

Can Large Language Models be Good Emotional Supporter? Mitigating Preference Bias on Emotional Support Conversations

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Abstract

Emotional Support Conversation (ESC) is a task aimed at alleviating individuals' emotional distress through daily conversation. Given its inherent complexity and non-intuitive nature, ESCConv dataset incorporates support strategies to facilitate the generation of appropriate responses. Recently, despite the remarkable conversational ability of large language models (LLMs), previous studies have suggested that they often struggle with providing useful emotional support. Hence, this work initially analyzes the results of LLMs on ESCConv, revealing challenges in selecting the correct strategy and a notable preference for a specific strategy. Motivated by these, we explore the impact of the inherent preference in LLMs on providing emotional support, and consequently, we observe that exhibiting high preference for specific strategies hinders effective emotional support, aggravating its robustness in predicting the appropriate strategy. Moreover, we conduct a methodological study to offer insights into the necessary approaches for LLMs to serve as proficient emotional supporters. Our findings emphasize that (1) low preference for specific strategies hinders the progress of emotional support, (2) external assistance helps reduce preference bias, and (3) LLMs alone cannot become good emotional supporters. These insights suggest promising avenues for future research to enhance the emotional intelligence of LLMs.

1 Introduction

Emotional support conversation (ESC) aims to alleviate individuals' emotional intensity and provide guidance for navigating personal challenges through engaging dialogue (Langford et al., 1997; Greene, 2003; Heaney and Israel, 2008). Effective emotional support involves not just providing helpful emotional support but also avoiding poor-quality emotional support, which can exacerbate an already stressful situation and may contribute to

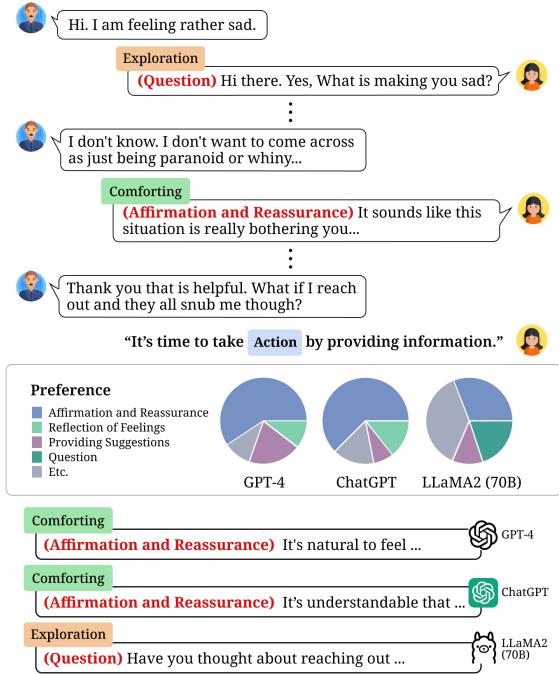


Figure 1: An example of an emotional support conversation with the analysis on the results of LLMs. Details about experiments are in Appendix A.1.

numerous psychological, relational, and physical problems (Burleson, 2003). However, providing emotional support is a complex and not intuitive task, often challenging even for humans (Burleson, 2003). Therefore, based on Hill's Helping Skills Theory (Hill, 2009), Liu et al. (2021) propose a framework for emotional support that generally follows three stages (Exploration → Comforting → Action), with a total of eight support strategies corresponding to each stage, where support strategies consist of various conversational methods for the generation of the following response, such as *reflection of feelings*, *self-disclosure*.

Recently, large language models (LLMs), based on their remarkable conversational ability, have been widely used in various dialogue systems (Ji et al., 2023; Friedman et al., 2023; Lee et al., 2023). In particular, there is a growing interest in leverag-

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ing LLMs for providing emotional support (Chen et al., 2023a; Zheng et al., 2023b), as it takes place in daily conversations rather than in professional counseling (Liu et al., 2021). However, LLMs that demonstrate outstanding capabilities often struggle with providing emotional support (Chen et al., 2023b; Farhat, 2023). As ESC task consists of strategy selection and strategy-constrained response generation, selecting the appropriate strategy is crucial for effective emotional support, thereby we anticipate that LLMs may struggle with predicting strategies. As expected, we find that LLMs lack proficiency in predicting the accurate strategy¹. To understand the reasons behind this, we examine the distribution of how often LLMs select each strategy and observe high preference for certain strategies (*i.e.*, preference bias), as shown in Figure 1.

Motivated by these, this work is guided by three research questions:

RQ1: Does the preference affect providing emotional support? (Section 4.2) Initially, we assess the proficiency of various LLMs, specifically identifying the stages where each model excels and struggles. Our findings reveal that strategies with higher preferences exhibit better performance. Consequently, as excessive preference for a specific strategy can negatively affect the performance of other strategies, we emphasize the importance of low preference bias for robustly predicting strategies across all three stages.

RQ2: How to mitigate the preference bias on LLMs? (Section 5.2) To understand how to alleviate the preference bias, we apply two groups of methods to LLMs, based on Contact Hypothesis (Allport et al., 1954), which posits that contact between different groups can reduce their bias. We find that LLMs align with Contact Hypothesis, indicating that reducing preference bias is challenging for LLMs themselves so that external assistance is necessary. As a result, when mitigating preference bias through external assistance, LLMs consistently perform well in predicting strategy across all three stages. This can effectively prevent poor-quality emotional support, which is more crucial than providing appropriate emotional support, given its potential to exacerbate an already stressful situation.

RQ3: Does improving preference bias indeed help to become a better emotional supporter? (Section 5.3) To precisely evaluate whether responses provide helpful emotional support, we

build a comprehensive set of criteria formulated in collaboration with psychologists. Within these criteria, we analyze whether enhancements in preference bias translate into actual improvements in the quality of emotional support, considering both the advantages of low preference bias and the drawbacks of high preference bias. In human evaluations based on the criteria, lower preference bias is associated with higher scores, while higher preference bias leads to an increased number of poor-quality responses.

To summarize, our contributions are as follows:

- We introduce that a wide range of LLMs exhibits different preference for strategies.
- We propose a new suite of metrics that focus on strategies: proficiency, preference, and preference bias.
- We emphasize the crucial role of preference bias in robustly providing effective emotional support across the stages.
- We showcase that LLMs align with Contact Hypothesis, which indicates that external assistance can help address preference bias.
- We construct a comprehensive set of criteria to precisely evaluate whether responses provide helpful emotional support.
- Through extensive human evaluation, we demonstrate that mitigating preference bias is crucial for decreasing the proportion of poor-quality responses and, consequently, for effective emotional support.

2 Preliminaries & Related Work

2.1 Emotional Support Conversation

Liu et al. (2021) propose the task of emotional support conversation and release the dataset ESCConv, covering a wide range of situations. The ESC centers on the interaction between a user experiencing emotional distress (help-seeker) and a system designed to provide comfort (supporter), aiming to alleviate the user’s emotional intensity. As ESC primarily focuses on providing emotional support, it differs from professional counseling, which instead emphasizes support within a social context, such as interactions with friends or family.

The procedure of emotional support in ESCConv generally follows three stages (Exploration → Comforting → Action). While it does not necessarily follow this sequence of stages, providing emotional support often requires progressing through multiple stages. Therefore, it is crucial to be able

¹The detailed results are shown in Appendix A.1

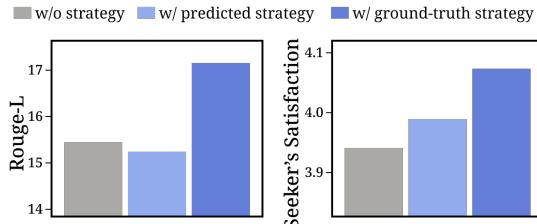


Figure 2: The results of strategy-constrained responses on both automated and human evaluation, showing the efficacy of strategy on ChatGPT. Appropriate strategy significantly enhances the quality of emotional support responses. The details are in Appendix A.2.

to provide appropriate responses in all stages, as poor performance in a particular stage could hinder the progress of the conversation. Further details about ESConv are in Appendix B.

2.2 Incorporating Strategies into ESC Systems

Prior researches on building ESC systems primarily emphasize the integration of support strategies, in conjunction with elements such as emotion, semantics (Zhao et al., 2023b), and persona (Cheng et al., 2023). Some latent studies focus on modeling the user’s state along with the strategies (Cheng et al., 2022; Jia et al., 2023). Notably, Deng et al. (2023) incorporate generative commonsense knowledge model (Hwang et al., 2020) with strategy prediction as an auxiliary task to provide better emotional support. However, many of these approaches involve modifications to the model’s architecture or tuning the pre-trained parameters, a process not typically feasible with LLMs.

2.3 Emotional Support from LLMs

With the emergence of LLMs, there has been an increased amounts of research exploring LLMs as emotional supporters. Recent studies have attempted to replace the fine-tuning approach by prompting LLMs via in-context learning to leverage LLMs as ESC systems (Chen et al., 2023a; Zheng et al., 2023b). Despite their potential, recent studies have demonstrated limitations in LLMs’ ability to provide emotional support (Chung et al., 2023; Farhat, 2023; Eshghie and Eshghie, 2023; Song et al., 2024). Specifically, Song et al. (2024) find that users may experience discomfort or concern due to the lack of responsibility in LLMs’ recommendations for emotional support response. However, even though the majority of ESC research has focused on leveraging support strategies

Strategy	Exploration			Comforting	Action	Total (D)
	D_1	D_2	D_3			
Que.	24.8	10.0	7.0			12.8
Res.	16.8	9.6	4.5			9.4
Ref.	16.8	18.3	6.3			12.7
Sel.	16.8	20.1	15.4			17.2
Aff.	7.6	24.1	21.1			18.2
Pro.	8.4	8.5	24.4			15.3
Inf.	6.5	6.5	18.5			11.7
Oth.	2.3	2.5	2.8			2.6

Table 1: The ratio (%) of support strategies in our test sets. Each test set D_t is composed with samples corresponding to each stage. The highlighted strategies are primarily utilized in each stage (Liu et al., 2021).

in their methods, a comprehensive analysis focused on strategy in LLMs has been under-explored.

3 Evaluation Setup

3.1 Task and Focus

Task: emotional support response generation. The effectiveness of machine-generated responses in providing emotional support is highly dependent on selecting an appropriate strategy. We formulate the emotional support response generation task as generating a response over a support strategy. Formally, given the dialogue background \mathcal{I} , a pre-chat survey from the seeker (e.g., emotion, situation), and the dialogue context \mathcal{C} , the model θ first predicts the strategy \mathcal{S} , and then generates the response \mathcal{R} based on \mathcal{I} , \mathcal{C} , and \mathcal{S} :

$$\mathcal{S} \sim P_\theta(\cdot | \mathcal{I}, \mathcal{C}) \quad (1)$$

$$\mathcal{R} \sim P_\theta(\cdot | \mathcal{I}, \mathcal{C}, \mathcal{S}) \quad (2)$$

Focus: strategy-centric analysis. Among the various reasons why LLMs struggle with providing emotional support, this work focuses on strategy, which is the key factor within the ESC systems. To emphasize the validity of strategy-centric analysis, we explore the potential of response quality when generated upon the ground-truth strategy. As a result, in Figure 2, if the model can predict strategies correctly, there is significant room for improvement in the quality of emotional support response.

3.2 Evaluation Set

For comprehensive analysis, we construct three test sets D_t based on stages from ESConv, as demonstrated in Table 1. Firstly, we randomly truncate the dialogues into 5-15 turns samples. We then annotate each sample with a stage and classify the samples according to their stage. Additionally, we

minimize the proportion of the strategy *Others* to reduce responses less relevant to emotional support. Finally, we remove some samples to ensure no overlap in each test set, and a more detailed explanation of data construction is in Appendix C.1.

3.3 Metrics

Proficiency. We define **proficiency** as *how well the model selects the correct strategy*. The proficiency for strategy (q_i) is quantified as the F1 score for strategy i . To precisely analyze the model’s proficiency, we utilize two types of F1 scores, both of which stem from the proficiency q_i of each strategy: (1) the **macro F1 score** \mathcal{Q} , and (2) the **weighted F1 score**. The macro F1 score (\mathcal{Q}) represents the overall proficiency of the model across the strategies, which is evaluated over the entire test sets (D). In contrast, we employ the weighted F1 score to assess the model on a test set (D_t) consisting only of data corresponding to a specific stage.

Preference. We define **preference** as *how much the model prefers certain strategies over others*. To quantify the preference for each strategy in LLMs, we employ the Bradley-Terry model (Bradley and Terry, 1952), which is widely used in human preference modeling (Rafailov et al., 2023). Following Newman (2023), we formally derive the preference p for strategy i as follows:

$$p'_i = \frac{\sum_j (w_{ij} p_j) / (p_i + p_j)}{\sum_j w_{ji} / (p_i + p_j)} \quad (3)$$

where w_{ij} represents the number of times the model predicts strategy i when the ground-truth strategy is j . The preference p_i is updated through iteration of the Eq (3)², where p'_i represents the preference in the next iteration. After the final iteration, we scale the total sum of p_i to 8 ($\sum p_i = 8$) and the average \bar{p} becomes 1, indicating a strong preference for strategy i if $p_i > 1$.

Preference Bias. We also define a standard deviation of preferences p_i across the strategies as **preference bias** \mathcal{B} .

$$\mathcal{B} = \sqrt{\frac{\sum_{i=1}^N (p_i - \bar{p})^2}{N}} \quad (4)$$

where a higher value for \mathcal{B} indicates that the model exhibits a clear preference for both preferred and non-preferred strategies.

²The details are demonstrated in Appendix C.2.

