

Potentiality of the AI Life Review Program on Psychological Distress and Well-Being of Advanced Cancer Patients

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How to cite this paper: Ando, M., Akechi, T., Kosugi, T., & Kashiwada, T. (2025). Potentiality of the AI Life Review Program on Psychological Distress and Well-Being of Advanced Cancer Patients. *Psychology*, 16, 499-510.

<https://doi.org/10.4236/psych.2025.164028>

Received: March 27, 2025

Accepted: April 22, 2025

Published: April 25, 2025

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Abstract

Background: Life review has potential to improve psychological distress of cancer patients. However, there are some problems with geography or chances to receive therapy. We needed to develop a new style of life review. **Purpose:** The purpose of this study was to develop an AI Life Review program, and to investigate the feasibility and utility of it on psychological distress and well-being. **Method:** Participants were advanced cancer patients. We made an AI Life Review application. In the first session, a patient reviewed his life using the AI Life Review application. The researcher made a life review book based on his review. After two weeks, the patient confirmed the book in the second session. The patient completed questionnaires about psychological distress by the HADS measuring anxiety and depression, and well-being by FACIT-Sp measuring spirituality, Gratitude, Hope, and Life Satisfaction. **Results:** The Anxiety score significantly decreased from 4.67 to 2.60 ($p < 0.01$), the Depression score also significantly decreased from 6.93 to 4.67 ($p < 0.05$). The FACIT-Sp score significantly increased from 28.2 to 30.9 ($p < 0.05$), the Gratitude score significantly increase from 27.4 to 30.3 ($p < 0.01$), and the Hope score significantly increased from 5.07 to 5.73 ($p < 0.05$). The Life Satisfaction score didn't change. The categories of main themes in narratives in life review were chosen. **Conclusion:** These results suggest that the AI Life Review application program has the potential to apply for advanced cancer patients and useful on psychological distress like anxiety and depression, and well-being life spirituality, gratitude, and hope.

Keywords

Life Review, AI Application, Advanced Cancer Patients, Psychological Distress,

1. Introduction

The number of cancer patients is increasing every year. The [World Health Organization \(2024\)](#) reported the following. Higher level of psychological distress is to a 41% increased risk of cancer death ([Russ, Stamatakis, Hamer et al., 2012](#)) and cancer patients undergoing chemotherapy feel psychological distress like anxiety, depression, and hopelessness ([Lee, Wu, Chiu et al., 2015](#)). Distress related to cancer diagnosis and treatment is explicitly tied to several common practical, physical, and psychological problems ([Carlson, 2012](#)). Depression and anxiety are common among patients receiving palliative care and contribute to a greatly diminished quality of life ([Wilson, Chochinov, Skirko et al., 2007](#)).

One of the most effective psychological cares for cancer patients is life review. Butler proposed life review and defined life review as natural event for elders in which they recall their past experiences, analyze them in orders, evaluates them, to achieve a more profound self-concept ([Butler, 1963](#)). He also said that life review is effective for patients confronted death.

Previous studies showed the life review is effective on psychological distress like anxiety or depression, spirituality ([Wang, 2015](#)), or quality of life for cancer patients ([Xiao, Kwong, Pang et al., 2013](#)). A systematic review and meta-analysis showed that life reviews affect quality of life significantly in the participants and only a few studies in the literature have evaluated the effect of life review therapy on terminal patients. Further studies are required to evaluate the efficacy ([Huang, Wang, & Wang, 2020](#)). Moreover, [Khai-Qiang Ng, Subramaniam, Ismail et al. \(2022\)](#) showed the feasibility of life review for cancer patients.

