Association between social mutual aid and psychological stress (K6) of residents in rural district

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Abstract

Objective: This study aimed to clarify the association between social mutual aid and psychological stress among residents in a rural district.

Materials and Methods: A cross-sectional study based on Andersen’s Behavioral Model of Health Care Utilization was conducted on 2,500 residents of City A in Akita Prefecture who were aged 65 years or older. The study was conducted from April 8 to May 15, 2017. Participants were administered a questionnaire containing items on individual characteristics (predisposing, enabling, and need) and contextual characteristics (physical factors).

Results: Responses were obtained from 1,236 participants, and data from 974 valid questionnaires were analyzed. Factors related to the high level of psychological stress were “maintenance of confidential relationships that could only be formed in the rural district (low)” and “social support (low)”, which are forms of social mutual aid. Use of health services had no association with psychological stress, whereas when psychological stress was high (5 points or higher), the rate of “not participating in community groups (no)” was also high.

Conclusion: The findings of this study indicate the need for the objective evaluation of the roles of self-help and mutual help among elderly adults living in a rural district and the mutual help and public help functions represented by health services. It is also important to develop districts that promote the enhancement of social mutual aid so that such help can be fully utilized.

Key words: rural districts, social mutual aid, K6, community improvement, local residents, elderly

Introduction

The term rural district refers to an “area where land use for agriculture and forestry accounts for a large percentage and population density is low, with rich secondary natural environment through agriculture and forestry and with public resources such as land and water”⁵. In rural districts a cooperative system of mutual help and self-help exists among the elderly⁶. In order to build a comprehensive community care system that fits the characteristics of rural districts, it is necessary to objectively evaluate social mutual aid among the elderly living in these districts (cooperation in which mutual help and self-help are combined and involve local residents and organizations). Previous studies on the elderly in rural districts have focused on individual characteristics, such as living function and blood sugar level⁷, depression⁸, drinking behavior⁹, and bone density⁴. Though courses of action for individuals receiving secondary prevention services⁵ and those who are unexamined have been suggested, residents, the local government, and health care providers need to collaborate to develop communities that support the maintenance and improvement of living functions among the elderly. Fujita et al.⁶ suggested that “approaches such as community developing activities and community empowerment are effective for improving mental health of local residents”. We think that clarification of the influence of social mutual aid among individuals on individual psychological stress in rural districts with limited social resources contributes to the development, evaluation, and enforcement of pol-
cies that lead to community development. In other words, mutual aid among residents in rural districts fosters community organization activities. This study aimed to clarify the association between social mutual aid and psychological stress among residents in a rural district.

Materials and Methods

Study design

This was a cross-sectional study.

Survey period

The study was conducted from April 8 to May 15, 2017.

Participants

The participants were 2,500 elderly people aged 65 years or older in City A, Akita Prefecture (population=27,530, as of April 1, 2016; aging rate=38.6%). The agricultural characteristics of Akita Prefecture are as follows: total agricultural land=109,356 ha (9.4% of the total area), farming land area=5,450 ha (3.7%), population engaged in agriculture=4.0%, and percentage of farms=3.9% (2015 Agricultural and Forestry Census Report). City A was founded in 2005 by the merging of one city, one town, and one village. In the city, Region A, which developed over time into a castle town, is an urban area located in the city's center. There have been many discoveries of stoneware and earthenware, and the remains of pit dwellings in Region B. Records also exist of hunting and farming during the ancient times in that region. Copper is mined in Region C. Region C is a local community where people have been living by agriculture for a long time. The city was designed and functions as a rural district.

Survey methods

1) The authors selected 2,500 people aged 65 years or older (as of April 1, 2017) from the Basic Resident Register, using a multi-stage sampling method.
2) Questionnaires were distributed to the potential participants by mail, and the respondents’ answers were collected by mail after they had agreed to participate in the study.

Survey contents

Based on Andersen’s Behavioral Model of Health Care Utilization, items corresponding to “Individual Characteristics” (predisposing, enabling, need) and “Contextual Characteristics” (physical factors) were used. One of the characteristics of the behavioral model is that it divides individual service use factors into three categories: “Predisposing” (individual characteristics that predispose an individual to service use), “Enabling” (environment of individual service use), and “Need” (intention of individual service use and judgment for the need of service by specialists such as physicians). The factors involved in the process leading to service utilization are depicted in a simple manner in the behavioral model. Although it is a simple model, it is an excellent model in that factors of the process leading to service use are arranged within the model. The model serves as a basic framework. Three types of factors (i.e., predisposing, enabling, and need) are included, and the need to focus on factors at local levels is emphasized. In order to ensure the validity of the questionnaire contents, items that matched the purpose of this study were carefully selected from past studies.

