia was most commonly 1–3 years in 151 (46.5%) participants, while 96 (29.5%) had symptoms for less than 1 year and 78 (24.0%) for more than 3 years. Grade II gynecomastia was most frequent, observed in 148 (45.5%) participants, followed by Grade I in 91 (28.0%) and Grade III in 86 (26.5%). Body dysmorphic concerns were present in 201 (61.8%) participants.

**Table 1: Demographic and Clinical Characteristics of Participants (n=325)**

Variables	Categories	n (%)
Age Group	15–20 years	88 (27.1)
	21–30 years	154 (47.4)
	31–40 years	83 (25.5)
Mean Age (years)	Mean $\pm$ SD	24.8 $\pm$ 6.3
BMI Category	Normal	112 (34.5)
	Overweight	136 (41.8)
	Obese	77 (23.7)
Duration of Gynecomastia	<1 year	96 (29.5)
	1–3 years	151 (46.5)
	>3 years	78 (24.0)
Gynecomastia Severity	Grade I	91 (28.0)
	Grade II	148 (45.5)
	Grade III	86 (26.5)
Body Dysmorphic Concerns	Present	201 (61.8)
	Absent	124 (38.2)
Anxiety Symptoms	None	61 (18.8)
	Mild	97 (29.8)

	Moderate	118 (36.3)
	Severe	49 (15.1)
Depressive Symptoms	None	104 (32.0)
	Mild	106 (32.6)
	Moderate	84 (25.8)
	Severe	31 (9.5)

The mean BDDQ score rose from  $11.2 \pm 3.1$  in Grade I to  $15.6 \pm 4.4$  in Grade II and  $19.8 \pm 5.2$  in Grade III. Similarly, anxiety scores increased from  $7.4 \pm 2.8$  in Grade I to  $10.3 \pm 3.6$  in Grade II and  $14.1 \pm 4.1$  in Grade III. Depression scores also showed a rising

trend from  $6.2 \pm 2.5$  to  $8.9 \pm 3.2$  and  $12.7 \pm 3.8$  across Grade I, II, and III, respectively. Body image dissatisfaction scores were highest in Grade III participants,  $20.4 \pm 5.6$ , compared with  $15.1 \pm 4.5$  in Grade II and  $10.5 \pm 3.7$  in Grade I.

**Table 2: Comparison of Psychological Assessment Scores According to Gynecomastia Severity**

Psychological Variables	Grade I Mean $\pm$ SD	Grade II Mean $\pm$ SD	Grade III Mean $\pm$ SD	p-value
BDDQ Score	$11.2 \pm 3.1$	$15.6 \pm 4.4$	$19.8 \pm 5.2$	<0.001
Anxiety Score	$7.4 \pm 2.8$	$10.3 \pm 3.6$	$14.1 \pm 4.1$	<0.001
Depression Score	$6.2 \pm 2.5$	$8.9 \pm 3.2$	$12.7 \pm 3.8$	<0.001
Body Image Dissatisfaction Score	$10.5 \pm 3.7$	$15.1 \pm 4.5$	$20.4 \pm 5.6$	<0.001

Regarding AI chatbot-assisted psychological screening, 214 (65.8%) participants were aware of AI mental health chatbots, while 111 (34.2%) were not aware. A total of 187 (57.5%) participants reported being comfortable discussing body image concerns with an AI chatbot, whereas 138 (42.5%) were not

comfortable. AI chatbots helped 173 (53.2%) participants express emotional concerns more easily, while 91 (28.0%) were neutral and 61 (18.8%) disagreed. Reduced hesitation during AI chatbot use was reported by 196 (60.3%) participants.

**Table 3: Participant Perception Regarding AI Chatbot-Assisted Psychological Screening (n=325)**

Variables	Categories	n (%)
Awareness Regarding AI Mental Health Chatbots	Yes	214 (65.8)
	No	111 (34.2)
Comfortable Discussing Body Image Concerns with AI Chatbot	Yes	187 (57.5)
	No	138 (42.5)
AI Chatbot Helped in Expressing Emotional Concerns More Easily	Agree	173 (53.2)
	Neutral	91 (28.0)
	Disagree	61 (18.8)
Reduced Hesitation While Using AI Chatbot	Yes	196 (60.3)
	No	129 (39.7)
Satisfaction with AI-Assisted Screening	Satisfied	182 (56.0)
	Neutral	84 (25.8)
	Dissatisfied	59 (18.2)
Preference for Combined AI and Clinical Psychologist Assessment	Yes	238 (73.2)
	No	87 (26.8)

ChatGPT was the most commonly used AI chatbot, reported by 118 (36.3%) participants, followed by Google Gemini in 67 (20.6%), Microsoft Copilot in 39 (12.0%), Wysa in 34 (10.5%), Woebot in 29 (8.9%), and Youper in 18 (5.5%) participants, while 20 (6.2%) had never used any AI chatbot. The most

common purpose of chatbot use was emotional support, reported by 102 (31.4%) participants, followed by body image discussion in 84 (25.8%), anxiety or stress management in 73 (22.5%), general health information in 46 (14.2%), and depression-related concerns in 20 (6.1%).

