

# Self-Selected Individual Music Therapy for Depression during Hospitalization for Cancer Patients: Randomized Controlled Clinical Trial Study

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## ABSTRACT

**Background:** Depression is a psychological distress that often occurs on cancer patients. Depression can increase patient perception about pain, resulting reduced drug efficacy and longer length of stay. Drug treatment for depression sometimes has side effects. Another intervention to decrease depression on cancer patients is music therapy. Music therapy might avoid polypharmacy in cancer patients. The purpose of this study was to determine the effects of self-selected individual music therapy toward depression of cancer patients.

**Methods:** The method used in this study was the randomized control trial (RCT). Simple Random Sampling was assigned randomly by three researcher assistants to participants (N=70) of intervention and control group. The intervention used was self-selected individual music therapy (SeLIMuT). SeLIMuT was applied four times in 2 days with a duration of 15 minutes each session. Beck Depression Inventory (BDI) was employed for selection purposes. The data were analyzed using Mann-Whitney with  $p < 0.05$  and 95% CI. The effectiveness of therapy was analyzed by the effect size test using  $abs\ r$ .

**Results:** Based on the result of the bivariate analysis, there was an effect of giving self-selected individual music therapy to reduce depression with depression gap in both groups with  $p$ -value of 0.001 ( $p < 0.05$ ). The value of the effect test obtained  $abs\ r = 0.82$  ( $r > 0.5$ ). At the end, the self-selected individual music therapy had moderate effect toward depression of cancer patients.

**Conclusions:** Music therapy is safe, inexpensive, and easy to use, for and by patients. The nurse can safely recommend any of these interventions for depression on cancer patients. Specific selections or types of music may have different effects on different patients and may provide different effects at different time, so the use of self-selected individual music therapy is recommended.

## INTRODUCTION

Cancer incidence in the world increases from 12.7 million to 14.1 million cases from 2008 to 2012. World Health Organization (WHO) mentioned two-thirds of new cancer-related cases are always in countries with low-to-middle social economies [1]. Cancer is a life-threatening disease as the condition of prognosis often worsens [2]. This disease has a serious impact on the quality of life of a person. The patients often experiences physical, psychosocial, spiritual and other problems [3]. Psychosocial issues consist of anxiety, fear of undergoing treatment, relapse, and depression [4–5].

Severe depression is estimated to occur in 16% to 25% of cancer patients [6]. The study result of Effendy et al. [3] in 2014 showed that 34.4% of cancer patients in Indonesia

were depressed. The increase of depression is in accordance with the occurrence of disability and widespread stage of cancer [3–7]. Depression improved patient perception towards pain, reducing drug efficacy and longer length of stay in the hospital and encouraging suicide [8].

Observing the adverse effects of depression on the prognosis of disease, the depression management is important in preparation of intervention for cancer patients [9–10]. Sometimes drug treatment has a side effects on cancer patients [11]. The use of Complementary and Alternative Medicine (CAM) in the treatment of cancer patients has increased lately. Globally, over 80% of cancer patients have used some types of CAM therapies [10–12].

Music therapy can indeed exert a positive effect of psychological support like depression, whereas no

adverse effects of music therapy have been reported so far [13]. The use of music therapy on depression of cancer patients might avoid the polypharmacy [11]. Music therapy is one form of CAM that can be used to overcome depression in cancer patients [9–14]. It has the advantage to be applied in a simple therapy and cost-effective because the price is affordable and the therapy is non-invasive, does not require a therapist and does not cause side effects [15].

Music therapy will be more effective if the individual chooses his own preferred type of music [16–17]. Self-selected individual music therapy is the planned use of music to achieve therapeutic outcomes combined with deep breath and the kind of song is chosen by the patient. This study aimed to evaluate the effect of self-selected individual music therapy toward depression of cancer patients. The reasons above, make the researcher use the self-selected music therapy as a complementary therapy for cancer patients in overcoming depression.

