Perceptions and Mental Health Effects of Therapeutic Farming across Age Groups: A Survey-based Study

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Abstract. **We aimed to derive data that can serve as the basis for designing customized therapeutic farming programs (TFPs) for different life stages by collecting information regarding the mental health status and perceptions of therapeutic farming (TF). We created a survey encompassing individual mental health conditions, general perceptions and participation, demand, and policy requirements regarding TF. By targeting children, adolescents, adults, and older adults in the metropolitan area of South Korea, we collected 505 surveys online and face-to-face. Children and adolescents had worse mental health management than adults and older adults. More than half of the respondents reported experiencing stress and depressive symptoms. Regarding perceptions of TF, compared with other age groups, older adults were more likely to believe in the mental health benefits of plants. Additionally, those with relatively lower stress, depression, and anxiety levels agreed on these benefits. The primary purposes and expected activities regarding TFP participation differed by age group. However, pets and small farm animals were the most preferred animals for TF across all age groups. When promoting TF, children and adolescents prioritized improved introduction and promotion, whereas adults and older adults prioritized improved accessibility. These data can help develop customized TFPs for different life stages as well as the general public.**

Mental illness is one of the most prevalent public health issues globally and leads to the deterioration of well-being (Rehm and Shield 2019). One of every eight people worldwide has at least one mental disorder, and the prevalence of mental illness is increasing by 13% each year (World Health Organization 2024). In South Korea, the lifetime prevalence of mental illness is 25.4%, with one of every four people experiencing alcohol or nicotine use disorders, anxiety, or depression (Ministry of Health and Welfare 2021). As mental health problems emerge globally, the health goals of the 21st century have expanded beyond increasing the life expectancy to include increasing the disability-free life expectancy (Robine 2006). In South Korea, the scope of mental health promotion projects has expanded from the social rehabilitation of patients with chronic mental illness to the early detection, treatment, and prevention of mental illness (Ministry of Health and Welfare 2021).

Therapeutic farming (TF), which promotes psychological, social, cognitive, and physical health through an integrated approach involving agriculture and social welfare, has recently gained attention (Park and Park 2024). Using agricultural materials and resources, TF encompasses all agricultural activities aimed at restoring mental and physical health (Rural Development Administration 2020). Depending on the type of activity, TF can be categorized as horticultural therapy, forest therapy, agricultural work therapy, or animal-assisted therapy (Rural Development Administration 2017). Additionally, TF positively impacts social health through interactions with and empathy toward others, plants, and animals as well as individual physical, psychological, and cognitive health (Bronfenbrenner 1979). Furthermore, TF leads to significant increases in emotional intelligence, resilience, and self-efficacy among children (Han and Yoo 2014; Lee et al. 2020; Oh et al. 2020), and it reduces stress levels and cortisol concentration (Lee et al. 2018). For adults, participation in TF on a care farm can reduce stress, depression, and anxiety (Park and Park 2024). Additionally, elements of nature (e.g., the scents of soil and herbs) can help regulate emotions such as stress, depression, and anxiety by stimulating the senses, lowering blood pressure, and transitioning brain activity to a state of relaxation (Choi et al. 2022; Kim et al. 2022a).

With such mental healing effects, TF is a promising industry that creates added social and economic values by providing healing programs mediated by animals and plants through agricultural activities and rural environments. In South Korea, the market size grew from 1.6 trillion Won in 2013 to 3.7 trillion Won in 2017 (23.3% per year) (Rural Development Administration 2022). The Netherlands has approximately 1100 care farms that offer therapeutic and recreational means for both the general public and individuals with school maladjustment, alcoholism, autism, dementia, stroke, and developmental disorders (Hassink et al. 2020). In South Korea, the Act on Research and Development and Promotion of Healing Agriculture was passed in Mar 2020, and domestic TF has been continuously growing (Choi et al. 2021). However, the systematic development of healing programs, improvement of service quality, data regarding public awareness and demand, and systematic reviews of the humanities of TF are still generally lacking (Kim et al. 2021; Kim et al. 2022b; Park et al. 2017).

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Because the incidence, timing of onset, and patterns of mental health problems vary by age group (Höglund et al. 2020; McGrath et al. 2023; Solmi et al. 2022), corresponding treatment methods and appropriate interventions should be tailored to the characteristics of each life stage (Jeon and Choi 2017). Therefore, to maximize the effectiveness of TF programs (TFPs) to enhance mental health, it is essential to design programs based on the understanding of the mental health status (MHS) as well as perceptions of TF according to the life stage. During this study, we conducted a survey to gather information about the individual MHS as well as general perceptions, demand, and policy requirements related to TF according to the life stage to derive data to tailor TFPs to different life stages.

