

Effects of the multimodal intervention program including animal-assisted therapy on depression and self-esteem among university students

Taeyoung Kil*

Department of Social Welfare, Faculty of Health and Welfare, Joongbu University, Geumsan 32713, Korea



Received: Oct 7, 2021
Revised: Oct 12, 2021
Accepted: Oct 12, 2021

*Corresponding author

Taeyoung Kil
Department of Social Welfare, Faculty of Health and Welfare, Joongbu University, Geumsan 32713, Korea.
Tel: +82-41-750-6706
E-mail: taeyoung@joongbu.ac.kr

Copyright © 2021 Korean Society of Animal Sciences and Technology. This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ORCID

Taeyoung Kil
<https://orcid.org/0000-0003-4143-449X>

Competing interests

No potential conflict of interest relevant to this article was reported.

Funding sources

This research was supported by the research fund of Joongbu University.

Acknowledgements

The author is deeply grateful to Prof. Min-kyu Kim, a member of the Laboratory of Animal Reproduction and Physiology of Chungnam National University who participated in this study.

Abstract

This study aimed to investigate the effects of the multimodal group intervention that combined animal-assisted therapy (AAT) and integrated play therapy (IPT) on depression and self-esteem in undergraduate university students. The subjects were 40 students attending animal-related and social welfare departments of universities located in a metropolitan city. The multimodal intervention program was conducted for eight sessions (twice a week, 60 min each) in the experimental group. Data analysis was conducted using the independent sample *t*-test, ANCOVA, and paired sample *t*-test for pre- and post-test. Therefore, the multimodal intervention program applying AAT and IPT showed positive effects on depression and self-esteem in university students. Based on these results, this study proposed the operation of multidisciplinary education and practical and policy utilization methods to reduce depression among university students and help improve their self-esteem.

Keywords: Multimodal intervention, Animal-assisted therapy, Depression, Self-esteem, University students

INTRODUCTION

The love and intimacy that individuals feel for pets or special animals gain them great satisfaction in their daily lives. In modern society, animals have become a key factor in human life; and animal-assisted therapy (AAT), which affects human cognitive ability, emotion, and social ability in addition to working tools, guardians, and companions, has become a general form of treatment [1]. Experts in various academic fields have been active in providing empirical evidence that they can treat human minds through unconditional love and endless commitment to animals [2]. AAT is designed to improve the physical, cognitive, emotional, and social functions of humans and is referred to as a destination-oriented intervention in which animals that meet certain standards become part of an integrated treatment process [3,4]. Integrated play therapy (IPT) combined with AAT is a single intervention program and a combination of the concept of play therapy. This study aimed to improve the quality of life by treating or preventing emotional maladjustment by allowing the trained therapist to experience

Availability of data and material

Upon reasonable request, the datasets of this study can be available from the corresponding author.

Authors' contributions

The article is prepared by a single author.

Ethics approval and consent to participate

This study does not require IRB/IACUC approval because it is performed during normal class and uses dogs owned by students.

self-reflection with the therapeutic force of play using tools [5]. Students have a conversation with themselves, which is a very personal experience through play, and they have the effect of obtaining various perceptions that are impossible through simple linguisticization because they focus on play activities in the treatment scene [6]. This play therapy is a direct treatment method that can intervene in emotional problems in a short and effective way, leading to new changes in clinical sites [7].

In the approach of non-drug therapy, the multimodal intervention, along with physical activities, cognitive rehabilitation, play and purposeful activities, recall therapy, recreation, music and art activities, and social interaction included in AAT and IPT, has a greater therapeutic effect than a single intervention method [8]. In the educational environment, multimodal interventions, such as AAT, animal mediation activities, animal mediation education, and visiting programs using various plays, are becoming more popular among college students. In particular, the multimodal intervention, including animal assisted for college students, has the advantage of maximizing the therapeutic experience and its effect by inducing positive emotions by interacting with animals, handlers, and play therapists to students who participated in the program [9].