4 Proficiency and Preference of LLMs on Strategy

4.1 Models & Implementation Details

According to the public release, we categorize LLMs into the following two groups: (1) Closed-source models which are available via APIs, such as ChatGPT and GPT4 (OpenAI, 2023b); (2) Open-source models accessible through parameters, including LLaMA2-7B/70B (Touvron et al., 2023), Tulu-70B (Ivison et al., 2023), Vicuna-13B (Zheng et al., 2023a), Solar-10.7B (Kim et al., 2023) and Mistral-7B (Jiang et al., 2023).

In the prompt, we include strategy descriptions to enhance the understanding of each strategy and randomly selected 2-shot examples due to challenges in adhering to the desired output format with open-source models. To facilitate comparison, we also provide 2-shot examples of the closed-source model. More details about models are in Appendix C.3 and about the prompt are in Appendix C.4.

4.2 RQ1: Does the preference affect providing emotional support?

Proficiency of LLMs. Figure 3a illustrates the proficiency \mathcal{Q} of each LLM (red line). Not surprisingly, GPT-4 records the highest score in proficiency \mathcal{Q} , indicating that it has the overall highest ability to align with strategies, and smaller models tend to achieve lower scores. However, even among models of similar sizes, LLMs exhibit different performances, with smaller models like Solar and LLaMA2-7B showing relatively good proficiency.

The performance varies depending on the test set. Figure 3a also exhibits the performance of LLMs on each test set, with distinct shapes representing different test sets D_t . Most LLMs achieve high scores on D_2 or D_3 , while scoring mostly lower on D_1 . This indicates that LLMs exhibit relatively better performance in comforting or action but struggle with exploration stage, suggesting that they may provide poor-quality emotional support in specific situations, especially during the exploration stage. Generally, emotional support progresses through the exploration to comforting and action stage, thereby providing poor-quality response in the exploration stage (D_1) may hinder the transition to the next stage, making it difficult to offer effective emotional support. As a result, a high score in proficiency \mathcal{Q} does not necessarily

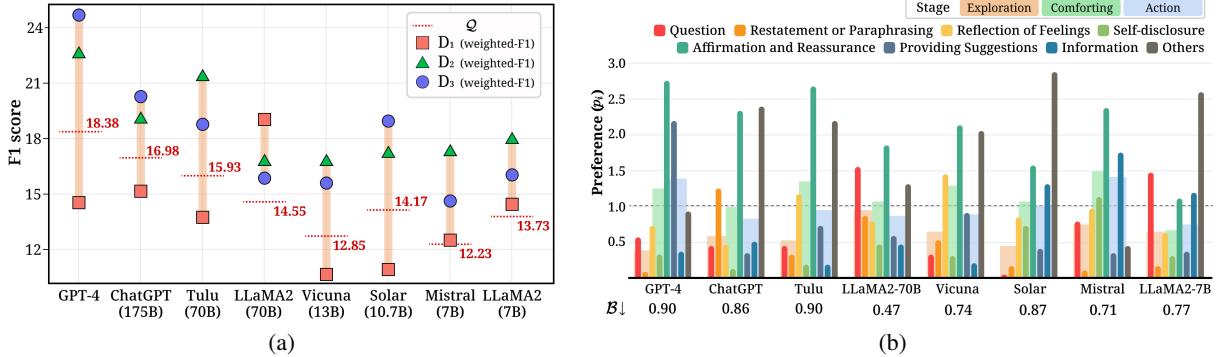


Figure 3: The details of LLMs’ proficiency and preference. (a) The results of the weighted F1 score on each test set D_t , where the red dashed line indicates the proficiency \mathcal{Q} for the entire test set D . (b) The preference (p_i) for each strategy, where the gray dashed line ($p_i = 1$) represents the threshold for preferring or not preferring the respective strategy, the average preference of strategies belonging to each stage, and the preference bias \mathcal{B} below each LLM.

guarantee providing helpful emotional support.

Preference bias affects robustness. Figure 3b illustrates that each LLM exhibits different preferences for strategies (p_i) and the average preference of strategies belonging to each stage, along with preference bias (\mathcal{B}). We observe a strong average preference in stages that exhibit higher performance in Figure 3a. Especially, GPT-4 exhibits low preferences for the exploration stage, which aligns with the lower performance on D_1 . In contrast, LLaMA2-70B demonstrates relatively uniform preferences for strategies, leading to robust performance across D_t . Through these observations, we can conclude that despite a high proficiency \mathcal{Q} , significant preference bias can result in lower performance depending on the stages, hindering robustness in predicting strategy, which means consistent performance across all three stages.

5 Methodological Study: Mitigating Preference Bias

According to findings from the previous section, our focus shifts to offering insights into effective approaches for LLMs to reduce their preference bias. We utilize two models, ChatGPT and LLaMA2-70B, each serving as a representative of closed-source and open-source LLM respectively.

5.1 Methods

Based on the Contact Hypothesis, which suggests that bias between two groups can be reduced through intergroup contact, we hypothesize that external assistance on LLMs might help alleviate preference bias. Therefore, we categorize available methods for LLMs into two groups: (1) self-contact and (2) external-contact.

Self-contact approaches. We define self-contact as methods that rely solely on LLMs’ abilities without external interaction. We utilize three self-contact methods: (1) Direct-Refine, refining the initially generated response by the model itself; (2) Self-Refine, refining the initially generated response through self-feedback; (3) Emotional-CoT, which generates user states as a reasoning path for response generation, following Wei et al. (2022).

External-contact approaches. External-contact involves methods where LLMs not only utilize their internal knowledge but also receive assistance from external knowledge. Similar to KEMI (Deng et al., 2023), one of the state-of-the-art model in ESC task, we leverage commonsense knowledge, COMET. Furthermore, we fine-tune LLaMA2-7B as a strategy planner, a model for planning the next strategy the supporter should take based on the dialogue context. LLMs then respond based on the strategy generated by the strategy planner. Finally, we expand the number of examples (n) in the prompt by selecting them randomly ($n = 4$). Details about the methods are in Appendix C.5.

5.2 RQ2: How to mitigate the preference bias on LLMs?

Methods with negative effects. Table 2 reports changes in proficiency \mathcal{Q} and preference bias \mathcal{B} across the various methods. Several methods exhibit negative effects on LLMs’ proficiency and preference bias. Specifically, the results of self-contact methods present a noticeable pattern in which proficiency declines and preference bias becomes more pronounced. This pattern implies that, similar to humans, when LLMs have bias, thinking alone can deepen those bias, indicating that

Methods	$\mathcal{Q} \uparrow$	$\mathcal{B} \downarrow$	B-2	R-L	
ChatGPT (<i>0-shot</i>)	13.50	1.38	6.27	14.86	
Self	+ Direct-Refine	13.40	1.60	5.68	14.50
	+ Self-Refine	12.37	1.53	5.16	14.33
	+ Emotional-CoT	9.55	1.56	5.23	14.12
External	+ w/ COMET	12.78	0.95	6.71	15.07
	+ w/ Example Expansion	<u>16.91</u>	<u>0.82</u>	7.45	15.22
	+ w/ Strategy Planner	21.09	0.36	<u>6.96</u>	14.91
LLaMA2-70B (<i>2-shot</i>)	14.55	0.47	6.15	14.29	
Self	+ Direct-Refine	13.17	0.59	5.59	13.98
	+ Self-Refine	13.15	0.55	5.56	13.70
	+ Emotional-CoT	12.73	0.53	6.37	13.87
External	+ w/ COMET	14.53	0.51	6.21	14.55
	+ w/ Example Expansion	<u>15.14</u>	<u>0.44</u>	6.56	14.66
	+ w/ Strategy Planner	21.09	0.36	<u>6.44</u>	14.49

Table 2: The results of methods on automatic metrics including \mathcal{Q} , \mathcal{B} , BLEU-2 (B-2) and ROUGE-L (R-L) for the total test set (D). A single strategy planner is employed to predict strategies and provides them to each LLM. The best results of each LLMs are **bolded** and the second best are underlined.

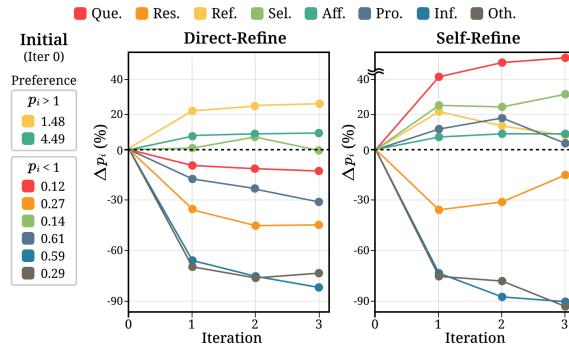


Figure 4: The results of iterations on Direct-Refine and Self-Refine in ChatGPT. To mitigate preference bias, strategies with $p_i > 1$ should lean towards the negative direction, while strategies with $p_i < 1$ should lean towards the positive direction as the iteration progresses.

self-contact methods do not contribute to enhancing their capabilities to become better emotional supporters. Moreover, the degradation of automated metrics (B-2, R-L) on self-contact stems from lower proficiency and increased preference bias, which leads to poor performance, especially in stages that are less proficient. To further investigate the negative impact of self-contact, we measure the results of *Direct-Refine* and *Self-Refine* under an iterative refinement setting to further analyze the preference of each strategy (p_i). In Figure 4, we observe a trend where, as the iterations continue, there is a growing preference for strategy that is initially preferred (*i.e.*, $p_i > 1$). In contrast, the preference for strategies that are initially dis-

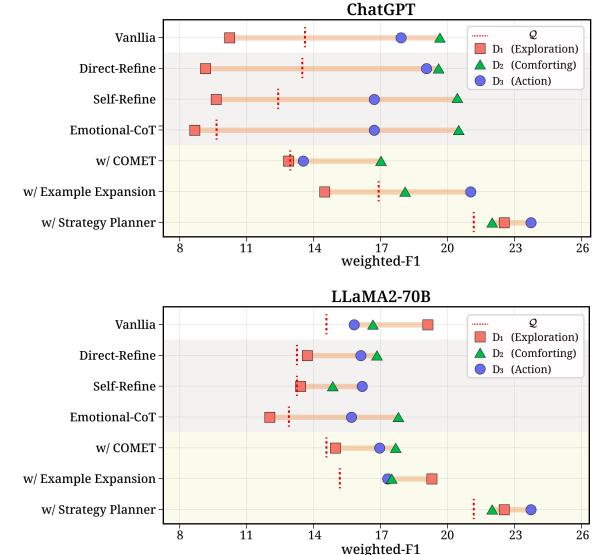


Figure 5: The weighted-F1 scores for each test set (D_t) on ChatGPT and LLaMA2. Self- and external-contact are backgrounded with gray and yellow, respectively.

preferred (*i.e.*, $p_i < 1$) tends to diminish over successive iterations. As this trend continues, LLMs may struggle more in stages that include strategies with lower preference, and during these stages, they gradually provide poor-quality emotional support.

LLMs align with contact hypothesis. As shown in Table 2, the application of external-contact methods mostly results in a reduction of preference bias on both closed- and open-source LLMs. Particularly, receiving assistance from a fine-tuned strategy planner (w/ Strategy Planner) or having more examples (w/ Example Expansion) seems to be more helpful than relying on commonsense knowledge. These external-contact methods commonly enable LLMs to receive knowledge they cannot generate independently. Utilizing the strategy planner or expanding more examples offers direct knowledge related to strategy, whereas incorporating commonsense knowledge transfers it indirectly. In summary, external assistance, particularly when directly informing about strategies, plays a crucial role in enhancing both proficiency and preference bias in LLMs. Further analysis on the impact of external-contact is provided in Appendix G.2.

Methodological impacts on providing emotional support. Figure 5 illustrates the results for each test set D_t when applying self-contact (gray background) and external-contact (yellow background) to both ChatGPT and LLaMA2-70B. As observed earlier, applying self-contact, which reduces profi-

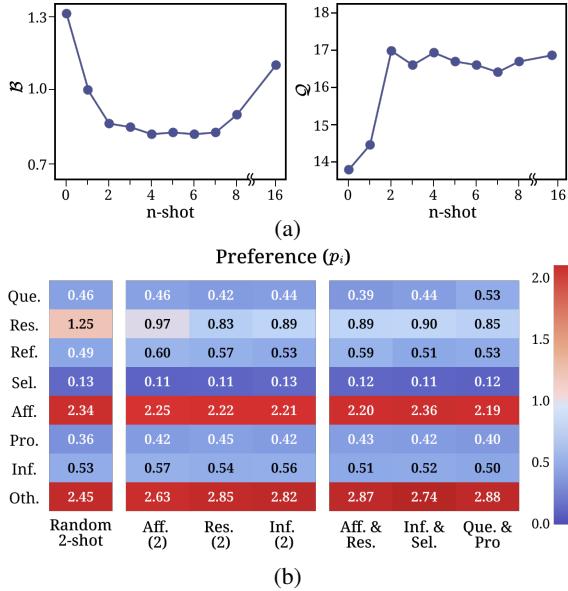


Figure 6: The results of (a) the variation in the number of shot examples, and (b) the effect of various combinations of strategies in 2-shot examples with ChatGPT.

ciency and intensifies preference bias, leads to an increased gap between D_t . This substantial gap between D_t indicates a decrease in robustness across various stages of emotional support, and in less proficient stages, they may provide poor-quality responses, which might worsen the seeker’s situation and intensify distress. In particular, all self-contact approaches significantly reduce performance on the exploration stage (D_1), which can create challenges in progressing to subsequent stages, ultimately hindering the achievement of the goals in emotional support. On the other hand, external-contact reduces the overall gap between different D_t , particularly exhibiting significant improvement on ChatGPT. This reduction contributes to robust performance in selecting strategy across the stages, which is crucial for effective emotional support.