## METHODS

### Design

This study utilized a randomized controlled trial study. Music therapy sessions took place in participants' rooms on the oncology unit after completing a pre-test. Data collection was conducted in inpatient unit I of Dr. Sardjito Hospital in Yogyakarta and Bougenville-Teratai unit of Prof. Dr. Margono Soekarjo Hospital in Purwokerto, Central Java, Indonesia. Data collection occurred from March until May 2017. The patients were recruited if they complied with inclusion criteria, agreed to be the participant, and had signed the informed consent. The intervention group was given self-selected individual music therapy (SeLIMuT) after measurement of depression on pre-test while the control group was given the treatment after the study had been complete (after finishing the post-test).

### Research Participant

Sampling was done by non-probability sampling with purposive sampling technique. Inclusion criteria for this study were patients diagnosed with cancer, depressed ( $BDI > 9$ ), who like music and did not experience hearing loss. Exclusion criteria were patients in emergency, listening music more than 20 minutes every day, using anxiolytic drugs (such as thiopentyl and flumazenil) and antidepressants. The number of samples was 70 respondents.

The screening process was conducted to determine the respondents who met the criteria and a simple randomization process was done to determine the respondents into either the intervention or control

group. Simple random sampling was assigned by anonymizing participants and using a random number table to distribute participants into either group: intervention group ( $n = 35$ ) and control group ( $n = 35$ ). This study used single-blind. The subjects were not informed about the allocation. Subjects in the intervention group had access to this information.

### Instruments

The instrument used in the study was Beck Depression Inventory (BDI) to measure the level of depression experienced by cancer patients [18]. Beck Depression Inventory is a self-rating assessment and was used to evaluate the intensity of depressive symptoms based on the patient's perception. Depression assessment of 0 to 9 indicates normal, 10 to 15 mild depression, 16 to 23 moderate depression, and 24 to 63 severe depression. It is considered significantly different if there is a difference in the average depression of 5 points between before and after intervention.

### Procedure

Self-selected individual music therapy was a procedure of providing music therapy with slow music criteria, stable tempo, soft dynamic, and consistent texture chosen according to the patient's preferences, combined with a deep breath. Intervention therapy was applied four times in 2 days with duration about 15 minutes each session and the patient could listen to music through MP3 Player and headphones. Self-selected individual music therapy was given to patients in both groups. For the control group, music therapy was given after the post-test had been performed.

The intervention was given in the afternoon to avoid interfering with the activities of the fixed procedure of treatment in the room, so the patient would feel more comfortable in doing music therapy. Before given music therapy, the author(s) checked the general state, vital signs and complaints of patients to avoid the side effects that might be caused by the music therapy like headaches and ears drooped.

To minimize the bias of this study, the author(s) made the data sample homogeneity with inclusion criteria. This study was approved by the Ethics Committee of the Medicine Faculty of Universitas Gadjah Mada with Ethical Clearance number of REF: KE/FK/0150/EC/2017.

### Statistical Analysis

The characteristics of demography data were categorical by the homogeneity test with Chi-Square or Fisher Exact. The mean differences of the depression

rates between the pre- and post-intervention of both groups (n = 35 on each group) were tested for normality with Shapiro-Wilk test and the results were not normally distributed, so the data were analyzed using Mann-Whitney with  $p < 0.05$  and 95% CI. The effectiveness of the therapy was performed by the effect size test using abs r.