Mental health, resilience, self-esteem, and welfare are major concerns of universities, which affect not only the performance of university students but also the new environment. They help students adapt and integrate, cope with various changes, and perform tests or tasks. The situation related to new academic needs, such as the ability to perform, causes considerable stress and damages the mental health of university students. The self-esteem of college students indicates a favorable or unfavorable attitude toward themselves [10]. Depression was accompanied by negative results of stress experienced during the 15 weeks of the semester, and the continuity and expansion of depression experienced by individuals was reported to be associated with low levels of self-esteem [11]. Therefore, intervention strategies for university education for students with low levels of depression and self-esteem are becoming very important.

The representative non-drug therapy methods in the multimodal intervention include physical activity, cognitive training, and social interaction [12], and previous studies have been conducted on these three activities. In this study, physical activities in AAT and IPT applied as a multimodal intervention are planned and purposeful activities aimed at physical health promotion and are related to the overall improvement of function related to depression and self-esteem [13]. Cognitive training includes training with the guide of the mediator in standardized tasks designed to reflect specific cognitive functions. Cognitive training can change the function of the brain at the level of molecules, synapses, and neural connections, and the changed function of life has a positive effect on self-esteem [14]. Social interaction activities were reported to be effective for participants in the multimodal intervention program by alleviating stress and preventing depression [15].

In a study by Lim et al. [16], who applied each single intervention program among the multimodal intervention programs, it was verified that AAT was effective in reducing depression among middle school students. In a study by Song et al. [17], AAT was reported to have a therapeutic effect on depression in children of female victims of domestic violence. In a study by Kil [6], it was found that IPT continuously reduces depression in elderly people living alone in urban and rural areas. Furthermore, the IPT program effectively reduces depression in elderly people with disabilities, and its effect continues [18]. In addition, as a result of the verification of the effectiveness of the multimodal intervention program, Lee et al. [19] provided physical activities, cognitive training, and social interaction activities at the same time, revealing that it has a positive effect on depression in the elderly with dementia [19].

As reviewed in previous studies, the multimodal intervention, including physical activity, cognitive training, and social interaction activities, has a positive effect on depression and self-esteem that affect the quality of life of the participants. The multimodal interventions of two or

more combined interventions have more positive effects [19]. However, few studies have applied three group intervention programs to college students at the same time to verify the effects on depression and self-esteem. Therefore, this study aimed to investigate the effects of the multimodal intervention program, which simultaneously applied three intervention methods of physical activity, cognitive training, and social interaction activities included in AAT and IPT on depression and self-esteem in university students.

MATERIALS AND METHODS

Research participants

This study randomly selected students attending animal-related and social welfare departments of universities located in a metropolitan city. To motivate the participants, the purpose, criteria, and contents of the group intervention program were introduced. The subjects were college students who were willing to participate actively in the program and had no experience in participating in group interventions. The participants were informed that the study could be stopped at any time considering its ethical aspect and that the contents of the questionnaire were confidential. A signed written consent form was collected from participants. The participants were divided into two groups, the experimental and control groups. Forty individuals were recruited from the related class in the semester. The sociodemographic characteristics of the experimental and control groups are presented in Table 1.

Experimental design

This study was conducted to compare the effects of group intervention, including AAT and IPT, on depression and self-esteem in the experimental and control groups. After the intervention, a post-test was conducted to compare the differences between the two groups. As suggested in Table 2, the pre-test was conducted on the day of the intervention, and the post-test was conducted at the time of the intervention termination. The group intervention program was applied to the experimental group for eight sessions, and the study period was eight weeks (from March to April 2020 when the COVID-19 pandemic started), and the group intervention was applied for 60 min each week. The

Table 1. Basic properties comparison between intervention and control groups

Variable	Multimodal intervention group (n=20)	Control group (n=20)
Age	Average age of 22.7	Average age of 22.9
Sex		
Male	8 (40.0)	7 (35.0)
Female	12 (60.0)	13 (65.0)
Religion		
Yes	11 (55.0)	10 (50.0)
No	9 (45.0)	10 (50.0)
Residential type		
With parents	8 (40.0)	9 (45.0)
Self-boarding	12 (60.0)	11 (55.0)
Family relationship		
Very good	5 (25.0)	6 (30.0)
Good	10 (50.0)	11 (55.0)
Normal	5 (25.0)	3 (15.0)

Values are presented as number (%).

