

## **INTERGENERATIONAL PROGRAMS**

# **REPRINTS: Effects of an Intergenerational Health Promotion Program for Older Adults in Japan**

**YOSHINORI FUJIWARA, MD, PhD**

*Research Team for Social Participation and Health Promotion,  
Tokyo Metropolitan Institute of Gerontology, Tokyo, Japan*

**NAOKO SAKUMA, BA**

*Research Team for Promoting Independence of the Elderly, Tokyo Metropolitan  
Institute of Gerontology, Tokyo, Japan*

**HIROMI OHBA, BA, MARIKO NISHI, PhD,**

**SANGYOON LEE, MA, NAOKI WATANABE, MA,**

**YOKO KOUSA, BA, HIROTO YOSHIDA, PhD, TARO FUKAYA, MA,**

**SATORU YAJIMA, MS, and HIDENORI AMANO, MA**

*Research Teams for Social Participation and Health Promotion,  
Tokyo Metropolitan Institute of Gerontology, Tokyo, Japan*

**YOICHI KURETA, PhD**

*Human Care Research Team, Tokyo Metropolitan Institute of Gerontology, Tokyo, Japan*

**KENJI ISHII, MD**

*Positron Medical Center, Tokyo Metropolitan Institute of Gerontology, Tokyo, Japan*

**HAYATO UCHIDA, PhD**

*School of Human Science and Environment, University of Hyogo, Hyogo, Japan*

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Address correspondence to Dr. Yoshinori Fujiwara, MD, PhD, Tokyo Metropolitan Institute of Gerontology, 35-2, Sakae-cho. Itabashi-ku, Tokyo, Japan. E-mail: fujiwago@tmig.or.jp

SHOJI SHINKAI, MD, PhD, MPH

*Research Teams for Social Participation and Health Promotion,  
Tokyo Metropolitan Institute of Gerontology, Tokyo, Japan*

*We launched a new intervention study called REPRINTS in which senior volunteers engaged in reading picture books to children. Sixty-nine volunteers and 72 participants in a control group, all aged 60 years and over, living in three urban locations, participated in a baseline health checkup in June 2004. After completion of a three-month training seminar, volunteers visited public elementary schools and kindergartens in groups of 6 to 10 for an 18 month period. They were assessed again by a follow-up health checkup in March 2006. At the follow-up, social network scores (frequency of contact with grandchildren and others around the neighborhood) and self-rated health improved or was maintained at a significantly higher rate for the 37 individuals volunteering most intensively as compared to those who did not volunteer or volunteered minimally. In conclusion, through intensively being engaged in the intergenerational volunteer programs during 21 months, self-rated health and social networks were more likely to improve or be maintained among senior volunteers than controls.*

*KEYWORDS* elderly housing, intergenerational relationships, literacy volunteers, lifelong learning, community building

## INTRODUCTION

There is a general worry in Japanese society about the economic burden put on younger generations due to the expected growth of welfare and health care needs of older generations. However, rather than focusing on an intergenerational inequity argument, Japan should put a priority on energizing older adults' social participation for the benefit of all the generations and the whole society. Thus, there is a need for intergenerational initiatives in Japan to encourage older generations to pursue physical and psychological health promotion activities in order to respond to issues among younger generations.

This article introduces one such intervention research project, the REPRINTS (**R**esearch of **P**roductivity by **I**ntergenerational **S**ympathy) Program (Fujiwara et al., 2006), which educates and engages senior volunteers in picture book reading to young and school-aged children in educational settings. The research team for Social Participation and Health Promotion of Tokyo Metropolitan Institute of Gerontology (TMIG) planned and

conducted the REPRINTS Program in collaboration with organizations at three locations in Japan starting in 2004. Currently, the program is at a semiself-sustainable stage, and it is being operated by the participating senior volunteers with supervision and support from TMIG and local municipal entities. In this article, the rationale and the underlying conceptual framework of the program, research methods, and a part of the short-term results of the program evaluation are shared and discussed.

### Rationale of the Program

In the United States, the productive aspects of aging have been considered as an essential aspect of the successful aging concept since the beginning of the 1990s. Volunteering as well as paid work are understood as activities that constitute productive aging (Morrow-Howell, Hinterlong, & Sherraden, 2001). In the literature in the United States and in Canada, volunteer activity is found to have a high correlation with the physical and psychological health of older participants, although the mechanism of causal relation remains unclear (Fujiwara, Sugihara, & Shinkai, 2005).

In addition, in terms of independent activity, another important aspect of successful aging, longitudinal studies conducted on a large population of Japan's older adults found that the decline in social roles and intellectual activity could predict Instrumental Activities of Daily Living (IADL) disability among older participants (Fujiwara et al., 2003a, 2003b); these studies used the TMIG Index of Competence (Koyano, Shibata, Nakazato, Haga, & Suyama, 1991), which is one of the Japanese standardized measures to assess the degree of IADL functions.

Thus, it is necessary for Japanese elders to maintain social roles and to engage in intellectual activity in a way that helps to maintain their physical and psychological health. The REPRINTS Program was planned and implemented as a health promotion program that utilized an intergenerational engagement approach to respond to such needs while at the same time enabling the volunteers to contribute to society and younger generations.