Though these studies showed the efficacy of life review, there are some problems. [Zhang, Xiao, & Chen \(2017\)](#) pointed out the problem by the systematic review: Life review is commonly undertaken in hospitals, palliative care units or other healthcare institutions. Patients in such settings may lose the opportunity to participate in a life review due to time conflicts between the life review and medical treatment or nursing care. Also, [Zhang & Xiao \(2018\)](#) said that few patients dwelling in a community can easily access a life review intervention, due to issues of geographic distance, traffic problems, and limited human resources. Addition to these problems, medical staffs need to learn how to conduct the life review. They are busy though they want to propose the life review. In Japan, [Ando, Morita, & Akechi \(2010\)](#) showed the effects of life review for terminally ill cancer patients, they confronted the same kind of problems and prevalence of life review is limited. Now Japanese government require to eliminate cancer care disparities as Government policy ([Ministry of Health Labor and Welfare Japan, 2023](#)).

In recent years, some new styles of life review using Information Communication Technology (ICT). [Wise, Marchand, Robers et al. \(2018\)](#) conducted online

life review by telephone and demonstrated increasing feelings of peace and decreasing negative mood. However, telephone-based life review did not provide the opportunity to observe nonverbal cues like facial expression. [Huang & Yang \(2022\)](#) showed the long-term effects of immersive virtual reality reminiscence people with dementia. There was significant reduction in depressive symptoms. However, it was expensive. [Haron, Sabri, & Ali \(2017\)](#) reviewed previous studies about reminiscence therapy using ICT like online or multimedia technology and suggest utility of it for elderly.

[Zheng, Zhang, & Xiao \(2022\)](#) showed that the Web-Chat-based life review program was effective in reducing anxiety and depressive symptoms and in improving the level of hope and self-transcendence among patients with digestive system cancer. In Web-Chat-Base life review, e-life review interview is an individual face-to face interview using the video-call function on Web-Chat. The interviewer was a registered nurse who has received 50 hours of life review training.

However, this program needed a professional facilitator to conduct life review. Some facilities can't secure these facilitators. So, we developed a program in which an application (app) conduct life review in voice using Artificial Intelligence (AI) and investigates potentiality of it on psychological aspect.

The purpose of this study was to investigate, 1) the feasibility of the Life Review AI app program for advanced cancer patients, 2) potentiality of this app on psychological distress like anxiety or depression, well-being (spirituality, gratitude, hope, life-satisfaction).

2. Method

2.1. Participants

The participants were 15 (6 male, 9 female) cancer patients. The mean age was 60 years. The inclusion criteria were cancer in advanced stage III or IV under chemotherapy, ability to communicate, and age > 20 years. The exclusion criteria were severe pain or physical symptoms diagnosed by the primary physician, and cognitive impairment such as dementia or serious mental illness. Performance status (PS) was measured by the Eastern Cooperative Oncology Group Performance Status Rating (ECOG-PSR), which is a single item rating of five activity levels from 0 (fully active) to 4 (completely disabled) ([Oken, Creech, Tormey et al., 1982](#)).

2.2. Life Review Interview by AI App.

We developed the life review AI app with a company of professions in Japan (applying patent). There were 5 question items and AI app require answer by voice. These questions were based on a previous study which were useful for advanced cancer patients ([Ando et al., 2010](#)). Questions were about "Memories of times when you were lively" "What you had been doing your best in your own way" "Your role in your life" "What is the most important thing in your life" "How do you think of your life." To keep safety of AI app-narrative, the researcher observed the session, and she confirmed narrative as text data after the session.

2.3. Questionnaires

We used the following questionnaires.

1) Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983; Kitamura, 1983): The Japanese version of the HADS was used to measure levels of anxiety and depression. The HADS score included 14 items measured from 0 to 3 and range from 0 to 42. The high score shows high anxiety or depression.

2) FACIT-Sp (Peterman, Fitchett, Brady et al., 2002; Noguchi, Ono, Morita et al., 2004): We used the Japanese version of the FACIT-Sp to measure meaning of life or meaning of existence or well-being of mind. The FACIT-Sp consists of two domains, meaning of life and religious issues, but only the meaning of life domain was used because religious issue might not change in short term. The meaning of life domain includes 8 questions and is scored on a 5-point scale (range 0 - 4). The total range of the FACIT-Sp is 0 - 32, and high scores indicate a high sense of meaning.