Table 2. Effective verification model of the multimodal intervention program

Group	Pre-test	Intervention	Post-test
Experimental group	O ₁	X ¹⁾	O ₂
Control group	O ₃	-	O ₄

¹⁾Multimodal interventional program.

Pre-test, day of intervention (O₁, O₃); Post-test, end of intervention (O₂, O₄).

study was conducted by two graduate students from related departments under the guidance of a professor of social welfare and a professor of veterinary medicine.

The therapy dogs that participated in this study were two Pomeranian dogs, a poodle, and two mixed dogs aged three years or older, who were vaccinated and administered. The therapy dogs were able to take proper rest with the help of pet partners so that they would not be exposed to stress caused by their participation in the program. The vaccinated therapy dogs selected a shoulder that was fully trained by experts in preparation for unexpected situations. In addition, various dogs were trained with various breeds, gender, and characteristics, and as the number of activities increased by placing strong affinity and obedience, they were considered to endure stress against strangers.

Measurement tools

Depression

The Beck Depression Inventory (BDI) was used to measure depression [20,21]. The BDI is a 4-point Likert scale that ranges from 0 to 3. It consists of 15 questions, the total score is 15 out of 15, and the cut-off point is based on four points. The higher the score, the higher the degree of depression. In this study, Cronbach's α for depression was 0.89.

Self-esteem

Self-esteem is an evaluation of one's self-concept, which is based on one's overall evaluation of themselves, as individuals accept themselves positively and perceive themselves as valuable human beings.

This method was developed by Rogenberg [10] and translated by Jon [22]. One of the biggest advantages of this scale is that it has been used for a long time in a wide group and has been proven to have predictive and constructive validity. The scale used in this study consists of 10 questions, five of which were positive and five were negative. For positive questions, the score was measured on a 5-point Likert scale (1= not at all, 5=very yes), and negative questions were scored by reverse coding. The score ranged from 0 to 40, which means that the higher the score, the higher the self-esteem. In this study, Cronbach's α for self-esteem was 0.92.

Multimodal intervention program

On previous studies on the multimodal intervention program

In this study, the group intervention program used AAT and IPT programs. First, the history of the AAT program was reported as the first case in 1972 when William Tuke applied a farm animal breeding program to prisoners with mental illness in York camps in England. Dogs, a representative companion animal among therapeutic animals, play a role in healing and healing to help those who have physical, mental, and emotional difficulties [23]. Bossard [24] published the therapeutic effects of pets in 1944, and Levinson published a study titled 'The Dog as a Co-Therapist' in 1962, introducing a new concept called pet-therapy, a human/companion animal therapy [25]. This started the use of the term animal-assisted therapy, which has been developed as a method of education or treatment of patients using animal media for the past 40 years [23].

AAT is defined as a professional activity that helps clients heal or rehabilitate various symptoms and diseases using a combination of humans and animals as a goal-oriented non-drug treatment method [26]. In this study, the animals used in the intervention activities were used as catalysts by experts skilled in dogs. The specific catalyst role can improve the self-esteem and confidence of the subjects through activities dealing with animals as a part of the dodge or treatment session and can reduce stress and induce tension relaxation through passive interaction [27].

The IPT applied to the multimodal intervention with AAT for the therapeutic effect of depression and self-esteem in university students was effective in preventing psychological and emotional problems when providing optimal emotional support through the interaction that applied systematic intervention of trained play therapist and therapeutic power of play, which started in 1942 [8,18]. IPT is an effective clinical approach in that individuals can enjoy the vitality and pleasure of life through the reconstruction of activities and activities that integrate individual areas such as cognitive games, music, linguistic literature, physical activities, artwork, traditional play, and everyday life. Depression is the most commonly used variable in counseling and treatment using play [28], and depression caused by continuous stress in college students because of COVID-19 produces physical, mental, and behavioral symptoms and onset of psychological pain [29].

As in the previous study, the multimodal intervention of AAT using dogs and play therapy that integrates individual areas provides physical activity, cognitive training, and social interaction activities at the same time, which has a positive effect on depression and self-esteem in university students. It is expected that the multimodal intervention method, which includes seven individual areas in AAT, has a more positive effect. However, there is a lack of studies on the effects of the three intervention methods of physical activity, cognitive training, and social interaction emphasized in multimodal intervention studies.