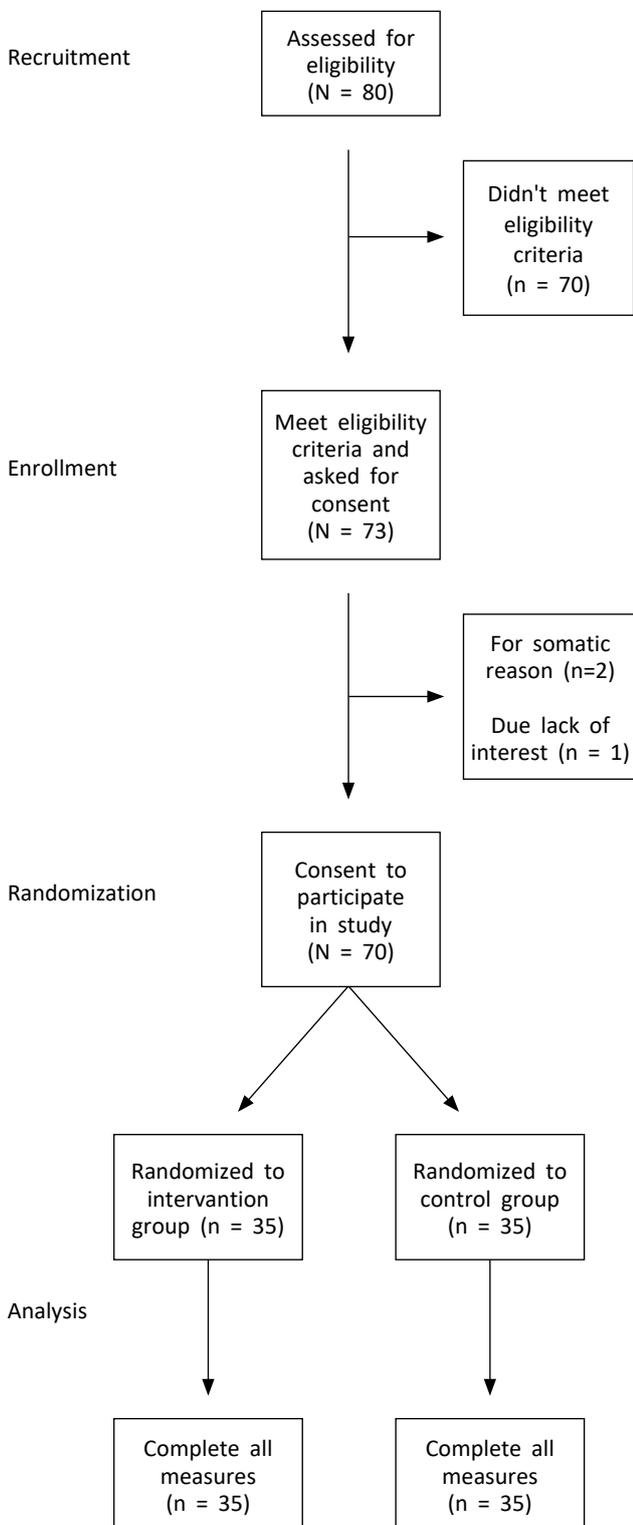


Figure 1. Assessment for eligibility criteria

## RESULTS

The demographic data of the respondents were divided to demographics and health condition of the respondents. Both intervention groups were compared with the control group (Table 1). The homogeneity of the demographic data in both groups showed that there was no significant difference. This means that the characteristics of the respondents of both groups are homogeneous or the same.

Table 1. Demographic characteristics (n=70).

Characteristics	Group	
	Intervention (n = 35)	Control (n = 35)
	f (%)	f (%)
Gender/Sex		
Female	26 (74.3)	25 (71.4)
Male	9 (25.7)	10 (28.6)
Age		
Early adulthood (20–40 years)	5 (14.3)	7 (20.0)
Mature adults (> 40–60 years)	26 (74.3)	25 (71.4)
The final adult (> 60 years)	4 (11.4)	3 (8.6)
Education level		
Elementary school	24 (68.6)	19 (54.3)
Junior high school	5 (14.3)	8 (22.9)
Senior high School	4 (11.4)	4 (11.4)
Diploma	0 (0)	3 (8.6)
Bachelor	2 (5.7)	1 (2.9)
Marital status		
Married	29 (82.8)	34 (87.1)
Widow	6 (17.2)	1 (2.9)
Work		
Housewife	11 (31.4)	12 (34.3)
Entrepreneur	5 (14.3)	10 (28.6)
Civil servant	4 (11.4)	7 (20.0)
Private	2 (5.7)	0 (0.0)
Farmers	13 (37.3)	6 (17.1)

According to Table 2, the homogeneity of the health condition data in both groups showed that there was no significant difference. This means that the characteristics of the health condition respondents of both groups are homogeneous or the same.