Effect of examples in the prompt. To assess the efficacy of examples in the prompt, we initially investigate a trend associated with the number of examples (n). Figure 6a demonstrates that proficiency and preference bias improve when using randomly selected examples. However, while proficiency Q converges as n increases, preference bias B worsens significantly with larger values of n ($n > 8$), indicating that too many examples may be detrimental. Additionally, to understand the impact of different types of strategies employed in the examples, we include the various combinations of strategies within 2-shot examples. Intriguingly,

Base Models	$Q \uparrow$	$\mathcal{B} \downarrow$	D_1	D_2	D_3
			weighted-F1		
BERT	18.02	0.50	18.17	22.68	19.25
RoBERTa	21.01	0.60	21.34	24.18	22.99
Mistral	21.89	0.45	22.61	23.57	24.59
LLaMA2-7B	21.10	0.36	22.59	21.85	23.77

Table 3: The results on the strategies selected by different strategy planners. Each model is fine-tuned with a uniform dataset across strategies.

Figure 6b reveals consistent results across the diverse combinations. In summary, providing the appropriate number of examples may enhance preference bias, whereas the type of strategies within each example does not matter. Further analysis of each preference p_i based on n is in Appendix F.3.

Various models as a strategy planner. In our previous experiments, a trained LLaMA2-7B serves as a strategy planner, yielding improved outcomes. To explore the potential of various models as a strategy planner, we ablate with several language models, including Mistral and encoder-based models such as BERT (Devlin et al., 2019) and RoBERTa (Liu et al., 2019). As shown in Table 3, we find that using LLMs as the backbone model for the strategy planner leads to notable enhancements in proficiency and preference bias. Moreover, while encoder-based models achieve performance comparable to LLMs, they exhibit relatively higher preference bias, indicating weaker robustness and potentially providing poor-quality emotional support. We also leave the exploration of training a strategy planner with more diverse and systematic methods for future work, and a more ablation study on supervised fine-tuning is provided in Appendix F.4.

5.3 RQ3: Does improving preference bias help to become a better emotional supporter?

Criteria of human evaluation. To precisely assess whether responses provide helpful emotional support, we build a comprehensive set of criteria formulated in collaboration with psychologists in terms of emotional support, based on the perspective of **seeker’s satisfaction** (*Sat.*). As emotional support aims to appropriately assess the user’s state and reduce emotional intensity, we fine-grain this perspective and finally construct three smaller criteria to enable a more elaborate assessment: (1) **Acceptance**: Does the seeker accept without discomfort; (2) **Effectiveness**: Is it helpful in shifting negative emotions or attitudes towards a positive

ChatGPT	Acc.	Eff.	Sen.	Sat.
Vanilla	27.9	23.5	22.1	24.5
Tie	20.6	32.4	22.1	25.0
+ Self-Refine	51.5[‡]	44.1[‡]	55.9[‡]	50.5[‡]
Vanilla	22.9	24.0	14.6	20.5
Tie	21.9	33.3	27.1	27.4
+ w/ COMET	55.2[‡]	42.7[†]	58.3[‡]	52.1[‡]
Vanilla	13.1	25.3	16.2	18.2
Tie	26.3	26.3	21.2	24.6
+ w/ Example Expansion	60.6[‡]	48.5[†]	62.6[‡]	57.2[‡]
Vanilla	16.7	29.2	29.2	25.0
Tie	12.5	16.7	12.5	13.9
+ w/ Strategy Planner	70.8[‡]	54.2[‡]	58.3[‡]	61.1[‡]

Table 4: The results of comparative human evaluation between various methods applied to ChatGPT and vanilla ChatGPT. (^{†/‡}: p-value < 0.1/0.05)

Methods	< 3 (fail)	≥ 3 (acceptable)
ChatGPT	16.7	83.3
+ Direct-Refine	21.2	78.8
+ Self-Refine	17.4	82.6
+ w/ Strategy planner	8.0	92.0
+ Oracle Strategy	3.8	96.2

Table 5: The ratio (%) of scores below 3 (fail) and scores of 3 or above (acceptable) in Seeker’s Satisfaction (Sat.).

direction; (3) **Sensitivity**: Does it take into consideration the general state of the seeker. Furthermore, to clarify the capability of LLMs to align strategy and responses, we include **Alignment**.

We randomly sample 100 dialogues from three test sets (D_t), ensuring diversity (e.g., strategy), and three annotators are required to determine the *Win/Tie/Lose* for each comparison in Table 4. Additionally, we ask three annotators to evaluate each sample on a 1-5 Likert scale, providing specific rubrics for each score to ensure detailed assessments on the quality of responses (Table 5). We include more details on the human evaluation, including the results of **Alignment**, in Appendix E.

Benefits of mitigating preference bias. Table 4 presents the results of comparative human evaluation between various methods on ChatGPT and the vanilla ChatGPT. Consistent with our previous findings, external-contact outperforms self-contact (i.e., Self-Refine) in terms of overall seeker’s satisfaction (Sat.). Concretely, when comparing the w/ COMET with Self-Refine, which have similar proficiency but significant differences in preference bias, the overall seeker’s satisfaction score is higher for w/ COMET with lower preference bias. Furthermore, among the external-contact methods, responses generated through the strategy planner,

which exhibits the most significant improvements in preference bias, are the most helpful in reducing the seeker’s emotional intensity. Consequently, we can confirm that it is crucial to mitigate preference bias to enhance robustness in predicting strategy, thereby providing effective emotional support.

Drawbacks of aggravating preference bias. To understand the negative impact of severe preference bias, we investigate the proportion of responses that could worsen the seeker’s situation or distress (i.e., rated below 3). Table 5 demonstrates that the proportion of poor-quality emotional support significantly increases in self-contact (i.e., Direct-Refine, Self-Refine), which exacerbates preference bias. This confirms that the aggravation in preference bias sharpens the contrast between proficient and less proficient stages, leading to providing more poor-quality responses in the less proficient stages. Additionally, the decrease in the proportion of poor-quality responses in external-contact (i.e., w/ Strategy Planner), where preference bias diminishes, supports this conclusion. As a result, high preference bias disturbs robustness, leading to an increased number of poor-quality responses. This demonstrates that low preference bias reduces the number of poor-quality responses and, consequently, is crucial for effective emotional support.

6 Discussion and Conclusions

This work conducts a strategy-centric analysis to delve into why LLMs struggle with providing emotional support, relying on the importance of strategy in emotional support. Our results show that as LLMs exhibit preference bias towards certain strategies, they lack robustness in predicting strategy across the three stages of emotional support, where struggling in a particular stage may hinder the progress to the next stage. We empirically demonstrate that LLMs are aligned with the psychological Contact Hypothesis just like humans, indicating that external assistance can mitigate the preference bias in LLMs, which they can not do themselves. We highlight that mitigating the preference bias strengthens robustness in selecting appropriate strategies across the stages, leading to overall improvement in the quality of emotional support and a significant reduction in the number of poor-quality responses. We hope that this work will become a promising step for future work to enhance the emotional intelligence of LLMs.

Limitations

This work has the following limitations: (1) As aforementioned in Section 3.2, Cheng et al. (2022) demonstrate that the strategy *Others* are not helpful in enhancing the response generation and may not be fully fine-grained. This can potentially prevent obtaining sufficient insights by obscuring more detailed preferences of the model; (2) We include 2-shot examples for open-source LLMs as they often struggle to adhere to the desired output format (*e.g.*, wrong strategy that is not among the eight provided). Since we demonstrated improvement when prompting with n-shot examples in Section 5.2, the actual proficiency and preference bias of open-source LLMs may be worse than the scores we published; (3) Understanding the reasons for preference bias is challenging not only for closed-source LLMs but also for open-source LLMs, as it is difficult to precisely grasp the relationships between strategy, training data, methods and model architecture; (4) We have observed that even when using an oracle strategy in LLMs (Table 8), responses that increase emotional intensity still exist (3.8%). This indicates a lack of ability to generate appropriate responses for emotional support, even when the strategy is perfectly selected; (5) While we confirm that LLMs generally generate well-aligned responses with the strategy (Figure 16), it is evident that there are some cases where they are not aligned, thereby future work should recognize this misalignment. Therefore, future work might consider both correctly predicting the strategy and generating helpful responses based on the predicted strategy.

Ethical Considerations

The ESConv a dataset used in this work is a publicly available and well-constructed benchmark for emotional support conversation, which is collected by employed crowd-sourced workers, with the sensitive and private information filtered during the dataset construction. All participants in our human evaluation are volunteered, transparently informed of our research intent, and paid reasonable wages.

Moreover, it is worth mentioning that the term "emotional support" in this paper mainly refers to support within a social context, such as interactions with friends or family in daily conversation, rather than professional counseling or diagnosis. However, as LLMs can generate sensual, harmful, biased, offensive, or violent content, using them as

emotional support systems requires particular caution to avoid such content from appearing to users. And it also requires considerable further efforts to construct a safer system, which is capable of detecting users who have tendencies of self-harming or suicide.

References

- Thomas Allport, Pettigrew, Kerstin Hammann, and S Salzborn. 1954. Gordon willard allport: The nature of prejudice. *Samuel Salzborn (Hg.): Klassiker der Sozialwissenschaften*, 100:193–197.
- Satanjeev Banerjee and Alon Lavie. 2005. Meteor: An automatic metric for mt evaluation with improved correlation with human judgments. In *IEEvaluation@ACL*.
- Ralph Allan Bradley and Milton E Terry. 1952. Rank analysis of incomplete block designs: I. the method of paired comparisons. *Biometrika*, 39(3/4):324–345.
- Brant R Burleson. 2003. Emotional support skill. In *Handbook of Communication and Social Interaction Skills*, page 551. Psychology Press.
- Hyungjoo Chae, Yongho Song, Kai Tzu-iunn Ong, Taeyoon Kwon, Minjin Kim, Youngjae Yu, Dongha Lee, Dongyeop Kang, and Jinyoung Yeo. 2023. Dialogue chain-of-thought distillation for commonsense-aware conversational agents. *arXiv preprint arXiv:2310.09343*.
- Maximillian Chen, Xiao Yu, Weiyan Shi, Urvi Awasthi, and Zhou Yu. 2023a. Controllable mixed-initiative dialogue generation through prompting. In *Annual Meeting of the Association for Computational Linguistics*.
- Yirong Chen, Xiaofen Xing, Jingkai Lin, Huimin Zheng, Zhenyu Wang, Qi Liu, and Xiangmin Xu. 2023b. Soulchat: Improving llms' empathy, listening, and comfort abilities through fine-tuning with multi-turn empathy conversations.
- Jiale Cheng, Sahand Sabour, Hao Sun, Zhuang Chen, and Minlie Huang. 2023. Pal: Persona-augmented emotional support conversation generation. In *ACL*.
- Yi Cheng, Wenge Liu, Wenjie Li, Jiashuo Wang, Ruihui Zhao, Bang Liu, Xiaodan Liang, and Yefeng Zheng. 2022. Improving multi-turn emotional support dialogue generation with lookahead strategy planning. In *Conference on Empirical Methods in Natural Language Processing*.
- Neo Christopher Chung, George Dyer, and Lennart Brocki. 2023. Challenges of large language models for mental health counseling. *arXiv preprint arXiv:2311.13857*.