3) Gratitude Scale: The original was the scale of McCullough, Emmons, & Tsang (2002). We used the Japanese version of the trait gratitude scale (Shiraki & Igarashi, 2014). It consisted of 5 questions measured from 1 point (not at all) to 7 (well true).

4) Hope Scale: It was a numeric scale from 1 (not at all) to 10 points (well true).

5) Life Satisfaction Scale (Diener et al., 1985): there were 5 questions about life satisfaction. Participants answered from 1 point (not at all) to 8 (well true). A high score shows high life satisfaction.

2.4. Procedure

The physician or nurse selected patients and got agreement with participating. Next the researcher explained about this research and got informed consent who interested in the research. The life review interview consisted of 2 times sessions. Duration of a session from 60 minutes. In the first session, a participant reviewed his life along with questions by AI app. Interview data was translated into letters and translated into words. After the first session, the researcher made a Life History Book editing words and using power point. In the second session, the participant confirmed the contents of the book. They completed the questionnaire pre and post.

2.5. Data Analysis

We conducted 1) basic statistics and conducted the paired T-test between pre and post, 2) analyzed main contents using a content analysis and chose categories. We sorted a code from short sentences and made categories. Usually we make code, subcategory, and category, however, the number of participants were small and we made categories from codes.

2.6. Ethics

We performed this study in accordance with the Declaration of Helsinki. This

study was approved by the Research Ethics Committee of Nisikyusyu University.

3. Results

We showed the background of participants (**Table 1**). Seventeen participants agreed with the research and received the first session and two could not receive the second session. Then the performance rate was 88.2%. The rate of gender was male (40%) and female (60%) and it was roughly equally. As for age, the number of 60 years patients was the highest (40%). As for PS, the rate of PS 2 was the highest (40%). As for the disease stage, the rate of stage 4 (87%) was higher than stage 3 (13%). Thus, most of the participants were in advanced stage.

Table 1. Background of participants.

Item	Detail	Number (%)
Gender	Male	6 (40%)
	Female	9 (60%)
Age	40 years	1 (6.5%)
	50 years	4 (27%)
	60 years	6 (40 %)
	70 years	3 (20%)
	80 years	1 (6.5%)
PS	PS 1	1 (7%)
	PS 2	10 (67%)
	PS 3	2 (13%)
	PS 4	2 (13%)
Disease	Lung	1
	Uterus	2
	Colon	4
	Liver	2
	Breast	2
	Kidney	1
	gallbladder	1
	Pancreas	1
	Blood	1
Stage	3	2 (13%)
	4	13 (87%)

We showed the results of T-test (**Table 2**). The Anxiety score of the HADS significantly decreased ($p < 0.01$). The Depression score of the HADS also signifi-

cantly decreased ($p < 0.05$). The FACIT-Sp score significantly increased ($p < 0.05$), the Gratitude score also significantly increased ($p < 0.05$), and the Hope score significantly increased ($p < 0.05$). The Life Satisfaction score did not change.

Table 3 showed the main categories of themes in narratives to the 5 questions. There are many themes about work or family.

Table 2. The results of analysis on each questionnaire.

Questionnaires	Pre	Post	<i>t</i>	<i>p</i> value
Anxiety	4.67	2.60	2.75	$p < 0.01$
Depression	6.93	4.67	2.71	$p < 0.05$
FACIT-Sp	28.2	30.9	2.10	$p < 0.05$
Gratitude	27.4	30.3	2.74	$p < 0.01$
Hope	5.07	5.73	2.32	$p < 0.05$
Life Satisfaction	23.3	23.1	0.19	n.s.

Table 3. Categories of main themes in narrative of life review.