**Table 2.** Health condition (n=70)

Characteristics	Group	
	Intervention (n = 35)	Control (n = 35)
	f (%)	f (%)
<b>Cancer types</b>		
Breast	12 (34.2)	10 (28.6)
Rectum	7 (20.0)	2 (5.7)
Cervix	6 (17.1)	3 (8.6)
Ovary	3 (8.6)	3 (8.6)
Colon	2 (5.8)	4 (11.4)
Colli/Tiroid	1 (2.9)	3 (8.6)
Other (femur, pedis testis, lung, nasopharynx, mandible)	4 (11.4)	10 (28.6)
<b>Duration of illness</b>		
< 2 year	22 (62.8)	24 (68.6)
2–5 year	10 (28.6)	8 (22.9)
> 5 year	3 (8.6)	3 (8.6)
<b>Type of therapy</b>		
No treatment	2 (5.7)	2 (5.7)
Surgery	7 (20.0)	11 (31.4)
Chemotherapy	3 (8.6)	2 (5.7)
Radiotherapy	2 (5.7)	0 (0.0)
Surgery & Chemotherapy	16 (45.7)	19 (54.3)
Surgery & Radiotherapy	0 (0.0)	1 (2.9)
Surgery, Chemotherapy, & Radiotherapy	5 (14.3)	0 (0.0)
<b>Comorbid disease</b>		
No comorbid disease	27 (77.1)	26 (74.3)
Anemia	3 (8.6)	3 (8.6)
DM	2 (5.7)	2 (5.7)
Asthma	2 (5.7)	2 (5.7)
Hypertension	0 (0.0)	2 (5.7)
Hepatitis	1 (2.9)	0 (0.0)
<b>Smoking</b>		
Yes	7 (20.0%)	8 (22.9)
No	28 (80.0%)	27 (77.1)
<b>Alcohol consumption</b>		
Yes	1 (2.9)	0 (0.0)
No	34 (97.1)	35 (100)

The depression conditions of the respondents in this study can be known from the results of BDI. Based on the results of BDI's first measurements in both groups (n=70), the majority of respondents answered that they postpone making decisions (45.7%), they felt that they might be punished (50%), they felt sad (64.3%), they felt they could not enjoy everything as usual (57.1%), they cried more than usual (57.1%), they were more easily irritated or angry (57.1%), they were awakened two to three hours early and they had difficulty sleeping back (48.6%), their appetites were not as big as usual (47.1%) and they were anxious about their physical health such as pain (54.3%).

The depression condition in the intervention group changed after SeLIMuT. Based on the results of BDI's last measurements in the intervention group (n=35), the majority of respondents answered that their making decisions was better than before (51.4%), they did not feel that they were being punished (34.3%), they did not feel sad (48.6%), they felt satisfied with everything (51.4%), they did not cry more than usual (60%), they did not feel more irritated than before (82.9%), they could sleep soundly (28.6%), their appetites were as usual (28.6%), and they did not worry about their health beyond the usual (42.9%). The depression condition in the last measurements on the control group (n=35) had the same result compared with the first measurements.

According to **Table 3**, the mean difference in the pre-post depression rates of the intervention group (n=35) result in p-value 0.001 ( $p < 0.05$ ) showed significant depression difference before and after SeLIMuT in intervention groups. While in the control group (n=35), result in p-value 0.196 ( $p > 0.05$ ) showed no significant depression difference in the first and last measurements in the control group.

**Table 3.** Mean difference depression on each group (n=35)

Group	Difference value on each group			
	Med. (min-max)	Mean Rank	p-value	95% CI
Intervention (n = 35)			0.001 <sup>c</sup>	
Pre-test	20.0 (13.0-34.0)	00.0		20.1-23.9
Post-test	13.0 (2.0-23.0)	18.0		11.4-14.6
Control (n = 35)			0.196 <sup>d</sup>	
Pre-test	17.0 (10.0-4.0)	16.1		16.4-21.8
Post-test	16.0 (11.0-5.0)	11.2		17.2-22.7

\* significant ( $p < 0.050$ ), d analysis using Wilcoxon

**Table 4.** Mean difference of depression on two groups (n=70)

Groups	Difference value on both groups						
	Med. (min-max)	Mean Rank	p-value	U	Z	r	95% CI
Intervention (n = 35)	8.0 (3.0 -31.0)	18.0	0.001* <sup>d</sup>	28.0	-6.8	0.8 <sup>e</sup>	7.2 -10.7
Control (n = 35)	0.0 (-13.0 -9.0)	52.0					