- Yang Deng, Wenxuan Zhang, Yifei Yuan, and Wai Lam. 2023. Knowledge-enhanced mixed-initiative dialogue system for emotional support conversations. In *ACL*.
- Tim Dettmers, Artidoro Pagnoni, Ari Holtzman, and Luke Zettlemoyer. 2023. Qlora: Efficient finetuning of quantized llms. *arXiv preprint arXiv:2305.14314*.
- Jacob Devlin, Ming-Wei Chang, Kenton Lee, and Kristina Toutanova. 2019. Bert: Pre-training of deep bidirectional transformers for language understanding. In *NAACL-HLT*.
- Mahshid Eshghie and Mojtaba Eshghie. 2023. Chatgpt as a therapist assistant: A suitability study. *arXiv preprint arXiv:2304.09873*.
- Faiza Farhat. 2023. Chatgpt as a complementary mental health resource: a boon or a bane. *Annals of Biomedical Engineering*, pages 1–4.
- Luke Friedman, Sameer Ahuja, David Allen, Zhenning Tan, Hakim Sidahmed, Changbo Long, Jun Xie, Gabriel Schubiner, Ajay Patel, Harsh Lara, Brian Chu, Zexi Chen, and Manoj Tiwari. 2023. Leveraging large language models in conversational recommender systems.
- Jun Gao, Wei Bi, Ruifeng Xu, and Shuming Shi. 2022a. **Ream#: An enhancement approach to reference-based evaluation metrics for open-domain dialog generation.**
- Silin Gao, Jena D. Hwang, Saya Kanno, Hiromi Wakaki, Yuki Mitsufuji, and Antoine Bosselut. 2022b. **ComFact: A benchmark for linking contextual commonsense knowledge.** In *Findings of the Association for Computational Linguistics: EMNLP 2022*, pages 1656–1675, Abu Dhabi, United Arab Emirates. Association for Computational Linguistics.
- Jennifer C Greene. 2003. *Handbook of Communication and Social Interaction Skills*. Psychology Press.
- Catherine A Heaney and Barbara A Israel. 2008. Social networks and social support. 4:189–210.
- Clara E Hill. 2009. *Helping Skills: Facilitating, Exploration, Insight, and Action*. American Psychological Association.
- Jena D. Hwang, Chandra Bhagavatula, Ronan Le Bras, Jeff Da, Keisuke Sakaguchi, Antoine Bosselut, and Yejin Choi. 2020. **Comet-atomic 2020: On symbolic and neural commonsense knowledge graphs.** In *AAAI Conference on Artificial Intelligence*.
- Hamish Ivison, Yizhong Wang, Valentina Pyatkin, Nathan Lambert, Matthew Peters, Pradeep Dasigi, Joel Jang, David Wadden, Noah A. Smith, Iz Beltagy, and Hannaneh Hajishirzi. 2023. **Camels in a changing climate: Enhancing lm adaptation with tulu 2.**
- Shaoxiong Ji, Tianlin Zhang, Kailai Yang, Sophia Anniadou, and Erik Cambria. 2023. **Rethinking large language models in mental health applications.**
- Mengzhao Jia, Qianglong Chen, Liqiang Jing, Dawei Fu, and Renyu Li. 2023. Knowledge-enhanced memory model for emotional support conversation. *arXiv preprint arXiv:2310.07700*.
- Albert Q. Jiang, Alexandre Sablayrolles, Arthur Mensch, Chris Bamford, Devendra Singh Chaplot, Diego de las Casas, Florian Bressand, Gianna Lengyel, Guillaume Lample, Lucile Saulnier, Lélio Renard Lavaud, Marie-Anne Lachaux, Pierre Stock, Teven Le Scao, Thibaut Lavril, Thomas Wang, Timothée Lacroix, and William El Sayed. 2023. **Mistral 7b**.
- Dahyun Kim, Chanjun Park, Sanghoon Kim, Wonsung Lee, Wonho Song, Yunsu Kim, Hyeyoung Kim, Yungi Kim, Hyeyoung Lee, Jihoo Kim, Changbae Ahn, Seonghoon Yang, Sukyung Lee, Hyunbyung Park, Gyoongjin Gim, Mikyoung Cha, Hwalsuk Lee, and Sunghun Kim. 2023. **Solar 10.7b: Scaling large language models with simple yet effective depth upscaling.**
- Catherine Penny Hinson Langford, Juanita Bowsher, Joseph P Maloney, and Patricia P Lillis. 1997. Social support: A conceptual analysis. *Journal of Advanced Nursing*, 25(1):95–100.
- Gibbeum Lee, Volker Hartmann, Jongho Park, Dimitris Papailiopoulos, and Kangwook Lee. 2023. **Prompted LLMs as chatbot modules for long open-domain conversation.** In *Findings of the Association for Computational Linguistics: ACL 2023*, pages 4536–4554, Toronto, Canada. Association for Computational Linguistics.
- Jiwei Li, Michel Galley, Chris Brockett, Jianfeng Gao, and William B. Dolan. 2016. A diversity-promoting objective function for neural conversation models. In *NAACL*.
- Chin-Yew Lin. 2004. Rouge: A package for automatic evaluation of summaries. In *Annual Meeting of the Association for Computational Linguistics*.
- Siyang Liu, Chujie Zheng, Orianna Demasi, Sahand Sabour, Yu Li, Zhou Yu, Yong Jiang, and Minlie Huang. 2021. Towards emotional support dialog systems. In *ACL*.
- Yinhan Liu, Myle Ott, Naman Goyal, Jingfei Du, Mandar Joshi, Danqi Chen, Omer Levy, Mike Lewis, Luke Zettlemoyer, and Veselin Stoyanov. 2019. **Roberta: A robustly optimized bert pretraining approach.**
- Aman Madaan, Niket Tandon, Prakhar Gupta, Skyler Hallinan, Luyu Gao, Sarah Wiegreffe, Uri Alon, Nouha Dziri, Shrimai Prabhumoye, Yiming Yang, Sean Welleck, Bodhisattwa Prasad Majumder, Shashank Gupta, Amir Yazdanbakhsh, and Peter Clark. 2023. **Self-refine: Iterative refinement with self-feedback.** *ArXiv*, abs/2303.17651.

- Shikib Mehri and Maxine Eskenazi. 2020. Usr: An unsupervised and reference free evaluation metric for dialog generation.
- M. E. J. Newman. 2023. Efficient computation of rankings from pairwise comparisons. *Journal of Machine Learning Research*, 24(238):1–25.
- OpenAI. 2023a. Chatgpt. <https://openai.com/blog/chatgpt>.
- OpenAI. 2023b. Gpt-4 technical report.
- Kishore Papineni, Salim Roukos, Todd Ward, and Wei-Jing Zhu. 2002. Bleu: a method for automatic evaluation of machine translation. In *Annual Meeting of the Association for Computational Linguistics*.
- Rafael Rafailov, Archit Sharma, Eric Mitchell, Stefano Ermon, Christopher D. Manning, and Chelsea Finn. 2023. Direct preference optimization: Your language model is secretly a reward model.
- Inhwa Song, Sachin R. Pendse, Neha Kumar, and Munmun De Choudhury. 2024. The typing cure: Experiences with large language model chatbots for mental health support.
- Hugo Touvron, Louis Martin, Kevin R. Stone, Peter Albert, Amjad Almahairi, Yasmine Babaei, Nikolay Bashlykov, Soumya Batra, Prajjwal Bhargava, Shruti Bhosale, Daniel M. Bikel, Lukas Blecher, Christian Cantón Ferrer, Moya Chen, Guillem Cucurull, David Esiobu, Jude Fernandes, Jeremy Fu, Wenying Fu, Brian Fuller, Cynthia Gao, Vedanuj Goswami, Naman Goyal, Anthony S. Hartshorn, Saghar Hosseini, Rui Hou, Hakan Inan, Marcin Kardas, Viktor Kerkez, Madian Khabsa, Isabel M. Kloumann, A. V. Korenev, Punit Singh Koura, Marie-Anne Lachaux, Thibaut Lavril, Jenya Lee, Diana Liskovich, Yinghai Lu, Yuning Mao, Xavier Martinet, Todor Mihaylov, Pushkar Mishra, Igor Molybog, Yixin Nie, Andrew Poulton, Jeremy Reizenstein, Rashi Rungta, Kalyan Saladi, Alan Schelten, Ruan Silva, Eric Michael Smith, R. Subramanian, Xia Tan, Binh Tang, Ross Taylor, Adina Williams, Jian Xiang Kuan, Puxin Xu, Zhengxu Yan, Iliyan Zarov, Yuchen Zhang, Angela Fan, Melanie Kambadur, Sharan Narang, Aurelien Rodriguez, Robert Stojnic, Sergey Edunov, and Thomas Scialom. 2023. Llama 2: Open foundation and fine-tuned chat models. *ArXiv*, abs/2307.09288.
- Ramakrishna Vedantam, C. Lawrence Zitnick, and Devi Parikh. 2014. Cider: Consensus-based image description evaluation. In *2015 IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, pages 4566–4575.
- Jason Wei, Xuezhi Wang, Dale Schuurmans, Maarten Bosma, Fei Xia, Ed Chi, Quoc V Le, Denny Zhou, et al. 2022. Chain-of-thought prompting elicits reasoning in large language models. *Advances in Neural Information Processing Systems*, 35:24824–24837.
- Ernst Zermelo. 1929. Die berechnung der turnierergebnisse als ein maximumproblem der wahrscheinlichkeitsrechnung. *Mathematische Zeitschrift*, 29(1):436–460.
- Weixiang Zhao, Yanyan Zhao, Xin Lu, Shilong Wang, Yanpeng Tong, and Bing Qin. 2023a. Is chatgpt equipped with emotional dialogue capabilities? *arXiv preprint arXiv:2304.09582*.
- Weixiang Zhao, Yanyan Zhao, Shilong Wang, and Bing Qin. 2023b. Transesc: Smoothing emotional support conversation via turn-level state transition. In *Annual Meeting of the Association for Computational Linguistics*.
- Lianmin Zheng, Wei-Lin Chiang, Ying Sheng, Siyuan Zhuang, Zhanghao Wu, Yonghao Zhuang, Zi Lin, Zuhuan Li, Dacheng Li, Eric P. Xing, Hao Zhang, Joseph E. Gonzalez, and Ion Stoica. 2023a. Judging llm-as-a-judge with mt-bench and chatbot arena.
- Zhonghua Zheng, Lizi Liao, Yang Deng, and Liqiang Nie. 2023b. Building emotional support chatbots in the era of llms. *ArXiv*, abs/2308.11584.

A Details of Preliminary Studies

For the preliminary study, we prompt *gpt-4-0613* and *gpt-3.5-turbo-1106* to predict a strategy and generate a strategy-constrained response in 0-shot setting, and LLaMA2-7B in 2-shot setting as it struggles with adhering to desired output format. We utilize a total of 4,833 samples across various strategies, and the strategy distribution of samples is reported in Table 7 (Ground-Truth). We provide the prompt used for the test in Table 12.

A.1 Analysis of LLMs on ESC

Performance in Selecting Correct Strategy. Table 6 indicates that LLMs have limited proficiency in accurately predicting strategy, showing performance similar to random selection.

Models	accuracy (%)	weighted-F1
random	12.6	13.0
GPT-4	22.1	17.5
ChatGPT	20.5	15.7
LLaMA2-70B	17.5	15.4

Table 6: The performance of strategy prediction for LLMs. The *random* represents the results when strategies are randomly selected.

Preference for Strategy. To further analyze the reason behind the low performance, we investigate the distribution of how often LLMs select each strategy. Table 7 includes the proportions of strategy selected by LLMs and their preferences (p_i)

Strategy	Ground-Truth	GPT-4		ChatGPT		LLaMA2-70B	
	ratio (%)	ratio (%)	preference	ratio (%)	preference	ratio (%)	preference
Question	16.6	1.4	0.11	1.4	0.12	19.6	1.50
Restatement or Paraphrasing	7.4	0.0	0.00	2.2	0.27	8.0	0.97
Reflection of feelings	12.0	10.2	0.92	14.4	1.48	11.0	0.85
Self-disclosure	12.9	4.0	0.26	2.0	0.14	7.3	0.48
Affirmation and Reassurance	17.9	60.0	4.26	64.0	4.49	32.0	1.88
Providing Suggestions	16.1	20.7	1.83	7.6	0.61	11.2	0.65
Information	11.9	2.8	0.34	6.6	0.59	6.2	0.48
Others	5.2	0.9	0.28	1.7	0.29	4.7	1.18
Total	100	100	8.00	100	8.00	100	8.00

Table 7: The ratio (%) of strategy selections and their preference (p_i) of each LLMs.

for each strategy. We have observed that all LLMs have a strong preference for the strategy *Affirmation and Reassurance* and each LLM has its preferred strategies with various degrees of preference.

A.2 Importance of Strategy

To comprehend the importance of strategy in emotional support conversation tasks using LLMs, we examine *gpt-3.5-turbo-1106* and LLaMA2-70B under the following settings: response generation (a) without strategy, (b) with randomly selected strategy, (c) with strategy predicted by itself, and (d) with ground-truth strategy.

Figure 2 and Table 8 represent that the responses based on correct strategy (*ground-truth strategy*) outperforms those generated without strategy. Furthermore, although LLMs exhibit low performance in strategy prediction, the responses conditioned on predicted strategy achieve performance similar to those without strategy, emphasizing the effectiveness of strategies in providing emotional support to LLMs.

Models	Strategy	Q	R-L.	Sat.
ChatGPT	no	-	<u>15.25</u>	3.94
	random	12.21	<u>14.90</u>	3.92
	predicted	15.04	<u>15.19</u>	<u>4.00</u>
	Ground-truth	-	17.16	4.06
LLaMA2 (70B)	no	-	<u>14.92</u>	3.80
	random	12.21	<u>14.10</u>	3.87
	predicted	14.55	<u>14.66</u>	<u>3.89</u>
	Ground-truth	-	17.13	4.02

Table 8: Results of both automated and human evaluation for the responses from ChatGPT and LLaMA2-70B. The responses are generated with/without strategy. The best results are **bolded** and the second best are underlined.

B ESConv Dataset

B.1 Definitions of Stages

Grounded on Hill’s Helping Skills Theory (Hill, 2009), Liu et al. (2021) propose three stages of emotional support:

1. **Exploration:** Explore to identify the seeker’s problem.
2. **Comforting:** Comfort the seeker through expressing empathy and understanding.
3. **Action:** Help the seeker solve the problems.

Although it is suggested that ESC target these stages in the order: (1) Exploration → (2) Comforting → (3) Action, this sequence can be flexibly tailored to individual needs, as conversations, in practice, cannot follow a fixed order.

B.2 Definitions of Strategies

Liu et al. (2021) also propose a specific set of conversational skills corresponding to each stage. In ESConv, they annotate eight types of support strategies:

- **Question:** Asking for information related to the problem to help the seeker articulate the issues that they face.
- **Restatement or Paraphrasing:** A simple, more concise rephrasing of the seeker’s statements that could help them see their situation more clearly.
- **Reflection of Feelings:** Articulate and describe the seeker’s feelings to show an understanding of the situation and empathy.
- **Self-disclosure:** Divulge similar experiences that you have had or emotions that you share with the help-seeker to express your empathy.

- **Affirmation and Reassurance:** Affirm the seeker’s ideas, motivation, strengths, and capabilities to provide reassurance and encouragement.
- **Providing Suggestions:** Provide suggestions about how to get over the tough and change the current situation, but be careful to not overstep and tell them what to do.
- **Information:** Provide useful information to the help-seeker, for example with data, facts, opinions, and resources.
- **Others:** Use other support strategies that do not fall into the above categories.

C Experiments Details

C.1 Evaluation Sets

In this study, we systematically partition the ESConv dataset into three distinct test sets, denoted as D_1 (Exploration), D_2 (Comforting), and D_3 (Action), to facilitate stage-specific assessments. To prevent utterance duplication, we split the 1,300 dialogues within the ESConv dataset into three sets and randomly allocate them to D_t . We slice each dialogue comprising 5 to 15 turns to generate instances. The determination of the stage for the label response of each instance is based on the majority stage indicated by surrounding strategies within a window size of 4. In cases where the randomly assigned stage of D_t differs from the determined stage, the instance is excluded from the respective test set. Furthermore, to maintain the relevance of the test sets to emotional support contexts, we restrict the slicing process, ensuring that the frequency of the *Others* strategy does not exceed 5%. Detailed statistics of the test sets are provided in Table 1 and Table 9.