Question item	Code	Categories
Memories of times when you were lively	<ul style="list-style-type: none"> • When I went on a trip with my wife • When I went on a trip oversea (+1) • When I was playing with my friends • When I was raising children (+6) • When I was working in a company • When I was working as a nurse • When I was working as a dealer and was glad • When I was working as a teacher 	<ul style="list-style-type: none"> • Trip • Playing with friends • Raising children • Working in various situation
What you had been doing your best in your own way	<ul style="list-style-type: none"> • Interaction with customer service and feeling glad • Continuing work in hard situations (+3) • Developing employees in work (+1) • Devising my teaching in work • Feeling attainments in my work • Working in a company to attain my purpose • Caring for my parents and saw off. • Raising children and keeping house • Continuing chemotherapy now 	<ul style="list-style-type: none"> • Working resulting in glad and feeling attainments • Caring for parents or raising children • Continuing medical treatment
Your role in your life	<ul style="list-style-type: none"> • Carrying out work tasks with responsibility • Carrying out work as a nurse • Supporting my family as a father (+1) or mother • Raising my children as a parent (+2) • Protecting my family adjusting members • Working for the family's income • Caring for my mother 	<ul style="list-style-type: none"> • Carrying out work • Support for family as a member

Continued

	<ul style="list-style-type: none"> • Activities cleaning in the community 	<ul style="list-style-type: none"> • Community activities
What is the most important thing in your life	<ul style="list-style-type: none"> • Gratitude for my parents because of my existence • Gratitude to members at work • Serving various things with gratitude • Gratitude for being alive • Living day by day • Ordinary days Health (+1) • To have consideration for others • Understanding people's feelings and gratitude • My wife to whom I thank • The whole family getting along with • Human relations and interaction with each other • Doing my best with conviction at work (+1) 	<ul style="list-style-type: none"> • Gratitude to others • Gratitude to my existence • Ordinary days • Human relations with consideration • Doing my best at work
How do you think of your life	<ul style="list-style-type: none"> • Satisfy with my life by work (+2) • Satisfied with life by my attainments (+1) • Wonderful life because of meeting my wife • Satisfying with my life with my children and grandchildren (+3) • Satisfying with work, raising, tastes (+1) 	<ul style="list-style-type: none"> • Satisfied with life at work • Satisfied with life at family • Satisfied with life in tastes

4. Discussion

4.1. Characteristics of Participants and Feasibility

The rate of gender of male and female was the almost same. As for age, the number of the 60 years was the most. As for the performance states, PS 2 patients were many. As for stage, participants were stage 3 or stage 4. That is, participants almost had physical power to move themselves and review their lives, even though the stage was advanced.

Seventeen patients participated in the program and two dropped. The reason for the drop was that they were under criteria for chemotherapy and could not come to the wards. Thus, the feasibility rate for completion of the Life Review AI app program was 88%. The rate is over 80 % like previous studies (Ando, Kuki-hara, & Yamamoto, 2018; Chochinov, Kristjanson, Breitbart et al., 2011) and suggests appropriate feasibility. It suggests that the Life Review AI app program had feasibility in clinical situations. The high level of feasibility is due to their physical and mental power to review and reassess their lives.

4.2. Effects of the Life Review AI app program

The Anxiety and Depression score significantly decreased. These results support previous studies (Wilson et al., 2007; Ando et al., 2010; Zheng et al., 2022).

There are some reasons for this decrease. One is that they could express their anxiety or depressive feelings in life review. Previous studies showed that expression is an effective way of regulating emotions, and patients sort out their thoughts and release negative emotions (Mikkelsen, Elkjer, Mennin et al., 2021; Brandao,

Tavares, Schulz et al., 2016).

Or their negative emotion decreased by positive emotions. Main categories of life review to the question of “Memories of times when you were lively” were “Trip,” “Raising children,” “Working various situations.” In memories about raising children, participants remembered nostalgic memories and felt happy feelings. When they remember lively memories, they feel good feelings. This emotion might decrease their anxiety or depression.