Variables of individual characteristics

(1) Predisposing: The demographic characteristics evaluated in this study were “age”, “sex” (male or female), “living status” (alone or with someone else), and “place of residence” (regions A, B, and C). The social characteristics evaluated in this study were “employment status” (with or without), “number of years of residence at current location”, and “social support” (SS). For belief, five items of “Feeling of subjective health control: support from surrounding (family)” of “The Health Locus of Control Scale Japanese Version” were used.

(2) Enabling: The economic characteristic evaluated in this study was “economical living” (facing economic hardship or not), and for the organizational characteristics and healthy practices, “family doctor” (have a family doctor or not) and “organizational or recreational activity” (perform these types of activities or not) were assessed.

(3) Need: For the subjective assessment of need, two variables were used: “participation in preventive activity with regard to nursing care” (participate or not) and “participation group” (participate in group or not). For the objective assessment of need, three variables were used: “treatment status” (undertreatment or treated), “the Kessler 6-item Psychological Distress Scale (K6) score” (psychological stress) and “drinking behavior” (having a drinking habit or not).

In this study, the Japanese version of the K6 was used as an index of psychological stress. The K6 consists of six items on the frequency of depressive feeling in the past 30 days. Responses are based on 5-point Likert scale of “Not at all”, “Just a little”, “Sometimes”, “Mostly”, and “Always”, to each of which 0–4 points were allocated, and total scores were calculated (score range=0–24 points). Higher scores indicate more psychological stress. In this study, we classified stress as normal (0–4 points) and more than mild (over 5 points), with scores over 5 points as “having psychological stress”, in accordance with Furukawa et al., who verified the performance of the Japanese version of the K6.

Variables of contextual characteristics
Social factors

In the evaluation of social mutual aid, the variable “social mutual aid for rural districts” (hereinafter referred to as ‘social mutual aid’) was used as discussed by Inoue et al. “Social mutual aid” consisted of four categories: “mutual relationship with nature”, “maintenance of confidential relationships that could only be formed in the rural district”, “respect for the social norms of the rural district”, and “social participation and network utilization that capitalizes on the advantage of rural district”. A total of 8 subcategories and 20 codes were used for social factors. The 20 codes were investigated with the 4-scale method (“Strongly agree”: 4 points, “Slightly agree”: 3 points, “Slightly disagree”: 2 points, “Do not agree at all”: 1 point) and graded for each category, and total scores were calculated. Furthermore, the scores were classified into two groups (high, low) by class values.

Use of health services

In the assessment of the use of health services the variable “Consciousness of participate in community groups” (have consciousness of participate in community groups or not) was used.

Analysis procedures

Descriptive statistics were executed, and basic statistics were calculated. Moreover, for psychological stress (K6), individual characteristics, and contextual characteristics, analyses were performed with the Mann-Whitney U and Kruskal-Wallis tests to compare the differences between variables. A multiple logistic-regression analysis was performed for multivariate adjustment and to calculate odds ratios and 95% confidence intervals (CI), with psychological stress (K6) (low [below 5 points] / high [over 5 points]) as a dependent variable and each item of the individual characteristics and contextual characteristics as an explanatory variable. Relationships between psychological stress (K6), individual characteristics, and contextual characteristics were analyzed. Age, sex, and SS were used for the adjustment variable, and contextual characteristics were used as an independent variable for all calculations. In the statistical analysis of the data, IBM SPSS version 25 (Armonk, NY, USA) was used, and the significance level was set at 5%.

Ethical considerations

This study was approved by the Ethical Review Board of the Graduate School of Nursing of the Faculty of Nursing at Iwate Prefectural University (April 12, 2017, 2017-D001). With regard to the protection of human rights, the participants were randomly selected, and the questionnaire was completed anonymously. As for private information, it was clearly stated in the study description that individuals could not be identified and that the data would not be used for other purposes besides those explained. Moreover, it was also stated that statistical processing was performed so that individuals and facilities would not be identified, participation in the study was voluntary, participants would not be disadvantaged even if they did not cooperate with the study, and responses with the enclosed envelope would be regarded as agreement to participate in the study. The researchers managed the data acquired by the survey responsibly with exclusive personal computers. The questionnaire sheets were shredded and discarded after the completion of the study. Furthermore, it was clearly stated in the study description and sufficiently explained to the participants that the results were to be presented at conferences and published in scholarly publications.