C.2 Preference Metric

Bradley-Terry Model. The Bradley-Terry model (BT model) serves as a probability model for pairwise comparisons between individuals or objects. Its utility spans a broad spectrum of areas, notably in ranking competitors in sports, chess, and other competitions. Beyond these traditional domains, the BT model extends to the realm of machine learning, facilitating multi-class probability estimations by incorporating pairwise classification results. Recently, Rafailov et al. (2023) employed the BT model for optimizing preference alignment of LLMs, known as direct preference optimization.

Preference Evaluation with Bradley-Terry Model.

In this study, we employ BT modeling to assess the preference of LLMs across the strategies. The probability p_{ij} , representing the preference for strategy i over ground-truth strategy j , is formally defined as:

$$p_{ij} = \frac{\pi_i}{\pi_i + \pi_j} \quad (5)$$

where we assign a numerical score s_i to each strategy i and define $\pi_i = e^{s_i}$, enabling the expression of p_{ij} in terms of these scores. Zermelo (1929) characterizes the parameter π_i as *playing strengths*. In scenarios involving a series of pairwise competitions among N competitors (specifically, 8 strategies in our case), estimating these strengths becomes relatively straightforward. A common approach involves maximum-likelihood estimation, where w_{ij} represents the total number of times strategy i is preferred over strategy j . It is shown that the maximum likelihood estimates of the strengths can be obtained through a simple iterative procedure.

Iterative Algorithms. Following the efficient algorithm proposed by Newman (2023) for estimating outcomes, we utilize the equation below (Eq 6) to calculate the preference p_i for each strategy i . Initially, we set all values (π_i) to 1 and iteratively refine these estimates over k iterations, with this study we utilize 20 iterations for estimation.

$$\pi'_i = \frac{\sum_j (w_{ij} \pi_j) / (\pi_i + \pi_j)}{\sum_j w_{ji} / (\pi_i + \pi_j)} \quad (6)$$

After updating the π value for each strategy, we consider one iteration complete. Subsequent to each iteration, it is necessary to normalize the values by dividing them by their geometric mean to ensure stability and convergence of the algorithm. This normalization step is represented as:

$$\pi_i \leftarrow \frac{\pi'_i}{\left(\prod_{j=1}^N \pi'_j \right)^{1/N}} \quad (7)$$

where N is the total number of strategies. After concluding the final iteration, the converged π values indicate the preference p_i for strategy i .

C.3 Models

ChatGPT / GPT-4. ChatGPT and GPT-4 (OpenAI, 2023a,b) are among the most widely used LLMs, demonstrating state-of-the-art performance

Category	D_1	D_2	D_3
stage	Exploration	Comforting	Action
# of samples	549	524	816
# of dialogues	433	434	433
Avg. # of turns	9.95	10.04	10.66
Avg. length of utterance	16.27	16.81	18.92

Table 9: Statistics of the processed ESConv dataset for our analysis.

in numerous applications. However, as closed-source LLMs, they are available exclusively through APIs. Thereby, we employ *gpt-3.5-turbo-1106* for ChatGPT and *gpt-4-0613* for GPT-4 in this work.

LLaMA2. LLaMA2 (Touvron et al., 2023) is a prestigious open-source LLM that is widely employed as a foundation model for various open-source LLMs. The model size ranges from 7B to 70B parameters. In this work, we implement both the 7B (*Llama-2-7b-hf*) and the 70B (*Llama-2-70B-hf*) versions, allowing for an exploration of the effects of model size on performance.

Tulu. Tulu is a model with 70B parameters, based on LLaMA2 models fine-tuned on V2 mixture (Ivison et al., 2023). The employ the *tulu-2-70b* version in our experiments to assess its capabilities within the context of our study.

Vicuna. Vicuna is a 13B language model from LLaMA-13B model fine-tuned with high-quality conversation datas (Zheng et al., 2023a). The incorporate the *vicuna-13b-v1.5* version into our experiments to evaluate its performance.

Solar. Solar is an LLM with 10.7B parameters, employing the depth up-scaling (DUS) method as its scaling method (Kim et al., 2023). This approach contributes to its performance exceeding other LLMs, including those utilizing mixture-of-experts (MOE) methods. We use the *SOLAR-10.7B-Instruct-v1.0* version in this work.

Mistral. Mistral is a 7B LLM that leverages grouped-query attention (GQA) and sliding window attention (SWA) for faster inference and reduced inference cost (Jiang et al., 2023). It claims superior performance over the LLaMA2-13B model and even the LLaMA-34B model across various evaluation benchmarks. We employ the *Mistral-7b-Instruct-v0.2* version.

C.4 Prompts Details

The prompts employed in our experiments are shown in Table 12. To ensure a clear understanding of the task, *Task description* and *strategy description* are prompted to LLMs. Furthermore, in addition to the *dialogue context*, we also incorporate *dialogue background*, which encompasses the seeker’s problem, emotion, and situation as gathered from a pre-chat survey. Depending on the method employed, various types of information, such as feedback, rationale, commonsense knowledge, and few-shot examples, are also included as supplementary inputs.

Random few-shot samples. To prevent potential biases in strategy induced by few-shot learning, we randomly select examples. During the experiments, for each data instance, we randomly select exemplars with non-overlapping strategies and incorporate them into the prompt. This approach ensures that the influence of few-shot samples on strategy prediction is minimized by diversifying the strategies presented to the model. However, we figure out in Section 5.2 and Figure 6b that the types of strategies included in the prompt as examples do not significantly impact on the results in the end.

C.5 Methods Details

Direct Refine. Direct refine is a straightforward refinement method, wherein we instruct the model to revise its initial response to incorporate emotional support elements.

Self-Refine. Self-refine, a method introduced by Madaan et al. (2023), initiates by generating feedback emphasizing emotional support from the initial response. Subsequently, it refines the response based on this feedback.

Emotional-CoT. Building upon the success of Chain-of-Thought (CoT) prompting (Wei et al., 2022), we employ CoT to first generate the *user state*, which then guides the generation of strategy and response.

w/ COMET. To incorporate external common-sense knowledge for providing emotional support, we integrate the COMET model (Hwang et al., 2020), specifically COMET-BART³, while leveraging five relation types (*i.e.*, xReact, xIntent, xNeed, xEffect, and xWant). Following Chae et al. (2023), we implemented a retriever using ComFact (Gao

³<https://github.com/allenai/comet-atomic-2020>

et al., 2022b) to align the dialogues with the knowledge from COMET. Among the inferences generated by COMET, we apply the retriever (DeBERTa-large⁴) and filter inferences that are non-relevant to the dialogue context. Subsequently, we convert the remaining inferences into natural language and augment to LLMs, which is shown in Table 12.

w/ Strategy Planner. Strategy planner is a classification model that is fine-tuned to predict the strategy based on dialogue background and context. Thereby, we formulate *w/ Strategy Planner* as follows: given the dialogue background \mathcal{I} , and dialogue context \mathcal{C} , the strategy planner model θ' predicts the strategy $\hat{\mathcal{S}}$. Then, LLM θ generates the response \mathcal{R} , leveraging \mathcal{I} , \mathcal{C} , and $\hat{\mathcal{S}}$.

$$\hat{\mathcal{S}} \sim P_{\theta'}(\cdot | \mathcal{I}, \mathcal{C}) \quad (8)$$

$$\mathcal{R} \sim P_{\theta}(\cdot | \mathcal{I}, \mathcal{C}, \hat{\mathcal{S}}) \quad (9)$$

D Implementation Details

All experiments are conducted on 8 NVIDIA GeForce RTX 3090 GPUs and 2 NVIDIA A100 80GB PCIe GPUs.

Fine-tuning. Since the test sets are constructed by dividing the dialogues in EConv into three without overlap, to evaluate each test set with a trained model, we construct a train/valid set from dialogues corresponding to the other two sets and train the model on it.

For training, we employ QLoRA (Dettmers et al., 2023) to effectively fine-tune a model, incorporating 4-bit quantization and specifying the dimension of low-rank matrices as 64 and alpha as 16. The DeepSpeed library⁵ is utilized to facilitate the training, with a learning rate of 5e-5 over 5 epochs, resulting in approximately 8 hours of training. For encoder-based models like BERT and RoBERTa, we train them to classify among 8 categories (corresponding to the number of strategies), with training extending up to a maximum of 20 epochs.

Inference. For generating responses, we follow the default settings provided by OpenAI for top- p sampling and temperature, with $p = 1.0$ and $T = 0.7$. To achieve higher throughput during inference, we leverage the vLLM library⁶.

⁴<https://github.com/silin159/comfact>

⁵<https://www.deepspeed.ai>

⁶<https://docs.vllm.ai>

Terms and License. For our implementation and evaluation, we use Huggingface library⁷ and vLLM library. Both libraries are licensed under Apache License, Version 2.0. We have confirmed that all of the artifacts used in this paper are available for non-commercial scientific use.

E Details on Human Evaluation

E.1 Human Evaluation Criteria

With automatic metrics, it is challenging to precisely assess the emotional support quality of responses (Mehri and Eskenazi, 2020; Gao et al., 2022a). Furthermore, conventional criteria commonly used for general dialogue are not specifically designed to evaluate whether a response provides emotional support. Hence, in collaboration with four psychologists, we develop a specific set of criteria focused on assessing whether a response provide effective emotional support from various perspectives of the seeker.

Seeker’s Satisfaction (Sat.), focusing on the quality of emotional support, comprises three detailed criteria. Moreover, we add **Alignment** to assess how well the generated response aligns with the predicted strategy. Consequently, we focus on these four criteria:

- **Acceptance:** Is the response accepted by the seeker without discomfort or resistance?
- **Effectiveness:** Is it expected that the response would mitigate or shift the seeker’s negative emotional state or attitude toward a more positive direction?
- **Sensitivity:** Does the response take into consideration the seeker’s state (mood, needs, resources, culture, attitude, etc.)?
- **Alignment:** Is the response fitting for the chosen strategy?

E.2 Implementations of Human Evaluation

We employ human evaluation, outsourcing the task to assess response quality on Amazon Mechanical Turk (AMT). Figure 9 shows the interface employed for comparative evaluations (*Win/Lose/Tie*) between two responses. Figure 10 and 11 depict the interface employed to rate our four criteria using 5-point Likert scale. Detailed instructions and

⁷<https://huggingface.co/>

Models	Params	Pearson Correlation
GPT4	-	0.820
ChatGPT	175B	0.752
Tulu	70B	0.899
LLaMA2	70B	0.772
Vicuna	13B	0.935
Solar	10.3B	0.747
Mistral	7B	0.943
LLaMA2	7B	0.600

Table 10: Relationship between preference and proficiency. The Pearson correlation between preference (p_i) and proficiency (q_i) of each strategy for LLMs.

rubrics for each score are included to ensure precise evaluation. For each evaluation, we ask three human annotator to assess 100 samples each based on four specified criteria. We compensate each data piece in the human evaluation with a payment of \$0.07.

F Additional Analysis

F.1 LLMs’ Proficiency for Each Strategy

Building upon the findings where LLMs generally tend to demonstrate a low proficiency, as shown in Figure 3a, we further delve into the proficiency of each strategy on LLMs. As illustrated in Figure 8, there are notable differences in proficiency depending on the strategy. In particular, each LLM tends to exhibit higher proficiency in strategies with higher preference, observed in Figure 3b.

F.2 Relation between Proficiency and Preference

In Figure 3, we observe that LLMs achieve higher scores on test sets aligned with strategies that they prefer more, raising the question of how this preference influences the proficiency. To explore the relationship between preference p_i and proficiency q_i , we calculate the Pearson correlation between p_i and q_i for each strategy. As a result, Table 10 reports a strong positive correlation between preference and proficiency for most LLMs, suggesting that a high preference p_i for strategy i leads to a high proficiency q_i . Ultimately, this confirms that LLMs perform better in stages containing preferred strategies.

F.3 Preference for Strategies by the Number of Examples

In Figure 6a, we observed improvements in proficiency and preference bias when prompting ChatGPT with few examples. However, we also found

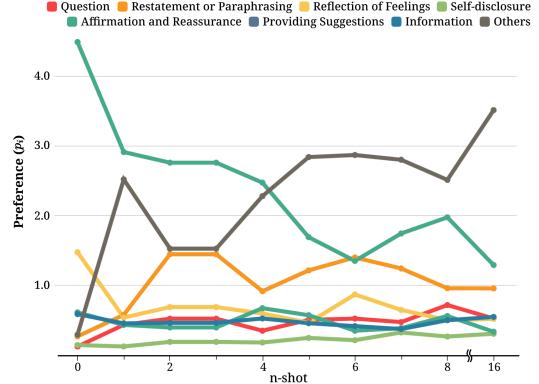


Figure 7: The results of strategy preference as the number of shots increases.

Methods	$\mathcal{Q} \uparrow$	$\mathcal{B} \downarrow$	B-2	R-L
LLaMA2-7B	13.73	0.77	4.98	13.09
+ SFT (w/o strategy)	-	-	6.95	15.00
+ SFT (w/ strategy)	21.48	0.36	7.15	15.50

Table 11: Automatic evaluation results of training approaches for the total test set (D).

that as the number of examples increases, preference bias significantly worsens. To delve deeper into the reasons behind this, we examine the changes in preference for each strategy as the number of examples increases. As demonstrated in Figure 7, the preference for *Affirmation and Reassurance* gradually diminishes, while the preference for *Others* gradually increases. The strong preference for the *Others*, as the number of examples increases, eventually exacerbates preference bias. Consequently, the strong preference for the *Others* disrupts the selection of alternative strategies, hindering the enhancement of proficiency as the number of shot examples increases.