### Conceptualizing the Program

There are three conceptual pillars underlying the REPRINTS Program: intergenerational engagement, intragenerational relationship building, and life-long learning. The first pillar refers to intergenerational engagement in which older participants contribute to children's growth. Erik Erikson defined "generativity" (Erikson, 1982) as adults' fundamental and inherent need to expand their attention from self to others, including younger generations, to transfer knowledge and wisdom and to care for them. In this

intergenerational program, senior participants are expected to share their accumulated cultural knowledge and values with the child participants as well as to generate mutual trust between the children's parents' generation and themselves by engaging in volunteer activities with children. In general, older persons tend to be inhibited in being "generative" when surrounding people including younger persons lack the understanding about such needs and abilities of older persons. Thus, it is not only preferable but also important for older people to demonstrate their "generativity" by responding to such ageism (Palmore, Branch, & Harris, 2005) and building mutually trustful relationships with younger generations.

The second pillar refers to building intragenerational relationships, which means encouraging the senior volunteers to build new social networks by working closely with other volunteers in group settings. Strong social networks can strengthen subjective health status and contribute significantly to psychological well-being in later life (Masuchi & Kishi, 2001; Ryff & Singer, 1996). The REPRINTS Program was designed in a way that would enable senior volunteers to continuously and closely work with peer volunteers so that they could develop meaningful relationships with one other.

The third pillar refers to lifelong learning. Volunteer activity with intensive learning opportunities has been found to improve cognitive ability (Fried et al., 2004). The program provided the senior volunteers with intensive initial learning opportunities during three-month weekly training sessions before the start of volunteering and continuous and ongoing learning experiences while they studied about picture books, selected appropriate books for children at each session, rehearsed for the sessions, and received feedback from peer volunteers.

The program selected picture books as the main tools to connect the children and the senior participants. Picture books were thought to be appropriate for the senior volunteers' learning for several reasons. First, picture books do not necessarily require intensive previous reading experiences on the part of the senior volunteers. Instead, it was expected that senior volunteers would feel familiar with those books targeting young children. Second, developing various styles of book reading entails complex skill development, and, hence, is an ideal activity through which to engage practitioners in continuous learning for quality improvement. Three trainers with extensive experience in picture book reading lectured at the initial training sessions and provided ongoing advice and feedback to the senior volunteers about book reading techniques. Third, reading picture books is considered developmentally appropriate not only for the children but also for adults. There is a Japanese saying that one should read a picture book at three different times through one's life: at first, in childhood, second, during the period of rearing children, and third, in later life (Yanagida, 2004). Older

people are thought to be particularly impressed and feel sympathy when reading picture books because of their rich life experiences. The Research Institute for Publications in Japan reported that picture books had increased by 24% from 2004 in its sales, while other general publications were declining in Japan.

## METHODS AND PROCEDURE

### Selecting Target Areas

Three experimental areas were selected for this study: Chuo-Ward in central Tokyo, Tama-Ward in Kawasaki City in Kanagawa Prefecture, suburb of Tokyo, and Nagahama City in Shiga Prefecture, a local city in the west of Japan. The populations of these three areas in 2004 were approximately 90,000, 94,000 and 62,000, respectively. When the project team sought collaboration with local municipalities in March 2004, these three municipalities became counterparts for this research project and formed project teams with TMIG staff. The Chuo-Ward Board of Education agreed to promote children's reading practices and lifelong education for older residents, and Tama-Ward Health and Welfare Centers and Nagahama City Health Promotion Centers agreed to develop and undertake new health promotion strategies for older residents.

### Recruiting Candidates of Participant Schools

The project team undertook needs assessments to determine the public elementary schools that would participate in the project starting in March, 2004. Collaborating municipal and research staff conducted mail surveys or face-to-face interviews with all of the 36 principals of public elementary schools in the three cities. Kindergartens were also included in this needs assessment in Chuo-Ward, and several public child care centers for after-school children in the three locations were also asked whether they would participate in the projects. As a result, six public elementary schools, three kindergartens, and six child care centers participated in the project.

### Recruiting the Participants

After determining the collaborating areas and municipal entities, efforts to recruit senior participants were made. The project team advertised the REPRINTS Program through community newspapers or newsletters and held events to recruit senior volunteers from March through July of 2004 in the three target municipalities. The program was introduced to the attendees,

and those who decided to participate in the program submitted application forms to the project members.

After the volunteer applications were submitted, the senior applicants attended intensive three-month weekly training seminars. Among 76 persons who applied for participation, 67 older persons participated in the seminars. After completing the seminars, all 67 persons agreed to participate in the project and were defined as the intervention group. The participants of the intervention group agreed to work as book reading volunteers for the children at each collaborating educational institution and to participate in health checks, surveys, and interviews during a subsequent three-year period for data collection purposes. Twenty-seven senior volunteers in Chuo-Ward, 19 in Tama-Ward, and 21 in Nagahama City were determined as the participants of the intervention group.

The participants in the control group were also recruited through the same methods as the intervention group and through word-of-mouth of the project staff and the participants in the intervention group. Seventy-four older persons were selected as the control group participants. The participants in the control group were recruited from various kinds of social activity clubs with adults other than the REPRINTS Program, such as hobby clubs, volunteering for adults, community based health promotion programs, and so forth, but none of them were allowed to engage themselves in intergenerational programs with children. After project staff explained the protocol of the project in detail and obtained informed consent, individuals in the control group engaged in conventional social activities and participated in the same health checkup as intervention group but did not take part in a specific training or program.

## Data Collection

The baseline data were collected from both the intervention and the control groups through health check, surveys, and interviews in June 2004. Neither age nor gender of the intervention and the control groups showed any significant difference. The subjects were all independent in six basic activities of daily living (BADL) (walking, eating, toileting, incontinence, dressing, and bathing). To examine the effects of program participation, data were collected regarding age, gender, marital status, living arrangements, subjectively rated economic status (excellent, good, fair, and poor), years of school attendance, history of occupation, and years of current residence.