Results

The authors distributed questionnaire sheets to 2,500 potential participants, and 1,236 were returned (49.4% response rate). Questionnaires with one or more incomplete or incorrect responses on life function, psychological stress (K6), or health services, which were to be analyzed for this study, were excluded from the study. As a result, 974 (38.9%) valid questionnaires were analyzed (Figure 1).

Characteristics of the participants and descriptive statistics of each variable

Characteristics of the participants, and results of the comparisons between life functions and individual characteristics and contextual characteristics appear in Tables 1 and 2, respectively. With regard to the characteristics of the participants, 352 (54.6%) were aged between 65 and 74 years, and 440 (45.2%) were aged over 75 years. Participants included 409 males (42.0%) and 552 females (56.7%). With regard to number of years at current residence, 336 participants had resided at their current residence for 50 years or more (55.0%). For “economical living”, 322 participants worried about their finances (33.1%). The score on the K6 (psychological stress) was high (more than 5 points) for 272 participants (27.9%) (Table 1). Comparisons of psychological stress (K6) and individual characteristics and contextual characteristics revealed significant differences in age, sex, employment status, years of residence, economical living, organizational or recreational activity, treatment status, drinking behavior, two items of social mutual aid, and participation group for individual characteristics (Table 2).

Factors related to psychological stress (K6)

Table 3 shows the results of the multiple logistic-regression analysis with psychological stress (K6) (low [below 5 points] / high [over 5 points]) as a dependent variable. For individual characteristics, the odds ratio for Age (participants 75 years or older) was 1.41 (95% CI 1.00–2.01), for economical living (worry) the ratio was 2.32 (95% CI 1.67–
3.21), for organizational or recreational activity (did not perform these types of activities), 1.98 (95% CI 1.39–2.82), for treatment status (undertreated), 1.76 (95% CI 1.09–2.84), for mutual relationship with nature (low) in social mutual aid, 2.14 (95% CI 1.10–4.17), for maintenance of confidential relationships that could only be formed in the rural district (low), 0.36 (95% CI 0.17–0.79), and for social support (low), 2.53 (95% CI 1.62–3.94) (Table 3).

### Discussion

Watanabe et al.\textsuperscript{18} clarified the relationship between aspects of daily living (i.e., language, visual acuity, diet, clothing, and audibility) and “definite aim” among residents of rural districts. Moreover, in their study, they stated “as for ‘friends and neighbors who can help each other’, positive answers were obtained from most subject groups though it was found to be a negative factor for the elderly group of the general healthy subject group, indicating that they ‘do not have friends or neighbors’”. Persons with definite aims were found to have significantly lower risk of need for nursing care\textsuperscript{19}. Cognitive activity is a regulatory factor that is important in the association between social participation and the need for nursing care\textsuperscript{20}. In this study, “mutual relationship with nature” and “social support”, which play important roles in social mutual aid in rural districts, were low. This finding is similar to those of previous studies. The Agricultural Cooperative Mutual Aid Research Institute Contract Research “Aging in Agricultural District and Measure for It” Study Group\textsuperscript{21} stated the following.

Continuation of agriculture and mutual help for farming in local communities, and thoughts for involving with traditional village festivals were seen. Moreover, agricultural products are vital not only for living but also for bearing and bringing up children and growth of children and grandchildren, and they are obtained not merely by producing activity of each one but also by ties with people living in the rural district.

Although the study by Watanabe et al.\textsuperscript{18} was performed 20 years before this study, similar results were obtained. Social mutual aid that is rooted in the community is related to lowered psychological stress and closeness, and therefore, it is necessary to investigate mutual help that is rooted in the community to shed light on the relationships between residents in a rural district and attitudes and behaviors in order to provide support for mutual living within the local community.

On the other hand, the odds ratio of “maintenance of confidential relationships that could only be formed in the rural district (low)” was 0.36 (95% CI 0.17–0.79). The items for this variable were “I feel that neighborly relations based on the community are becoming weak”, “I feel that relations unique to rural districts is weakening”, “I feel that there are characteristics of human relations that are unique to rural districts”, “I feel that relations unique to agricultural districts are taking root in my life”, and “The entire district functions as if we are all related”, and psychological stress was not these questions.