Materials and methods

Research participants

We conducted a survey about MHS and perceptions of TF among the following four age groups: children (age, 8–13 years); adolescents (age, 14–19 years); adults (age, 20–64 years); and older adults (age, 65 years and older). From 19 Dec 2023 to 26 Mar 2024 (98 d), we administered the survey in Seoul and Gyeonggi Province (South Korea's metropolitan area), where we expected interest in and demand for TF to be high. Although it was feasible to conduct the survey using an online panel for adults and older adults, it was not possible to obtain samples of children and adolescents online; therefore, we performed face-to-face surveys of these age groups. The online panel for adults and older adults was conducted using a website that specializes in online surveys, and the face-to-face survey used for children and adolescents was conducted after contacting schools and children's centers and visiting them in person. During both online and face-to-face surveys, the participants were instructed to take a break and resume the survey at any time if they felt tired. We collected a total of 505 surveys—46 from children, 64 from adolescents, 206 from adults, and 189 from older adults—and used all of them for the analysis.

Adults and older adults who completed the online survey were given a small number of points by the online survey agency website, and children and teenagers who completed the face-to-face survey were given a 30-min gardening class involving mini succulents and flower pots. This study was approved by the Institutional Review Board of Konkuk University (7001355-202310-HR-715).

Survey composition

We developed a survey comprising 142 questions to investigate the MHS of individuals and their perceptions of TF according to their life stage. The survey contained 9 items about demographic information, 73 about MHS, 15 about perceptions and participation in TFPs, 41 about the demand for TFPs, and 4 about TF policy tasks.

The content regarding individual MHS consisted of the personal health status, level of mental healthcare, stress area, the Korean version of the Brief Encounter Psychosocial Instrument (which measures stress), the Korean version of the Patient Health Questionnaire-9 (which is used to monitor the severity of depression), and the Korean version of the Generalized Anxiety Disorder-7 scale. The content of perceptions and participation in TF comprised the evaluation of plant/animal contributions to mental health, awareness of TF, experience and purpose on plant/animal-mediated TF. Demand for TFPs was assessed as the expectation level for major activities through a plant/animal-mediated TFP, willingness to pay for TFP, preferred plants and animals when participating in plant/animal-mediated TFPs. The TF policy tasks asked about the prospects and task of revitalizing TF.

The Korean version of the Brief Encounter Psychosocial Instrument measured the level of stress by evaluating stressful experiences perceived by the respondent over the past month (Bae et al. 1992; Frank and Zyzanski 1988) and contained five questions, with each rated using a scale of 0 to 4 points to obtain the average total score. The higher the score, the greater the stress level: <1.8 points = low stress; 1.8 to 2.8 points = moderate stress; and ≥ 2.8 points = high stress. Cronbach's α (0.811) of this scale proved its reliability.

The Patient Health Questionnaire-9 measured the degree of depression by evaluating the participant's perceived depression over the past 2 weeks (Han et al. 2008; Spitzer et al. 1999) and contained nine questions, with each rated using a scale of 0 to 3 points based on the sum of the scores. The higher the score, the greater the level of depression: 0 to 4 points = not depressed; 5 to 9 points = mildly depressed; 10 to 19 points = moderately depressed; and 20 to 27 points = severely depressed. Cronbach's α was 0.84.

The Generalized Anxiety Disorder Scale-7 was used to screen for and diagnose generalized anxiety disorders by evaluating the experiences of anxiety perceived by the respondent over the past 2 weeks (Spitzer et al. 2006) and contains seven questions, with each rated using a scale of 0 to 3 points. The scores were summed afterward. The higher the score, the greater the level of anxiety: 0 to 4 points = no anxiety; 5 to 9 points = mild anxiety; 10 to 14 points = moderate anxiety; and 15 to 21 points = severe anxiety. Cronbach's α was 0.89.

During this study, we elicited "stated preferences" rather than "revealed preferences," meaning that participants reported their preferences in a hypothetical context rather than in actual decision-making situations. To mitigate the potential hypothetical bias, we presented realistic scenarios to reduce the risk of overestimating or underestimating preferences that may arise in survey-based research.

Statistical analysis

Descriptive statistics (mean, standard deviation, and percentage) for the demographic information and each survey item were calculated using Microsoft Excel (Office 2007; Microsoft Corp., Redmond, WA, USA). A one-way analysis of variance (ANOVA) using SPSS (version 25 for Windows; IBM Corp., Armonk, NY, USA) was performed to understand the differences in perceptions of TF according to the life stage and MHS. Duncan's post hoc test was used to determine the differences in means. All statistical analyses were conducted based on the significance level of $P < 0.05$.

Results and discussion

Demographic information

Regarding participants' general demographic traits, 40.8% were adults, 37.4% were older adults, 12.7% were adolescents, and 9.1% were children. Regarding gender, 42.2% were male

Table 1. Descriptive information of participants in this survey study.