The first follow-up data were collected in March 2005, nine months after the baseline data. The follow-up data consisted of the same items as the baseline. Fifty-six volunteers among the 67 participants in the intervention group, who participated in the baseline health checks continued to

volunteer, and 11 volunteers withdrew. Thirty-nine volunteers who had participated in more than a few sessions every month were defined as “intensive volunteers” and 17 volunteers with session attendance of once a month or less as “volunteers with low frequency.” The second follow-up data were collected from 37 intensive volunteers, 16 volunteers with low frequency and 60 volunteers in the control groups in March 2006.

## Measurement

### PHYSICAL HEALTH CONDITIONS

The participants were asked about their histories of outpatient and inpatient medical treatment; medication; chronic illness such as hypertension, hyperlipidemia, and stroke; their chewing ability; and their hearing and visual abilities.

### HIGHER LEVEL FUNCTIONAL CAPACITY

The TMIG Index of Competence was used for assessment of higher-level functional capacity among the participants (Koyano et al., 1991). The TMIG Index of Competence is a multidimensional, 13-item index of competence shown in Table 1. The first-order factors are Instrumental Self-Maintenance, Intellectual Activity and Social Role, and the second-order factor is Competence. The responses to each item were “yes” (able to do) or “no” (unable) and scored

**TABLE 1** The Tokyo Metropolitan Institute of Gerontology (TMIG) Index of Competence

Subscales	Questionnaires		
<i>Instrumental Self-Maintenance</i>	(1) Can you use public transportation (bus or train) by yourself?	1. Yes	0. No
	(2) Are you able to shop for daily necessities?	1. Yes	0. No
	(3) Are you able to prepare meals by yourself?	1. Yes	0. No
	(4) Are you able to pay bills?	1. Yes	0. No
	(5) Can you handle your own banking?	1. Yes	0. No
<i>Intellectual Activity</i>	(6) Are you able to fill out forms for your pension?	1. Yes	0. No
	(7) Do you read newspapers?	1. Yes	0. No
	(8) Do you read books or magazines?	1. Yes	0. No
	(9) Are you interested in news stories or programs dealing with health?	1. Yes	0. No
<i>Social Role</i>	(10) Do you visit the homes of friends?	1. Yes	0. No
	(11) Are you sometimes called on for advice?	1. Yes	0. No
	(12) Are you able to visit sick friends?	1. Yes	0. No
	(13) Do you sometimes initiate conversations with young people?	1. Yes	0. No

1 for “yes” and 0 for “no.” The highest possible score was 13 points. Three sub-levels of competence were also calculated: 0 to 5 scores for instrumental self-maintenance, 0 to 4 scores for intellectual activity, and 0 to 4 scores for social role.

#### SUBJECTIVE HEALTH STATUS AND PSYCHOLOGICAL HEALTH

Self-rated health (excellent, good, fair, and poor) and the degree of depression were also measured. To measure mental health status, the short version of Geriatric Depression Scale (GDS) was utilized (Niino, Kawakami, & Imaizumi, 1991). In addition, the level of self-esteem was measured by using Rosenberg’s 10-item scale (Rosenberg, 1979). Kamahara’s 18-item version of Locus of Control (LOC) was also utilized (score ranging 18–72; higher scores indicate more internal tendency) (Kambara, Higuchi, & Shimizu., 1982).

#### SOCIAL PARTICIPATION

Social activity was assessed by using a social activity checklist (Takahashi et al., 2000), which was developed for self-evaluation of social activity. The participants were asked whether they had been engaged in the following social activities: individual activities, social participation/volunteering, education/training, and employment.

#### SOCIAL NETWORK AND SOCIAL SUPPORT

The participants’ social networks were assessed according to the amount of daily contact with individuals fitting into four different types of relations: relatives, business acquaintances, neighbors, and others. (The numbers were grouped into six categories: 0 (null), 1–4 persons, 5–9 persons, 10–19 persons, 20–49 persons, 50 persons and over, and sequentially scored 0–5, respectively.) The frequency of personal contacts was assessed for four different types of contacts: grandchildren, children in the neighborhood, other children they had contact with in the volunteer program, or events and friends or neighbors. The frequency of contacts was grouped into five categories: 0 (never), less than once a month, a few times a month, once a week, twice a week or more, and was sequentially scored 0–5.

Social support was measured by using a scale developed by Noguchi and colleagues (Noguchi, 1991). Four items were used to measure provided social support: “To what degree does the person listen to your private worries and fears?” “To what degree is the person caring for you?” “To what degree can you ask some help in a daily life to the person?” “To what degree does the person provide care when you are sick in bed for several days?”



The participants were asked to rate the degree of each type of support from family members living together, children or relatives living separately, and friends or neighbors (by six categories: “not applicable,” “never,” “not so well,” “so-so,” “well,” “very well,” and sequentially scored 0–5).

#### COGNITIVE FUNCTION

Trained clinical psychologists evaluated cognitive functions. All the participants were examined in episodic memory, language capability, and intelligence. For episodic memory, the immediate and delayed episodic memory test named “Story Recall” was used from the Japanese version of the Rivermead Behavioral Memory Test (Watomori, Hara, Miyamori, & Eto, 2002). Phonological and semantic verbal fluency tests were used to examine language capability (Sasanuma, 2003). Three subtests of the Japanese version of the Wechsler Adult Intelligence Scale-Revised (WAIS-R), Information, Picture Completion, and Digit Symbol were used to examine intelligence (Shinagawa, Kobayashi, Fujita, & Maekawa, 1990).

#### PHYSICAL PERFORMANCE TEST

Walking speed, one-leg standing duration test, grip strength, and elaboration of fingers were measured. Blood pressure was measured after the Korotkoff sound V was taken as the diastolic blood pressure. The lower value was taken as a representative measure.