Multimodal intervention program (IPT-AAT)

IPT is an effective intervention tool for sustaining interest and short-term participation within clinical practices, and it is an experience-centered integrated approach that maximizes the effects of intervention using psychological and emotional assistance, aside from the everyday care and independence of the elderly by integrating individual play activities, such as cognitive games, music, language, literature, physical activities, art, traditional games, and everyday life [18].

AAT is a physical interaction with treatment-assistance dogs; this is an intervention in the environment of the elderly to assess physical, emotional, and social rehabilitation effects. It is a prevention approach program that evaluates professional treatment effects [30].

Thus, this study is the first interdisciplinary study in Korea on group integrated intervention of AAT and IPT that aims to identify the effects of the group integrated intervention program by considering areas of cognitive, physical, emotional, and social interaction activities on the cognitive functions and depression in university students, which was achieved by providing various intervention methods, verifying the effectiveness, and suggesting effective educational programs.

Each session comprised a single intervention program combined with cognitive, physical, emotional, and social interaction activities. The content of the program is listed in Table 3.

Table 3. Contents of the multimodal intervention program

Stage (Session)	Goal	Multimodal intervention activity and integration principles by session	
		Session	Activities
Initial (1-2)	Lapo formation	1	<ul style="list-style-type: none"> • Making the name tag / introduce me and know friend's name (IPT-social interaction activity) • Introduction of the therapy assisted dogs/ singing about dogs (AAT-emotional activity)
	Ice-Breaking to form intimacy and trust between group members, play therapists and therapy dogs	2	<ul style="list-style-type: none"> • Watching the applied video of the therapy dogs (AAT-cognitive activity) • Coloring a printed dog picture (IPT-emotional activity) • Description and feeling sharing of the therapy dogs (AAT-cognitive activity)
Middle (3-6)	The Approaching Activities of multimodal intervention <ul style="list-style-type: none"> • Cognitive activity • Physical activity • Emotional activity • Social interaction activity 	3	<ul style="list-style-type: none"> • To greet a therapy dogs and skin ship (AAT-emotional activity) • Making maracas and playing / My dog (IPT-physical activity) • Introducing how to touch and playing with therapy dogs (AAT-social Interaction activity)
		4	<ul style="list-style-type: none"> • Legs subtract game and chair gymnastics (IPT-physical activity) • Remembering therapy dogs (AAT-cognitive activity) • Learning how to brush and massage a therapy dog (AAT-social interaction activity)
		5	<ul style="list-style-type: none"> • Hands-on play (IPT-physical activity) • Sharing praise and goodness (IPT-social interaction activity) • Music appreciating with a therapy dogs / Flower Waltz (AAT-social interaction activity)
		6	<ul style="list-style-type: none"> • My proud hand (IPT-physical activity) • Making a snack for therapy dogs (AAT-emotional activity) • Walking with the therapy dogs (AAT-social interaction activity)
Final (7-8)	Activity and preparation for finishing the program Discussion and exchanged opinions about the program, sharing joyful experiences and precious memories, feedback and reviews	7	<ul style="list-style-type: none"> • Appreciation and reconstruction of poetry (IPT- cognitive activity) • Emotional Coordination with the therapy dogs (AAT-social interaction activity) • Making memory albums (IPT-emotional activity)
		8	<ul style="list-style-type: none"> • Thank you to the therapy dogs/Say goodbye and snack feeding (IPT-emotional activity) • Talking about participation in the program and closing

RESULTS

Measurement of depression levels before and after implementing the multimodal intervention program

The mean values and standard deviation of each group were analyzed to determine the effects of the multimodal intervention program on depression levels in elderly patients. Table 4 demonstrates that depression levels of the experimental group before and after implementing the program significantly decreases by 0.81 ± 0.06 and 0.57 ± 0.07 , respectively ($p < 0.05$).

Results of self-esteem scores before and after implementing the multimodal intervention program

The results of comparing self-esteem scores based on the scale by Jon [22] are as follows: The mean values and standard deviation of each group significantly increase to 3.48 ± 0.07 and 3.81 ± 0.05 , respectively ($p < 0.05$). The results are listed in Table 5.