Variable	N	%
Life stage		
Children	46	9.1
Adolescents	64	12.7
Adults	206	40.8
older adults	189	37.4
Gender		
Male	213	42.2
Female	292	57.8
Region		
Seoul	381	75.4
Gyeonggi Province	124	24.6
Own pets/plants?		
Have pets	44	8.7
Have animals	230	45.5
Have both	74	14.7
Neither	157	31.0
Occupation		
Office/administrative	150	29.7
Production/sales	32	6.3
Self-employed	21	4.2
Student	128	25.3
Housewife	98	19.4
Unemployed/other	76	15.0

and 57.8% were female. Additionally, 75.4% lived in Seoul and 24.6% lived in Gyeonggi Province. Regarding pets and plants, 8.7% had pets, 45.5% had plants, 31% had neither, and 14.7% had both. Regarding occupation, office/administrative was the most common (29.7%), followed by student (25.3%), housewife (19.4%), unemployed or other (15%), production/sales (6.3%), and self-employed (4.2%) (Table 1).

Mental health status

Individual mental health status. Regarding the individual MHS across life stages, 56.2% responded that they usually managed their mental health well, which could be considered as maintaining psychological well-being through practices such as self-care, emotional regulation, and seeking appropriate support when needed. However, 28.7% and 15% reported moderate and poor management, respectively. When examined across the life stages, adults and older adults reported good mental health management with rates of 53.9% and 66.1%, respectively, whereas children and adolescents had lower levels of mental health management of 43.5% and 43.8%, respectively.

Regarding major mental disorders, 65.2% of all respondents experienced moderate to high levels of stress. When examined across the life stages, the percentages of respondents who experienced moderate to high stress were as follows: 69.6% for children; 84.4% for adolescents; 63.1% for adults; and 59.8% for older adults. These rates indicated high levels of stress across all age groups and were considerably higher than the 10% to 40% reported by the official figures released in Korea (Korea Disease Control Agency 2022). Although national institution studies and similar studies have primarily concentrated on individuals who exhibited "severe" stress symptoms, the findings of this study suggest that a substantial proportion of the population also experiences moderate stress.

Regarding depression, 43.4% of all respondents reported experiencing some degree of depressive symptoms, with children, adolescents, and adults reporting rates of 52.3%, 45.2%, and 45.7%, respectively; these rates were higher than that of older adults (38.2%). Mild to severe anxiety was reported by 30.9% of all respondents;

Table 2. Results of the mental health status according to the life stage of participants in this survey study.

	%				
Variable	Total (N = 505)	Children (n = 46)	Adolescents (n = 64)	Adults (n = 206)	Older adults (n = 189)
Mental healthcare levels[i]					
Good management	56.2	43.5	43.8	53.9	66.1
Manage well in general	28.7	37.0	40.6	27.2	24.3
Poor management	15.0	19.6	15.6	18.9	9.5
Stress					
High	20.6	28.3	43.8	18.4	13.2
Moderate	44.6	41.3	40.6	44.7	46.6
Low	34.9	30.4	15.6	36.9	40.2
Depression					
Highly depressed	17.3	29.6	22.5	18.0	11.9
Mildly depressed	26.1	22.7	22.6	27.7	26.3
Not depressed	56.6	47.7	54.8	54.4	61.8
Anxiety					
Highly anxious	10.1	19.7	11.4	11.2	5.3
Mildly anxious	20.8	15.2	18.8	22.3	22.2
Not anxious	69.1	65.1	69.8	66.5	72.5

[i] Levels in psychological well-being maintenance through practices such as self-care, emotional regulation, and seeking appropriate support when necessary.

Table 3. Results of stress areas by life stage of participants in this survey study.

Variable	%								
	Health	Time pressure	Family life	Work/ school	Finance	Future concerns	Internal factors	Environment	Others
Children (n = 46)	4.3	28.3	13.0	17.4	0.0	4.3	4.3	4.3	21.7
Adolescents (n = 64)	4.7	35.9	1.6	31.3	3.1	7.8	9.4	1.6	3.1
Adults (n = 206)	12.1	16.5	15.0	17.5	15.5	11.2	5.8	4.4	1.9
Older adults (n = 189)	31.2	10.1	18.0	3.7	14.8	6.9	9.0	3.7	2.6

this rate was relatively lower than the rates of stress and depression. However, children, adolescents, and adults reported higher rates of anxiety (34.9%, 30.2%, and 33.5%, respectively) than that of older adults (27.5%) (Table 2).

The trend of a higher prevalence of mental health issues experienced by children, adolescents, and adults decreasing with age as they approached older adulthood was consistent with the findings of previous domestic studies (Kim et al. 2023). According to the Korea Disease Control Agency, the stress perception rate among adolescents has increased by 4.6% in the past year, and the prevalence of depression has increased by 26.8% over the past 6 years. Suicide attributable to depression is the leading cause of death among teenagers, thus highlighting serious stress and depression issues among younger age groups (Korea Disease Control Agency 2022). Furthermore, we found that a significant proportion of adults also experience some level of depressive and anxiety symptoms, with a range of 30% to 40%, which are high rates. According to the Centers for Disease Control and Prevention, symptoms of depression and anxiety experienced by adults continue to increase, with a significant increase observed among individuals 20 to 40 years of age (Terlizzi and Schiller 2022). Hence, it is necessary to focus on stress, depression, and anxiety issues among relatively younger age groups such as children, adolescents, and adults.