F.4 Supervised Fine-tuning on ESC Task

The most straightforward approach for solving a task is fine-tuning with task-specific datasets. However, closed-source LLMs or open-source LLMs with large sizes have constraints when it comes to direct fine-tuning. So, we train a relatively smaller model LLaMA2-7B to generate emotional support responses. Table 11 shows that fine-tuning the model leads to significant improvements in emotional support quality.

We also ablate to examine the effectiveness of strategy on fine-tuned models. As a result, Table 11 demonstrates that fine-tuning the model on a dataset with strategies yields a higher quality of emotional support compared to training on a dataset

that does not include strategies.

G Case Study

G.1 Responses of LLMs by Stages

In Figure 12, 13, and 14, we present examples of generated responses in each stage from LLMs. During the *Exploration* stage (Figure 12), it is observed that LLMs, excluding the LLaMA2 family, tend to express empathy prematurely before sufficient exploration, potentially causing discomfort for the seeker. These findings correlate with the LLaMA2 family’s high preference for *Question*, in contrast to other models, exhibiting a lower preference, as illustrated in Figure 3b. Furthermore, these results correspond to earlier findings discussed in Appendix F.1. In the *Comforting* stage (Figure 13), each model demonstrates suitable responses, primarily due to the high preference for *Affirmation* and *Reassurance* in most LLMs. Lastly, in the *Action* stage (Figure 14), GPT-4 and ChatGPT exhibit the superior performance compared to others, particularly excelling in generating informative responses, aligning with the observations in Zhao et al. (2023a) and Chen et al. (2023b). Psychologists who assess the overall responses of LLMs also comment as follows:

“ChatGPT exhibits a tendency to excessively employ affirmations. In contrast, LLaMA2, despite its overall lower proficiency, displays notable strength in effectively handling open-ended questions.”

These results are aligned with the findings we identify through our case study.

G.2 Comparison between Self-Contact and External-Contact

While self-contact methods negatively impact on performance, external-contact methods exhibit a noticeable enhancement. A detailed case study presented in Figure 15 supports this findings, where the response of self-contact methods fall short of meeting the seeker’s expectations, while the external-contact methods effectively address the seeker’s question by drawing upon personal experiences.

G.3 Misalignment between Strategy and Response

A possible concern is that LLMs might lack ability to generate responses aligned with strategies.

Therefore, we conduct an empirical case study to figure out this misalignments. In Figure 16, ChatGPT generates a response that is not aligned with the strategy *Information* predicted by external strategy planner. This may be due to knowledge conflicts, *i.e.*, ChatGPT does not consider it appropriate to use the *Information* for the next response, despite being forced to generate a response aligned with the strategy *Information*. In conclusion, while external assistance has potential to enhance performance, it is crucial to acknowledge that not all approaches yield positive impacts.

Prompt**[[TASK DESCRIPTION]]**

The strategy should be chosen from the following 8 types of strategy:

- Question: Asking for information related to the problem to help the help-seeker articulate the issues that they face. Open-ended questions are best, and closed questions can be used to get specific information.
- Restatement or Paraphrasing: A simple, more concise rephrasing of the help-seeker's statements that could help them see their situation more clearly.
- Reflection of Feelings: Articulate and describe the help-seeker's feelings.
- Self-disclosure: Divulge similar experiences that you have had or emotions that you share with the help-seeker to express your empathy.
- Affirmation and Reassurance: Affirm the help seeker's strengths, motivation, and capabilities and provide reassurance and encouragement.
- Providing Suggestions: Provide suggestions about how to change, but be careful to not overstep and tell them what to do.
- Information: Provide useful information to the help-seeker, for example with data, facts, opinions, resources, or by answering questions.
- Others: Exchange pleasantries and use other support strategies that do not fall into the above categories.

[Example 1]

Dialogue background

The following is a conversation between a supporter and a seeker about {emotion type} regarding a/an {problem type}. The seeker says "{situation}".

Dialogue context

{context}

[[Supplementary Input]]

Methods	Task Description	Supplementary Input
Vanilla	You will be provided with a dialogue context between a supporter and seeker. Your task is to make the next response based on the given dialogue context.	### Model's response ###
Direct-Refine	You will be provided with a dialogue context between a supporter and seeker, as well as a response written by a language model from the perspective of the supporter, including strategy and utterance. Your task is to refine the model's response (i.e., Strategy and Utterance) based on the given dialogue context.	### Model's response ### Strategy: {strg pred} Utterance: {res pred} ### Refined response ###
Self-Refine (Feedback)	You will be provided with a dialogue context between a supporter and seeker, as well as a response written by a language model from the perspective of the supporter, including strategy and utterance. Your task is to feedback for the model response (i.e., Strategy and Utterance) based on the given dialogue context.	### Model's response ### Strategy: {strg pred} Utterance: {res pred} ### Feedback ###
Self-Refine (Refine)	You will be provided with a dialogue context between a supporter and seeker, as well as a response written by a language model from the perspective of the supporter, including strategy and utterance. Your task is to refine the model response (i.e., Strategy and Utterance) based on the given dialogue context and feedback of the model response.	### Model's response ### Strategy: {strg pred} Utterance: {res pred} ### Feedback ### Feedback : {feedback} ### Refined response ###
w/ COMET	You will be provided with a dialogue context between a supporter and seeker, and a commonsense knowledge from external model. Your task is to generate a response for the supporter based on the dialogue context and commonsense knowledge, you should ignore the commonsense knowledge if it mislead the next response.	### Commonsense knowledge ### {comet} ### Model's response ###

Table 12: Example prompts for response generation.

Models	Params	$\mathcal{Q} \uparrow$	$\mathcal{B} \downarrow$	BLEU-2	BLEU-4	ROUGE-L	METEOR	CIDEr	Dist-1	Dist-2
<i>0-shot</i>										
GPT-4	-	15.04	1.35	5.00	0.96	14.24	10.20	3.11	4.13	26.21
ChatGPT	175B	13.50	1.38	6.27	1.16	14.86	9.17	6.27	4.33	24.34
<i>2-shot</i>										
GPT-4	-	18.38	0.90	6.47	1.39	15.18	<u>9.55</u>	5.97	7.58	36.92
ChatGPT	175B	<u>16.98</u>	0.86	6.30	1.41	<u>14.94</u>	9.30	6.91	4.75	27.03
<i>2-shot</i>										
Tulu	70B	15.93	0.90	6.90	<u>1.63</u>	13.94	7.65	<u>7.10</u>	4.50	23.78
LLaMA2	70B	14.55	0.47	6.15	1.28	14.29	7.31	7.52	5.70	30.95
Vicuna	13B	12.85	0.74	<u>6.55</u>	1.70	14.43	8.42	6.95	4.37	24.15
Solar	10.7B	14.17	0.87	4.79	0.81	13.53	9.08	3.86	5.11	32.36
Mistral	7B	12.23	<u>0.71</u>	4.72	0.45	12.93	7.13	3.32	4.46	25.36
LLaMA2	7B	13.73	0.77	4.98	0.96	13.09	6.67	5.41	<u>6.35</u>	<u>34.74</u>

Table 13: Automatic evaluation results on the generated response of closed-source LLMs and open-source LLMs for the entire test set (D). The automatic metrics include BLEU-n (Papineni et al., 2002), ROUGE-L (Lin, 2004), METEOR (Banerjee and Lavie, 2005), CIDEr (Vedantam et al., 2014), and Distinct-1/2 (Li et al., 2016). The best results are **bolded** and the second best are underlined.

Models	Params	$\mathcal{Q} \uparrow$	$\mathcal{B} \downarrow$	D_1			D_2			D_3		
				F1	B-2	R-L	F1	B-2	R-L	F1	B-2	R-L
<i>0-shot</i>												
GPT-4	-	15.04	1.35	11.23	4.58	13.67	20.41	4.70	14.13	21.04	5.45	14.67
ChatGPT	175B	13.50	1.38	10.23	5.95	<u>14.59</u>	19.60	6.02	<u>14.70</u>	17.97	6.62	14.86
<i>2-shot</i>												
GPT-4	-	18.38	0.90	14.61	5.22	14.27	22.55	5.36	14.54	24.68	6.47	15.18
ChatGPT	175B	<u>16.98</u>	0.86	<u>15.16</u>	6.10	14.90	19.07	6.08	14.81	20.10	6.30	<u>15.07</u>
<i>2-shot</i>												
Tulu	70B	15.93	0.90	13.77	5.99	13.43	<u>21.37</u>	6.52	13.85	18.78	7.33	14.34
LLaMA2	70B	14.55	0.47	19.12	<u>6.20</u>	14.22	16.51	<u>6.18</u>	14.27	15.82	6.05	14.34
Vicuna	13B	12.85	0.74	10.21	6.58	14.44	16.74	<u>5.65</u>	13.97	15.74	<u>7.07</u>	14.74
Solar	10.7B	14.17	0.87	10.53	4.49	13.12	17.29	4.31	13.38	18.93	<u>5.31</u>	13.89
Mistral	7B	12.23	<u>0.71</u>	12.40	3.82	12.40	17.18	5.74	13.94	14.74	4.59	12.60
LLaMA2	7B	13.73	0.77	14.61	5.04	13.04	18.40	5.23	13.17	15.87	4.76	13.07

Table 14: Automatic evaluation results of closed-source LLMs and open-source LLMs include \mathcal{Q} , \mathcal{B} , for the total test set (D) and weighted F1, BLEU-2 (B-2), ROUGE-L (R-L) for each test set (D_t).

Methods	$\mathcal{Q} \uparrow$	$\mathcal{B} \downarrow$	BLEU-2	BLEU-4	ROUGE-L	METEOR	CIDEr	Dist-1	Dist-2
ChatGPT (<i>0-shot</i>)	13.50	1.38	6.27	1.16	14.86	9.17	6.27	4.33	24.34
+ Direct-Refine	13.40	1.60	5.68	1.03	14.50	<u>9.43</u>	4.57	3.95	22.95
+ Self-Refine	12.37	1.53	5.16	0.94	14.33	10.12	2.97	3.37	20.72
+ Emotional-CoT	9.55	1.56	5.23	1.03	14.12	9.34	3.87	3.29	18.76
+ w/ COMET	12.78	0.95	6.71	1.35	<u>15.07</u>	9.00	6.68	3.89	21.87
+ w/ Example Expansion	<u>16.91</u>	0.82	7.45	2.01	15.22	8.62	8.88	5.01	27.66
+ w/ Strategy Planner	21.09	0.36	<u>6.96</u>	<u>1.86</u>	14.91	8.79	9.64	4.96	<u>27.63</u>
LLaMA2-70B (<i>2-shot</i>)	14.55	0.47	6.15	1.28	14.29	7.31	7.52	5.70	30.95
+ Direct-Refine	13.17	0.59	5.86	1.31	13.98	7.08	6.64	5.40	28.43
+ Self-Refine	13.15	0.55	5.56	1.11	13.70	8.09	4.53	4.46	25.11
+ Emotional-CoT	12.73	0.53	6.37	1.35	13.87	7.53	6.07	5.28	28.89
+ w/ COMET	14.53	0.51	6.21	<u>1.51</u>	<u>14.55</u>	7.29	<u>8.66</u>	5.82	31.23
+ w/ Example Expansion	<u>15.14</u>	<u>0.44</u>	6.55	1.86	14.66	7.42	9.30	<u>5.89</u>	32.12
+ w/ Strategy Planner	21.09	0.36	<u>6.44</u>	1.29	14.49	<u>7.54</u>	8.46	5.92	<u>31.72</u>

Table 15: Automatic evaluation results on the generated response of methods for the entire test set (D). The automatic metrics include BLEU-n, ROUGE-L, METEOR, CIDEr, and Distinct-1/2 . The best results are **bolded** and the second best are underlined.

Methods	$\mathcal{Q} \uparrow$	$\mathcal{B} \downarrow$	D_1			D_2			D_3		
			F1	B-2	R-L	F1	B-2	R-L	F1	B-2	R-L
ChatGPT (<i>0-shot</i>)	13.50	1.38	10.23	5.95	14.59	19.57	6.02	14.70	17.97	6.62	15.14
+ Direct-Refine	13.40	1.60	9.28	5.35	14.09	19.45	5.45	14.39	19.02	6.02	14.84
+ Self-Refine	12.37	1.53	9.55	4.74	14.09	20.56	5.06	14.10	16.77	5.48	14.62
+ Emotional-CoT	9.55	1.56	8.67	4.69	13.83	15.02	5.06	14.09	13.10	5.68	14.33
+ w/ COMET	12.78	0.95	12.81	5.85	14.40	17.00	<u>6.60</u>	14.98	13.42	7.30	<u>15.55</u>
+ w/ Example Expansion	<u>16.91</u>	<u>0.82</u>	<u>14.51</u>	7.31	15.02	18.24	6.77	<u>14.88</u>	<u>21.09</u>	<u>7.59</u>	15.57
+ w/ Strategy Planner	21.09	0.36	22.59	<u>6.17</u>	<u>14.84</u>	<u>20.46</u>	6.32	14.19	23.77	7.73	15.46
LLaMA2-70B (<i>2-shot</i>)	14.55	0.47	19.12	6.20	14.22	16.51	6.18	14.27	15.82	6.05	14.34
+ Direct-Refine	13.17	0.59	12.10	5.65	13.59	17.87	5.92	14.10	16.66	5.84	14.14
+ Self-Refine	13.15	0.55	15.18	5.28	14.26	14.53	4.91	13.22	15.40	<u>6.16</u>	13.66
+ Emotional-CoT	12.73	0.53	11.69	6.10	13.69	<u>18.45</u>	6.66	13.91	16.12	6.40	13.95
+ w/ COMET	14.53	0.51	17.06	6.65	14.42	17.95	<u>6.35</u>	<u>14.42</u>	15.57	5.84	14.71
+ w/ Example Expansion	<u>15.14</u>	<u>0.44</u>	<u>19.22</u>	8.13	15.11	17.50	6.08	14.57	<u>17.27</u>	5.93	14.42
+ w/ Strategy Planner	21.09	0.36	22.59	<u>7.27</u>	<u>14.84</u>	21.85	6.29	14.15	23.77	6.05	<u>14.50</u>

Table 16: Automatic evaluation results include \mathcal{Q} , \mathcal{B} , for the total test set (D) and weighted F1, BLEU-2 (B-2), ROUGE-L (R-L) for each test set (D_t). The best results are **bolded** and the second best are underlined.