To test walking speed, the subjects were asked to walk on a straight walkway 11 meters in length on a flat floor once in their usual speed and once in their maximum speed. Walking speed was measured over a five meter distance between three and eight meters from the start of the walkway. (For maximum walking speed, we used the faster results in the analysis.) For the one-leg standing test, subjects were asked to look straight ahead at a dot one meter in front of them and to stand on the preferred leg with their eyes open and hands down alongside the trunk. The time until balance was lost (or maximum 60 seconds) was recorded. The better of the two trials was used in the analysis. Hand grip strength was evaluated by a mechanical dynamometer in the dominant hand and the higher value of the two trials in the analysis.

#### Volunteer Training Sessions

The participants in the intervention group attended the three-month weekly training sessions beginning July 2004 to learn about book selection and reading techniques. Basic knowledge of children’s school life and the rules for school-based volunteer activities were also introduced so that the participants could start their work as book reading volunteers.

## Grouping the Participants of the Program

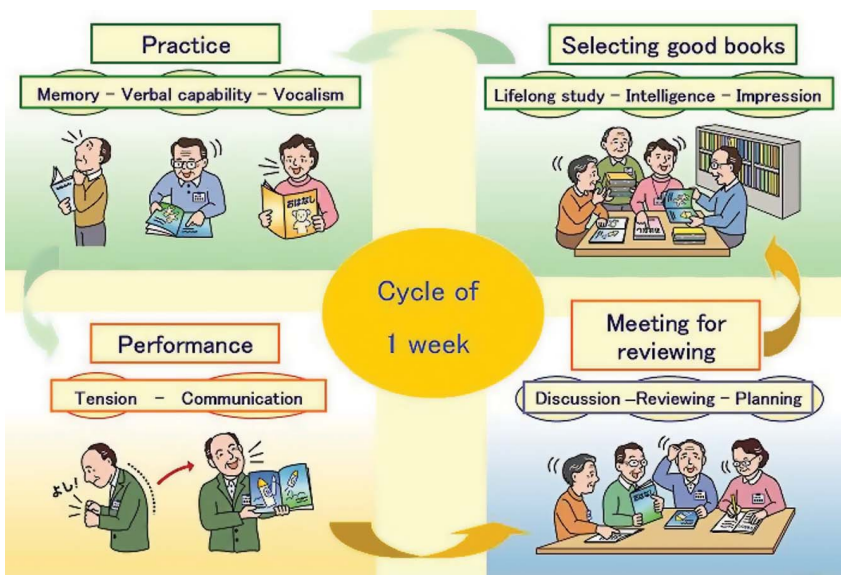
After finishing the training seminars, the volunteers were divided into groups of six to ten volunteers to visit six elementary schools, three kindergartens, and six child care centers for after-school children once a week or every two weeks beginning in October 2004. Each volunteer chose a group mostly because of the location of the school or child care center that the group was to visit regularly. The volunteer groups worked intensively with peer volunteers. Each group had regular meetings before and after the reading sessions for information sharing and discussion to improve the quality of reading techniques and for receiving organizational updates. In addition, the groups in the same area met monthly for information sharing and mutual learning purposes. Book reading trainers and other professionals in related fields, such as gerontology and lifelong learning, were invited to the area meetings to provide lectures in which they shared their knowledge development about picture books, volunteerism, aging, and issues in the lives of contemporary children.

## Planned Activities of the Volunteers

Although, there was some variation across participating schools in terms of the style of volunteer activities, there was also much consistency across sites. At each kindergarten, one of the group members would read a picture book for approximately 20 children and play with toys with them in 30-minute sessions. At each elementary school, one of the group members would read one or two picture books before the first class in the morning in each weekly session and the rest of the members would assist the reader or keep notes about book reading quality, children's responses, and other happenings during the session. The volunteers sometimes secured extra time to read picture books for 20–30 minutes during other breaks on the same day to respond to students' occasional requests.

These cyclic activities mentioned previously were planned with consideration for engaging volunteers in intensive intellectual activities that were defined as helping to maintain linguistic cognition, to activate intellectual curiosity, and to maintain capacity for clerical business and responsiveness in the TMIG Index of Competence. Concretely, the former two definitions suggest engagement in literary activity through studying about and reading picture books, and the last one suggests participating in organizational work of the volunteer groups (Figure 1).

Average frequency and hours of REPRINTS volunteer activity during the six months just after the seminar ended were as follows: To select suitable picture books, 76.3% of volunteers went to the libraries and 40.0% went to the book stores; 94.5% of volunteers practiced at home and 38.2% did so with the other members to prepare for their performance; and



**FIGURE 1** Cycle of One Week among REPRINTS Volunteers

43.6% of volunteers visited schools to read picture books more than once a week. Average time  $\pm$  standard deviation for selecting picture books was  $75 \pm 38$  minutes, practicing or preparing for performance was  $69 \pm 31$  minutes, and visiting schools to read picture books was  $83 \pm 50$  minutes for one.

## ANALYSIS

The participants in the control group were selected on the basis of having the same characteristics as those in the intervention group in terms of independence and frequency of going out per week. All 74 applicants in the intervention group, except one who had a collagen disease, were found to be eligible as control group participants from the baseline data.