Stress area. A more detailed investigation of the areas in which respondents with major mental disorders felt stress revealed that the primary areas differed across life stages. Time pressure and workplace/school environment ranked first and second at 28.3% and 17.4% among children, respectively, and 35.9% and 31.3% among adolescents, respectively. For adults, workplace/school environment (17.5%) and time pressure (16.5%) were significant areas of stress, along with the financial domain (15.5%) and family life (15%). For older adults, health was the primary area of stress, at 31.2%, followed by family life (18.0%) and the financial domain (14.8%) as the second and third most significant areas of stress, respectively (Table 3).

This result aligns with those of previous studies that indicated that children and adolescents are primarily stressed by

Table 4. Results of differences in perceptions of therapeutic farming according to life stage and mental health characteristics of participants in this survey study.

Variable	Agreement regarding the contribution of plants to mental health		Agreement regarding the contribution of animals to mental health		Awareness of TF[i]	
	Mean ± *SD*[ii]	f	Mean ± *SD*	f	Mean ± *SD*	f
Total (N = 505)	**3.74 ± 1.59**		**3.83 ± 1.13**		**1.48 ± 0.79**	
Life stage						
Children (n = 46)	3.33 ± 3.14 c[iii]	15.809***[iv]	3.65 ± 1.58	1.940^{NS}	1.41 ± 0.10	1.868^{NS}
Adolescents (n = 64)	3.14 ± 3.71 c		4.06 ± 1.17		1.28 ± 0.12	
Adults (n = 206)	3.71 ± 4.08 b		3.89 ± 1.01		1.50 ± 0.05	
Older adults (n = 189)	4.08 ± 3.74 a		3.74 ± 1.11		1.54 ± 0.04	
Stress						
High	3.33 ± 1.15 b	9.829***	3.78 ± 1.11	0.958^{NS}	1.48 ± 0.79	0.219^{NS}
Moderate	3.81 ± 1.07 a		3.91 ± 1.14		1.45 ± 0.86	
Low	3.89 ± 1.06 a		3.78 ± 1.11		1.51 ± 0.64	
Depression						
Highly depressed	3.25 ± 1.31 b	12.405***	3.70 ± 1.32	0.881^{NS}	1.45 ± 0.88	1.491^{NS}
Mildly depressed	3.76 ± 0.98 a		3.84 ± 1.04		1.39 ± 1.00	
Not depressed	3.89 ± 1.04 a		3.88 ± 1.11		1.53 ± 0.63	
Anxiety						
Highly anxious	3.12 ± 1.24 b	11.502***	3.64 ± 1.16	1.765^{NS}	1.54 ± 0.65	0.690^{NS}
Mildly anxious	3.61 ± 1.04 a		3.72 ± 1.10		1.40 ± 1.06	
Not anxious	3.87 ± 1.07 a		3.90 ± 1.14		1.49 ± 0.70	

[i] TF = therapeutic farming.
[ii] Mean ± standard deviation.
[iii] Post hoc analysis shows a > b > c according to Duncan's multiple range tests.
[iv] Statistical significance was determined using a one-way analysis of variance.
NS, *, **, *** not significant or significant at $P < 0.05$, 0.01, and 0.001, respectively, according to the one-way analysis of variance.

Table 5. Participation rates in plant/animal-mediated therapeutic farming programs by life stage of participants of this survey study.

Variable	%				
	Total (N = 89)	Children (n = 11)	Adolescents (n = 12)	Adults (n = 39)	Older adults (n = 27)
Plant-mediated TFP[i]					
Experienced	64.0	81.8	58.3	71.8	48.1
Not experienced	36.0	18.2	41.7	28.2	51.9
Animal-mediated TFP					
Experienced	29.2	63.6	33.3	25.6	18.5
Not experienced	70.8	36.4	66.7	74.4	81.5

[i] TFP = therapeutic farming program.

school-related pressures and social relationships, whereas adults experience high levels of stress related to financial responsibilities and work–life balance, and older adults face stress mostly attributable to health issues (Johansen et al. 2021; Stanczykiewicz et al. 2019).

Perceptions of and participation in TFPs

Differences in perceptions of TF. We largely assessed the perceptions of TF based on the following three factors: the contribution of plants to mental health management; the contribution of animals to mental health management; and awareness of TF. The respondents rated the contributions of plants and animals to their mental health using a 5-point Likert scale and awareness of TF using a 3-point Likert scale (Table 4).

In agreement with the statement that plants contribute to mental health management, we observed statistically significant differences according to age and the MHS ($P < 0.001$). From the perspective of the life stage, agreement regarding the contribution of plants to mental health was highest among older adults, with an average score of 4.08 out of 5; the average scores of children, adolescents, and adults were 3.33, 3.14, and 3.71, respectively ($P < 0.001$) (Table 4). According to Bae et al. (2019), the desire to participate in plant-mediated TFPs, such as agricultural, horticultural, and forest TFPs, increased with age. This suggests that older individuals have a greater preference for plants and plant-mediated TFPs, and our results support this finding. Thus, when composing TFPs according to the life stage, it is beneficial to increase the proportion of plant-mediated TFPs for older adults to enable program satisfaction.