**Table 4: Usage Pattern of AI Chatbots Among Participants for Psychological and Body Image-Related Concerns (n=325)**

Variables	Categories	n (%)
AI Chatbot Previously Used by Participants	ChatGPT	118 (36.3)
	Google Gemini	67 (20.6)
	Microsoft Copilot	39 (12.0)
	Wysa	34 (10.5)
	Woebot	29 (8.9)
	Youper	18 (5.5)
	Never Used Any AI Chatbot	20 (6.2)
Main Purpose of AI Chatbot Usage	Emotional Support	102 (31.4)
	Body Image Discussion	84 (25.8)
	Anxiety/Stress Management	73 (22.5)
	General Health Information	46 (14.2)
	Depression-Related Concerns	20 (6.1)
Frequency of AI Chatbot Usage	Daily	76 (23.4)
	Weekly	129 (39.7)

	Occasionally	98 (30.2)
	Rarely	22 (6.7)
Perceived Helpfulness of AI Chatbots	Very Helpful	116 (35.7)
	Moderately Helpful	143 (44.0)
	Minimally Helpful	48 (14.8)
	Not Helpful	18 (5.5)
Participants Reporting Increased Confidence After AI Interaction	Yes	171 (52.6)
	No	154 (47.4)

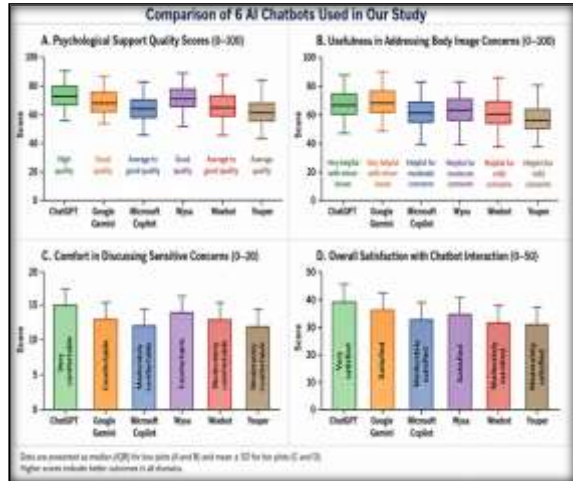


Figure 1: Comparison of AI chatbots used in psychological support

Post-hoc pairwise comparisons showed that ChatGPT had significantly higher psychological support scores compared with Google Gemini, with a mean difference of  $2.8 \pm 0.9$ , 95% CI 1.1 to 4.5,  $p=0.003$ . ChatGPT also performed significantly better than Microsoft Copilot, Wysa, Woebot, and Youper, with all comparisons showing statistically significant differences. Google Gemini did not differ significantly from Microsoft Copilot, Wysa, Woebot, or Youper, as all  $p$ -values were greater than 0.05. Among mental health-specific chatbots, Wysa showed significantly higher support scores than Youper, with a mean difference of  $1.8 \pm 0.7$  (95% CI 0.4 to 3.2),  $p=0.017$ , while Woebot also scored significantly higher than Youper, with a mean difference of  $1.4 \pm 0.6$  (95% CI 0.2 to 2.6),  $p=0.024$ .

Table 5: Post-hoc Pairwise Comparisons of AI Chatbot Psychological Support Scores Among Participants

Comparison Between AI Chatbots	Mean Difference $\pm$ SE	95% Confidence Interval	p-value
ChatGPT vs Google Gemini	$2.8 \pm 0.9$	1.1 to 4.5	0.003
ChatGPT vs Microsoft Copilot	$4.1 \pm 1.0$	2.0 to 6.2	<0.001
ChatGPT vs Wysa	$1.9 \pm 0.8$	0.4 to 3.4	0.012
ChatGPT vs Woebot	$2.3 \pm 0.9$	0.7 to 4.1	0.008
ChatGPT vs Youper	$3.7 \pm 1.1$	1.5 to 5.9	0.002
Google Gemini vs Microsoft Copilot	$1.3 \pm 0.7$	-0.2 to 2.8	0.084
Google Gemini vs Wysa	$-0.9 \pm 0.6$	-2.1 to 0.3	0.116
Google Gemini vs Woebot	$-0.5 \pm 0.7$	-1.9 to 0.9	0.281
Google Gemini vs Youper	$0.9 \pm 0.8$	-0.7 to 2.5	0.164
Wysa vs Woebot	$0.4 \pm 0.5$	-0.7 to 1.5	0.412
Wysa vs Youper	$1.8 \pm 0.7$	0.4 to 3.2	0.017
Woebot vs Youper	$1.4 \pm 0.6$	0.2 to 2.6	0.024