Moreover, we also defined that controls should not engage in social activities with children such as hobbies, working, and volunteering. All seventy-four controls accepted these conditions at the baseline survey. Two-way analysis of variance (ANOVA) for groups (volunteers versus controls) and region (Chuo-Ward versus Tama-Ward, versus Nagahama city) was used to detect significant differences in baseline characteristics between the participants of the volunteer group and control group. If a significant difference of  $<0.017$  was detected, Bonferroni correction was applied for comparisons between groups. Chi-square tests were performed to detect significant differences in baseline characteristics between the volunteer

participants who continued to participate in the study and those who withdrew at the first follow-up survey, with  $p < 0.05$  set as the level of significance. In addition, chi-square tests were performed to detect significant differences between intensive volunteers and those with low frequency in baseline characteristics at the first follow-up survey, with  $p < 0.05$  set as the level of significance.

General linear models were conducted to detect significant main effects and interactions between the groups (intensive volunteers versus controls) and number of surveys adjusted for confounding factors such as gender, age, and school years only for cognitive tests during the 21 months. All data were analyzed using the SPSS/PC+ Statistical Software for Windows version 13.0.

## RESULTS

First, we surveyed the need for REPRINTS volunteer activity at all 36 elementary schools in the three locations. All schools had PTA volunteers, but only five schools had senior volunteers. Frequency of their activities was irregular or just a few times a year. Six elementary schools were interested in introducing the REPRINTS program in 2004.

Table 2 indicates the baseline characteristics of the participants of the intervention group and those of the control group. If  $p < 0.017$  was detected by Bonferroni correction, main effects were seen as being significant in all of the three locations. The proportion of those who had no grandchildren among the participants of the intervention group in Tama-Ward and had longer school years and volunteer experience among volunteers in Nagahama was significantly higher than those of the control group (not shown in Table 2). The proportion of those who had no grandchildren was significantly higher in the intervention group (41.8% versus 20.3%,  $p = 0.006$ ). Other significant differences between the intervention and control groups were for school years ( $13.4 \pm 2.5$  versus  $12.3 \pm 2.5$  years,  $p = 0.008$ ), experience of volunteer activity (79.1% versus 52.7%,  $p = 0.001$ ) and usual walking speed ( $86.7 \pm 12.3$  versus  $81.3 \pm 12.9$  m/min,  $p = 0.012$ ). There were no significant differences among TMIG Index of Competence items and other variables between the two groups.

As indicated in Table 3, we named 56 of the intervention group members engaged in the REPRINTS program for more than nine months—the “continuous volunteers” group, and the 11 volunteers who withdrew from the REPRINTS program after less than nine months—the “withdrawn volunteers” group. The proportion of those who had lower systolic blood pressure ( $137 \pm 22$  mmHg versus  $157 \pm 27$  mmHg,  $p < 0.010$ ), seldom use of eyeglasses (30.4% versus 0.0%,  $p = 0.028$ ), had motivation of participation for expecting to have new friends (67.9% versus 27.3%,  $p = 0.019$ ) and enjoyed picture books (71.4% versus 36.4%,  $p = 0.049$ ) were significantly

**TABLE 2** Baseline Characteristic of Volunteers Versus Controls

	Volunteers <sup>a)</sup> (n = 67)		Controls <sup>a)</sup> (n = 74)		p-value
	Mean	± SD	Mean	± SD	
[Demographic variables]					
Age, year	68.2	± 6.0	68.7	± 4.8	n.s
Gender—male, n (%)	15	(22.4)	23	(31.1)	n.s
School years, year	13.4	± 2.5	12.3	± 2.5	0.008
Family structure — no children, n (%)	12	(17.9)	7	(9.5)	n.s
— no grandchildren, n (%)	28	(41.8)	15	(20.3)	0.006
Experience of reading picture books to children, n (%)	56	(83.6)	57	(90.5)	n.s
[Social activity]	53	(79.1)	39	(52.7)	0.001
Experience of volunteer activities, n (%)					
Social network score, frequency of communication	4.3	± 1.0	4.5	± 0.9	0.016
friends or neighbors	1.9	± 2.1	2.8	± 2.0	n.s
grandchildren	2.8	± 2.1	2.7	± 1.9	n.s
neighborhood children	1.5	± 1.7	1.5	± 1.8	
distant children <sup>b)</sup>					
number of persons	1.9	± 1.1	2.1	± 0.9	n.s
friends or neighbors	3.1	± 1.3	3.3	± 1.2	n.s
distant friends					
Receiving social support score	11.8	± 6.9	12.7	± 6.3	n.s
from family members living together	12.0	± 5.0	11.9	± 4.5	n.s
from family members living apart	10.3	± 4.7	10.1	± 5.0	n.s
from friends or neighbors					
Providing social support score	13.6	± 7.6	15.2	± 4.7	n.s
to family members living together	14.3	± 6.1	15.2	± 4.7	n.s
to family members living apart	11.7	± 5.7	12.2	± 5.4	n.s
to friends or neighbors					

(Continued)

**TABLE 2** (Continued)

	Volunteers <sup>a)</sup> (n = 67)		Controls <sup>a)</sup> (n = 74)		p-value
	Mean ± SD		Mean ± SD		
Social activity score					
social or volunteer activity	3.6 ± 1.6		3.4 ± 1.3		n.s
personal activity	8.2 ± 1.6		8.4 ± 1.1		n.s
lifelong study	1.6 ± 0.9		1.4 ± 1.0		n.s
occupation	0.4 ± 0.5		0.5 ± 0.5		n.s
[Cognitive function]					
Delayed recall	11.7 ± 3.4		11.8 ± 3.6		n.s
Verbal fluency (animal)	18.8 ± 4.4		17.7 ± 5.4		n.s
Information (WAIS-R)	13.1 ± 2.4		12.5 ± 2.9		n.s
[Psychological variables]					
Self-rated health, score	1.9 ± 0.6		2.1 ± 0.4		n.s
Depressive mood, 15 item-Geriatric depression scale	2.9 ± 2.6		2.7 ± 2.4		n.s
Rosenberg' self-esteem scale	3.8 ± 1.7		4.1 ± 1.5		n.s
Locus of control scale	49.4 ± 6.3		49.6 ± 6.3		n.s
[Physical function]					
Number of chronic conditions <sup>c)</sup> , n	0.7 ± 0.9		0.9 ± 1.1		n.s
Higher-level functional capacity <sup>b),d)</sup> , n (%)	37 (55.2)		49 (66.2)		n.s
Peg test, n	13.8 ± 1.6		13.2 ± 1.6		n.s
Systolic blood pressure, mmHg	141 ± 25		144 ± 20		n.s
Diastolic blood pressure, mmHg	81 ± 13		83 ± 12		n.s
Usual walking speed, m/minute	86.7 ± 12.3		81.3 ± 12.9		0.012
Hand grip strength, kg	25.1 ± 6.8		26.3 ± 6.7		n.s
Standing time on one leg with eye open, minute	47.5 ± 20.4		44.2 ± 20.8		n.s