There were also differences in agreement regarding the contribution of plants to mental health according to the levels of stress, depression, and anxiety. The agreement was significantly higher when the levels of these conditions were fairly low or absent ($P < 0.001$). In other words, the low-stress and moderate-stress groups exhibited higher agreement than the high-stress group ($P < 0.001$), and the nondepressed and mildly depressed groups demonstrated higher agreement than the moderately/severely depressed group ($P < 0.001$). Similarly, regarding anxiety, the nonanxious and mildly anxious groups expressed higher agreement than the highly anxious group ($P < 0.001$). This implies that plant-mediated therapy may be more effective for individuals with mild or early symptoms of stress, depression, and anxiety than for those with severe symptoms (Table 4).

Regarding agreement with the statement that animals contribute to mental health management, there were no statistically significant differences across the life stages and levels of stress, anxiety, or depression ($P > 0.05$); however, the overall average score was 3.83, which was higher than that of the contribution of plants to mental health (3.74).

The overall average score for awareness of TF was 1.48 out of 3, indicating that approximately half of the respondents were aware of TF. There were no significant differences according to the life stage or mental health characteristics ($P > 0.05$) (Table 4).

During a 2019 survey of people associated with care farms and social welfare in South Korea, 45.1% said they were aware of TF (Bae et al. 2019). During a 2015 survey of 1302 South Korean citizens, 46% were aware

Table 6. Purposes of participation in plant/animal-mediated therapeutic farming programs by life stage of participants in this survey study.

Variable	%					
	Leisure activities	Recreation	Mental/ physical healing	Education	Simple experiences/ curiosity	Other
Plant-mediated TFPs[i]						
Total (N = 57)	38.6	28.1	28.1	28.1	24.6	12.3
Children/adolescents (n = 16)	0.0	18.8	6.3	31.3	25.0	37.6
Adults/older adults (n = 41)	53.7	31.7	36.6	26.8	24.4	2.4
Animal-mediated TFPs						
Total (N = 26)	7.7	23.1	34.6	11.5	30.8	23.1
Children/adolescents (n = 11)	6.7	18.2	9.1	18.2	27.3	45.5
Adults/older adults (n = 15)	22.2	26.7	53.3	6.7	33.3	6.7

[i] TFPs = therapeutic farming programs.

Table 7. Expected levels for plant/animal-mediated therapeutic farming programs by life stage of participants in this survey study.

	%							
	Plant-mediated TFPs[i]				Animal-mediated TFPs			
Variables	Indoor gardening	Outdoor gardening	Making crafts using plants	Cooking using harvested produce	Feeding animals	Playing with animals	Bathing animals	Walking animals
Total (N = 505)	76.6	77.0	72.3	76.6	73.9	72.3	53.3	73.9
Children (n = 46)	69.6	63.0	65.2	78.3	87.0	82.6	73.9	84.8
Adolescents (n = 64)	64.1	65.6	67.2	76.6	84.2	82.8	64.1	79.7
Adults (n = 206)	74.8	77.7	70.9	76.7	78.2	78.2	57.8	78.6
Older adults (n = 189)	84.7	83.6	77.2	76.2	84.7	59.8	39.7	64.0

[i]TFPs = therapeutic farming programs.

of TF (Park et al. 2017). Therefore, awareness of TF has not changed significantly over the past 10 years. Hence, to enhance and promote awareness of TF in South Korea, it is necessary to establish systematic strategies and publicity efforts.

Participation in TFPs. Among the 505 respondents, we investigated the experiences of 89 who had participated in TFPs (Table 5); 64% reported that they participated in plant-mediated TFPs, and children and adults had particularly high participation rates (81.8% and 71.8%, respectively). In contrast, only 29.2% of the respondents reported participating in animal-mediated TFPs. Notably, 63.6% of children had participated in these programs, whereas the participation rates were lower for adolescents, adults, and older adults (33.3%, 25.6%, and 18.5%, respectively).

Table 6 displays the results of the survey regarding the purpose of participation among those who reported experience with plant-mediated or animal-mediated TFPs. The main purposes of participation in plant-mediated TFPs were leisure activities (38.6%), recreation (28.1%), mental/physical healing (28.1%), and education (28.1%). When divided by age group, children and adolescents showed high participation rates in education (31.3%) and simple experiences/curiosity (25%), whereas adults and older adults had high participation rates in leisure activities (53.7%) and mental/physical healing (36.6%).