Comparison of changes in depression and self-esteem before and after the multimodal intervention program

In the changes in pre-test and post-test scores of the experimental and control groups before and after the multimodal intervention program, the average changes in the pre-test and post-test scores

Table 4. Effects of the multimodal intervention program on depression in university students

Variables	Group (n=20, each group)	Pre-test (Mean ± SD)	Post-test (Mean ± SD)
Depression	Experiment	0.81 ± 0.06^a	0.57 ± 0.07^b
	Control	0.83 ± 0.05^a	0.81 ± 0.06^a

^{a,b}Within rows, values with different superscripts are significantly different ($p < 0.05$).

Table 5. Effects of the multimodal intervention program on self-esteem in university students

Variables	Group (n=20, each group)	Pre-test (Mean ± SD)	Post-test (Mean ± SD)
Self-esteem	Experiment	3.48 ± 0.07 ^a	3.81 ± 0.05 ^b
	Control	3.32 ± 0.06 ^a	3.41 ± 0.04 ^a

^{a,b}Within rows, values with different superscripts are significantly different ($p < 0.05$).

on depression and self-esteem levels of the experimental and control groups were statistically significant. The results are shown in Fig. 1.

DISCUSSION

In this study, the pre-post change in each variable was confirmed by a post-post comparison survey of the non-identical control group to verify the intervention effect of depression and self-esteem in university students using the multimodal intervention program. The major findings of this study are summarized as follows: First, the results of applying the regular multimodal intervention program to college students twice a week for 60 min for four weeks showed that depression was reduced after program implementation. These results were consistent with the study by Song et al. [17], who applied AAT to children of female victims of domestic violence, and the study by Im and Kim [16], who applied AAT to middle school students. Kil et al. [8] applied IPT to the elderly living alone in rural and rural areas, and the results of Kil's study [18] verified the mediating effect of the elderly with disabilities. In addition, it was consistent with Lee et al.'s study [19], which showed that physical activities, cognitive training, and social interaction activities provided at the same time showed positive effects on depression in the elderly with dementia. Therefore, the group-based intervention program, which integrates AAT and IPT programs, prevents or reduces depression among college students with medical diseases and psychological and social difficulties and is more effective in strengthening the vitality of life as it may use self-management programs through repetitive education.

Second, the application of the multimodal intervention program was found to be effective for improving self-esteem in university students. These results are consistent with the study by Kim and Kim [31] that applied AAT to middle-aged women, the study by Kang et al. [32], that applied AAT to low-income children in rural areas, and the study by Im and Kim [33] that investigated the

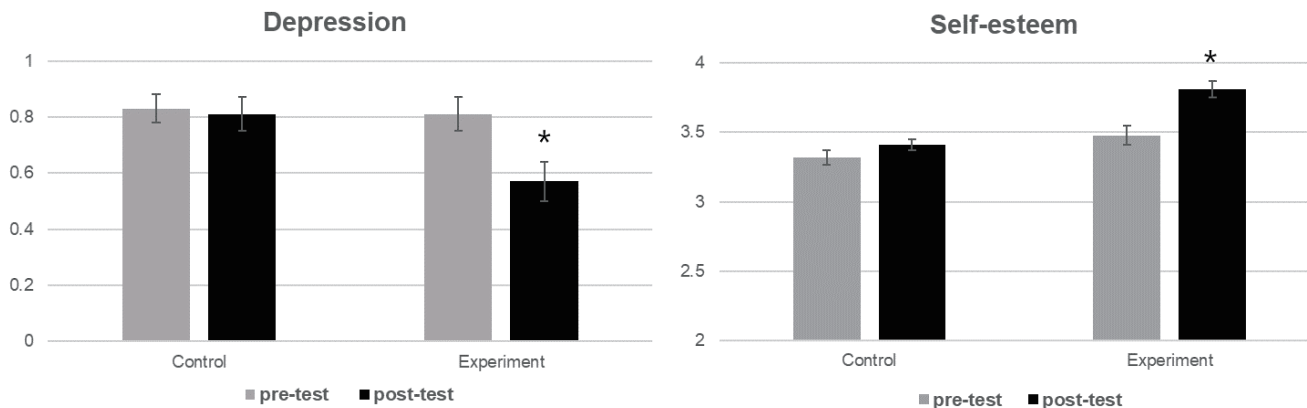


Fig. 1. Changes in depression and self-esteem before and after the application of the multimodal intervention program in university students.