<sup>a)</sup>Total subjects of 3 fields (Chuo-ku, Kawasaki, Nagahama), <sup>b)</sup>Children with whom contacted through volunteer activities, <sup>c)</sup>Total number of chronic conditions: hypertension, hyperlipidemia, stroke, cerebral hemorrhage, subarachnoid hemorrhage, angina pectoris, myocardial infarction, arrhythmia, other heart diseases, diabetes, arthritis, and other disease (≤3), <sup>d)</sup>Full scorer of Tokyo Metropolitan Institute of Gerontology Index of Competence.

**TABLE 3** Baseline Characteristic of Continuous volunteers vs. Withdrawn Volunteers

	Continuous volunteers <sup>a)</sup> (n = 56)		Withdrawn volunteers <sup>a)</sup> (n = 11)		p-value
	Mean ± SD		Mean ± SD		
[Demographic variables]					
Age, year	68.2 ± 5.0		71.3 ± 8.1		n.s
Gender—male, n (%)	13 (23.2)		3 (27.3)		n.s
School years, year	13.4 ± 2.6		13.3 ± 2.4		n.s
Family structure —no children, n (%)	9 (16.1)		3 (27.1)		n.s
—no grandchildren, n (%)	6 (10.7)		0 (0.0)		n.s
Experience of reading picture books to children, n (%)	47 (83.9)		10 (90.9)		n.s
[Motivation of participation]					
to exchange with children	44 (78.6)		7 (63.6)		n.s
to enjoy reading picture books	40 (71.4)		4(36.4)		0.049
to have new friends	38 (67.9)		3 (27.3)		0.019
[Social activity]					
Experience of volunteer activities, n (%)	44 (78.6)		8 (72.7)		n.s
Social activity score					
social or volunteer activity	3.7 ± 1.5		3.4 ± 2.0		n.s
personal activity	8.1 ± 1.7		8.6 ± 1.5		n.s
lifelong study	1.6 ± 0.9		1.8 ± 0.9		n.s
occupation	0.5 ± 0.5		0.3 ± 0.5		n.s
[Cognitive function]					
Delayed recall	11.9 ± 3.4		10.9 ± 3.8		n.s
Verbal fluency (animal)	19.0 ± 4.5		17.7 ± 4.8		n.s
Information(WAIS-R)	13.2 ± 2.4		12.5 ± 2.6		n.s

(Continued)

**TABLE 3** (Continued)

	Continuous volunteers <sup>a)</sup> (n = 56)	Withdrawn volunteers <sup>a)</sup> (n = 11)	p-value
	Mean ± SD	Mean ± SD	
[Psychological variables]			
Self-rated health, score	1.9 ± 0.6	2.1 ± 0.3	n.s
Rosenberg' self-esteem scale	3.9 ± 1.7	3.6 ± 1.3	n.s
[Physical function]			
Number of chronic conditions <sup>b)</sup> , n	0.7 ± 0.9	0.6 ± 0.7	n.s
Using eye-glass —sometimes or seldom, n (%)	17 (30.4)	0 (0.0)	0.028
Higher-level functional capacity <sup>c)</sup> , n (%)	31 (55.4)	7 (63.6)	n.s
Systolic blood pressure, mmHg	137 ± 22	157 ± 27	0.001
Diastolic blood pressure, mmHg	83 ± 14	85 ± 12	n.s
Usual walking speed, m/minute	87.0 ± 13.0	85.5 ± 7.6	n.s

<sup>a)</sup>Total subjects of 3 fields(Chuo-ku, Kawasaki, Nagahama), <sup>b)</sup>Total number of chronic conditions: hypertension, hyperlipidemia, stroke, cerebral hemorrhage, subarachnoid hemorrhage, angina pectoris, myocardial infarction, arrhythmia, other heart diseases, diabetes, arthritis, and other disease(≦3), <sup>c)</sup>Full scorer of Tokyo Metropolitan Institute of Gerontology Index of Competence.



higher in the continuous volunteers group than in withdrawn volunteers group at the first follow-up survey, respectively. There was no significant difference in other variables such as socioeconomic, functional capacity, physical, and psychological items between the two groups. Also, there was no significant difference in these variables between the intensive volunteers group and the group of volunteers with low frequencies at the first follow-up survey (not shown in tables).

Frequency of interchange with children, except for grandchildren and neighboring children, evaluated by social network scores and providing social support scores, self-rated health, and grip strength, the general linear models detected significant interactions between the groups (intervention group versus control group) and number of surveys, adjusted for confounding factors such as gender and age during the nine months (Table 4). Furthermore, we found significant interaction between the groups (intensive volunteers group versus control group) and time of surveys (baseline, first follow-up, second follow-up) with regard to frequency of interchange with children ( $p < 0.01$ ) and self-rated health ( $p < 0.01$ ) and these positive effects on intensive volunteers continued 12 months more for these two variables (Figures 2 and 3).