In contrast, the main participation purposes for animal-mediated TFPs were mental/physical healing (34.6%) and simple experiences/curiosity (30.8%), indicating that, unlike plant-mediated TFPs, which often involve light leisure activities, many people seek healing through interactions with animals. The purposes of participation for children/adolescents were similar to those for plant-mediated TFPs, with high rates of simple experiences/curiosity (27.3%), education (18.2%), and recreation (18.2%). For adults and older adults, the most common purpose of participation was mental/physical healing (53.3%).

Demand for TFPs

Expected level for each TFP. The results regarding the expected level of participation in plant-mediated TFPs were as follows: outdoor gardening, 77.0%; indoor gardening, 76.6%; cooking using harvested produce, 76.6%; and making crafts using plants, 72.3% (Table 7). When we analyzed the expected levels by life stage, children and adolescents had the highest expectations for cooking using harvested produce (78.3% and 76.6%, respectively), whereas adults and older adults had the highest expectations for outdoor gardening (77.7%) and indoor gardening (84.7%), respectively. When we subdivided the expectation levels (very high, somewhat high, low, and no expectations), the results regarding "very highly anticipated" for each program were as follows: outdoor gardening, 32.5%; cooking using harvested produce, 29.5%; making crafts using plants, 24.6%; and indoor gardening, 23.6% (Fig. 1). This indicated that outdoor gardening and cooking using harvested produce were the most desirable activities, and that the respondents preferred activities involving harvesting and cooking their own vegetables.

The expected levels of participation in animal-mediated TFPs were as follows: feeding animals, 73.9%; walking animals, 73.9%; playing with animals, 72.3%; and bathing animals, 53.3% (Table 8). An analysis of the expected levels by life stage revealed that children and adolescents had higher expectations of animal-mediated TFPs than those of adults/older adults. When

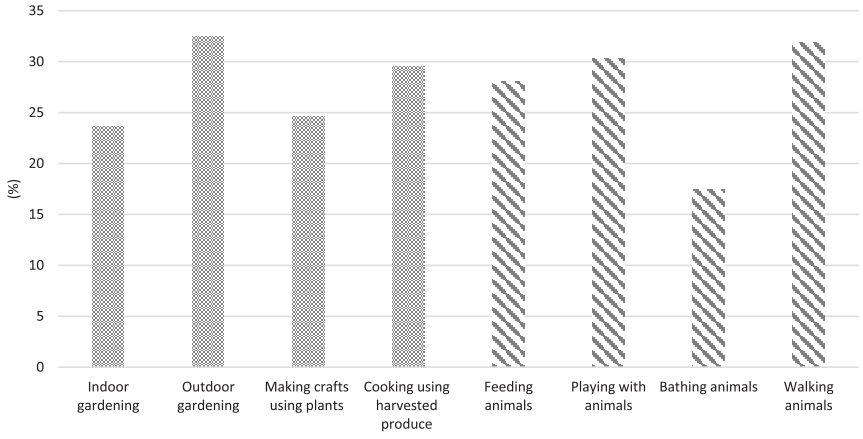

Fig. 1. Comparison of the response level of "very highly anticipated" for plant/animal-assisted therapeutic farming programs.

Table 8. Willingness to pay for plant-mediated therapeutic farming programs by life stage of participants in this survey study.

	%							
Variable	<10,000 KRW[i]	10,000–20,000 KRW	20,000–30,000 KRW	30,000–40,000 KRW	40,000–50,000 KRW	≥50,000 KRW	No WTP[ii]	No response
Total (N = 505)	31.5	27.9	15.0	7.3	4.2	1.2	12.1	0.8
Children (n = 46)	43.5	13.0	10.9	10.9	0.0	0.0	19.6	2.2
Adolescents (n = 64)	26.6	34.4	9.4	1.6	4.7	0.0	21.9	1.6
Adults (n = 206)	26.2	31.1	19.9	8.3	4.9	1.9	7.8	0.0
Older adults (n = 189)	36.0	25.9	12.7	7.4	4.2	1.1	11.6	1.1

[i] KRW = South Korean Won (the official currency of South Korea).
[ii] WTP = willingness to pay.

we subdivided expectation levels (very high, somewhat high, low, and no expectations), the results regarding "very highly anticipated" of each program were as follows: walking animals, 31.9%; playing with animals, 30.3%; feeding animals, 28.1%; and bathing animals, 17.4% (Fig. 1). Except for bathing animals, the other three programs had relatively similar levels of high expectations, indicating the need to primarily focus on the them.

Willingness to pay for TFPs. Willingness to pay (WTP) for plant-mediated TFPs showed the following results: <10,000 South Korean Won (KRW), 31.5%; 10,000 to 20,000 KRW, 27.9%; 20,000 to 30,000 KRW, 15.0%; no WTP, 12.1%; 30,000 to 40,000 KRW, 7.3%; 40,000 to 50,000 KRW, 4.2%; >50,000 KRW, 1.2%; and no response, 0.8% (Table 8). Examining no WTP by life stage indicated the following: adolescents, 21.9%; children, 19.6%; older adults, 11.6%; and adults, 7.8%. The economic capability of different age groups is thought to influence these outcomes. Therefore, it seems necessary to construct an appropriate program budget and materials according to the economic performance of each age group.