As for FACIT-Sp, the score significantly increased and suggested an increase of feeling of meaning of life and peace of mind. The effect on spirituality supports Wang (2015). Categories for questions about “what you had been doing your best in your own way” or “Your role in your life” were “Working resulting in glad or feeling attainments,” “Caring for parents or raising children,” “Carrying out work,” “Support for family as a member.” Thus, participants might recognize their doing best things or role in their lives, finding meaning of life. Addition to this, categories about “Working” or “Raising children” were related with social connection. They interfered with many other people in social lives. Van Tilburg, Sedikides, Wildschutt et al. (2019) showed that social connection or self-continuity related with meaning of life. Participants might feel self-continuity or social connectedness through attainments and working or raising children. Ando (2024) also showed that positive memory proneness related to social connection. Maybe, participants remembered positive memories and recognized social connectedness, then the FACIT-Sp increased.

Also, participants received a life review book. Some participants were very glad to see the book. This book might progress their attainments and promote increasing meaning of life or existence of life.

As for Gratitude scores, there are some categories about gratitude or thanking to the question “What is the most important things in your life.” There are “Gratitude to others” or “Gratitude to my existence.” Participants felt gratitude after getting cancer for families, medical staff, or others. Illness such as confronting life, patients may become awake newly. Li, Zhu, Li et al. (2023) showed that the gratitude intermediate between the relationships between nostalgia positive proneness and well-being. Thus, remembering the trajectory of the illness, memories promote gratitude.

As for life satisfaction, the scores of Life Satisfaction Scale 23 point did not change. The reason for no change was followings. The session time was only one in the first session and savoring the life history book in the second session. To increase life satisfaction, much more session time might be needed. Moreover, translated Japanese question sentence from the original seemed to be a little not suitable for cancer patients. We might need to select much more suitable life satisfaction scale.

4.3. Utility of the AI Life Review Program

4.3.1. Promoting Oneself Insight

We discussed characteristics of categories from narratives.

Integrating some categories, “Working” or “Raising children” were selected duplicated. It suggests that these memories were significant for participants in this study. Moreover, categories “Gratitude to myself” is like self-compassion (Yang, Kong, Guo et al., 2021). Patients might recognize the importance of oneself when they get cancer. Moreover, they recognized “Live day by day” as an important thing. They may insight their mind or their lives.

Even though the program is AI life review, participants could think or look back their lives. Sometimes, not much intervention may be important. In the usual life review, psychologists or facilitators try to direct positive feelings. However, natural insight or thinking of their lives might be important for advanced cancer patients. The patients who confront their own death may rethink deeply and insight for themselves.

There is an opinion that life review by AI is difficult to understand human mind and help them, however, AI may be useful to assist to life review and insight themselves.

4.3.2. Equality to Chance to Receive Life Review Program

People can enjoy a life review program even though they live apart from hospitals or facilities. It overcomes the obstacles of geographic distance and traffic issues. Moreover, they can have a chance to receive life review not influenced by medical treatment time. It supports Zheng et al. (2022). Japanese Government try to reduce imbalance of geographic distance or regional medical facilities as Government policy (Ministry of Health Labor and Welfare Japan, 2023). Then the AI Life Review program may contribute the direction of the Japanese Government policy.

4.3.3. About AI App

AI showed sympathetic words as much as a human facilitator. AI is not tired showing sympathy, does not feel empathy fatigue, and it can show empathy to patients anytime. It may be one of the usefulness.

The researcher accompanied the session and observed safety of AI-generated narratives, and she confirmed narratives as text data after the session to keep safety.

5. Limitation and Future

As a limitation, the sample size was so small, because most patients were under chemotherapy, physical or mental state was unstable during our research duration. So, in future, we need to include many more participants. Moreover, this study was preliminary, we did not set a control group. As the next step, we set the control group. Moreover, we will need to investigate a longitudinal study to assess an effects over times (ex. After one month or three month).

As for the app, there was some situation when a patient thought for a few minutes and spoke very slowly, the app began to speak without waiting for the patient. So, the talking speed will be modified adjusting the patient.

6. Conclusion

The AI Life Review application program had feasibility for advanced cancer patients, and it has potential of effects on psychological distress like anxiety or depression and psychological well-being like spirituality, and gratitude.

Funding

This study is supported by Dean's Discretionary Expenses in Nishikyusyu University.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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