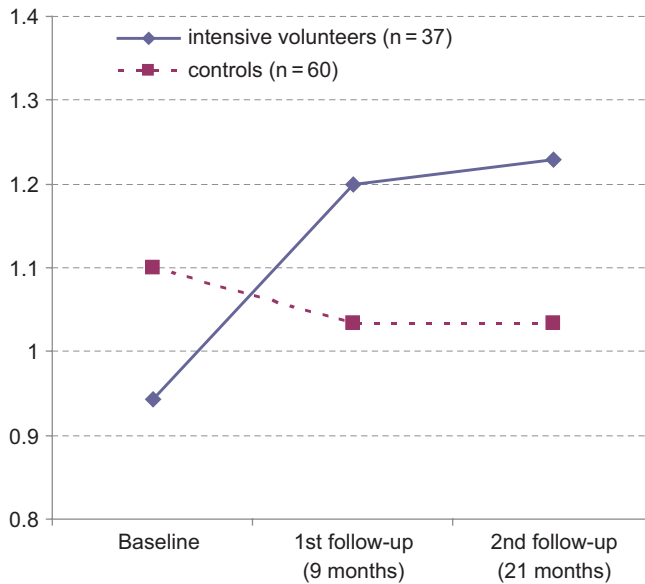
## DISCUSSION

The intervention program of this study aimed to activate senior volunteers' intellectual activities regularly and cyclically through reading picture books with children, intensively reading and practicing reading these books before performance (with children), and discussing these books and book-reading methods and styles with other volunteers at weekly school-based training meetings. In our study, all of the participants, except for one who had a collagen disease in the intervention group, were independent according to the TMIG Index of Competence. An eight-domain cognitive test was used for the subjects. Both of two groups scored high in every test at baseline and tended to maintain or improve their scores at the first or second follow-up because of ceiling effects or repeated effects among these independent subjects with highly cognitive function. Previous studies demonstrated that reading aloud was found to improve frontal function of people with dementia (Kawashima et al., 2005) and that discussion-based therapy for cognitive stimulation was found to maintain episodic memory or executive function of people with Mild Cognitive Impairment (MCI) (Yatomi, 2004). These effects were short term, but there is no evidence regarding the effects on cognitively intact older subjects as the volunteers and controls of this study. Thus, although this study, whose subjects were healthy older persons, might need long-term follow-up, the scores of a few variables in the intensive volunteers group remained significantly higher than in those of the control group during the 21 months.

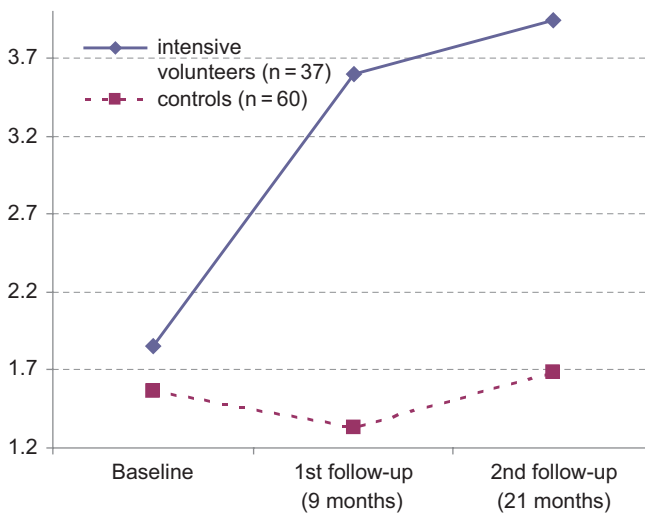
**TABLE 4** Comparison of Volunteers and Controls over Nine-Month Follow-Up

	Volunteers (n = 56)		Controls (n = 56)		Main effect <sup>b)</sup>		Interaction <sup>c)</sup>
	Baseline	Follow-up	Baseline	Follow-up	Group	Time	
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Group × Time	Group × Time	
Social network score, frequency of communication							
friends or neighbors	4.4 ± 0.9	4.5 ± 0.7	4.5 ± 0.9	4.5 ± 0.9	n.s	n.s	n.s
grandchildren	2.1 ± 2.1	2.4 ± 2.1	2.7 ± 2.0	2.4 ± 2.0	n.s	n.s	0.007
neighborhood children	2.7 ± 2.1	2.8 ± 1.8	2.8 ± 1.9	2.7 ± 1.7	n.s	n.s	n.s
distant children <sup>a)</sup>	1.6 ± 1.7	3.3 ± 1.1	1.6 ± 1.8	1.4 ± 1.5	<0.001	<0.001	<0.001
number of persons							
friends or neighbors	1.9 ± 1.1	2.2 ± 0.9	2.1 ± 0.9	2.1 ± 1.0	n.s	0.031	n.s
distant friends	3.1 ± 1.3	3.5 ± 1.1	3.3 ± 1.2	3.2 ± 1.1	n.s	n.s	0.044
Receiving social support score							
from family members living together	12.1 ± 6.6	12.3 ± 6.7	12.7 ± 6.4	12.9 ± 6.3	n.s	n.s	n.s
from family members living apart	11.6 ± 5.2	11.0 ± 4.9	11.9 ± 4.6	12.2 ± 5.1	n.s	n.s	n.s
from friends or neighbors	9.9 ± 4.8	8.8 ± 4.6	10.5 ± 4.8	11.0 ± 4.1	0.028	n.s	0.038
Providing social support score							
to family members living together	13.9 ± 7.2	13.9 ± 7.2	14.9 ± 6.9	14.0 ± 6.5	n.s	n.s	n.s
to family members living apart	14.0 ± 6.5	14.7 ± 5.1	15.0 ± 4.7	14.5 ± 4.7	n.s	n.s	n.s
to friends or neighbors	11.2 ± 5.9	13.1 ± 4.5	12.7 ± 5.0	12.7 ± 4.4	n.s	0.030	0.046
Social activity score							
social or volunteer activity	3.6 ± 1.5	4.1 ± 1.5	3.5 ± 1.3	3.9 ± 1.3	n.s	<0.001	n.s
personal activity	8.1 ± 1.7	8.4 ± 1.6	8.3 ± 1.1	8.5 ± 1.3	n.s	n.s	n.s
lifelong study	1.6 ± 0.9	1.9 ± 1.0	1.4 ± 1.0	1.5 ± 0.9	n.s	n.s	n.s
occupation	0.3 ± 0.4	0.2 ± 0.4	0.3 ± 0.5	0.3 ± 0.4	n.s	n.s	<0.001
Self-rated health, score	1.9 ± 0.6	2.1 ± 0.7	2.1 ± 0.5	2.0 ± 0.6	n.s	n.s	0.012
Usual walking speed, m/minute	86.9 ± 12.3	92.1 ± 15.3	81.0 ± 11.8	88.2 ± 15.6	n.s	<0.001	n.s
Hand grip strength, kg	25.7 ± 6.8	25.4 ± 6.4	26.6 ± 5.9	25.1 ± 6.7	n.s	<0.001	0.005

