Automatic Evaluation for Mental Health Counseling using LLMs

Anonymous ACL submission

Abstract

High-quality psychological counseling is crucial for mental health worldwide, and timely evaluation is vital for ensuring its effectiveness. However, obtaining professional evaluation for each counseling session is expensive and challenging. Existing methods that rely on self or third-party manual reports to assess the quality of counseling suffer from subjective biases and limitations of time-consuming.

To address above challenges, this paper proposes an innovative and efficient automatic approach using large language models (LLMs) to evaluate the working alliance in counseling conversations. We collected a comprehensive counseling dataset and conducted multiple third-party evaluations based on therapeutic relationship theory. Our LLM-based evaluation, combined with our guidelines, shows high agreement with human evaluations and provides valuable insights into counseling scripts. This highlights the potential of LLMs as supervisory tools for psychotherapists. By integrating LLMs into the evaluation process, our approach offers a cost-effective and dependable means of assessing counseling quality, enhancing overall effectiveness.

1 Introduction

Globally, approximately one in five individuals experience mental health problems each year, with many seeking psychological counseling for support (Eysenbach et al., 2004; Steel et al., 2014; Holmes et al., 2018). Timely feedback during counseling sessions can greatly enhance the quality of counseling (Lambert, 2013a). However, obtaining this level of supervision is expensive and challenging. Currently, the evaluation of counseling quality, such as working alliance [1] , is often assessed through retrospective self-reports from counselors and clients (Goldberg et al., 2020), but these self-assessments are prone to subjective biases (Stahler and Rappaport, 1986; Heinonen et al., 2013; Nissen-Lie et al., 2013), compromising the reliability regarding the impartial evaluation of counseling quality (Fenton et al., 2001). Similar to the previous findings, our analysis demonstrates that counselors and clients do not always agree in their feedback in terms of the working alliance in counselings, with counselors exhibiting bias of overestimating the relationship and clients influenced by social biases also tending to give high scores. Therefore, there is a need for a timely, affordable, impartial, and professional third-party method of counseling evaluation and feedback.

Existing research in the field has aimed to provide automatic counseling quality evaluation, but their methods are often not as effective as human evaluation for three reasons. First, they are limited to predicting client-reported scores due to the lack of ratings from third-party experts (Atkins et al., 2014; Wu et al., 2023; Li et al., 2022, 2023). Second, they typically analyze individual turns in the conversation and fail to consider the multi-turn interaction within the entire counseling session (Martinez et al., 2019; Goldberg et al., 2020; Lin et al., 2023, 2022). Third, their evaluations are based on specific linguistic features from counselors' and clients' utterances, limiting interpretability (Martinez et al., 2019; Goldberg et al., 2020).

In this paper, we address these limitations by introducing an effective automatic approach to third-party assessment of the working alliance, achieved through analyzing entire counseling conversations using large language models (LLMs) (Wei et al., 2022a). We collect a large-scale text-based counseling dataset from an online counseling platform, including self-reported working alliance scores from both counselors and clients. Using an observer version of the working alliance scale based on Bor-

[1] **Working Alliance**: "*the alliance represents interactive, collaborative elements of the relationship (i.e., therapist and client abilities to engage in the tasks of therapy and to agree on the targets of therapy) in the context of an affective bond or positive attachment*" (Constantino et al., 2002).

din's theory of therapeutic relationship (Bordin, 1979), we design specific guidelines for each question of the scale. Experts carefully annotate a subset of counseling sessions, highlighting the differences in working alliance assessment from diverse perspectives and emphasizing the need for multiple experts.

We then utilize these guidelines to enhance the proficiency of four advanced LLMs in evaluating the annotated sessions. Experimental findings demonstrate that the precise guidelines significantly improve LLMs' ability to assess the working alliance, ensuring internal consistency and alignment with human evaluations. Additionally, we validate the integration of Chain-of-Thought (CoT) (Wei et al., 2022b) into LLMs, enabling them to identify supportive evidence for scoring within the conversation, further enhancing their capabilities. Importantly, the evidence extracted by GPT-4 proves instrumental in improving agreement among human annotators, highlighting the value of automatic evaluation as a tool for enhancing human understanding of counseling scripts. This also suggests the potential for LLMs to serve as supervisors for psychotherapists.

2 Related Work

Evaluating Counseling Quality Using NLP. Many researchers have endeavored to leverage machine learning and NLP techniques for the automatic evaluation of conversations in mental health counseling, including assessing counselors' therapeutic skills (Cao et al., 2019; Gibson et al., 2016; Chiu et al., 2024) and treatment fidelity (Atkins et al., 2014), as well as clients' intervention responses (Tanana et al., 2015; Li et al., 2023). These work mostly focuses on studying individual participants' behaviors and language features, rather than relational dynamics between them. However, in psychotherapy research, the relationship between counselors and clients are widely investigated (Ribeiro et al., 2013; Norcross, 2010; Falkenström et al., 2014). The working alliance, defined as the collaboration and attachment between counselors and clients, is a crucial researched variable (Bordin, 1979; Norcross, 2010; Falkenström et al., 2014). There are methods that attempt to evaluate the therapeutic relationship between counselors and clients but only limited to clients' self-reported general alliance, due to the lack of observers' assessments (Goldberg et al., 2020; Martinez et al., 2019). But the scores of alliance obtained from counselors and their clients appear to be independent and unreliable, influenced by their own biases (Horvath and Greenberg, 1994). Our research is designed to align with the fine-grained observer-rated alliance based on theoretical framework, which demonstrates significant predictive capabilities for objective counseling outcomes in psychology (Fenton et al., 2001).

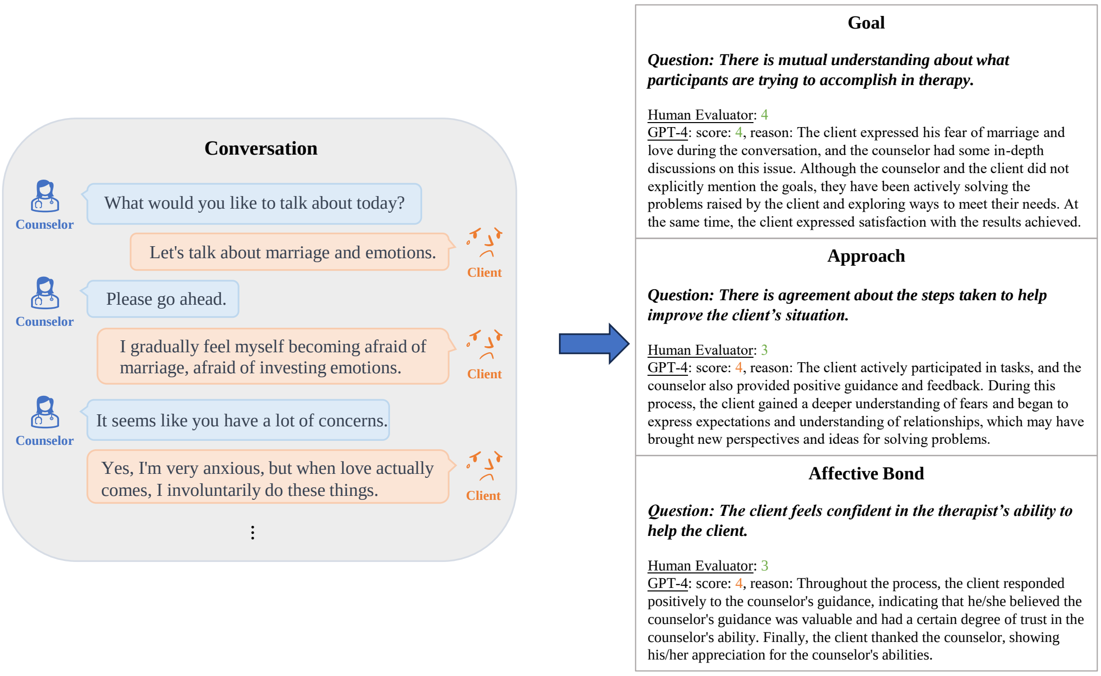
LLMs for Conversation Evaluation. As the emergence of Large Language Models (LLMs) showcasing advanced text understanding and reasoning capabilities, recent research has explored to leverage LLMs to evaluate the quality of conversations (Wang et al., 2023; Lin and Chen, 2023; Gong and Mao, 2023). Most works employ LLMs to assess conversation responses, focusing on criteria such as naturalness, coherence and fluency. Wu et al. (2023) specifically investigates the capability of ChatGPT to assess the context-consistency and coherence of the reflection strategy employed in counseling sessions. However, these studies only confine evaluation to the utterance level of conversations. There are some research attempts to assess the overall quality or individual performances exhibited in entire conversations, with the conversation scenarios limited to task-oriented or chit-chat dialogues (Mehri and Eskenazi, 2020; Lin and Chen, 2023). Different from the existing studies, our work aims to empower LLMs to better understand interlocutors' relationships in the context of mental health counseling. This task presents a greater challenge for LLMs, as it demands a heightened capability to comprehend natural language and human interactions.

3 Framework and Guidelines for Measuring Working Alliance

To understand the working alliance between counselors and clients in psychological counseling, we adapt the existing working alliance definitions and observer-rated scales to the context of online text-only counseling. To facilitate accurate third-party evaluations based on this framework, we carefully design specific guidelines in collaboration with counseling psychology experts.

3.1 Framework

In psychology research, the preeminent definition of alliance is introduced in Bordin (1979)'s theory of therapeutic working alliance. According to this



What would you like to talk about today?

Let's talk about marriage and emotions.

Please go ahead.

I gradually feel myself becoming afraid of marriage, afraid of investing emotions.

It seems like you have a lot of concerns.

Yes, I'm very anxious, but when love actually comes, I involuntarily do these things.

⋮

Goal

Question: There is mutual understanding about what participants are trying to accomplish in therapy.

Human Evaluator: 4
GPT-4: score: 4, reason: The client expressed his fear of marriage and love during the conversation, and the counselor had some in-depth discussions on this issue. Although the counselor and the client did not explicitly mention the goals, they have been actively solving the problems raised by the client and exploring ways to meet their needs. At the same time, the client expressed satisfaction with the results achieved.

Approach

Question: There is agreement about the steps taken to help improve the client's situation.

Human Evaluator: 3
GPT-4: score: 4, reason: The client actively participated in tasks, and the counselor also provided positive guidance and feedback. During this process, the client gained a deeper understanding of fears and began to express expectations and understanding of relationships, which may have brought new perspectives and ideas for solving problems.

Affective Bond

Question: The client feels confident in the therapist's ability to help the client.

Human Evaluator: 3
GPT-4: score: 4, reason: Throughout the process, the client responded positively to the counselor's guidance, indicating that he/she believed the counselor's guidance was valuable and had a certain degree of trust in the counselor's ability. Finally, the client thanked the counselor, showing his/her appreciation for the counselor's abilities.

Figure 1: Our framework of working alliance contains three integral components - agreement on goal-setting and the approaches towards goals, alongside the establishment of affective bonds. For each of these components, we design four detailed questions and differentiate the evidence spectrum spanning from considerable evidence against, some evidence against, no evidence against, some evidence for, and considerable evidence for these aspects. All examples shown in this paper have been modified to ensure the absence of any real personal information about the speakers.

theory, the working alliance represents interactive and collaborative elements of the relationship between counselors and clients in the context of an affective bond of positive attachment (Constantino et al., 2002). This concept consists of three core components – counselors and clients' mutual agreement on the targets of counseling (*Goal*), abilities to engage in the tasks of counseling (*Approach*), as well as the cultivation of emotional connections (*Affective Bond*) (Bordin, 1979).