The WTP for animal-mediated TFPs showed the following results: <10,000 KRW, 28.3%; 10,000 to 20,000 KRW, 23.6%; no WTP, 19.0%; 20,000 to 30,000 KRW, 15.0%; 30,000 to 40,000 KRW, 5.0%; 40,000 to 50,000 KRW, 4.8%; >50,000 KRW, 3.2%; and no response, 1.2% (Table 9). Examining no WTP by life stage revealed the following: older adults, 29.1%; children, 17.4%; adolescents, 12.5%; and adults, 12.1%. This denotes that in animal-assisted TFPs, both the level of expectation of the program and economic capability influenced WTP. Therefore, similar to plant-mediated TFPs, it will be necessary to allocate appropriate amounts based on the economic capability as well as program expectations for each age group.

Preferred plants/animals in TFPs. When preferences for plants in plant-mediated TFPs were studied, it was found that 39.8% of the respondents preferred fruits and vegetables, 18.2% preferred herbs, and 11.5% preferred fruit trees, followed by flowering plants, leafy plants, leafy vegetables, succulents, foliage plants, root vegetables, and food crops (Table 10). The high preference for fruits and vegetables over other plants seemed to be attributable to the following factors: they are commonly observed; they can be grown and harvested relatively quickly; and they can be eaten. When examined by life stage, children and adolescents chose fruits and vegetables (34.8% and 32.8%, respectively) and fruit trees (21.7% and 21.9%, respectively) as their first and second choices, respectively. In contrast, adults and older adults chose fruits and vegetables (42.7% and 40.2%, respectively) and herbs (22.3% and 18.5%, respectively).

Regarding preferences for animals in animal-mediated TFPs, 57.2% of the respondents preferred pets, 14.5% preferred small farm animals, and 9.5% preferred birds, followed by large farm animals and insects (Table 11). The high preference for pets such as dogs and cats was likely attributable to the following factors: they are familiar and they are considered safe because of their frequent contact. When we broke down preferences by life stage, children and adolescents showed the highest preference for pets (65.2% and 67.2%) and the lowest preference for large farm animals (0% and 3.1%). This suggested that large animals are less familiar and can be intimidating for children. Therefore, when developing animal-assisted TFPs for children, special consideration should be given to the choice of animals.

Table 9. Willingness to pay for animal-mediated therapeutic farming programs by life stage of participants in this survey study.

	%							
Variable	<10,000 KRW[i]	10,000–20,000 KRW	20,000–30,000 KRW	30,000–40,000 KRW	40,000–50,000 KRW	≥50,000 KRW	No WTP[ii]	No response
Total (N = 505)	28.3	23.6	15.0	5.0	4.8	3.2	19.0	1.2
Children (n = 46)	34.8	10.9	10.9	6.5	0.0	15.2	17.4	4.3
Adolescents (n = 64)	21.9	31.3	20.3	4.7	6.3	1.6	12.5	1.6
Adults (n = 206)	26.2	29.6	18.0	5.3	5.8	2.9	12.1	0.0
Older adults (n = 189)	31.2	17.5	11.1	4.2	4.2	1.1	29.1	1.6

[i] KRW = South Korean Won (the official currency of South Korea).
[ii] WTP = willingness to pay.

Table 10. Preferences for plants in plant-mediated therapeutic farming programs based on life stage of participants in this survey study.

Variable	%									
	Fruits and vegetables	Herbs	Fruit trees	Flowering plants	Leafy vegetables	Succulents	Foliage plants	Root vegetables	Food crops	Others
Total (N = 505)	39.8	18.2	11.5	9.7	7.5	4.2	3.8	1.8	1.4	2.2
Children (n = 46)	34.8	4.3	21.7	13.0	0	6.5	4.3	4.3	2.2	8.7
Adolescents (n = 64)	32.8	14.1	21.9	7.8	3.1	9.4	3.1	1.6	1.6	4.7
Adults (n = 206)	42.7	22.3	10.2	8.7	6.3	2.4	3.9	1.9	1.0	0.5
Older adults (n = 189)	40.2	18.5	6.9	10.6	12.2	3.7	3.7	1.1	1.6	1.6

TF policy tasks

The future development of TF is highly possible because 67.7% indicated positive expectations (Table 12). When evaluated according to the life stage, older adults (70.4%) and adults (70.4%) perceived a higher possibility for the development of TF than children (65.2%) and adolescents (53.1%).

Regarding the need to strengthen government policies regarding TF, 83% of the respondents indicated that this was necessary (Table 12). When evaluated according to the life stage, the need for policy enhancement was most strongly felt by older adults (87.8%), followed by adults (82.0%), children (80.4%), and adolescents (73.4%).