effects on the improvement of self-esteem in middle school students with poor learning. The study by Kim et al. [34] verified the intervention effect on children. Therefore, the beginning and end of each session are the results of improving receptive attitude toward oneself through various activities, such as sharing greetings with the therapy dog, calling names, petting, snacking, and nonverbal strengthening; enhancing the sense of accomplishment by expressing one's feelings naturally; and evaluating oneself positively using IPT.

Based on the results of this study, the following are suggested for future studies: First, the multimodal intervention program, which was not covered in previous studies, was applied to university students majoring in animal-related and social welfare, and the intervention effect on their depression was verified in relation to mental health caused by the COVID-19 pandemic. However, the precise measurement of the effectiveness of the multimodal intervention has limitations, such as the limited area for experimental groups, gender ratio of the sample, and research condition. Therefore, it is necessary to apply this study to various college students in the future. Second, it is necessary to link the group intervention program to college students with various academic fields, such as pedagogy, health, and nursing, and it is necessary to verify its effectiveness by applying the mixed method in the research method. It is expected that it will continuously expand through the development of programs for university students.

REFERENCES

1. Berek DLM. Animal-assisted therapy (AAT). 2013 [cited 2021 Jul 20]. <http://login.libproxy>
2. Boe VRM. Effects of animal-assisted therapy on a student with an emotional/behavioral disorder. *J Am Acad Spec Educ Prof.* 2008;Winter:25-47.
3. Shin SJ, Jung SH. The effects of therapy dog-facilitated program on the improvement of social functioning for the schizophrenics. *Ment Health Soc Work.* 2000;10:85-112.
4. Shin J, Kang YK. Introduction of AAT (animal-assisted therapy) and implication of applying AAT in counseling. *J Spec Educ Rehabil Sci.* 2016;55:191-214. <https://doi.org/10.15870/jsers.2016.03.55.1.191>
5. O'Connor KJ. *The play therapy primer: an integration of theories and techniques.* New York: Wiley; 1991.
6. Kil TY. The effectiveness verification of integrated elderly play therapy for the older people living alone in a urban and rural complex area: focusing on the depression and interpersonal relationships. *Korean J Gerontol Soc Welf.* 2017;72:115-40. <https://doi.org/10.21194/kjg-sw.72.4.201712.115>
7. Solomon JC. Active play therapy. *Am J Orthopsychiatry.* 1938;8:479-98. <https://doi.apa.org/doi/10.1111/j.1939-0025.1938.tb06398.x>
8. Kil T, Kim H, Kim M. The effectiveness of group combined intervention using animal-assisted therapy and integrated elderly play therapy. *J Anim Sci Technol.* 2019;61:371-8. <https://doi.org/10.5187/jast.2019.61.6.371>
9. Daltry RM, Mehr KE. Therapy dogs on campus: recommendations for counseling center outreach. *J Coll Stud Psychother.* 2015;29:72-8. <https://doi.org/10.1080/87568225.2015.976100>
10. Rosenberg M. *Society and adolescent self-image.* Princeton, NJ: Princeton University Press; 1965.
11. Besser A, Zeigler-Hill V. Positive personality features and stress among first-year university students: implications for psychological distress, functional impairment, and self-esteem. *Self Identity.* 2014;13:24-44. <https://doi.org/10.1080/15298868.2012.736690>
12. Shin SJ, Lee JS, Kim SK, Jeon BJ. The effect of a group occupational therapy on cognitive func-