\*significant ( $p < 0.05$ ), d analysis using Mann-Whitney, e analysis ES using abs r

According to **Table 4**, the pre-post depression gap in both groups obtained p-value 0.001 ( $p < 0.05$ ) which means there is a significant effect of giving self-selected individual music therapy to reduce depression. The effect test obtained abs r = 0.82 ( $r > 0.5$ ) indicating that music therapy has a severe effect on depression decrease.

## DISCUSSION

Based on the results of the screening, it was shown that all cancer patients who were treated in oncology unit suffered from depression. The results showed that SeLiMuT had an effect on depression both statistically and clinically. Significant effect of self-selected individual music therapy administration on depression reduction can be seen in **Table 4**, which obtained value difference between pre- and post-depression in both groups with a p-value of 0.001 ( $p < 0.05$ ).

Self-selected individual music therapy has a moderate effect on reducing depression in cancer patients. The effect test resulted in absolute r test (abs r) of 0.82 ( $r > 0.5$ ). The result of this effect size is higher than the study of Romito et al. [19] which got the result of  $d = 0.52$ . This suggests that music has a moderate effect on decreasing depression. Different effect sizes in this study may be due to music administration duration, wherein Romito et al. [19] study music therapy was given only once (single session) when the patients were undergoing chemotherapy.

The positive impact of self-selected individual music therapy to decrease depression in this study can be explained by the fact that self-selected individual music therapy can reduce stress, improve mood, overcome changes in motor function and behavior, and increase relaxation.

Stress is associated with the incidence of depression and will result in dysregulation of the Hypothalamic Pituitary Adrenal (HPA) Axis that causes changes in serotonin metabolism and negatively affects cognitive control in the frontal lobes of the brain, causing damage to the hippocampus and decreased dopaminergic function [20–21]. The stress caused a decrease in cognitive abilities, difficulty in concentrating, decision

making, getting easily confused, impaired memory, feeling of guilt or regret and lack of self-esteem [22–23]. Stress can be observed from the result of BDI of the respondents of both groups in the last measurement showing that the respondents postponed making decisions and felt that they might be harvested.

Stress is related to patients' condition during hospitalization. They said that the stress was caused by their illness and the feeling of boredom due to monotonous activities such as being examined by healthcare personnel, taking medication, eating diet foods from the hospital, and resting on the bed. The state of stress in cancer patients is associated with the incidence of depression [24]. Stress conditions due to undergoing treatment will make cancer patients think of the perceived depression more acutely [25].

In the intervention group of respondents, after being given self-selected individual music therapy, the majority answered that they made decision better than before and did not feel punished. The phenomenon can be explained by the fact that music has a component of tone and rhythm that can give a psychological effect on the listener [26–27]. Electromagnetic wave-shaped sound stimulation from music therapy will vibrate the eardrum and pass to the central nervous system precisely on the limbic system that functions as neurophysiology associated with feelings, memory, sensation, and motivation [28–29]. This result is similar to Jia et al. [10] that music intervention can improve the emotion of cancer patients during disease progression.

Based on the result of BDI response of the initial measurement in both groups, the majority of respondents answered that they were feeling sad, could not enjoy everything as usual, cried more than usual, and were more easily annoyed or angry. According to Nevid et al. [22], one of the common characteristics of depression is a change in mood conditions of feeling down, sad or cheap, crying more frequently and increased irritability. The symptoms of depression are included in affective manifestations [18].

Self-selected individual music therapy is able to decrease the symptoms of depression that include those

affective manifestations. Based on the result of the last BDI measurement in the intervention group showing that the majority of respondents said that they did not feel sad, felt satisfied on everything, did not cry more often than usual and did not feel more easily irritated than before. The change can be explained by the fact that once the music sound stimulates the limbic system, the music will call the memory or deep memories of the patients resulting in mood changes and can make a therapeutic effect by decreasing the depression in patients [30].