In order to measure the working alliance within the aforementioned theoretical framework from the perspective of observers, we adopt the Observer-rated Short version of Working Alliance Inventory (WAI-O-S) (Tichenor and Hill, 1989). This inventory comprises 12 designed questions, where each dimension of the working alliance is measured by four questions. Each question is rated ranging from 1 to 5 points. Its reliability and validity has undergone thorough and comprehensive verification in various psychotherapy types (Santirso et al., 2018; Ribeiro et al., 2021). Table 1 presents the dimensions along with questions that shape the working alliance.

Goal. In counseling, goals are important for facilitating changes in clients' thoughts, feelings, and actions. They provide direction for both counselors and clients during their sessions. Clear agreement on goals increases adherence and leads to better outcomes. However, at the beginning of counseling, there can be a lack of clarity about clients' issues and differences in goals between clients and counselors. To address this, counselors should engage in deeper discussions with clients to establish mutually endorsed and valued objectives.

Approach. In addition to the agreement on goals, the strength of the working alliance also depends on the participants' clear and mutual understanding as well as acceptance on the tasks that their shared goals impose upon them (Bordin, 1983). Tasks are usually assigned by counselors based on their counseling styles, personal experiences and predispositions. However, clients may not fully understand the interconnections between the assigned tasks and the overarching goals. Moreover, clients may perceive that the demands of tasks exceed their abilities. In such cases, counselors need to skillfully adapt to their clients by offering alternative

Dimension	Question	No.
Goal	There is mutual understanding about what participants are trying to accomplish in therapy.	Q1
	The client and counselor are working on mutually agreed upon goals.	Q2
	The client and counselor have same ideas about what the client's real problems are.	Q3
	The client and counselor have established a good understanding of the changes that would be good for the client.	Q4
Approach	There is agreement about the steps taken to help improve the client's situation.	Q5
	There is agreement about the usefulness of the current activity in therapy (i.e., the client is seeing new ways to look at his/her problem).	Q6
	There is agreement on what is important for the client to work on.	Q7
	The client believes that the way they are working with his/her problem is correct.	Q8
Affective Bond	There is a mutual liking between the client and counselor.	Q9
	The client feels confident in the counselor's ability to help the client.	Q10
	The client feels that the counselor appreciates him/her as a person.	Q11
	There is mutual trust between the client and counselor.	Q12

Table 1: The framework of working alliance contains three core components: *Goal*, *Approach*, and *Affective Bond*. Each dimension is assessed through a set of four questions.

or modified tasks, thereby empowering clients to actively and effectively engage.

Affective Bond. Apart from cognitive collaboration, emotional connections play a crucial role in shaping the therapeutic alliance. The concept of affective bonds embraces the complex network of positive personal attachments between counselors and clients, including issues such as mutual trust, liking, acceptance, and confidence (Horvath and Marx, 1990). As clients perceive that counselors genuinely care about and appreciate them, a sense of security is established, fostering a greater willingness to delve into deeper self-disclosure during counseling, particularly in discussing their negative behaviors and thoughts. Moreover, clients' confidence in counselors' capabilities to facilitate positive changes make them more inclined to accept counselors' guidance and actively participate in the tasks assigned by the counselors.

3.2 Guidelines

To facilitate the understanding of questions and the differentiation of scores by observers, we have four developers to carefully design specific guidelines for each score associated with each question.

Firstly, we randomly select 15 conversations and ask all the developers to annotate them independently based on general guidelines. After the annotation, the developers discuss the differences and confusions among their annotations in several conversations until reaching a consensus. During this process, they may refine the guidelines by compiling the behavioral indicators of counselors and clients relevant to each question, with the associated degree and frequency at each score level. The developers repeat annotating these conversations based on modified guidelines. After iterating the above step 3 times, the final version of the guidelines is obtained. The intra-class agreement (Koo and Li, 2016) among the four developers in the three iterations are as follows: 0.5267, 0.6084, and 0.6603. The monotonically increasing agreement proves that the iterative process effectively resolves differences among developers. And the moderate agreement ensures the reliability of our guidelines. The specific guidelines and more details of the development process are presented in Appendix A.

4 Data Collection

To validate the feasibility of our proposed framework, we collect counseling conversations between professional counselors and actual clients, and carefully annotate these conversations according to the framework.

4.1 Data Source

We developed an online text-based counseling platform and enlisted 9 qualified professional counselors (7 females, *Mean age* = 34.67 years old, *SD* = 7.45). We recruited 82 adults (55 females, *Mean age* = 27.62 years old, *SD* = 5.94) as clients who were interested in and eligible for online psycho-counseling. These clients were assessed using the self-report symptom inventory (SCL-90)(Wang et al., 1999) to ensure they did not exhibit severe depressive, anxious, or psychiatric symptoms. Each counseling session lasted 50 minutes, which is a widely accepted standard duration for psychological counseling. Clients were encouraged to attend a minimum of 7 counseling sessions, scheduled weekly or bi-weekly. After each session, counselors and clients completed the therapists' and clients' versions of the Working Alliance Inventory, respectively(Horvath and Greenberg, 1989; Hatcher and Gillaspy, 2006), to assess the therapeutic relationship. These inventories are based on Bordin's theory of alliance, similar to the observer-rated scale used in this study.

We collected total 859 counseling sessions and 728 out of them received the self-reported scales from both counselors and clients. The statistics of the overall conversations are detailed in Table 2. The length of counseling conversations are significantly longer than the existing conversations obtained through crowdsourcing or generated by language models (avg. 76.07 utterances compared to 29.8 utterances in ESConv (Liu et al., 2021) and 6.36 utterances in SMILE (Qiu et al., 2023)). Moreover, each counselor-client pair engages in multiple consecutive counseling sessions (avg. 10.48 sessions compared to 4 sessions in Multi-Session Chat (Xu et al., 2022)), suggesting, in real-world scenarios, an effective resolution of clients' concerns often requires extended multi-turn interactions and multiple sessions.

Category	Total	Counselor	Client
# Dialogues	859	-	-
# Speakers	91	9	82
# Avg. sessions per speaker	-	95.44	10.48
# Utterances	65,347	32,860	32,487
Avg. utterances per dialogue	76.07	38.25	37.82
Avg. length per utterance	26.84	24.01	29.70

Table 2: Statistics of the overall conversations.

4.2 Annotation Process

To ensure the quality of the annotations, we engaged three experienced developers of the guidelines to annotate a subset of collected conversations. Their extensive knowledge of the working alliance framework and guidelines allowed for a thorough evaluation. Before the annotation process, we took measures to protect the privacy of the counselors and clients by anonymizing their personal information, including names, organizations, addresses, and more.

For the annotation phase, we randomly selected 79 sessions involving 4 counselors and 8 clients. Each conversation was annotated by all three annotators. To determine the final score for each question, we calculated the average of all scores assigned by the annotators.

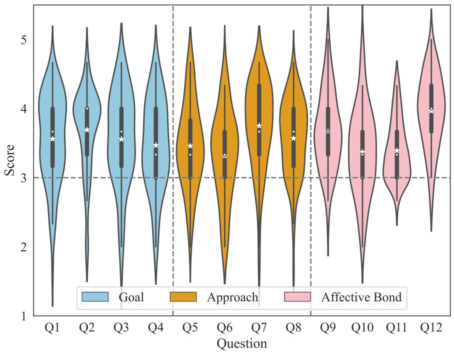


Figure 2: The violin plot of the distribution of scores annotated for each question, with a boxplot inside. The white pentagons within the violins represent the mean values.

After obtaining the annotated data, we calculated the intraclass correlation coefficient (ICC)(Koo and Li, 2016) among the annotators for each question. The inter-rater agreement for the dimensions of *Goal*, *Approach*, and *Affective Bond* were found to be 0.7581, 0.6587, and 0.6498, respectively. These values indicate a reliable level of agreement among the annotators[2]. Further details regarding the inter-rater agreement for each question can be found in Appendix B.1.

4.3 Data Characteristics

Figure 2 illustrates the distribution of annotated scores for all the questions. For further insights into the average scores per dimension and question, as well as their corresponding standard deviations, please refer to Appendix B.2.

On average, the scores for each dimension range between 3.5 and 4, indicating a generally high quality in the overall counseling conversations, although there is room for improvement. It is evident that counselors and clients have developed positive emotional connections and are making progress towards shared counseling objectives. Among the three dimensions of alliance, the *Affective Bond* stands out with the highest average score, particularly in the question regarding mutual trust between counselors and clients (Q12), where the score al-

[2] An ICC value between 0.5 and 0.75 indicates moderate reliability, while a value between 0.75 and 0.9 indicates good reliability.

most reaches 4. However, the *Approach* dimension has the lowest average score, specifically in the question concerning agreement on the usefulness of the current therapy activity (Q6, avg. = 3.32). This signifies that there are still some differences between counselors and clients regarding the steps and tasks to be taken in addressing the client's psychological issues throughout the counseling process.

5 LLM Evaluation

To investigate whether LLMs can evaluate the working alliance between counselors and clients, we conduct zero-shot experiments to prompt advanced LLMs including GLM-4, Claude-3, ChatGPT and GPT-4 to assess text-only conversations based on our proposed guidelines.

5.1 Setup

The prompt comprises four key components: the definition of evaluation task, the counseling conversation to be evaluated, the evaluation question and corresponding guidelines. To further investigate the impact of guidelines on the evaluation capabilities of LLMs, we conduct three experimental settings — prompting LLMs without guidelines, with general guidelines, and with our proposed detailed guidelines. The impact of the Chain-of-Thoughts process on the scoring of LLMs after providing detailed evaluation criteria was explored. In the CoT setting, we require models to provide corresponding evidence for ratings within the dialogue text. We carefully design specific prompts for each experiment setting accordingly. Figure 3 illustrates example prompts designed for LLMs to score a given counseling session across four experimental conditions.

5.2 Models

We select four accessible top-performing large language models – GLM-4 (Zhipu AI) (ZHIPU, 2024), Claude-3 (*Sonnet* model; Anthropic) (Anthropic, 2024), ChatGPT (*gpt-35-turbo-16k* model; OpenAI) (OpenAI, 2023a) and GPT-4 (*gpt-4* model; OpenAI) (OpenAI, 2023b). These models have been enhanced to follow human instructions through instruction tuning and align with human preferences via reinforcement learning from human feedback (RLHF, (Ouyang et al., 2022)). Our interactions with these models are facilitated using the official API. The temperature and nuclear sampling parameter are set as 1.0 for all models. Each model is tasked with rating the same conversation three times independently for thorough evaluation.

6 Results and Analysis

In this section, we answer a set of research questions through the above data collected and the conducted experiments. We first demonstrate the difference among working alliance rated by counselors, clients and observers. We then analyze the potential of LLMs to serve as tools for assessing consultation quality, and effective approaches to enhance their evaluation capabilities. Furthermore, we discuss the feasibility of utilizing evidence generated by GPT-4 to further enhance human annotators' agreement.