<sup>a)</sup>Children with whom contacted through volunteer activities, <sup>b,c)</sup>Adjusted for gender, age, school years using Generalized Linear Model.



**FIGURE 2** Transition of self-rated wealth among participants during the 21 months.



**FIGURE 3** Transition of frequency of interchange with children in volunteer program or events among participants during the 21 months.

Self-rated health of the intensive participants of the intervention group was better than that of the controls for 21 months. These findings are consistent with results from a study of Experience Corps conducted in the United States. In that study, it was reported that older adults who were

involved in structured school volunteer activities over a four to eight month period showed improvement in self-rated health measure (Fried et al., 2004). This finding from both studies is significant insofar as self-rated health is a good comprehensive marker of physical, mental, and social health to predict mortality and ADL among older people (Sugisawa & Sugisawa, 1995). Continued and intensive involvement in the REPRINTS program led to the largest improvements in senior participants' self-rated health.

Social network scores with children increased significantly in the intensive participants of the intervention group compared with those of the control group. This intergenerational aspect was, of course, the first basic concept of REPRINTS. This increase is probably because regular visits to schools provided a chance to have contact with children through volunteer activities. On the other hand, frequency of interchange with grandchildren increased significantly in the volunteer group during the initial nine months, although the difference attenuated gradually during the subsequent 12 months. Kusano (2004) pointed out that those who participate in intergenerational programs often also become more skilled at communicating with family members of other generations. As participants of the intervention group acquired skills for reading picture books, they might have had a greater motivation to read with their grandchildren, and, thus, the frequency of meeting them might increase.

Also, the frequency of interchange with friends and acquaintances of the same generation among volunteer group member increased significantly during the initial nine months. Although the difference attenuated gradually during the subsequent 12 months, the increasing tendency was lasting. Six to ten participants of the intervention group formed one small team in the allotted school or residential region. Participating in the REPRINTS program seemed to activate an intensive intragenerational social networking process among the volunteers. Beyond the social function served by the volunteer group, this intragenerational interaction was an important vehicle for enhancing the volunteers' performance in the program. These group meetings built up a strong team work dynamic that helped volunteers support one another in the intergenerational activities and added to the effectiveness and efficiency of the overall program. As schools regard the time of reading picture books by the volunteers as part of the educational curriculum, they need and expect volunteers with a high level of knowledge and skill.

The volunteers need to support one another when rehearsing or when they need to replace one another in case of an urgent absence. These supporting attitudes among the volunteers might have resulted in a significant increase of providing social support scores during the initial nine months. Many previous studies report that social support and networking contributes to maintaining mental health among older people (Masuchi & Kishi, 2001). Therefore, it is expected that they will have psychological effects on REPRINTS volunteers, too.

On the other hand, received support scores declined significantly in the intervention group during the initial nine months. Many volunteers are busy with housekeeping or care for family members in daily life. They often said, “We did not hesitate to provide support to colleagues, but we did not want to bother them by asking for support.” During the short term intervention program, it is possible that the participants were inhibited in the degree to which they were open to developing deep relationships with other volunteers; for some volunteers, pride may have been a factor that prevented them from accepting social support.

With regard to the effects on physical functioning during the initial nine months, the intervention group showed a significant improvement in grip strength when measured via a baseline survey and follow-up survey compared to the control group. Interaction of frequency of going outdoors and usual walking speed were close to being significant between the two groups at first follow-up. Maintenance of muscle strength in upper arms might be due to keeping their arms horizontal and showing the children.

## CONCLUSION

Through being engaged in the intergenerational and intellectual volunteer programs for nine months, the participant’s self-rated health and some aspects of social support, networking, and physical performance (e.g., hand-grip strength) were significantly promoted in senior volunteers. However, effects of physical performance on volunteers were attenuated during the subsequent 12 months. It was mainly due to ceiling effects, because both groups were healthy and active at baseline and maintained good scores during 21 months. Therefore, in order to find more long lasting physical effects, long-term follow-up studies with larger sample sizes are needed in the future.

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