Besides, music can also cause effects of pleasure or euphoria for those who listen [31]. This effect is equivalent to consuming caffeine and alcohol [32–33]. The happy or cheerful feelings can reduce the levels of cortisol, epinephrine, and norepinephrine because the music that has entered the pituitary gland is able to respond to the emotion through negative feedback to the adrenal gland to suppress the release of the hormone [34]. The cheerful feeling was observed in the intervention group respondents who participated in singing some memorized lyrics, moving the toes and moving the wrists as the self-selected individual music therapy process progresses.

The last BDI measurements showed that the majority of respondents in both groups answered they woke up two to three hours earlier and were having difficulty to sleep again and the appetite was not as great as usual. The symptoms of depression are included in vegetative and physical manifestations [18].

In contrast to the non-intervention group, after getting self-selected individual music therapy, the majority of the intervention group respondents answered that they could sleep as soundly as usual and had normal appetite. The changes in the symptoms of depression indicated that music therapy is a unique application to enhance personal that may create positive changes in one's behavior [35]. Changes to those conditions can be explained by the fact that the sound waves issued by music could generate alpha waves [36]. Alpha waves are created in the cerebral cortex through a cortical relationship with the thalamus and are the result of spontaneous feedback of oscillations in the thalamocortical system causing an increase of serotonin, which is a neurotransmitter responsible for hunger and generating theta waves associated with mental activity, as well as delta waves associated with drowsiness [36–37]. It was observable in the intervention group because the respondents seemed to close their eyes because they were feeling comfortable, and some even fell asleep during the intervention.

The preliminary BDI measurement results showed that the majority of respondents in both groups were

feeling anxious about their physical health for having problems such as getting sicker and pain, stomachache, or constipation. Symptoms of such psychosomatic depression include the categories of vegetative and physical manifestations [18]. The pain will have an impact on anxiety and depression [38].

After obtaining self-selected individual music therapy, the majority of respondents in the intervention group did not worry about their health beyond the usual. It is supported by another study conducted by Romito et al. [19] that mentioned music therapy could reduce psychological discomfort like anxiety.

Self-selected individual music therapy mechanism in enhancing relaxation can be explained by the fact that the stimulus of music will form a perfect alpha wave and stimulate the release of the neurotransmitter serotonin which will be converted into melatonin and provides a relaxing effect that can reduce depression [11,28,36,37]. This audio stimulus also affects the pituitary in the brain to produce endorphins that can reduce feelings of anxiety [39].

The limitation of this study is that the stage of cancer was not examined because it was not recorded in the medical record and the authors did not check the surgical oncologist because of the limited time. However, the study has looked at the general condition of the cancer patients prior to music therapy, both in the intervention and control groups.

## CONCLUSIONS

Music therapy is safe, inexpensive, and easy to use, for and by patients. The nurse can safely recommend any of these interventions for depression on cancer patients. Specific selections or types of music may have different effects on different patients and may provide different effects at different time, so the use of self-selected individual music therapy is recommended.

## DECLARATIONS

### Competing of Interest

There is no conflict of interest in this study.

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## Appendix

Beck's Depression Inventory.

### Beck's Depression Inventory

This depression inventory can be self-scored. The scoring scale is at the end of the questionnaire.

1.
  - 0 I do not feel sad.
  - 1 I feel sad
  - 2 I am sad all the time and I can't snap out of it.
  - 3 I am so sad and unhappy that I can't stand it.
2.
  - 0 I am not particularly discouraged about the future.
  - 1 I feel discouraged about the future.
  - 2 I feel I have nothing to look forward to.
  - 3 I feel the future is hopeless and that things cannot improve.
3.
  - 0 I do not feel like a failure.
  - 1 I feel I have failed more than the average person.
  - 2 As I look back on my life, all I can see is a lot of failures.
  - 3 I feel I am a complete failure as a person.
4.
  - 0 I get as much satisfaction out of things as I used to.
  - 1 I don't enjoy things the way I used to.
  - 2 I don't get real satisfaction out of anything anymore.
  - 3 I am dissatisfied or bored with everything.
5.
  - 0 I don't feel particularly guilty
  - 1 I feel guilty a good part of the time.
  - 2 I feel quite guilty most of the time.
  - 3 I feel guilty all of the time.
6.
  - 0 I don't feel I am being punished.
  - 1 I feel I may be punished.
  - 2 I expect to be punished.
  - 3 I feel I am being punished.