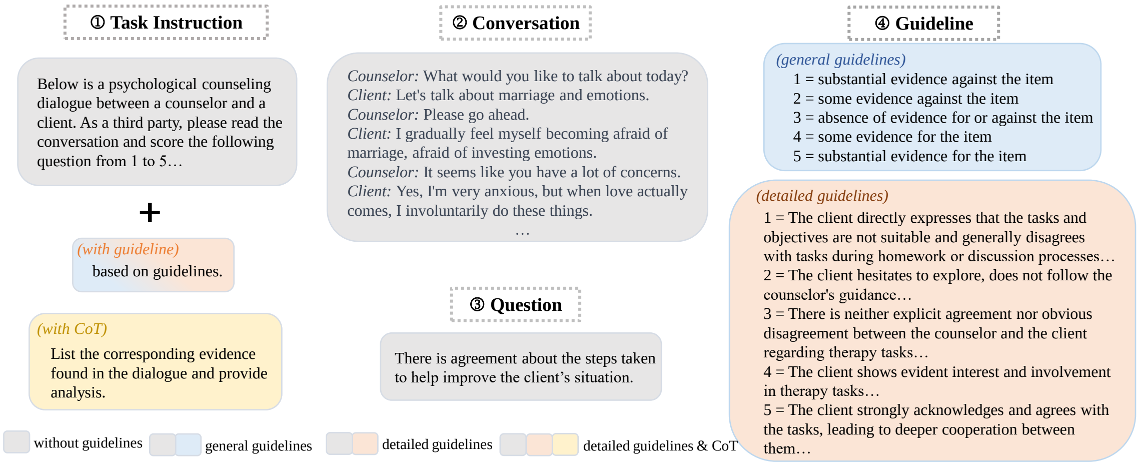
6.1 RQ1: Is Retrospective Self-reports Reliable?

To examine differences in the assessment of working alliance from various perspectives, we calculated pairwise Pearsonr correlation among counselors, clients, and three annotators. The heatmap in Figure 4 shows low correlation between counselors and clients, confirming rating disparities based on self-reports. Counselors tend to rate significantly higher than their clients in 21% of counseling sessions (details in Appendix C), indicating an overly positive bias in self-assessment (Walfish et al., 2012; Lambert, 2013b). On the client side, 13 out of 81 clients consistently assign the highest ratings in over half of their counseling sessions, potentially due to social desirability and dissonance-reducing responses, making their self-reports unreliable (Shick Tryon et al., 2007; Tryon et al., 2008). Therefore, an impartial and professional third-party assessment becomes essential for unbiased and accurate evaluation (Tichenor and Hill, 1989; Goldberg et al., 2020).

In contrast, consensus among third-party observers surpasses that between observers and either counselors or clients. This emphasizes the robustness and feasibility of evaluating the therapeutic relationship when multiple observers contribute assessments from a third-party perspective.

6.2 RQ2: Can LLMs Assess the Reliably of Working Alliance?

Model Self-Consistency. The reliability of a model as an annotator depends on its consistency in multiple independent evaluations of the same samples. We evaluated all these models by assessing their consistency in evidence extraction using



Below is a psychological counseling dialogue between a counselor and a client. As a third party, please read the conversation and score the following question from 1 to 5…

(with guideline) based on guidelines.

(with CoT) List the corresponding evidence found in the dialogue and provide analysis.

Counselor: What would you like to talk about today?
Client: Let's talk about marriage and emotions.
Counselor: Please go ahead.
Client: I gradually feel myself becoming afraid of marriage, afraid of investing emotions.
Counselor: It seems like you have a lot of concerns.
Client: Yes, I'm very anxious, but when love actually comes, I involuntarily do these things.
…

There is agreement about the steps taken to help improve the client's situation.

(general guidelines)
1 = substantial evidence against the item
2 = some evidence against the item
3 = absence of evidence for or against the item
4 = some evidence for the item
5 = substantial evidence for the item

(detailed guidelines)
1 = The client directly expresses that the tasks and objectives are not suitable and generally disagrees with tasks during homework or discussion processes…
2 = The client hesitates to explore, does not follow the counselor's guidance…
3 = There is neither explicit agreement nor obvious disagreement between the counselor and the client regarding therapy tasks…
4 = The client shows evident interest and involvement in therapy tasks…
5 = The client strongly acknowledges and agrees with the tasks, leading to deeper cooperation between them…

Figure 3: Example prompts for evaluating a giving conversation across different experimental setups (i.e. with different prompt types and with/without CoT) addressing question *There is agreement about the steps taken to help improve the client's situation*. General guidelines remain consistent across different questions, whereas detailed guidelines are intricately tailored to each specific question.

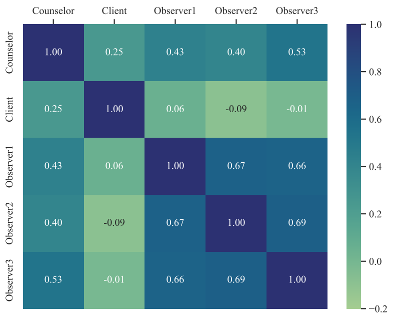


Figure 4: The heatmap of the pairwise correlation among counselors, clients, and three annotators in evaluating the working alliance.

	ChatGPT	GLM-4	Claude-3	GPT-4
Overall	*0.5209*	*0.9938*	*0.8322*	*0.7205*

Table 3: The overall agreement of three independent runs of all four models with detailed guideline and CoT in evaluating all questions.

fine-grained guidelines. The summarized results are shown in Table 3, and detailed results can be found in Table 8 in the Appendix. Our analysis shows that all four models achieve self-consistency at moderate level or above, indicating their reliability in evaluations.

Alignment with Human Evaluations. The models' capability on the evaluation task is defined as the extent to which its assessments align with those of human experts. We calculate the Pearsonr correlation coefficients (Lee Rodgers and Nicewander, 1988) between human and model ratings on the fine-grained rating scale ranging from 1 to 5 points. The results in Table 4 highlight GPT-4's superior performance compared to other models. The results also show that when given detailed guidelines and CoT, the LLM evaluations has a correlation of 0.5 with human evaluation, even higher than the correlation between counselors and clients.

6.3 RQ3: How to Improve LLMs' Evaluation Capabilities?

To investigate the impact of prompt tuning on the consistency of LLMs with human evaluations, we focus on two factors: the level of detail in guidelines and the setting of the Chain-of-Thought. The alignment between LLMs and human evaluations across different experimental settings is summarized in Table 4.

Guidelines. We find that ChatGPT falls short of reaching a moderate level of self-agreement without detailed guidelines and CoT. However, GLM-4, Claude-3, and GPT-4 maintain a moderate or higher level of self-consistency across all guideline types, ensuring the validity of their annotated results (see Table 8 in Appendix). Therefore, we further analyze the influence of guidelines on the alignment between these latter three models and human evaluations.

As shown in Table 4, the results consistently demonstrate that increasing the level of detail in guidelines improves the alignment. This improvement is particularly significant when transitioning

Models		**Goal**	**Approach**	**Affective Bond**	**Overall**
ChatGPT	**Detailed Guidelines + CoT**	0.2004	*0.3612*	*0.4122*	*0.3246*
GLM-4	**No Guidelines**	0.3187	0.4117	0.4466	0.3924
	General Guidelines	0.3723	0.4844	0.4300	0.4289
	Detailed Guidelines	*0.4184*	0.4301	0.4893	0.4459
	Detailed Guidelines + CoT	0.4102	*0.5004*	*0.4997*	*0.4701*
Claude-3	**No Guidelines**	0.3821	0.4713	0.3506	0.4013
	General Guidelines	0.3229	0.4724	0.3962	0.3971
	Detailed Guidelines	*0.4700*	0.4506	***0.5024***	0.4743
	Detailed Guidelines + CoT	0.4552	***0.5608***	0.4787	*0.4982*
GPT-4	**No Guidelines**	0.3591	0.4288	0.3693	0.3857
	General Guidelines	0.3320	0.4516	0.3961	0.3933
	Detailed Guidelines	***0.4979***	*0.5480*	0.4417	0.4959
	Detailed Guidelines + CoT	0.4937	0.5448	*0.4667*	***0.5018***

Table 4: The overall Pearsonr correlation results of all models with human evaluation on the working alliance dimensions across different experimental settings.

from general guidelines to more detailed ones, resulting in a notable average increase in correlation of 23.61%. Detailed guidelines are particularly effective in enhancing LLMs' performance on challenging questions. For instance, in the case of discerning whether counselors and clients like each other (Q9), GPT-4 performs poorly without guidelines or with general guidelines. However, when detailed guidelines are provided, there is a remarkable 76% increase in correlation (Detailed results can be found in Table 9 in the Appendix).

These findings highlight the potential to improve the alignment of LLM evaluations with human assessments by refining the guidelines. Ensuring high self-agreement in LLMs is a crucial prerequisite for them to be qualified evaluators.

Chain-of-Thought Prompting. Table 4 demonstrates that integrating CoT improves the alignment of LLM evaluations with human assessments. CoT significantly enhances LLMs' performance on challenging questions. For instance, with regard to the challenging question Q9 mentioned above for GPT-4, incorporating CoT leads to a significant 32.05% increase in the Pearsonr correlation with human evaluations. Thus, facilitating evidence extraction and explanation generation prior to scoring proves to be an effective strategy for enhancing LLMs' comprehension of dialogue content and improving assessment accuracy.

6.4 RQ4: Can LLMs' Explanations Help Human Annotators?

To explore how LLM assessments can support human annotation, we conducted a qualitative investigation. We assessed how evidence generated through Chain-of-Thought prompting could help less experienced annotators refine their evaluations. Given GPT-4's superior performance in the overall assessment, we leveraged the evidence it generated. We identified annotators who disagreed with two others as "weak annotators" and tasked them with re-evaluating samples where GPT-4 consistently aligned with over half of the annotators. To avoid bias, we didn't disclose GPT-4's scores to weak annotators. In Table 5, all three annotators revised their scores with a correction rate exceeding 80%, resulting in improved human agreement from 0.6888 to 0.7087 (detailed improvements in Table 6 in Appendix). This suggests that GPT-4's ability to process extensive textual information may help humans capture crucial evidence that could be overlooked.

Annotator	**Weak Annotation**	**Modified annotation**	**Modified ratio**
A	44	36	81.81%
B	40	40	100%
C	31	27	87.10%

Table 5: The amount of modified annotations of each annotator after reading the reasons generated by GPT-4.

7 Conclusion

We developed detailed guidelines, dataset, and LLM-based approaches for evaluating working alliance between counselors and clients in text-based counseling from observers' perspective. Our demonstration suggests that the integration of detailed guidelines and CoT prompting empower LLMs to assess the working alliance effectively with underlying rationales. Moreover, the identified evidence proves helpful in improving the mutual understanding of working alliance for human.