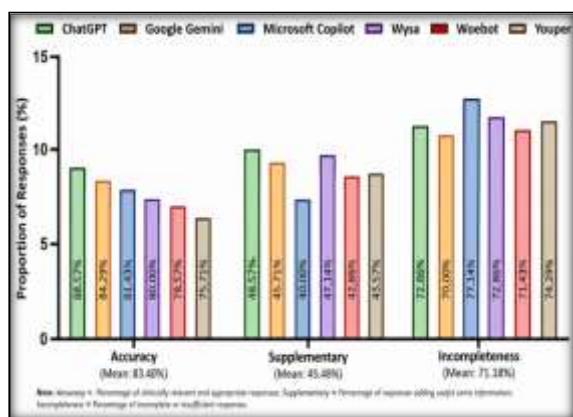


Figure 2: Comparison of AI chatbot performance in psychological support assessment among males with gynecomastia

dysmorphia concerns of males with gynecomastia was investigated. The results showed that there was a high prevalence of body dysmorphic concerns, anxiety symptoms, and depressive symptoms as well as body image dissatisfaction in affected persons. The study also noted that AI chatbots could be increasingly accepted and beneficial for psychological screening and clinical psychological assessment, thereby highlighting their potential. In the present study, 61.8% of participants had body dysmorphic concerns, suggesting that psychological distress about body appearance is very common among males with gynecomastia.<sup>[16]</sup> The results of this study are consistent with earlier studies demonstrating that gynecomastia has a profound effect on self-esteem, body image perception, and psychosocial functioning. Past studies have shown that chest size in male subjects is commonly associated with a socially withdrawn attitude and embarrassment, which also results in dissatisfaction with body appearance, especially in adolescents and

## DISCUSSION

In the present study, the role of Artificial Intelligence and clinical psychology in the evaluation of body

young adults. This is also a possibility, given the rising pressure on men's body image and muscular appearance in society, as reflected in the present study.<sup>[17]</sup>

Most study participants were aged 21-30 years, and Grade II was the most common gynecomastia severity grade. In previous studies, it was also found that young adult men reported an increase in the incidence of gynecomastia during times in their lives when they were more body-conscious and more concerned with comparing themselves to others. Moreover, in the current study, body dysmorphic concerns were significantly related to obesity and longer duration of gynecomastia.<sup>[18]</sup> Previous studies show that obesity and increased length of visible physical changes are associated with increased body dissatisfaction and psychological stress, which further supports these results. There was a significant increase in psychological assessment scores with the increasing severity of gynecomastia. The highest scores were observed for participants who had Grade III gynecomastia in the body dysmorphic disorder questionnaire, anxiety scores, depression scores, and body image dissatisfaction scores.<sup>[19]</sup> The results indicate that the psychological effects of gynecomastia may be more severe the more severe the physical changes. Previous studies also indicated that severe gynecomastia correlated with decreased social confidence, emotional distress, lower quality of life, and avoidance behaviors.<sup>[20]</sup> The statistically significant association between gynecomastia severity and psychological burden in the present study reinforces the importance of a comprehensive psychological evaluation in the clinical workup.<sup>[21]</sup> The evaluation of the psychological assessment assisted by AI chatbots was one of the most important parts of the present study. Many participants knew about AI mental health chatbots, and over half said they were comfortable talking about body image issues with AI-assisted platforms. The participants also reported less reluctance to use AI chatbots and greater comfort expressing their emotions. The results indicate that AI-powered systems could offer a more objective and accessible environment for discussing sensitive psychological issues.<sup>[22]</sup> Prior studies on digital mental health technologies also have shown that AI-driven conversational tools can help individuals in psychological distress with emotional disclosure, reduce stigma, and facilitate help-seeking.<sup>[23]</sup>

Based on their perceived usefulness and perceived quality of psychological support scores, ChatGPT and Google Gemini had moderately high scores, while Microsoft Copilot and some mental health-focused chatbots had relatively moderate scores. The post hoc pairwise comparison analysis showed that some psychological support scores differed significantly across Chatbot platforms.<sup>[24]</sup> The disparities could stem from the differences in conversational depth and emotional sensitivity, context understanding, and the quality of interaction with the user between the various AI systems.<sup>[25]</sup> In

the past, it was also recommended that the more psychologically oriented the conversational AI models are, with better NLP capabilities, the more they could aid psychological support and emotional engagement. There were several limitations to consider, however, with the promising findings. The study employed a cross-sectional design which did not allow us to make causal inferences regarding the relationship between the severity of gynecomastia and psychological outcomes. The PS response analysis and chatbot interactions could also contribute to response bias. Also, the performance of AI chatbots can vary depending on participants' expertise with digital technology and their command of the language used. The study also focuses on specific AI platforms and may not cover the performance of all the available AI mental health tools.

## CONCLUSION

In conclusion, there is strong evidence that a significant proportion of males with gynecomastia have body dysmorphic concerns, as well as anxiety and depression, and that there is also body image dissatisfaction that is significantly higher in males with greater disease severity and duration of symptoms. The study validated the good screening performance, and acceptable acceptance of the Artificial Intelligence-assisted chatbot system for discussing sensitive psychological concerns regarding body image and emotional distress. The AI chatbots, like ChatGPT, Google Gemini, Microsoft Copilot, Wysa, Woebot and Youper, were used to help participants express their emotions, lessened hesitation and enhanced engagement in psychological assessment. Together with clinical psychology, the use of Artificial Intelligence can be useful for better recognizing body dysmorphic concerns at an early stage and provide more extensive psychological care for males experiencing gynecomastia.

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