Fujita et al.\textsuperscript{8} stated that “Various psychosocial factors are related to the mental health of local residents, and they are plural in most cases. The individual support alone is not sufficient and therefore social support by community development is important”. As mental health needs increase, more community development focused on the varying and local characteristics of rural districts is needed. At the same time, it is important to establish community development indices that clarify which social mutual aids affect local residents, and visualize and utilize them for changes in policy.

Ikuta et al.\textsuperscript{22} investigated the changes in community health nurse activity from before to after the municipal merger and stated, “Accessibility of residents has decreased”. The authors further stated “There exist imbalance
| Table 1 Subjects’ characteristics |
|----------------------------------|

| Individual Characteristics | n=974 | Ratio (%) |
|-----------------------------|-------|-----------|
| Predisposing                |       |           |
| Demographic Characteristics |       |           |
| Age (years) 65–74           | 532   | 54.6      |
| 75 ≤                       | 440   | 45.2      |
| Sex                         |       |           |
| Male                        | 409   | 42.0      |
| Female                      | 552   | 56.7      |
| living status               |       |           |
| Alone                       | 99    | 10.2      |
| With someone else           | 871   | 89.4      |
| Place of residence          |       |           |
| Region A                    | 394   | 40.5      |
| Region B                    | 378   | 38.8      |
| Region C                    | 177   | 18.2      |
| Social support              |       |           |
| Low (8–16 points)           | 129   | 13.2      |
| High (17–32 points)         | 740   | 76.0      |
| Social Characteristics      |       |           |
| Employment state            |       |           |
| Employed                    | 369   | 37.9      |
| Unemployed                  | 590   | 60.6      |
| Residence year for the current local community |       |           |
| Less than 10 years          | 40    | 4.1       |
| 10–29                       | 100   | 10.3      |
| 30–49                       | 296   | 30.4      |
| More than 50 years          | 536   | 55.0      |
| Beliefs                     |       |           |
| HLC (support (family))      |       |           |
| Low (5–10 points)           | 19    | 2.0       |
| High (11–20 points)         | 916   | 94.0      |
| Enabling                    |       |           |
| Financial characteristic    |       |           |
| Economical living           |       |           |
| Not                         | 617   | 63.3      |
| Facing economic hardship    | 322   | 33.1      |
| I don’t know.               | 22    | 2.3       |
| Organized characteristic, health practice |       |           |
| Family doctor               |       |           |
| Have family doctor          | 758   | 77.8      |
| Have no family doctor       | 181   | 18.6      |
| Recreation activity         |       |           |
| Do recreation activity      | 432   | 44.4      |
| Do not do recreation activity| 489   | 50.2      |
| Need                        |       |           |
| Objective evaluation        |       |           |
| Treatment status            |       |           |
| Under treatment             | 773   | 79.4      |
| Not treated                 | 185   | 19.0      |
| Vital function (basic check list) total point1) (1–19 points) |       |           |
| Median                      | 25    | 2.00      |
| Percentile                  | 75    | 7.00      |
| K6 (psychological stress) (0–24 points) |       |           |
| Low (0–4 points)            | 702   | 72.1      |
| High (5–24 points)          | 272   | 27.9      |
| Drinking habit              |       |           |
| Have drinking habit         | 360   | 37.0      |
| Have no drinking habit      | 606   | 62.2      |
| Contextual Characteristics  |       |           |
| Social factor               |       |           |
| Social mutual help in agricultural district area |       |           |
| Mutualism with the nature   |       |           |
| Low (4–8 points)            | 57    | 5.9       |
| High (9–16 points)          | 828   | 85.0      |
| Maintenance of confidential relationship that could be seen only in the rural district |       |           |
| Low (5–10 points)           | 58    | 6.0       |
| High (11–20 points)         | 817   | 83.9      |
| Respect the social norm of the rural district |       |           |
| Low (6–12 points)           | 145   | 14.9      |
| High (13–24 points)         | 695   | 71.4      |
| Social participation and network utilizing the advantage of rural district |       |           |
| Low (5–10 points)           | 249   | 25.6      |
| High (11–20 points)         | 618   | 63.4      |
| Utilization of the health service |       |           |
| Participating group         |       |           |
| Participate in group        | 459   | 47.1      |
| Not participate in community groups | | 496 | 50.9 |

Ground total. 1) Median and percentile of the vital function total points (Higher total scores indicate lower vital function). The total does not reach 974 for some item due to missing values. The total does not reach 974 for some item due to missing values.
and inefficiency of the service in the new city and town” for health service. Tsuzuki et al. 23) clarified the influence of the municipal merger on health service and community health nurse activity according to population scale.