8 Limitations

As this is the first LLM-based approach to automatically evaluate counseling quality, there is huge room for future improvement. First, our experiments focus exclusively on assessing the performance of four preeminent general-purpose LLMs: GLM-4, Claude-3, ChatGPT and GPT-4. Because of the high costs, unavailability of open APIs, and inherent limitations in the capabilities of LLMs, we limit our testing scope. As our approach can be generalized to any other language models, we envision future endeavors expanding into broader LLMs, particularly those fine-tuned for psychology applications. Second, despite our efforts to enhance guidelines through consensual qualitative research, improving the alignment between LLMs and human ratings, challenges persist in evaluating certain questions. We will continue to explore how to systematically design guidelines to target improvements in the ability of specific LLMs to effectively assess the working alliance of counseling.

9 Ethics Statement

Data Privacy. This study is granted ethics approval from the Institutional Ethics Committee. All the counselors and clients provided their consent to participate and received reasonable fee for participation. All the participants were notified that the conversations collected on the platform would be utilized for scientific research purposes and potentially shared with third parties for the same purpose. Participants were also informed that they could discontinue counseling and withdraw from the research at any time. The detailed consent form for clients and user services agreement are presented in Appendix D.

Throughout the annotation process, we devoted meticulous attention to manually de-identifying and anonymizing the data, ensuring the utmost protection of the privacy of both clients and counselors. Additionally, our guidelines developers and annotators, prior to accessing the conversation data, formally committed to data confidentiality agreements and adhered to ethical guidelines, underscoring our commitment to upholding the highest standards of privacy and ethical conduct. Moreover, to avoid potential privacy concerns during LLMs evaluations, we utilize LLMs through the official API and provide them with the anonymized counseling data.

Data Release. In order to foster interdisciplinary research at the intersection of NLP and psychology, we plan to release a subset of this dataset to interested researchers upon article acceptance. For whom request the data, we will evaluate their qualification. We require them to provide a valid ID, the reason they request data, proof of full-time work in non-profit academic or research institutions which have the approval of an Institutional Review Board (IRB), full-time principal investigators, and the approval of the institution's Office of Research or equivalent office. Meanwhile, they must sign a Data Non-disclosure Agreement and promise that they would not share the data with any third party.

LLM Evaluation. *1) Imperfect Capabilities of LLMs:* Due to the current limitations in LLMs' assessment capabilities, they may not achieve perfect alignment with assessments conducted by professional human evaluators. Utilizing inaccurate results generated by LLMs for clinical evaluation has the potential to compromise the effectiveness of psychological counseling services, and may even incur medical and legal responsibilities.

2) Inherent Biases of LLMs: LLMs are trained on data that may contain biases reflecting societal biases and discriminations. Failing to mitigating these biases during the evaluation of psychological counseling quality using LLMs could result in unfair assessment outcomes, negatively impacting certain demographics.

3) Societal Acceptance: There is uncertainty regarding the societal acceptance of integrating LLMs for evaluating psychological counseling quality. Concerns regarding potential technology misuse and ethical issues related to human-machine collaboration may lead to public resistance and opposition to the clinical application of LLMs.

This work aims to offer an alternative option to human evaluation rather than seeking to replace human judgements. The positive results in the work provide NLP and psychology researchers with an alternative approach for applying LLMs in the automatic evaluation of counseling, fostering further discussions on this topic. This can facilitate the future research of AI psychology and sociology.

References

Anthropic. 2024. The claude 3 model family: Opus, sonnet, haiku. https://api.semanticscholar.org/CorpusID:268232499. [Accessed 16-04-2024].

David C Atkins, Mark Steyvers, Zac E Imel, and Padhraic Smyth. 2014. Scaling up the evaluation of psychotherapy: evaluating motivational interviewing fidelity via statistical text classification. *Implementation Science*, 9(1):1–11.

Edward S Bordin. 1979. The generalizability of the psychoanalytic concept of the working alliance. *Psychotherapy: Theory, research & practice*, 16(3):252.

Edward S Bordin. 1983. A working alliance based model of supervision. *The counseling psychologist*, 11(1):35–42.

Lars Buitinck, Gilles Louppe, Mathieu Blondel, Fabian Pedregosa, Andreas Mueller, Olivier Grisel, Vlad Niculae, Peter Prettenhofer, Alexandre Gramfort, Jaques Grobler, Robert Layton, Jake VanderPlas, Arnaud Joly, Brian Holt, and Gaël Varoquaux. 2013. API design for machine learning software: experiences from the scikit-learn project. In *ECML PKDD Workshop: Languages for Data Mining and Machine Learning*, pages 108–122.

Jie Cao, Michael Tanana, Zac Imel, Eric Poitras, David Atkins, and Vivek Srikumar. 2019. Observing dialogue in therapy: Categorizing and forecasting behavioral codes. In *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics*, pages 5599–5611, Florence, Italy. Association for Computational Linguistics.

Yu Ying Chiu, Ashish Sharma, Inna Wanyin Lin, and Tim Althoff. 2024. A computational framework for behavioral assessment of llm therapists.

MJ Constantino, LG Castonguay, and AJ Schut. 2002. The working alliance: A flagship for the "scientist-practitioner" model in psychotherapy. *Counseling based on process research: Applying what we know*, pages 81–131.

Andrew Darchuk, Victor Wang, David Weibel, Jennifer Fende, Timothy Anderson, and Adam Horvath. 2000. Department of psychology ohio university december 11, 2000.

Gunther Eysenbach, John Powell, Marina Englesakis, Carlos Rizo, and Anita Stern. 2004. Health related virtual communities and electronic support groups: systematic review of the effects of online peer to peer interactions. *Bmj*, 328(7449):1166.

Fredrik Falkenström, Fredrik Granström, and Rolf Holmqvist. 2014. Working alliance predicts psychotherapy outcome even while controlling for prior symptom improvement. *Psychotherapy Research*, 24(2):146–159.

Lisa R Fenton, John J Cecero, Charla Nich, Tami L Frankforter, and Kathleen M Carroll. 2001. Perspective is everything: The predictive validity of six working alliance instruments. *The Journal of psychotherapy practice and research*, 10(4):262.

James Gibson, Dogan Can, Bo Xiao, Zac E Imel, David C Atkins, Panayiotis Georgiou, and Shrikanth Narayanan. 2016. A deep learning approach to modeling empathy in addiction counseling. *Commitment*, 111:21.

Simon B Goldberg, Nikolaos Flemotomos, Victor R Martinez, Michael J Tanana, Patty B Kuo, Brian T Pace, Jennifer L Villatte, Panayiotis G Georgiou, Jake Van Epps, Zac E Imel, et al. 2020. Machine learning and natural language processing in psychotherapy research: Alliance as example use case. *Journal of counseling psychology*, 67(4):438.

Peiyuan Gong and Jiaxin Mao. 2023. Coascore: Chain-of-aspects prompting for nlg evaluation. *arXiv preprint arXiv:2312.10355*.

Robert L. Hatcher and J. Arthur Gillaspy. 2006. Development and validation of a revised short version of the working alliance inventory. *Psychotherapy Research*, 16(1):12–25.

E. Heinonen, O. Lindfors, T. Härkänen, E. Virtala, T. Jääskeläinen, and P. Knekt. 2013. Therapists' professional and personal characteristics as predictors of working alliance in short-term and long-term psychotherapies. *Clinical psychology & psychotherapy*, 21 6:475–94.

Emily A Holmes, Ata Ghaderi, Catherine J Harmer, Paul G Ramchandani, Pim Cuijpers, Anthony P Morrison, Jonathan P Roiser, Claudi LH Bockting, Rory C O'Connor, Roz Shafran, et al. 2018. The lancet psychiatry commission on psychological treatments research in tomorrow's science. *The Lancet Psychiatry*, 5(3):237–286.

Adam O Horvath and Leslie S Greenberg. 1989. Development and validation of the working alliance inventory. *Journal of counseling psychology*, 36(2):223.

Adam O Horvath and Leslie S Greenberg. 1994. *The working alliance: Theory, research, and practice*, volume 173. John Wiley & Sons.

Adam O Horvath and Ronald W Marx. 1990. The development and decay of the working alliance during time-limited counselling. *Canadian Journal of Counselling and Psychotherapy*, 24(4).

Tae Kyun Kim. 2015. T test as a parametric statistic. *Korean journal of anesthesiology*, 68(6):540–546.

Terry K Koo and Mae Y Li. 2016. A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of chiropractic medicine*, 15(2):155–163.

Michael J Lambert. 2013a. *Bergin and Garfield's handbook of psychotherapy and behavior change*. John Wiley & Sons.

Michael J Lambert. 2013b. Outcome in psychotherapy: the past and important advances.

Joseph Lee Rodgers and W Alan Nicewander. 1988. Thirteen ways to look at the correlation coefficient. *The American Statistician*, 42(1):59–66.

Anqi Li, Jingsong Ma, Lizhi Ma, Pengfei Fang, Hongliang He, and Zhenzhong Lan. 2022. Towards automated real-time evaluation in text-based counseling. *arXiv preprint arXiv:2203.03442*.

Anqi Li, Lizhi Ma, Yaling Mei, Hongliang He, Shuai Zhang, Huachuan Qiu, and Zhenzhong Lan. 2023. Understanding client reactions in online mental health counseling. In *Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*, pages 10358–10376, Toronto, Canada. Association for Computational Linguistics.

Baihan Lin, Guillermo Cecchi, and Djallel Bouneffouf. 2022. Working alliance transformer for psychotherapy dialogue classification. *arXiv preprint arXiv:2210.15603*.

Baihan Lin, Guillermo Cecchi, and Djallel Bouneffouf. 2023. Deep annotation of therapeutic working alliance in psychotherapy. In *International Workshop on Health Intelligence*, pages 193–207. Springer.

Yen-Ting Lin and Yun-Nung Chen. 2023. Llm-eval: Unified multi-dimensional automatic evaluation for open-domain conversations with large language models.

Siyang Liu, Chujie Zheng, Orianna Demasi, Sahand Sabour, Yu Li, Zhou Yu, Yong Jiang, and Minlie Huang. 2021. Towards emotional support dialog systems. In *Proceedings of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing (Volume 1: Long Papers)*, pages 3469–3483, Online. Association for Computational Linguistics.

Victor R Martinez, Nikolaos Flemotomos, Victor Ardulov, Krishna Somandepalli, Simon B Goldberg, Zac E Imel, David C Atkins, and Shrikanth Narayanan. 2019. Identifying therapist and client personae for therapeutic alliance estimation. In *Interspeech*, volume 2019, page 1901. NIH Public Access.

Shikib Mehri and Maxine Eskenazi. 2020. Unsupervised evaluation of interactive dialog with DialoGPT. In *Proceedings of the 21th Annual Meeting of the Special Interest Group on Discourse and Dialogue*, pages 225–235, 1st virtual meeting. Association for Computational Linguistics.

H. Nissen-Lie, O. Havik, P. Høglend, Jon T Monsen, and M. H. Rønnestad. 2013. The contribution of the quality of therapists' personal lives to the development of the working alliance. *Journal of counseling psychology*, 60 4:483–95.

John C Norcross. 2010. The therapeutic relationship. *The heart and soul of change: Delivering what works in therapy*, pages 113–141.

OpenAI. 2023a. [link].

OpenAI. 2023b. Gpt-4 technical report. *arXiv preprint arXiv:2303.08774*.