Num of Shot	$\mathcal{Q} \uparrow$	$\mathcal{B} \downarrow$	D_1			D_2			D_3		
			F1	B-2	R-L	F1	B-2	R-L	F1	B-2	R-L
0-shot	13.50	1.38	10.23	5.95	14.59	19.57	6.02	14.70	17.97	6.62	15.14
1-shot	14.43	1.00	9.94	6.24	14.93	16.73	6.35	<u>15.19</u>	20.70	7.84	15.91
2-shot	16.98	0.86	15.16	6.10	14.90	<u>19.07</u>	6.08	14.81	20.10	6.30	15.07
3-shot	16.62	0.85	15.00	6.88	15.34	16.58	6.25	14.85	21.28	8.26	<u>15.97</u>
4-shot	<u>16.91</u>	0.82	14.51	7.31	15.02	18.24	6.77	14.88	<u>21.09</u>	7.59	<u>15.57</u>
5-shot	16.70	<u>0.83</u>	<u>17.17</u>	7.20	15.47	18.31	6.37	14.73	18.18	7.81	15.87
6-shot	16.60	0.82	17.08	7.04	15.04	17.25	6.78	14.67	19.00	6.73	15.49
7-shot	16.43	<u>0.83</u>	17.49	<u>7.50</u>	16.43	18.57	<u>6.99</u>	15.34	18.99	<u>7.97</u>	15.98
8-shot	16.61	0.89	16.08	6.99	15.23	18.50	7.04	15.02	19.79	7.68	15.58
16-shot	16.90	1.14	15.00	7.76	<u>16.07</u>	18.43	6.69	14.95	20.04	7.85	15.74

Table 17: The results of ChatGPT with respect to the number of shot samples. The best results are **bolded** and the second best are underlined.

Num of Shot	$\mathcal{Q} \uparrow$	$\mathcal{B} \downarrow$	D_1			D_2			D_3		
			F1	B-2	R-L	F1	B-2	R-L	F1	B-2	R-L
2-shot	<u>14.55</u>	<u>0.47</u>	<u>19.12</u>	6.20	14.22	<u>16.51</u>	6.18	14.27	15.82	6.05	14.34
3-shot	14.50	<u>0.47</u>	18.36	<u>7.56</u>	<u>14.52</u>	<u>15.63</u>	6.00	14.63	16.06	<u>6.33</u>	14.57
4-shot	15.14	0.44	19.22	8.13	15.11	17.50	<u>6.08</u>	<u>14.57</u>	17.27	5.93	<u>14.42</u>

Table 18: The results of LLaMA2-70B with respect to number of shot samples. The best results are **bolded** and the second best are underlined.

ChatGPT	Self-Refine			w/ COMET			w/ Example Expansion			w/ Strategy Planner		
	vs. Vanilla			vs. Vanilla			vs. Vanilla			vs. Vanilla		
	Win	Tie	Lose									
Acceptance	51.5[‡]	20.6	27.9	55.2[‡]	21.9	22.9	60.6[‡]	26.3	13.1	70.8[‡]	12.5	16.7
Effectiveness	44.1[‡]	32.4	23.5	42.7[†]	33.3	24.0	48.5[†]	26.2	25.3	54.2[‡]	16.7	29.2
Sensitivity	55.9[‡]	22.1	22.0	58.3[‡]	27.1	14.6	62.6[‡]	21.2	16.2	58.3[‡]	12.5	29.2
Sat.	50.5[‡]	25.0	24.5	52.1[‡]	27.4	20.5	57.2[‡]	24.6	18.2	61.1[‡]	13.9	25.0
Alignment	60.3[‡]	23.5	16.2	57.3[‡]	24.0	18.7	44.4[†]	30.3	25.3	45.8[†]	29.2	25.0

Table 19: The results of human evaluation on ESConv. (^{†/‡}: p-value < 0.1/0.05).

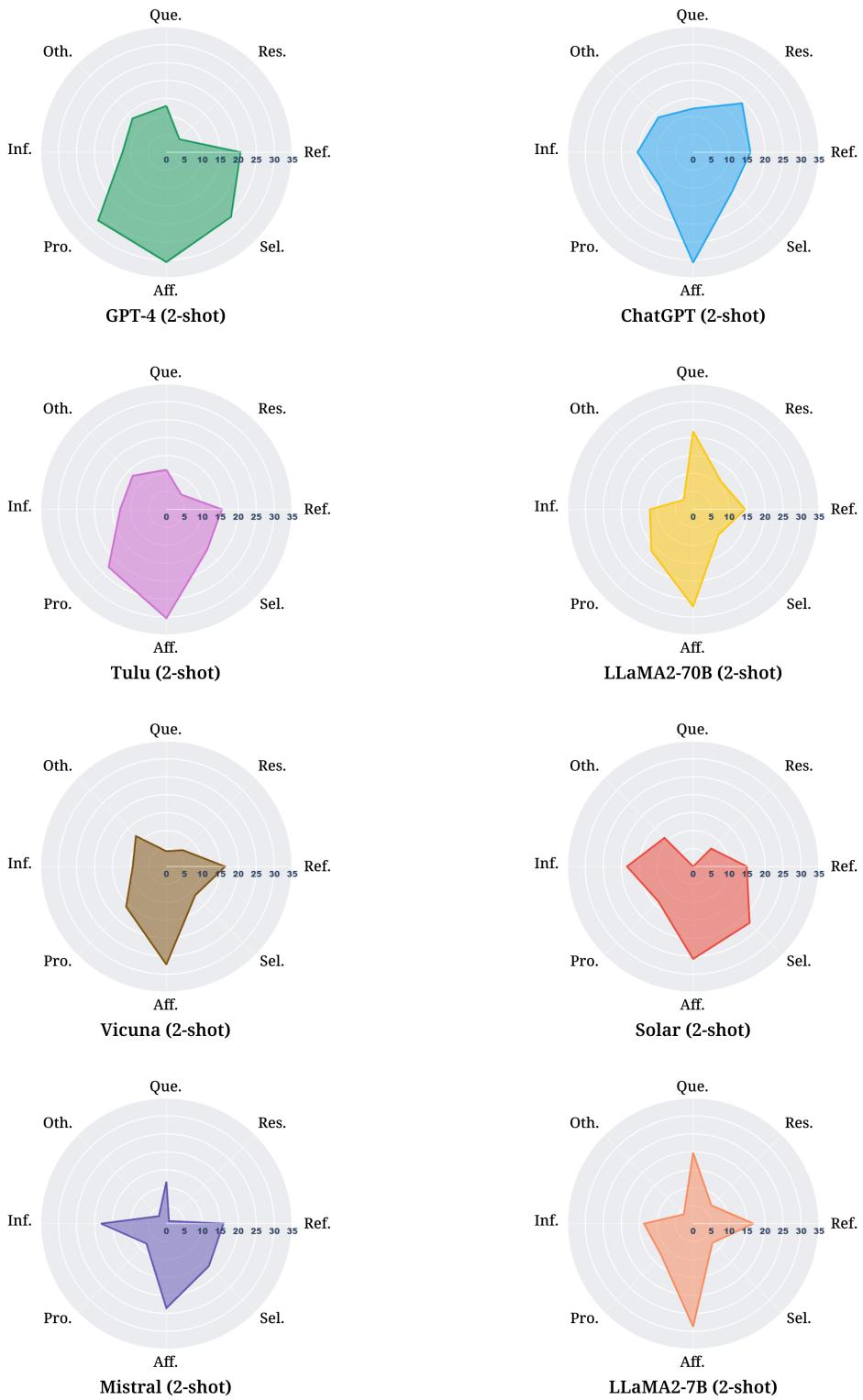


Figure 8: The proficiency by strategy (F1-score) on LLMs.

We are surveying qualities for **responses** from dialogue.

This is an emotional support (using various strategies to care for the seeker) task, each task consists of a background (seeker's emotion, problem and situation), assuming that you are the seeker (seeking emotional support). You need to choose which response is better based on 3 criteria.

Criteria:

1. **Acceptance**

- o Is the response accepted by the seeker without discomfort or resistance?

2. **Effectiveness**

- o Is it expected that the response would mitigate or shift the seeker's negative emotional state or attitude towards a more positive direction?

3. **Sensitivity**

- o Does the response take into consideration the seeker's state (mood, needs, resources, culture, attitude, etc.)?

Strategy:

1. **Question**

- o Asking for information related to the problem to help the help-seeker articulate the issues that they face. Open-ended questions are best, and closed questions can be used to get specific information.

2. **Restatement or Paraphrasing**

- o A simple, more concise rephrasing of the help-seeker's statements that could help them see their situation more clearly.

3. **Reflection of Feelings**

- o Articulate and describe the help-seeker's feelings.

4. **Self-disclosure**

- o Divulge similar experiences that you have had or emotions that you share with the help-seeker to express your empathy.

5. **Affirmation and Reassurance**

- o Affirm the helpseeker's strengths, motivation, and capabilities and provide reassurance and encouragement.

6. **Providing Suggestions**

- o Provide suggestions about how to change, but be careful to not overstep and tell them what to do.

7. **Information**

- o Provide useful information to the help-seeker, for example with data, facts, opinions, resources, or by answering questions.

8. **Others**

- o Exchange pleasantries and use other support strategies that do not fall into the above categories.

Background

Seeker's

- emotion: \${emotion_type}
- problem: \${problem_type}
- situation: \${situation}

Dialogue Context

\${context_human}

Candidate 1

Strategy: \${strg_chatgpt}
Response: \${res_chatgpt}

Candidate 2

Strategy: \${strg_pred}
Response: \${res_pred}

1. Acceptance: Which response is more accepted by the seeker without discomfort or resistance?

- 1 2 tie

2. Effectiveness: Which response more effectively mitigates or changes the seeker's negative emotional state or attitude towards a more positive direction?

- 1 2 tie

3. Sensitivity: Which response better takes into consideration the seeker's state (mood, needs, resources, culture, attitude, etc.)?

- 1 2 tie

Figure 9: Interface for comparative human evaluation on **Seeker's Satisfaction (Sat.)**.

We are surveying qualities for **responses** from dialogue.

This is an emotional support (using various strategies to care for the seeker) task, each task consists of a background (seeker's emotion, problem and situation), assuming that you are the seeker (seeking emotional support). You need to assess the response based on 4 criteria.

Criteria:

1. Acceptance

- Is the response accepted by the seeker without discomfort or resistance?

2. Effectiveness

- Is it expected that the response would mitigate or shift the seeker's negative emotional state or attitude towards a more positive direction?

3. Sensitivity

- Does the response take into consideration the seeker's state (mood, needs, resources, culture, attitude, etc.)?

4. Alignment

- Is the response fitting for the chosen strategy?

Strategy:

1. Question

- Asking for information related to the problem to help the help-seeker articulate the issues that they face. Open-ended questions are best, and closed questions can be used to get specific information.

2. Restatement or Paraphrasing

- A simple, more concise rephrasing of the help-seeker's statements that could help them see their situation more clearly.

3. Reflection of Feelings

- Articulate and describe the help-seeker's feelings.

4. Self-disclosure

- Divulge similar experiences that you have had or emotions that you share with the help-seeker to express your empathy.

5. Affirmation and Reassurance

- Affirm the helpseeker's strengths, motivation, and capabilities and provide reassurance and encouragement.

6. Providing Suggestions

- Provide suggestions about how to change, but be careful to not overstep and tell them what to do.

7. Information

- Provide useful information to the help-seeker, for example with data, facts, opinions, resources, or by answering questions.

8. Others

- Exchange pleasantries and use other support strategies that do not fall into the above categories.

Figure 10: Interface for human evaluation on **Seeker's Satisfaction (Sat.)** using 5-point Likert scale (Instruction part).

Background	
Seeker's	
- emotion: \${emotion_type}	
- problem: \${problem_type}	
- situation: \${situation}	
Dialogue Context	
`\${context_human}`	
Strategy: \${strg_pred}	
Response: \${res_pred}	
1. Acceptance: Is the response accepted by the seeker without discomfort or resistance?	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
1. The response inevitably triggers emotional resistance.	
2. The response is highly likely to trigger emotional resistance.	
3. The response has a possibility of emotional resistance occurring.	
4. The response rarely provokes emotional resistance.	
5. The response has no occurrence of emotional resistance.	
2. Effectiveness: Is it expected that the response would mitigate or shift the seeker's negative emotional state or attitude towards a more positive direction?	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
1. The response exacerbates the seeker's emotional distress.	
2. The response has risk of stress exacerbation depending on the user.	
3. The response maintains the current seeker's emotional intensity.	
4. The response may be effective for soothing emotional intensity, but it is complex or unclear for the user to understand.	
5. The response seems to be effective for soothing and providing helpful emotional support.	
3. Sensitivity: Does the response take into consideration the seeker's state (mood, needs, resources, culture, attitude, etc.)?	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
1. The response makes incorrect judgments about the seeker's state.	
2. The response involves hasty judgments without sufficient assessment and exploration of the seeker's state.	
3. The response is made with partial judgment and exploration of the seeker's state.	
4. The response includes an understanding only a portion of the seeker's state.	
5. The response accurately comprehends the seeker's state and is appropriately generated based on the seeker's state.	
4. Alignment: Is the response fitting for the chosen strategy?	<input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4 <input type="radio"/> 5
1. The response completely contradicts the predicted strategy.	
2. The response slightly differs from the predicted strategy.	
3. The response is somewhat ambiguous with the predicted strategy.	
4. The response generally aligns well with the predicted strategy but has ambiguous parts.	
5. The response successfully aligns the response with the predicted strategy.	