The results regarding tasks to revitalize TF were as follows: improvement of accessibility, 32.1%; improvement of introduction and promotion, 28.1%; and improvement of programming/content, 19%; these were followed by reductions in participation costs, strengthening of the program operator's abilities, and increasing safety (Table 13). When evaluated by life stage, children and adolescents selected the improvement of introduction and promotion (34.8% and 34.4%, respectively), and adults and older adults selected the improvement of accessibility (36.9% and 32.8%, respectively) as the first priority for development tasks. Because most TF-related activities occurred within schools, children and adolescents seemed to require introduction and more promotion rather than accessibility.

Conclusions

We conducted a survey to gather information to develop tailored TFPs for each life stage that included the individual MHS, general perceptions and participation, demand, and policy requirements related to TF.

Children and adolescents showed lower levels of mental health management than those of adults and older adults, indicating the need for consistent attention and proactive measures. Additionally, more than half of the respondents reported experiencing symptoms of stress and depression, with children, adolescents, and adults exhibiting higher levels of stress, depression, and anxiety than those of older adults. Therefore, creating more programs to address overall mental health issues, especially those of children, adolescents, and adults, is necessary, and programs, such as those involving raising plants or animals, for children and adolescents should be created to help them manage their own mental health.

Empathy toward the contribution of plants to improving mental health was significantly higher among older adults than it was among other age groups. Additionally, those who perceived mild or no stress, depression, and anxiety symptoms showed higher empathy than those with severe symptoms. Thus, the customized provision of plant-mediated TFPs is particularly necessary for older adults and those who experience mild to low stress, depression, and anxiety levels.

Most respondents' expectations for healing agricultural program activities were high, but few respondents wanted to bathe animals, and the preference for large farm animals was low compared with that for pets and small farm animals. From this viewpoint, the animal bathing program should be excluded from TFPs, especially those for adults and older adults who had lower preference scores. Digital-based TFPs, such as those that use virtual reality, could facilitate the experience of interacting with various type of animals when it is difficult to do so on real farms and are convenient for urban residents and older adults with mobility issues. Experiencing natural objects and nature, such as plants and animals, through virtual reality can help reduce stress and improve the psychological well-being of adults and the elderly (Chan et al. 2023).

Regarding the future development of TF, the majority of respondents answered that the prospects are high and acknowledged the need to strengthen government policies. Regarding tasks related to implementing TF, children and adolescents chose introducing and promoting, whereas adults and older adults selected improving accessibility for primary tasks. This indicated significant public expectations of the mental health benefits of TF and emphasized the efforts of stakeholders to make TF more accessible.

This survey study involved participants from the metropolitan area of South Korea. Although this study provides valuable insights, future studies could benefit from including responses from individuals in additional regions and countries to derive more comprehensive results. Additionally, the uneven

Table 11. Preferences for animals in animal-mediated therapeutic farming programs based on life stage of participants in this survey study.

Variable	%					
	Pets	Small farm animals	Birds	Large farm animals	Insects	Others
Total (N = 505)	57.2	14.5	9.5	7.9	5.0	6.0
Children (n = 46)	65.2	13.0	2.2	0.0	8.7	10.8
Adolescents (n = 64)	67.2	12.5	10.9	3.1	1.6	4.7
Adults (n = 206)	64.6	12.6	4.9	11.7	5.3	1.0
Older adults (n = 189)	43.9	17.5	15.9	7.4	4.8	10.6

Table 12. Results of development prospects and the necessity of strengthening government policies of therapeutic farming by life stage of participants in this survey study.

Variables		%				
		Total (N = 505)	Children (n = 46)	Adolescents (n = 64)	Adults (n = 206)	Older adults (n = 189)
Development prospects	High	67.7	65.2	53.1	70.4	70.4
	Normal	21.8	26.1	25.0	21.8	19.6
	Low	9.7	6.5	18.8	7.8	9.5
Is it necessary to strengthen government policy?	Yes	83.0	80.4	73.4	82.0	87.8
	No	16.2	17.4	23.4	18.0	11.6

Table 13. Requirements for revitalizing therapeutic farming by life stage of participants in this survey study.

Variable	%						
	Improvement of introduction and promotion	Improvement of accessibility	Improvement of programming/ content	Reduction in participation costs	Strengthening the program operator's capabilities	Increase in safety	Others
Total (N = 505)	28.1	32.1	19.0	9.5	4.6	5.1	1.6
Children (n = 46)	34.8	10.9	19.6	8.7	10.9	8.7	6.5
Adolescents (n = 64)	34.4	29.7	14.1	7.8	4.7	4.7	4.7
Adults (n = 206)	24.3	36.9	21.4	9.7	4.4	2.9	0.5
Older adults (n = 189)	28.6	32.8	18.0	10.1	3.2	6.9	0.5

distribution of sample sizes across different age groups suggested the need for a more balanced approach to enhance the comparability and generalizability of the findings. Future research should aim to use a more diverse sample and ensure an even distribution of sample sizes across age groups to further strengthen the reliability and generalizability of the results. The data collected during this study can serve as foundational material for developing tailored TFPs for each life stage and are expected to support the provision of customized TFPs for the public according to the life stage.

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