Long Ouyang, Jeff Wu, Xu Jiang, Diogo Almeida, Carroll L. Wainwright, Pamela Mishkin, Chong Zhang, Sandhini Agarwal, Katarina Slama, Alex Ray, John Schulman, Jacob Hilton, Fraser Kelton, Luke E. Miller, Maddie Simens, Amanda Askell, Peter Welinder, Paul Francis Christiano, Jan Leike, and Ryan J. Lowe. 2022. Training language models to follow instructions with human feedback. *ArXiv*, abs/2203.02155.

Huachuan Qiu, Hongliang He, Shuai Zhang, Anqi Li, and Zhenzhong Lan. 2023. Smile: Single-turn to multi-turn inclusive language expansion via chatgpt for mental health support.

Eugénia Ribeiro, António P Ribeiro, Miguel M Gonçalves, Adam O Horvath, and William B Stiles. 2013. How collaboration in therapy becomes therapeutic: The therapeutic collaboration coding system. *Psychology and Psychotherapy: Theory, Research and Practice*, 86(3):294–314.

Nathálya Soares Ribeiro, Fernando Antonio Basile Colugnati, Nikolaos Kazantzis, and Laisa Marcorela Andreoli Sartes. 2021. Observing the working alliance in videoconferencing psychotherapy for alcohol addiction: Reliability and validity of the working alliance inventory short revised observer. *Frontiers in Psychology*, 12:647814.

Faraj A Santirso, Manuel Martín-Fernández, Marisol Lila, Enrique Gracia, and Elena Terreros. 2018. Validation of the working alliance inventory–observer short version with male intimate partner violence offenders. *International journal of clinical and health psychology*, 18(2):152–161.

Georgiana Shick Tryon, Sasha Collins Blackwell, and Elizabeth Felleman Hammel. 2007. A meta-analytic examination of client–therapist perspectives of the working alliance. *Psychotherapy Research*, 17(6):629–642.

Patrick E Shrout and Joseph L Fleiss. 1979. Intraclass correlations: uses in assessing rater reliability. *Psychological bulletin*, 86(2):420.

Gerald J Stahler and Herbert Rappaport. 1986. Do therapists bias their ratings of patient functioning under peer review? *Community Mental Health Journal*, 22:265–274.

Zachary Steel, Claire Marnane, Changiz Iranpour, Tien Chey, John W Jackson, Vikram Patel, and Derrick Silove. 2014. The global prevalence of common mental disorders: a systematic review and meta-analysis 1980–2013. *International journal of epidemiology*, 43(2):476–493.

Michael Tanana, Kevin Hallgren, Zac Imel, David Atkins, Padhraic Smyth, and Vivek Srikumar. 2015. Recursive neural networks for coding therapist and patient behavior in motivational interviewing. In *Proceedings of the 2nd Workshop on Computational Linguistics and Clinical Psychology: From Linguistic Signal to Clinical Reality*, pages 71–79, Denver, Colorado. Association for Computational Linguistics.

Victoria Tichenor and Clara E Hill. 1989. A comparison of six measures of working alliance. *Psychotherapy: Theory, Research, Practice, Training*, 26(2):195.

Georgiana Shick Tryon, Sasha Collins Blackwell, and Elizabeth Felleman Hammel. 2008. The magnitude of client and therapist working alliance ratings. *Psychotherapy: Theory, Research, Practice, Training*, 45(4):546.

Raphael Vallat. 2018. Pingouin: statistics in python. *Journal of Open Source Software*, 3(31):1026.

Steven Walfish, Brian McAlister, Paul O'Donnell, and Michael J Lambert. 2012. An investigation of self-assessment bias in mental health providers. *Psychological reports*, 110(2):639–644.

Xiangdong Wang, Xilin Wang, and Hong Ma. 1999. Manual for the mental health rating scale. *Chinese Mental Health Journal*, 13(1):31–35.

Yaqing Wang, Jiepu Jiang, Mingyang Zhang, Cheng Li, Yi Liang, Qiaozhu Mei, and Michael Bendersky. 2023. Automated evaluation of personalized text generation using large language models. *arXiv preprint arXiv:2310.11593*.

Jason Wei, Yi Tay, Rishi Bommasani, Colin Raffel, Barret Zoph, Sebastian Borgeaud, Dani Yogatama, Maarten Bosma, Denny Zhou, Donald Metzler, et al. 2022a. Emergent abilities of large language models. *arXiv preprint arXiv:2206.07682*.

Jason Wei, Xuezhi Wang, Dale Schuurmans, Maarten Bosma, Fei Xia, Ed Chi, Quoc V Le, Denny Zhou, et al. 2022b. Chain-of-thought prompting elicits reasoning in large language models. *Advances in Neural Information Processing Systems*, 35:24824–24837.

Zixiu Wu, Rim Helaoui, Diego Reforgiato Recupero, and Daniele Riboni. 2023. Towards effective automatic evaluation of generated reflections for motivational interviewing. In *Companion Publication of the 25th International Conference on Multimodal Interaction*, pages 368–373.

Jing Xu, Arthur Szlam, and Jason Weston. 2022. Beyond goldfish memory: Long-term open-domain conversation. In *Proceedings of the 60th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*, pages 5180–5197, Dublin, Ireland. Association for Computational Linguistics.

ZHIPU. 2024. ZHIPU AI DevDay GLM-4. `https://zhipuai.cn/en/devday`. [Accessed 16-04-2024].

A Guidelines

A.1 Guidelines Development Process

To facilitate the understanding of questions and the differentiation of scores by observers, we have four developers (One is a postdoctoral fellow in psychology and a State-Certificated Class 3 Psychocounselor with 4 years of experience; another is a master student in psychology; and the remaining two are a doctoral student and a postdoctoral fellow in the intersection of computer science and psychology.) to carefully design specific guidelines for each score associated with each question. Following Darchuk et al. (2000)'s work, we employ the amount of evidence present in counseling conversations as anchor labels for scores, using the middle point (i.e., 3) as the start point representing "no evidence". The higher score denotes more positive evidence, and vice versa. As a result, each question is scored from 1 to 5.

Expanding on the general guidelines, we further design specific descriptions for each score of every question. Here, we introduce the detailed descriptions by taking the question "*There is agreement about the usefulness of the current activity in therapy (i.e., the client is seeing new ways to look at his/her problem)*" as an example. Firstly, we anchor the extreme scores of the scale with bipolar adjective relevant to this question, resulting in "open claim of useless" at a rating of 1 and "overt statements of usefulness" at a rating of 5. Secondly, we outline counselors and clients' behavioral indicators at each score level, along with the corresponding extent and frequencies. For the exemplar question, the descriptions are formulated based on clients' frequency (always or sometimes) and attitude (actively or passively) towards participating in tasks proposed by counselors.

The resulting guidelines establish conceptual boundaries among questions within the same dimension and provide clear distinctions among the points on the scale, allowing raters to discern subtle changes in the working alliance with greater reliability.

A.2 Detailed Guidelines

—— Goal ——

Q1: There are doubts or a lack of understanding about what participants are trying to accomplish in therapy.

1 = The counselor or the client explicitly mentions the counseling goals and works around the

established objectives, such as understanding information related to the goals and methods to achieve them. The relevance of the dialogue to the goals is evident for both the counselor and the client. They may discuss the goals to acknowledge or comment on the usefulness of the therapeutic process.

2 = The counselor and the client do not explicitly mention the goals but are working towards a common objective. The counselor addresses the client's concerns immediately and adjusts the therapeutic process to meet the client's needs. The client is satisfied with the progress made.

3 = There is no evidence to suggest that the counselor and the client have established consistent counseling goals, or there is an equal level of confusion and understanding regarding the goals.

4 = There is disagreement between the counselor and the client regarding counseling goals. While there may be some communication between both parties, the counselor's specific tasks or interventions may be questioned or resisted by the client. The counseling may need to be paused multiple times to adjust the goals. The client may express overall dissatisfaction with the counseling. At this stage, the counselor may take on an "expert" role, sometimes overlooking the client's opinions or therapeutic ideas, and instances where the counselor guides but the client is not engaged may occur. The client may become less emotionally invested.

5 = The counselor and the client have clearly identified different goals, and there are disagreements in the order of issues and solutions in therapy. This inconsistency may lead the client to express strong dissatisfaction with the overall counseling process and goals, possibly mentioning the reasons for participating in therapy. This could further trigger a negative reaction from the counselor. At this stage, it seems challenging for both parties to find common ground, making the therapeutic process difficult.

Q2: The client and therapist are working on mutually agreed upon goals.

1 = The shift of topics often occurs abruptly, usually without mutual agreement from both parties. This frequent topic shift may result from one party interrupting or disregarding the other's statements. At this stage, significant conflicts exist between the counselor and the client regarding the appropriateness, definition, and boundaries of the goals, leading to confusion in the rhythm and content of the conversation.

2 = Topics may shift before resolution or conclusion, but the transition typically moves from one relevant topic to another related or less related one. This shift can be initiated by either the counselor or the client. At this stage, both parties may express dissatisfaction with the frequent shift of topics or the overall pace of therapy, but friction is relatively minor and has not escalated into apparent conflict.

3 = There may be some ambiguity or uncertainty between the counselor and the client regarding session goals. The current stage of communication lacks clear evidence that both parties have reached a common understanding or collaboration, but there is also no explicit conflict or disagreement. Further communication and discussion may be necessary to clarify expectations and goals to ensure the effectiveness of therapy.

4 = The counselor and the client have made some progress through discussing relevant topics, but there may still be a small amount of disagreement or areas that need further exploration. At this stage, although both parties generally agree on the current direction and topics of therapy, more communication and consensus may be needed to ensure the achievement of goals.

5 = The counselor and the client have achieved complete agreement on goals through in-depth, targeted discussions, and have had highly productive discussions on multiple related topics. At this stage, both parties almost always reach consensus on the current topic identified by the client as a goal and then smoothly transition to another relevant topic. The overall session and communication are very smooth and efficient.

Q3: The client and therapist have different ideas about what the client's real problems are.

1 = The counselor and the client have a very clear and consistent understanding of the client's issues and goals. At this stage, there is a strong consensus on problem resolution, with both parties often identifying the same issues and considering therapy sessions highly effective. This indicates that they have formed a close collaborative relationship in the session.

2 = The counselor and the client have a certain level of consensus on the client's issues and goals. While not fully synchronized like the first category, both parties are making efforts to understand each other and demonstrate open and cooperative attitudes in discussions. This indicates that they are working towards establishing a common therapeutic direction and goals.

3 = In the communication between the counselor

and the client regarding the client's issues, there is no clear evidence of agreement or disagreement. In the current interaction, there may be neither a clear consensus nor explicit conflict in opinions and feelings on both sides. Further communication and discussion may be needed to clarify the positions and expectations of both parties.

4 = There is some disagreement between the counselor and the client regarding the client's issues. This disagreement may manifest as controversy in response to certain topics or differences in the relevance of counseling goals. At this stage, although there may be occasional confrontations in the interaction between the two, it has not escalated to strong opposition or sustained conflict.

5 = There is evident conflict and disagreement between the counselor and the client in defining and addressing the client's issues. The client may strongly oppose the counselor's viewpoints, and the counselor may shift topics, frequently interrupt, and express disagreement with the client's perspectives. At this stage, there may be clear confrontations in the interaction between both parties, leading to a compromised effectiveness of the session.

Q4: The client and therapist have established a good understanding of the changes that would be good for the client.