Figure 11: Interface for human evaluation on **Seeker's Satisfaction (Sat.)** using 5-point Likert scale (Evaluation part).

Dialogue Background \mathcal{I}

The following is a conversation between a supporter and a seeker about depression regarding a/an breakup with partner. The seeker says "After breaking up with the partner I had lot of stress and depression in my life. I was facing really a mental stress without my boyfriend."

Dialogue Context \mathcal{C}

seeker: How was your day

supporter: (Others) Boring

seeker: It really very stress full and depressed situation.

seeker: Why your day is boring

supporter: (Question) Don't worry about my day, I'm 34 and retired I do this to help people, tell me about your situation

seeker: My situation is really very sad and depressed

supporter: (Restatement or Paraphrasing) I was a homeless drug-addicted junkie for over 10 years. Tell me how yours is worse sweetly

supporter: (Question) Tell me why you are so sad and depressed.

seeker: I had a breakup with my partner, it was really very horrible for me to overcome.

supporter: (Question) Was he abusive, tell me more

seeker: I tried a lot but i couldn't forget him at all

seeker: He was not abusive at all

Ground Truth

Exploration (Question) So what was the problem?

Responses from LLMs

GPT-4 (Affirmation and Reassurance) I'm really sorry to hear that you're going through this. Breakups can be really tough, but remember, it's okay to grieve the relationship and it's okay to feel sad. It's a part of the healing process. You're stronger than you know.

ChatGPT (Affirmation and Reassurance) It's okay to still feel hurt even if he wasn't abusive. Breakups are tough.

Tulu (Affirmation and Reassurance) You'll find another good person. I know it's hard, but it's very important to move on.

LLaMA2-70B (Question) What happened?

Vicuna (Reflection of Feelings) I can imagine how hard that must be for you. It sounds like you're really hurting.

Solar (Affirmation and Reassurance) It's understandable that you're struggling with the breakup, but you've shown great resilience by acknowledging and expressing your feelings, which is an important step towards healing.

Mistral (Affirmation and Reassurance) That is completely understandable, it takes time to recover from a breakup.

LLaMA2-7B (Question) Did he ever abuse you?

Figure 12: Example of the responses from LLMs in the *Exploration* stage. The responses that are appropriate (green) and inappropriate (yellow) for the ground truth stage are highlighted.

Dialogue Background

The following is a conversation between a supporter and a seeker about a sadness regarding a/an ongoing depression. The seeker says "I cannot deal with the death of a parent. This was some years ago but still badly affects me."

Dialogue Context C

seeekr: Hi there, are you free to talk?

supporter: (Others) Hello, how can i help you today?

seeekr: I have been feeling terrible about the death of my dad. It would have been his birthday last week and that makes it even worse.

supporter: (Reflection of Feelings) Oh no... I am sorry to hear that. It must be devastating. Was it an accident, illness or natural old age?

seeekr: He was only in his early sixties but he suffered a number of health problems, including early onset dementia.

supporter: (Affirmation and Reassurance) That is rough, both for you and him. I know it's meaningless to tell you not to be sad, however, you can think that he's not in a better place

seeekr: I presume you mean now and not not ;). Though I simply am not a believer. It just made me think how meaningless life was.

supporter: (Self-disclosure) oh sorry, yyeah I mean now. Life is... fleeting isn't it? I sometimes think it's meaningless too

seeekr: I do not really know what to do about my feelings. They are not going away.

supporter: (Self-disclosure) I feel you, coping with losing your loved ones is never easy. In fact, it's confusing when you grieve and even when you recover and move on

seeekr: Do you think that people ever really recover from a significant bereavement?

seeekr: I think that what you said there was very wise. Maybe it's worse, in some ways, to feel that your grief has lessened .. there is guilt that comes with that.

supporter: (Affirmation and Reassurance) I don't think people can completely get over that, you just get used to the pain of not having them around

seeekr: Whilst it hurts to think about him being dead, I think that it would hurt more if I had totally forgotten about him and did not think about him every day.

Ground Truth

Comforting (Affirmation and Reassurance) I just need you to know that whatever your feeling is, it's completely normal and you shouldn't feel guilty for having it

Responses from LLMs

GPT-4 (Affirmation and Reassurance) Absolutely, remembering him is a way to honor him and keep his memory alive. It's completely okay to feel the way you do. It's normal to grieve and feel pain. You are not alone in this.

ChatGPT (Affirmation and Reassurance) It's normal to think about him every day, and it shows how much you love him. Maybe you can do something in his memory to honor him and help you feel close to him.

Tulu (Affirmation and Reassurance) That is very true. It's normal to feel this way, and it's good that you still remember him.

LLaMA2-70B (Self-disclosure) I think so too, I lost my grandfather last year and I feel the same way.

Vicuna (Affirmation and Reassurance) That's a good way of looking at it. It's good that you still have those memories and thoughts of your father close to you.

Solar (Information) That's a valid thought process. You might find solace in seeking professional help, such as a grief counselor, or joining a support group for those going through similar experiences. They can provide you with useful coping mechanisms and help you learn to live with your grief.

Mistral (Affirmation and Reassurance) That sounds like a tough time, but I want you to know that you're not alone, it happens to a lot of people.

LLaMA2-7B (Self-disclosure) I understand. You should be proud of yourself for not forgetting him

Figure 13: Example of the responses from LLMs in the *Comforting* stage. The responses that are appropriate (green) and inappropriate (yellow) for the ground truth stage are highlighted.

Dialogue Background \mathcal{I}

The following is a conversation between a supporter and a seeker about sadness regarding a/an ongoing depression. The seeker says "I have a daughter who has decided to go live with her dad. I'm having a hard time with this. She is 16. And that's her decision. I'm fine with that part but I'm not fine with her not seeing me or spending time with me. 3 months ago I grounded her and she's been upset with me ever since. She needed it though. She was getting out of hand. This is my baby girl. Her dad thinks everything is ok. like it is but I feel I have a right to see my daughter as well."

Dialogue Context \mathcal{C}

...

seeker: My daughter is 16 and got out of hand for a little while. I grounded her. And since that time, she has decided to move in with her dad. which is fine. But I've only gotten to see her once in 3 months. She don't want to see me.

supporter: (Affirmation and Reassurance) That's tough, I'm sorry. I don't have children of my own yet, but I remember being a teenager and having a similar phase. If it makes you feel any better, I eventually grew out of that phase and have a wonderful relationship with my parents now!

seeker: That's good.

supporter: (Affirmation and Reassurance) With the holidays coming up, maybe that's a good opportunity to reunite and spend some quality time with her?

seeker: By law though I don't think that my ex husband can keep her from me? I feel like I have a right to see my child. I have 4 kids altogether. My other 2 daughters are older and have already moved out and my son is still at home. I've dealt with teenagers and it's not easy but this is too extreme.

seeker: I asked about the holidays and she said she didn't know. It's gonna be hard not having her here.

supporter: (Question) Does she have a good relationship with her siblings? Maybe they can help convince her to spend some family time at home?

seeker: She did but not so great anymore. I sure hope so.

seeker: It's been hard on everybody. especially her little brother.

Ground Truth

Action (Providing Suggestions) Maybe she just needs some time to decompress. Being a teenager is a stressful time, especially this year with everything w

Responses from LLMs

GPT-4 (Providing Suggestions) Perhaps you and her siblings can speak to her together. Express your feelings and let her know how much you all miss her. Sometimes, hearing from multiple people can have a greater impact.

ChatGPT (Providing Suggestions) Maybe you can try to plan some fun activities for the holidays that she would enjoy. It might help her feel more comfortable coming back home.

Tulu (Affirmation and Reassurance) That sounds difficult, especially for your son. I hope things get better for you and your family.

LLaMA2-70B (Self-disclosure) I can relate, I moved out of my parents' home at a very young age and that made it hard for me to spend time with them.

Vicuna (Affirmation and Reassurance) I can only imagine how difficult this is for you. It's great that you have a good relationship with your children, and I'm sure that will continue even if it's not always easy.

Solar (Self-disclosure) I understand how important it is to maintain family ties during difficult times. I had a similar experience with my own child, and it was challenging, but we eventually resolved the situation.

Mistral (Reflection of Feelings) It takes a lot of courage to make a change and to start a new chapter in your life. I am happy that you are reaching out to me and that you are willing to take this step.

LLaMA2-7B (Affirmation and Reassurance) I'm so sorry to hear about your situation. I hope you feel better soon.

Figure 14: Example of the responses from LLMs in the *Action* stage. The responses that are appropriate (green) and inappropriate (yellow) for the ground truth stage are highlighted.

Dialogue Background \mathcal{I}

The following is a conversation between a supporter and a seeker about fear regarding a/an job crisis. The seeker says "I am so scared of going out and finding a job due to Covid 19 but I need to work right now. my bills are piling up"

Dialogue Context \mathcal{C}

...

seeker: I live with my grandmother and my mom who are both elderly or have underlying health conditions

supporter: (Affirmation and Reassurance) I understand. You are scared to put them in danger, correct?

seeker: Yes, I also don't want them to have to support me and my family either.

supporter: (Reflection of Feelings) With keeping your family in mind while trying to find a job have you considered looking for an online job? Just from chatting with you I can tell how much it stresses you out.

seeker: I have tried but it seems I am way out of my league due to me working in Bars, cafes, and restaurants my entire life.

supporter: (Providing Suggestions) I understand I felt that way when trying to find new opportunities for myself. I kept looking and tried to apply the skills I learned to fit into the new requirements. Maybe a call representative. I assume from previous experience you have excellent customer service skills

seeker: Yes I actually do, I also have pretty good typing skills as well.

supporter: (Information) From that answer I believe that job could be a good fit!

seeker: Sure could be. How did you know you could work online for a living? Is this a field you always worked in?

Ground Truth

Exploration (Self-disclosure) With Covid I also lost my job. I looked online and it is currently a field I am pursuing. I don't do call center work but I do social media marketing all from the comfort of my home.

Responses from LLMs

ChatGPT (Affirmation and Reassurance) It's completely understandable that you're worried about putting your family at risk. You're being very considerate of their health and well-being.

Self-Contact

Direct Refine (Affirmation and Reassurance) It's completely understandable that you're worried about putting your family at risk. You're being very considerate of their health and well-being. It's clear that you care deeply about their safety.

Self-Refine (Affirmation and Reassurance) It's completely understandable that you're worried about putting your family at risk. You're being very considerate of their health and well-being. It's clear that you want to make sure they're safe while also providing for your family

Emotional-CoT (Restatement or Paraphrasing) It sounds like you are worried about finding a job that won't put your family at risk and also feeling unsure about your ability to adapt to online work due to your previous experience.

External-Contact

w/ COMET (Self-disclosure) No, I actually worked in a completely different field before transitioning to an online job. It took some time, but I found something that fits my skills and lifestyle.

w/ Example Expansion (Self-disclosure) I have worked in a variety of fields, but I found that my writing and communication skills translated well to online work.

w/ Strategy Planner (Self-disclosure) I actually have a friend who transitioned from working in a restaurant to working as a virtual assistant. It's definitely possible to make a change, and I think you have the skills to do it

Figure 15: Example of self-contact methods and external-contact methods on ChatGPT. The responses that are appropriate (green) and inappropriate (yellow) for the ground truth stage are highlighted.

Dialogue Background \mathcal{I}

The following is a conversation between a supporter and a seeker about depression regarding a/an ongoing depression. The seeker says "I find it hard to get motivated, I suffer from low mood and don't know how to get out of this."

Dialogue Context \mathcal{C}

...

seeker: Yeah. I worry that I'll just keep feeling even more down and depressed. I'm really having a bad time and struggle to get out of bed to be honest.

supporter: (Affirmation and Reassurance) Firstly, you are not alone in feeling this way. Many people struggle with depression and it's good that you have reached out for help for this.

seeker: Any suggestions on what to do about it?

supporter: (Information) There are many reasons people have depression. It is a recognised medical condition and the good news is that there is help out there. The first step is recognizing the problem.

seeker: Ok well there is definitely a problem.

supporter: (Question) Have you spoken to friends and family about this? do they know how much you are struggling with it at the moment?

seeker: Ok well there is definitely a problem.

supporter: (Providing Suggestions) if people care about you then they will be happy to give you the time and listen to how you are feeling at the moment. I think it will be a really good move to speak to family or friends tell them how you are feeling and talk it through this might really help.

seeker: Yeah maybe. I suppose nobody really understands but I could at least speak to them about it.

supporter: (Providing Suggestions) everyone has problems and it is good to talk about them because a problem shared is a problem halved. It doesn't mean the problems will go away but it might help you understand them and then be able to deal with them better.

seeker: I don't want to feel like this anymore. I'm willing to at least give it a go

Ground Truth

Exploration

(Information) I also think that it will be worse to get in touch with your doctor or a medical professional. these people are trained to deal with problems like yours and will be able to offer effective Solutions from a medical perspective.

Responses from LLMs

ChatGPT

(Affirmation and Reassurance) It's great to hear that you're willing to give it a go. That shows strength and determination, and those are important qualities for working through depression. You're taking a positive step forward.

w/ Strategy Planner

(Information) Have you considered seeking out networking opportunities to help rebuild your confidence and connections in the workforce? **Misalignment**

Figure 16: Example of misalignment between strategy and response in w/ Strategy Planner on ChatGPT. The responses that are appropriate (green) and inappropriate (yellow) for the ground truth stage are highlighted.