- tion and depression for mild dementia patients in a community. *J Korean Society Occup Ther.* 2013;21:45-60.
13. Bherer L, Erickson KI, Liu-Ambrose T. A review of the effects of physical activity and exercise on cognitive and brain functions in older adults. *J Aging Res.* 2013;2013:657508. <https://doi.org/10.1155/2013/657508>
 14. Woods B, Aguirre E, Spector AE, Orrell M. Cognitive stimulation to improve cognitive functioning in people with dementia. *Cochrane Database Syst Rev.* 2012;2:CD0055. <https://doi.org/10.1002/14651858.CD005562.pub2>
 15. Pitkala KH, Routasalo P, Kautiainen H, Sintonen H, Tilvis RS. Effects of socially stimulating group intervention on lonely, older people's cognition: a randomized, controlled trial. *Am J Geriatr Psychiatry.* 2011;19:654-63. <https://doi.org/10.1097/JGP.0b013e3181f7d8b0>
 16. Im EK, Kim OJ. Effects of animal-assisted intervention program on the sociability and depression of middle school students. *J Anim Assist Psychother.* 2016;5:53-65.
 17. Song Y, Kim JS, Cho JH, Park BK, Kim CH. The effects of animal-assisted therapy on aggression and depression of children of family violence women victims. *Korean J Play Ther.* 2011;14:93-105.
 18. Kil T. The effect of integrated play therapy with elderly program on self-expression and depression of the elderly with disabilities. *Korean J Gerontol Soc Welf.* 2017;74:9-28.
 19. Lee YJ, Lee JH, Kim YJ, Yang NY, Park JH. The effect of multimodal intervention on quality of life, depression, and cognitive function in elderly people with dementia: a pilot study. *J Korean Soc Occup Ther.* 2014;22:85-97. <https://doi.org/10.14519/jksot.2014.22.3.07>
 20. Metalsky GI, Joiner TE. Vulnerability to depressive symptomatology: a prospective test of the diathesis-stress and causal mediation components of the hopelessness theory of depression. *J Pers Soc Psychol.* 1992;63:667-75. <https://doi.org/10.1037/0022-3514.63.4.667>
 21. Yoon SM, Lee YH. Validation study of Korean version of the hopelessness depression symptom questionnaire; the subject of adolescents. *Korean J Clin Psychol.* 2004;23:1051-63.
 22. Jon BJ. Self-esteem: a test of its measurability. *Yonsei Nonchong.* 1974;11:107-29.
 23. Friesen L. Exploring animal-assisted programs with children in school and therapeutic contexts. *Early Child Educ J.* 2010;37:261-7. <https://doi.org/10.1007/s10643-009-0349-5>
 24. Bossard JHS. Family backgrounds of wartime adolescents. *Ann Am Acad Political Soc Sci.* 1944;236:33-42. <https://doi.org/10.1177%2F000271624423600106>
 25. Levinson BM. The dog as a "co-therapist". *Ment Hyg New York.* 1962;46:59-65.
 26. Fine AH. *Handbook on animal-assisted therapy: theoretical foundations and guidelines for practice.* San Diego, CA: Academic Press; 2000.
 27. Graham B. *Creature comfort: animals that heal.* Amherst, NY: Prometheus Books; 2000.
 28. Kim YK. The effect of group therapy on self-esteem and depression of the elderly in day care center. *Korean J Couns.* 2011;12:1527-44. <https://doi.org/10.15703/kjc.12.5.201110.1527>
 29. Kapitan L. Does art therapy work? Identifying the active ingredients of art therapy efficacy. *J Am Art Ther Assoc.* 2012;29:48-9. <https://doi.org/10.1080/07421656.2012.684292>
 30. Blender JA. *A multimodal investigation of the use of animal assisted therapy in a clinical interview [Ph.D. thesis dissertation].* Rochester, New York: University of Rochester; 2009.
 31. Kim SS, Kim OJ. Effects of animal assisted intervention on the self-esteem of mid-life woman. *J Anim Assist Psychother.* 2014;3:45-54.
 32. Kang WG, Jang SM, Kim, O. Study on animal-assisted therapy regarding self-esteem and sociality of children from low-income families in rural areas. *J Rural Soc.* 2018;28:193-217. <https://doi.org/10.31894/JRS.2018.06.28.1.193>
 33. Im EK, Kim OJ. The effects of animal assisted intervention on the self-esteem and sociality

- of underachieving middle school students. *Korean J Play Ther.* 2019;22:339-59. <https://doi.org/10.17641/KAPT.22.3.6>
34. Kim SY, Park SM, Park BJ. The effect of theraplay program on self-esteem and emotional maladjustment behaviors of children from single-parent family. *J Play Ther.* 2013;17:109-24.