1 = There are clear misunderstandings and disagreements between the counselor and the client in the process of change. The client may express concerns or doubts about the direction of their change, the expected outcomes of the change, or the methods of change suggested by the counselor. At this stage, more communication and guidance may be needed to build trust and understanding.

2 = The client may have doubts or uncertainties in the process of change. Although they may be taking some actions or practices, it is not clear how to achieve the expected change or the actual effectiveness of these practices. The counselor and the client need to further explore and clarify the path and expectations of change.

3 = The counselor and the client have a neutral attitude towards the process and goals of change in the conversation. Both parties may not have explicitly expressed their understanding or misunderstanding of the change. Expectations and methods of change are neither emphasized nor overlooked in the discussion, resulting in an overall lack of clear consensus or disagreement on the goals and process of counseling.

4 = Both the counselor and the client in the conversation are aware of changes that would benefit the client. This understanding may be reflected in the client's compromise on counseling goals, expressions, or discussions about the client's current situation and future expectations. Both parties are working to clarify the path and direction of change.

5 = In the counseling process, there is strong consistency and clarity between the counselor and the client regarding the client's goals and how to achieve them. They not only discuss these goals frequently and explicitly during the session but also summarize and confirm the progress and outcomes achieved at the end. The interaction and discussion at this stage align completely with the therapeutic plan.

—— Approach ——

Q5: There is agreement about the steps taken to help improve the client's situation.

1 = The client directly expresses that the tasks and goals are inappropriate and generally disagrees with homework or tasks during the session. There is a disagreement between the client and the counselor regarding the approach to be taken. The client refuses to engage in tasks.

2 = The client hesitates to explore and does not follow the counselor's guidance in the change process. The client withdraws from the counselor, seeming to just "go through the motions," not engaging or focusing on the counselor or tasks. Even after some clarification by the counselor, the client still seems uncertain about the relevance of the tasks to their goals. The client appears conflicted or indifferent towards tasks in therapy and passively resists them (e.g., limited participation).

3 = There is no clear consensus or disagreement between the counselor and the client regarding therapy tasks. Both may have vague views on the significance and purpose of tasks, resulting in a neutral attitude towards participation and involvement in tasks during the session.

4 = The client shows a clear interest and involvement in therapy tasks. Whether occasional clarification is needed or not, the client participates and follows the exploration process. There is an unspoken understanding behind the tasks, leading the client to gradually acknowledge and engage in the tasks.

5 = The counselor and client strongly agree on different goals, and there is a clear disagreement on the order and solutions to issues in therapy. This

inconsistency may lead the client to express strong dissatisfaction with the overall therapy process and goals, possibly mentioning the reasons for attending therapy, which may further trigger a negative reaction from the counselor. At this stage, finding common ground seems challenging, making the therapy process difficult.

Q6: There is agreement about the usefulness of the current activity in therapy (i.e., the client is seeing new ways to look at his/her problem).

1 = The client repeatedly argues against tasks. The client refuses to participate, claiming that it is pointless for their goals. Tension exists in the relationship between the counselor and the client, and issues are not explored.

2 = The client does not actively engage in the session tasks, although he/she may not openly question the usefulness of the tasks. The client fails to openly discuss the issues. The client may hesitate to participate in tasks but eventually engages in them. The counselor accurately conveys the reasons behind the tasks, enabling the client to understand the relevance of the tasks to their current concerns.

3 = There is no clear evidence in the communication between the counselor and the client about whether they have reached an agreement or disagreement on the client's issues. In the current interaction, there is neither a clear consensus nor an explicit conflict in opinions and feelings. Further communication and discussion may be needed to clarify their positions and expectations.

4 = The client actively participates in and is committed to therapy tasks, showing no skepticism about their effectiveness. Regardless of occasional resistance, the client engages and follows the exploration process. Both parties share a common understanding of the tasks' principles, allowing the client to gradually accept and participate in the tasks.

5 = In the counseling process, the counselor and the client have a strong and clear agreement on the client's goals and how to achieve them. They not only frequently and explicitly discuss these goals during the session but also summarize and confirm the progress and achievements at the end. The interaction and discussion at this stage align completely with the therapeutic plan.

Q7: There is agreement on what is important for the client to work on.

1 = There is a clear disagreement and opposition between the counselor and the client regarding the current focus. This difference may manifest as the counselor not allowing the client to shift to different topics or the client showing strong opposition during the therapy process. Their views on the direction and outcomes of therapy are entirely different.

2 = The counselor and the client have some disagreement about the content and direction of therapy, differing in the themes and time allocation to focus on during therapy.

3 = There are no clear signs of agreement or disagreement in the interaction between the counselor and the client regarding the themes or issues of therapy. Although they may engage in some exploration and communication, it is challenging to determine whether they share views on therapy themes or issues. Their reactions seem neither particularly synchronized nor explicitly conflicting.

4 = The client and the counselor respond to each other's focus and needs to some extent. They explore and accept each other's views and intentions to some degree. Although there may be some differences, they both strive to seek a common understanding and progress the therapy process.

5 = The counselor and the client are highly actively engaged in the therapy process, thoroughly exploring each other's issues and responding explicitly and continuously to each other's views and intentions. They approach therapy themes and issues with an open mindset, working together, reflecting flexibility, and demonstrating a cooperative spirit.

Q8: The client believes that the way they are working with his/her problem is correct.

1 = The client holds evident doubts and aversions towards the counseling process, frequently engaging in arguments with the counselor. Progress between the counselor and the client is very limited, and the time spent arguing may exceed the time dedicated to therapy. This inconsistency and questioning impact the overall therapy process.

2 = The counselor and the client sometimes have conflicting opinions, but they seem to cooperate in certain parts of the therapy process. The client expresses doubts about the therapy process or occasionally expresses concerns about certain techniques, finding other things to do during most of the counseling time.

3 = The client maintains a neutral stance toward the therapy process and methods. He/she neither explicitly expresses satisfaction nor dissatisfaction with therapy, nor does he/she clearly indicate agree-

ment or disagreement with the therapeutic methods. During the therapy process, the client may comply at certain moments and show reservations at other times, without providing a clear evaluation of the therapy's effectiveness. This neutral attitude may stem from the client's ongoing assessment of therapy effectiveness or uncertainty about how to evaluate therapy progress.

4 = The client partially agrees with certain aspects of therapy tasks, although this agreement may not always be explicitly expressed. His/her level of involvement in the therapy process falls between simple compliance and actively providing suggestions. The client shows a certain level of agreement with the collaboration with the counselor, possibly being more actively involved in certain aspects of therapy.

5 = The client is satisfied and excited about the counselor's methods and approach to problem-solving. His/her performance in therapy is highly positive, possibly suggesting suggestions to further advance therapy tasks. Overall, the client is content with therapy work, and their interaction demonstrates a high level of cooperation and enthusiasm.

—— Affective Bond ——

Q9: There is a mutual liking between the client and therapist.

1 = There is evident animosity, hostility, or indifference between the counselor and the client. This may manifest in arguments, derogatory comments, or open hostility. The counselor fails to demonstrate concern for the client and may either forget important details of their life or completely disregard the client.

2 = Although there is no direct hostility between both parties, there is noticeable tension and distance in the relationship. The counselor appears indifferent or mechanical in response to the client, lacking enthusiasm. While there may not be explicit negative language, there is a lack of positive feedback and reinforcement in their interactions.

3 = There are no clear signs of warmth or coldness in the relationship between the counselor and the client. Communication lacks strong emotional feedback, and both parties seem to maintain a neutral stance. Despite engaging in communication, there is no clear expression or implication of liking or disliking each other. The relationship appears balanced without significant signs of warmth or indifference.

4 = In the majority of the sessions, the counselor and the client have positive interactions. The counselor shows enthusiasm and care for the client, frequently communicating with empathy and encouragement, exploring and understanding important details of the client's life.

5 = Throughout the therapy process, the counselor and the client consistently demonstrate a deep care for each other and provide positive feedback. The counselor not only encourages and reinforces the client's healthy behaviors but also deeply understands and cares about various aspects of the client's life, including their interests and hobbies. This profound care may lead to the client explicitly expressing gratitude and trust in the counselor. The client may also show appreciation for the counselor's care.

Q10: The client feels confident in the therapist's ability to help the client.

1 = The client expresses minimal or no hope for the therapy outcomes. The client significantly questions the therapist's capabilities and may directly challenge the therapist's qualifications or understanding of the client's experiences. The client resists the therapist's suggestions, attempts at assistance, or expresses discouragement and pessimism.

2 = The client harbors doubts about the therapist, the therapy process, or the anticipated outcomes. The client may question whether the therapist truly understands their issues or doubt the interventions/homework provided during the problem-solving stages. These doubts do not come with strong opposition or hostility but noticeably impact the progress of the therapy process.

3 = The client holds a neutral stance regarding the therapist's capabilities. Throughout the therapy process, there is no clear evidence suggesting that the client has high confidence in the therapist, nor is there evidence indicating skepticism about the therapist's abilities. The client's responses and comments neither explicitly appreciate nor question the therapist's skills and capabilities.

4 = The client expresses a certain level of confidence in the therapist's abilities. This confidence may be reflected in the client's in-depth discussions on therapy topics, positive responses to the therapist's guidance, or an optimistic attitude towards resolving current counseling issues. Additionally, the client has substantial trust in the therapist's competency, possibly expressing appreciation for the effectiveness of the therapy or the therapist's abilities.

5 = The client consistently agrees with the therapist's reflections and interventions/guidance, expressing high satisfaction and appreciation for certain aspects of the therapy process or the therapist themselves. There may be multiple discussions during the therapy process highlighting the strengths of the therapy and/or the therapist.

Q11: The client feels that the therapist appreciates him/her.

1 = The client feels that the therapist is indifferent, inattentive, and unconcerned about his/her issues. This is expressed through explicit accusations, disdain, or other negative reactions, indicating a sense of being disregarded or misunderstood by the therapist.

2 = The client harbors some doubts about whether the therapist genuinely cares. These doubts might be indirectly expressed, such as subtle mentions or manifestations of emotions like withdrawal, displeasure, or frustration.

3 = Throughout the therapy process, there is no clear evidence of strong positive or negative reactions from the client regarding the therapist's care and support. The client neither explicitly appreciates nor expresses dissatisfaction or disregard for the therapist's sensitivity and empathetic abilities. The emotional tone of the relationship is neutral, with no apparent strong connection or distance.

4 = The therapist demonstrates a level of acceptance, warmth, and empathy towards the client, and the client perceives and responds to this caring attitude. During the therapy process, the client acknowledges to some extent the therapist's warmth and understanding.

5 = The client strongly senses the therapist's care and support, expressing gratitude for the relationship. They may praise the therapist's sensitivity and empathetic abilities, feeling comfortable and at ease for most of the therapy process.

Q12: There is mutual trust between the client and therapist.

1 = The client has significant mistrust towards the therapist, demonstrated by avoiding discussions on critical issues or directly expressing distrust. This mistrust hinders open communication, and the therapist may also show concerns and discomfort about the therapeutic process.

2 = There is a moderate level of mistrust between both parties, though not as intense as in the first category. The client may hesitate to share private content, and the therapist may feel a sense of uncertainty or slight discomfort regarding the therapeutic situation.