- 7.
- 0 I don't feel disappointed in myself.
  - 1 I am disappointed in myself.
  - 2 I am disgusted with myself.
  - 3 I hate myself.
- 8.
- 0 I don't feel I am any worse than anybody else.
  - 1 I am critical of myself for my weaknesses or mistakes.
  - 2 I blame myself all the time for my faults.
  - 3 I blame myself for everything bad that happens.
- 9.
- 0 I don't have any thoughts of killing myself.
  - 1 I have thoughts of killing myself, but I would not carry them out.
  - 2 I would like to kill myself.
  - 3 I would kill myself if I had the chance.
- 10.
- 0 I don't cry any more than usual.
  - 1 I cry more now than I used to.
  - 2 I cry all the time now.
  - 3 I used to be able to cry, but now I can't cry even though I want to.
- 11.
- 0 I am no more irritated by things than I ever was.
  - 1 I am slightly more irritated now than usual.
  - 2 I am quite annoyed or irritated a good deal of the time.
  - 3 I feel irritated all the time.
- 12.
- 0 I have not lost interest in other people.
  - 1 I am less interested in other people than I used to be.
  - 2 I have lost most of my interest in other people.
  - 3 I have lost all of my interest in other people.
- 13.
- 0 I make decisions about as well as I ever could.
  - 1 I put off making decisions more than I used to.
  - 2 I have greater difficulty in making decisions more than I used to.
  - 3 I can't make decisions at all anymore.
- 14.
- 0 I don't feel that I look any worse than I used to.
  - 1 I am worried that I am looking old or unattractive.
  - 2 I feel there are permanent changes in my appearance that make me look unattractive
  - 3 I believe that I look ugly.
- 15.
- 0 I can work about as well as before.
  - 1 It takes an extra effort to get started at doing something.
  - 2 I have to push myself very hard to do anything.
  - 3 I can't do any work at all.

- 16.
- 0 I can sleep as well as usual.
  - 1 I don't sleep as well as I used to.
  - 2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.
  - 3 I wake up several hours earlier than I used to and cannot get back to sleep.
- 17.
- 0 I don't get more tired than usual.
  - 1 I get tired more easily than I used to.
  - 2 I get tired from doing almost anything.
  - 3 I am too tired to do anything.
- 18.
- 0 My appetite is no worse than usual.
  - 1 My appetite is not as good as it used to be.
  - 2 My appetite is much worse now.
  - 3 I have no appetite at all anymore.
- 19.
- 0 I haven't lost much weight, if any, lately.
  - 1 I have lost more than five pounds.
  - 2 I have lost more than ten pounds.
  - 3 I have lost more than fifteen pounds.
- 20.
- 0 I am no more worried about my health than usual.
  - 1 I am worried about physical problems like aches, pains, upset stomach, or constipation.
  - 2 I am very worried about physical problems and it's hard to think of much else.
  - 3 I am so worried about my physical problems that I cannot think of anything else.
- 21.
- 0 I have not noticed any recent change in my interest in sex.
  - 1 I am less interested in sex than I used to be.
  - 2 I have almost no interest in sex.
  - 3 I have lost interest in sex completely.

## INTERPRETING THE BECK DEPRESSION INVENTORY

Now that you have completed the questionnaire, add up the score for each of the twenty-one questions by counting the number to the right of each question you marked. The highest possible total for the whole test would be sixty-three. This would mean you circled number three on all twenty-one questions. Since the lowest possible score for each question is zero, the lowest possible score for the test would be zero. This would mean you circles zero on each question. You can evaluate your depression according to the Table below.

Total Score \_\_\_\_\_ Levels of Depression

1-10 _____	These ups and downs are considered normal
11-16 _____	Mild mood disturbance
17-20 _____	Borderline clinical depression
21-30 _____	Moderate depression
31-40 _____	Severe depression
over 40 _____	Extreme depression