3 = There are no clear signs of trust between the therapist and client, but there are also no apparent behaviors indicating mistrust. There is a balance between trust and mistrust in their interactions, with no explicit demonstration of reliance on each other, nor clear signs of doubt or guardedness.

4 = The client is willing to disclose some personal concerns, and the therapist accepts the client's surface statements. The therapist does not overturn or interrupt the client's thoughts and maintains focus.

5 = The trust between both parties is deep enough that the client not only willingly shares deeper layers of privacy and issues but also accepts and responds to the therapist's feedback and suggestions. This level of trust enhances the overall smoothness and efficiency of the therapeutic process.

B Human Evaluation

B.1 Human Agreement

Table 6 shows human agreement in evaluating working alliance across all dimensions and questions during the initial annotation phase and after refinement based on evidence generated by GPT-4. Given that we plan to generalize our reliability results to any annotators with similar characteristics as the selected raters in this work, focus on the absolute agreement instead of consistency between annotators, and use the mean value of three annotators as an assessment basis, we adopt the ICC(2, k) form with two-way random effects, absolute agreement, and multiple raters. We use Pingouin package (Vallat, 2018) to calculate the ICC metric.

Besides, Table 5 presents the proportion of revisions made by each annotator during the process of refining labels with evidence from GPT-4.

B.2 Data Characteristics

Based on the annotated data, we analyze the score distribution. Table 7 presents the average scores per dimension and questions along with their standard deviations in parentheses.

C Experimental Results and Analysis

C.1 Biases of Counselors' Retrospective Self-reports

We employ a paired t-test (Kim, 2015) implemented in scikit-learn package (Buitinck et al., 2013) to examine the relationship between the

	Before	**After**
Q1	0.6785	0.6835
Q2	0.8297	0.8341
Q3	0.7337	0.7381
Q4	0.7906	0.8061
Goal	*0.7581*	***0.7655***
Q5	0.6034	0.6034
Q6	0.6645	0.6750
Q7	0.6055	0.6398
Q8	0.7612	0.7612
Approach	*0.6587*	***0.6699***
Q9	0.6455	0.6906
Q10	0.7124	0.7396
Q11	0.617	0.6357
Q12	0.6241	0.6970
Affective Bond	*0.6498*	***0.6907***
Overall	*0.6888*	***0.7087***

Table 6: Human agreement on evaluating the working alliance across all dimensions and questions before and after the refinement of weak annotators.

Dimension	**Avg. Score**	**Question**	**Avg. Score**
Goal	3.57(0.56)	**Q1**	3.56(0.63)
		Q2	3.69(0.60)
		Q3	3.56(0.67)
		Q4	3.47(0.64)
Approach	3.52(0.56)	**Q5**	3.46(0.61)
		Q6	3.32(0.64)
		Q7	3.75(0.63)
		Q8	3.57(0.55)
Affective Bond	**3.60(0.48)**	**Q9**	3.67(0.55)
		Q10	3.37(0.63)
		Q11	3.39(0.42)
		Q12	**3.97(0.52)**

Table 7: The average scores annotated on each question and dimension, with standard deviations presented in parentheses. The highest average score in each column is shown in bold.

working alliance scores rated by counselors and clients within each counselor-client pair. We observe that counselors tend to assign significantly higher scores than their clients in nearly 21% of counseling sessions. In these instances, counselors' average ratings stand at 4.38 ± 0.57, contrasting sharply with clients' average rating of only 2.84 ± 0.60. This disparities demonstrate significant distinctions in how counselors perceive the overall relationship with their clients compared to the assessments provided by the clients themselves.

C.2 Model Self-Agreement

As the final annotation is determined by the average of the model's three independent annotations, we adopt the intraclass correlation coefficient with the 2-way mixed-effects model, absolute agreement definition, and the mean of k measurements type as the measure of the model's self-reliability (Koo and Li, 2016; Shrout and Fleiss, 1979). Table 8 presents models' intra-rater agreement on evaluating all the questions.

C.3 Alignment with Human Evaluations

The alignment between LLMs and human evaluations are presented in Table 9.

D The Consent Form and User Services Agreement

Below are the English translation of consent forms and user services agreement used in the current work, the original documents are in Mandarin Chinese. Every client gave their consent to attend the online text-based psycho-counseling on our counseling platform and agreed to data usage for the current work.

D.1 Consent Form

Dear clients,

Thank you for your trust. Before we formally begin the counselings, there are some relevant matters that need to be communicated to you, so that the consultation can proceed smoothly and effectively. This agreement is the basic framework to ensure the normal conduct of the psychological consultation process. Please read it carefully and tick the box at the bottom to indicate your agreement. If you have any questions, please raise them with your counselor after the counselings.

1. Duration and Frequency of Consultation: Psychological consultations require regular sessions, each typically lasting 50 minutes. The fre-

	ChatGPT				GLM-4				Claude-3				GPT-4			
Question	**No**	**General**	**Detailed**	**Detailed + CoT**	**No**	**General**	**Detailed**	**Detailed + CoT**	**No**	**General**	**Detailed**	**Detailed + CoT**	**No**	**General**	**Detailed**	**Detailed + CoT**
Q1	-0.2924	0.1989	0.0410	0.2921	0.9775	1.0000	1.0000	0.9966	0.4880	0.4886	0.8054	0.7779	0.5359	0.4136	0.7210	0.7111
Q2	0.3314	0.2521	0.5165	0.5972	1.0000	1.0000	1.0000	1.0000	0.7864	0.8379	0.7400	0.8359	0.4327	0.6193	0.6884	0.6978
Q3	0.0203	-0.0130	-0.0021	0.0195	1.0000	0.9864	0.9957	0.9955	0.4811	0.7588	0.5062	0.7061	0.5935	0.5174	0.5368	0.6432
Q4	0.5338	0.3630	0.5448	0.6179	1.0000	1.0000	0.9733	1.0000	0.8819	0.9278	0.8651	0.9038	0.7516	0.8716	0.8500	0.8086
Goal	*0.1483*	*0.2002*	*0.2750*	*0.3816*	*0.9944*	*0.9966*	*0.9922*	*0.9980*	*0.6593*	*0.7533*	*0.7292*	*0.8060*	*0.5784*	*0.6055*	*0.6991*	*0.7152*
Q5	0.5124	0.4511	0.5440	0.7828	1.0000	0.9972	1.0000	0.9781	0.8689	0.9058	0.8886	0.8992	0.8674	0.8806	0.7648	0.7424
Q6	0.3928	0.0686	0.4193	0.4448	0.9877	1.0000	0.9879	1.0000	0.8907	0.9083	0.7775	0.8921	0.6768	0.8188	0.7137	0.6580
Q7	0.3968	0.5911	0.3975	0.5755	0.9933	0.9933	1.0000	0.9784	0.7488	0.8373	0.7105	0.8432	0.4903	0.7278	0.4286	0.7158
Q8	0.6374	0.6196	0.5640	0.6710	1.0000	0.9928	1.0000	0.9965	0.8432	0.9318	0.8637	0.8518	0.8279	0.8218	0.8115	0.7885
Approach	*0.4849*	*0.4326*	*0.4812*	*0.6185*	*0.9953*	*0.9958*	*0.9970*	*0.9883*	*0.8379*	*0.8958*	*0.8101*	*0.8716*	*0.7156*	*0.8122*	*0.6796*	*0.7262*
Q9	0.7761	0.7614	0.5296	0.7148	0.9872	0.9807	1.0000	1.0000	0.4503	0.7097	0.8022	0.7404	0.8439	0.9232	0.5222	0.5449
Q10	0.3655	0.3124	0.5846	0.6225	1.0000	0.9932	1.0000	1.0000	0.8305	0.8414	0.8054	0.8868	0.6476	0.7942	0.7920	0.7786
Q11	0.7260	0.5660	0.2330	0.4708	1.0000	0.9914	0.9948	0.9916	0.9240	0.8870	0.8191	0.8027	0.6716	0.8913	0.7175	0.8117
Q12	0.3302	0.1837	0.4539	0.4418	1.0000	0.9707	1.0000	0.9883	0.6962	0.8538	0.8038	0.8461	0.6849	0.6992	0.6781	0.7456
Affective Bond	*0.5494*	*0.4559*	*0.4503*	*0.5625*	*0.9968*	*0.9840*	*0.9987*	*0.9950*	*0.7252*	*0.8230*	*0.8076*	*0.8190*	*0.7120*	*0.8270*	*0.6774*	*0.7202*
Overall	*0.3942*	*0.3629*	*0.4022*	*0.5209*	*0.9955*	*0.9921*	*0.9960*	*0.9938*	*0.7408*	*0.8240*	*0.7823*	*0.8322*	*0.6687*	*0.7482*	*0.6854*	*0.7205*

Table 8: The intrarater reliability of models in evaluating each question and dimension across different experimental settings.

	ChatGPT				GLM-4				Claude-3				GPT-4			
Question	**No**	**General**	**Detailed**	**Detailed + CoT**	**No**	**General**	**Detailed**	**Detailed + CoT**	**No**	**General**	**Detailed**	**Detailed + CoT**	**No**	**General**	**Detailed**	**Detailed + CoT**
Q1	-0.0462	0.1743	0.1014	0.1139	0.2818	0.4359	0.4186	0.4469	0.3752	0.1473	0.3657	0.5503	0.2406	0.3012	**0.5379**	0.4292
Q2	0.2415	0.0303	0.2978	0.2877	0.3840	0.4491	0.4236	0.4447	0.4293	0.2663	**0.4976**	0.3994	0.3423	0.3698	0.4712	0.5379
Q3	-0.1578	-0.0171	0.1453	0.2430	0.2614	0.1460	0.4721	0.4650	0.1758	0.3229	**0.4987**	0.4249	0.3869	0.2920	0.4907	0.4510
Q4	0.2904	0.1192	0.4497	0.1570	0.3477	0.4582	0.3593	0.2841	0.5482	0.5551	0.5180	0.4460	0.4667	0.3651	0.4919	**0.5569**
Goal	*0.0820*	*0.0767*	*0.2486*	*0.2004*	*0.3187*	*0.3723*	*0.4184*	*0.4102*	*0.3821*	*0.3229*	*0.4700*	*0.4552*	*0.3591*	*0.3320*	***0.4979***	*0.4937*
Q5	0.4624	0.2061	0.4070	0.4222	0.4253	0.5058	0.4738	0.4610	0.5542	**0.6485**	0.5048	0.6088	0.5710	0.6423	0.5618	0.6025
Q6	0.4033	0.2998	0.3290	0.3599	0.5716	**0.6798**	0.4378	0.6558	0.6160	0.5891	0.4183	0.5949	0.5237	0.6190	0.5065	0.5371
Q7	0.1300	0.2140	0.3924	0.3392	0.3982	0.4350	0.4141	0.4145	0.4069	0.3815	0.3612	0.4283	0.3764	0.2921	**0.5341**	0.4924
Q8	0.4179	0.3464	0.2058	0.3233	0.2516	0.3172	0.3949	0.4703	0.3081	0.2703	0.5180	**0.6114**	0.2439	0.2532	0.5898	0.5472
Approach	*0.3534*	*0.2666*	*0.3336*	*0.3612*	*0.4117*	*0.4844*	*0.4301*	*0.5004*	*0.4713*	*0.4724*	*0.4506*	***0.5608***	*0.4288*	*0.4516*	*0.5480*	*0.5448*
Q9	0.1850	0.3062	0.3577	0.3752	0.2229	0.1725	0.4801	**0.5555**	-0.1563	-0.0277	0.2851	0.3027	0.0106	0.1325	0.2337	0.3086
Q10	0.4433	0.3144	0.3352	0.4273	0.5401	0.5507	0.4512	0.4520	0.6269	**0.6839**	0.5957	0.5420	0.5164	0.6339	0.5114	0.4520
Q11	0.4943	0.3920	0.4633	0.4570	0.5256	0.5250	0.5705	0.5834	0.4463	0.5250	0.5528	0.4975	0.4994	0.3874	**0.6113**	0.6103
Q12	0.2651	0.1914	0.2507	0.3892	0.4981	0.4717	0.4552	0.4079	0.4853	0.4035	**0.5762**	0.5727	0.4506	0.4305	0.4101	0.4960
Affective Bond	*0.3469*	*0.3010*	*0.3517*	*0.4122*	*0.4466*	*0.4300*	*0.4893*	*0.4997*	*0.3506*	*0.3962*	***0.5024***	*0.4787*	*0.3693*	*0.3961*	*0.4417*	*0.4667*
Overall	*0.2608*	*0.2148*	*0.3113*	*0.3246*	*0.3924*	*0.4289*	*0.4459*	*0.4701*	*0.4013*	*0.3971*	*0.4743*	*0.4982*	*0.3857*	*0.3933*	*0.4959*	***0.5018***

Table 9: Pearson correlation between human and model annotations on each dimension and question. Statistic significance levels for individual question correlations are denoted by $* * *p < 0.001$, $* * p < 0.01$, and $*p < 0.05$. The overall and dimension-specific correlations are calculated as the averages of the correlations on corresponding questions.

quency and total duration of the consultations will be jointly determined by you and your counselor based on the nature of your psychological distress and personal needs.

2. Confidentiality and Exceptions to Confidentiality: In general, your counselor will keep the information you provide confidential, including case records, test materials, letters, recordings, videos, and other materials, all of which are considered professional information and are stored under strict confidentiality to prevent public disclosure in any public setting. However, there are exceptions to confidentiality in the following cases, and relevant individuals and institutions will be notified:

1) Violation of relevant laws (e.g., if you pose a danger to others; suspicion of child or elder abuse or abuse of someone dependent on you for care, etc.)

2) If your situation endangers your own safety (e.g., suicide, self-harm, mental illness, severe depression, etc.), we will notify your relatives or guardians when necessary and consult your opinion to ensure your safety.

3) Counselors need to receive supervision during their work. Counselors will discuss parts of the consultation content and visitor information in personal supervision and case discussions. Privacy information unrelated to the consultation, such as personal names and regions, will be anonymized; supervisors and case discussion members are also bound by the aforementioned confidentiality rules. If there is a need to publicly release or publish consultation details, the visitor's written consent must be obtained first.

3. Adjusting Consultation Times: If you wish to adjust your consultation time, please do so at least 24 hours in advance on the platform. Adjustments cannot be made if the time limit is exceeded.

4. Handling of Lateness: You may enter the counseling from the start of the scheduled appointment until it ends, but the end time of the consultation will not be extended due to your lateness. If you are late and do not log in to start the consultation by the service end time, the consultation will be considered expired, and the consultation fee will not be refunded.

5. Responsibilities of the Clients: During the consultation process, visitors need to:

1) Attend and participate in the consultation sessions;

2) Express and share their thoughts and feelings as much as possible during the consultation;

3) Seriously reflect on their own expressions, the counselor's responses, and the interaction process between the two.

6. Responsibilities of the Counselor: Counselors need to:

1) Arrange a suitable consultation schedule for both parties;

2) Strive to guide visitors towards an understanding of themselves and their current situation, and help them better deal with the various difficulties and life events they are facing;

3) Regularly participate in professional learning and case discussions to ensure their competence in counseling work with visitors;

4) Be aware of their limitations as a counselor and discuss ending the consultation or referrals with the visitor in a timely manner if the consultation is ineffective or unsuccessful.

7. Duration and Frequency of Consultation:

1) Psychological consultations are regular sessions, typically 50 minutes each, once a week. Changes to the interval and frequency will be determined based on the nature of your psychological issues and personal needs.

2) Consultation sessions will start and end on time. Flexibility in timing will not exceed 5 minutes.

8. Emergency Consultation: In urgent situations, you may make a temporary appointment or call the local crisis intervention hotline.

9. Crisis Intervention Measures: In the event that you are experiencing severe psychological stress with thoughts of suicide and impulses, it is necessary to discuss potential risks and coping strategies with a counselor. This includes how to access local support resources and techniques for self-regulation. Due to the limitations of remote counseling, counselors may be unable to work with visitors at high risk of suicide. In cases of intense suicidal urges or self-destructive behavior, counselors are obligated to discuss referral to appropriate assistance agencies. (National 24-Hour Suicide Intervention Hotline: 4001619995)

10. Physical symptoms and psychological symptoms often interact, and if necessary, we may discuss the need for consultation and treatment in medical institutions during counseling. Additionally, medication can be beneficial at the appropriate time in alleviating both physical and mental issues. Throughout the treatment process, based on your specific situation, the counselor may recommend relevant laboratory and instrumental examinations, providing detailed explanations as needed.

11. Psychological counseling and therapy are complex processes that may require coordination, continuous goal adjustment, or referrals and other interventions during the course.

12. Voluntary Withdrawal: You have the right to terminate your counseling at any time, but it is recommended to discuss and carefully conclude with your counselor before formal withdrawal.

13. If there are other research and teaching matters that require your participation, your counselor will inform you and negotiate with you to sign an additional written agreement.

14. During the period of the consultation work, if there is a need to adjust or modify the agreement, both parties can propose it during the consultation. After thorough discussion and agreement, corresponding changes will be made.

Remote/Online Counseling Additional Matters:

When conducting online counseling, identity verification is required. For this purpose, you need to provide some materials (such as personal information, current situation, etc.) to complete this process.

For situations not suitable for online counseling, such as suicidal or homicidal thoughts, life-threatening circumstances, a history of suicidal, abusive, or violent tendencies, hallucinations, and substance or alcohol abuse, it is recommended to consider face-to-face counseling or alternative intervention methods.

Considering the potential impact on the counseling relationship, please refrain from recording audio or video during the counseling process. If there is a genuine need for such recordings, it should be discussed thoroughly and agreed upon by both parties.

The smooth conduct of online counseling depends on stable network conditions, communication devices, and a disturbance-free room. Please ensure that you are adequately prepared before starting online counseling. Additionally, be psychologically prepared for unforeseen events such as network interruptions during online counseling.

[ ] I fully understand and agree to the above terms.

D.2 Informed Consent Form in the User Services Agreement

VI. Informed Consent

6.1 To protect your rights, please read and agree before activating the dialogue service of this application: Users agree to accept the online text counseling or venting services (hereinafter referred to as the service) provided by this application based on my confusions. Users understand that the current service provided by this application is AI-assisted psychological counseling/venting, with real human counselors also providing services. Users need to understand that the online text venting/counseling service is an internet-based form of instant psychological confusion resolution and psychological knowledge popularization service. This service is provided in Chinese. Users need to understand that the service content includes support and help for psychological confusions (including, but not limited to: emotional issues, relationship issues, family relations, interpersonal relationships, personal growth, career development, etc.). Although it is difficult to guarantee a complete improvement in psychological conditions and resolution of confusions, we serve you with the attitude of "sometimes curing, often helping, always comforting". Users need to understand that during the service process: conversations will involve the user's physiological/psychological health and emotional state among other related information. Users have the right to privacy in the venting/counseling service, and the personal information disclosed by users will, in principle, be kept strictly confidential. At the same time, the user's right to privacy is protected and restricted by national laws in terms of content and scope. Users need to understand, based on national laws, there are exceptions to the principle of confidentiality, including but not limited to the following situations:

1) When the service seeker or others are preparing or in the process of engaging in actions that endanger the safety of themselves or others' person or property;

2) When the service seeker may endanger others (such as in cases of contagious diseases);

3) When the information disclosed by the service seeker involves a minor being or about to be sexually abused;

4) When the service seeker or others are preparing or in the process of engaging in actions that endanger national security or public safety;

5) In cases where data is anonymized for discussions, consultations, or when receiving supervision and training among consulting members;

6) In cases where data is anonymized for scientific research.

7) When disclosure is required by law.

6.2 Users must agree that for the aforementioned non-confidential situations, for the fundamental reason of protecting the rights of the user or related individuals, we may disclose information to the minimal extent necessary and only within the necessary scope of personnel. Furthermore, users must understand that since the counseling service is conducted over the internet, although we strive to protect users' privacy to the greatest extent, it is difficult to avoid the possibility of personal information being leaked due to internet security vulnerabilities, technical failures, or unauthorized access. Users must understand that under the following conditions, we are unable to provide effective venting/counseling services, and it is necessary to seek professional offline treatment or counseling services:

1. Having thoughts or plans of suicide;

2. Having thoughts or plans of harming oneself or others;

3. Having any psychiatric disorder diagnosed by a hospital;

4. Meeting the diagnostic criteria for any psychiatric disorder.

Users need to understand that if the physiological, psychological, mental state, and behavior plans described or reflected in their information meet any of the above criteria, we cannot continue to provide services to them, and may suggest seeking professional offline treatment or counseling services. Users must understand that this application provides support and help for psychological confusions (including but not limited to: emotional issues, relationship issues, family relations, interpersonal relationships, personal growth, career development, etc.), but there still exist some services that are difficult to provide:

1) Crisis intervention for suicide or other harmful behaviors;

2) Diagnosis and treatment of psychiatric disorders;

3) Specific advice on the use of psychiatric medications;

4) Dealing with severe psychological trauma;

5) Providing specific resources or information for careers, academics, etc.;

6) Providing views on social phenomena and interpretations of policies;

7) Interpretation of dreams (e.g., explaining the meaning of dreams, why certain people or things appear in dreams, etc.).

8) To answer psychological confusions not related to myself (for example, those of my friends, family, online friends, etc.).

Users need to understand that when the described situation exceeds our service scope (which does not include the aforementioned 8 types), we cannot meet their needs. Users need to understand the potential benefits and risks of internet-based text venting/counseling services. The benefits include, but are not limited to, being able to access services more conveniently without the need to travel to a designated location. And, although the risks are small, users still understand that there may be potential risks. These risks include, but are not limited to: due to possibly insufficient information provided by the user, the services received may not fully resolve the user's confusions or improve the user's psychological state; due to possible technical failures or other unforeseen reasons, the user may not receive timely analysis and advice for their psychological confusions. Users must agree that when the application provides services, it follows the laws and regulations of mainland China, not the laws and regulations of the user's location. The above informed consent remains effective during the user's single or multiple uses of the service.

6.3. I agree to convert the collected psychological counseling dialogue text data into digital and graphical forms for use in non-profit academic cooperation, academic conferences, journal publications, and other academic activities by certified third-party academic institutions (*1).

(*1) Certified third-party academic institutions refer to universities and research institutes officially recognized by the state, and researchers working within them have undergone formal academic training.