The number of spheres controlled by cities and towns grew after the municipal merger, which indicates that con-

Table 2  Association between psychological stress (K6) and individual characteristics and contextual characteristics

|                              | n=974 | Ratio (%) | Kt: Number of people with more than 5 points (%) | P value |
|------------------------------|-------|-----------|-----------------------------------------------|--------|
| **Individual Characteristics** |       |           |                                               |        |
| **Predisposing**             |       |           |                                               |        |
| **Demographic Characteristics** |       |           |                                               |        |
| Age (years)                  |       |           |                                               |        |
| 65–74                        | 532   | 54.6      | 128 (24.1)                                    | 0.003  |
| 75 ≤                         | 440   | 45.2      | 144 (32.7)                                    |        |
| Sex                          |       |           |                                               |        |
| Male                         | 409   | 42.0      | 99 (24.2)                                     | 0.028  |
| Female                       | 552   | 56.7      | 169 (30.6)                                    |        |
| living status                |       |           |                                               |        |
| Alone                        | 99    | 10.2      | 30 (30.3)                                     | 0.530  |
| With someone else            | 871   | 89.4      | 238 (27.3)                                    |        |
| Place of residence           |       |           |                                               |        |
| Region A                     | 394   | 40.5      | 119 (30.2)                                    | 0.150  |
| Region B                     | 378   | 38.8      | 92 (24.3)                                     |        |
| Region C                     | 177   | 18.2      | 53 (29.9)                                     |        |
| Social support               |       |           |                                               |        |
| Low (8–16 points)            | 129   | 13.2      | 57 (44.2)                                     | <0.001 |
| High (17–32 points)          | 740   | 76.0      | 190 (25.7)                                    |        |
| **Social Characteristics**   |       |           |                                               |        |
| Employment state             |       |           |                                               |        |
| Employed                     | 369   | 37.9      | 84 (22.8)                                     | 0.007  |
| Unemployed                   | 590   | 60.6      | 182 (30.8)                                    |        |
| Residence year for the current local community | | | | |
| Less than 50 years           | 436   | 44.8      | 108 (24.7)                                    | 0.049  |
| More than 50 years           | 536   | 55.0      | 163 (30.4)                                    |        |
| **Belifes**                  |       |           |                                               |        |
| HLC (support (family))       |       |           |                                               |        |
| Low (5–10 points)            | 19    | 2.0       | 8 (42.1)                                      | 0.164  |
| High (11–20 points)          | 916   | 94.0      | 253 (27.6)                                    |        |
| **Enabling**                 |       |           |                                               |        |
| Financial characteristic     |       |           |                                               |        |
| Economical living            |       |           |                                               |        |
| Not                          | 617   | 63.3      | 138 (22.4)                                    | <0.001 |
| Facing economic hardship     | 322   | 33.1      | 122 (37.9)                                    |        |
| I don’t know.                | 22    | 2.3       | 9 (40.9)                                      |        |
| Organized characteristic, health practice | | | | |
| Family doctor                |       |           |                                               |        |
| Have family doctor           | 758   | 77.8      | 218 (28.8)                                    | 0.099  |
| Have no family doctor        | 181   | 18.6      | 41 (22.7)                                     |        |
| Recreation activity          |       |           |                                               |        |
| Do recreation activity       | 432   | 44.4      | 82 (19.0)                                     | <0.001 |
| Do not do recreation activity | 489   | 50.2      | 190 (35.1)                                    |        |
| **Need**                     |       |           |                                               |        |
| Objective evaluation         |       |           |                                               |        |
| Treatment status             |       |           |                                               |        |
| Under treatment              | 773   | 79.4      | 234 (30.3)                                    | 0.002  |
| Not treated                  | 185   | 19.0      | 35 (18.9)                                     |        |
| Drinking habit               |       |           |                                               |        |
| Have drinking habit          | 360   | 37.0      | 83 (23.1)                                     | 0.008  |
| Have no drinking habit       | 606   | 62.2      | 188 (31.0)                                    |        |
| **Contextual Characteristics** |     |           |                                               |        |
| **Social factor**            |       |           |                                               |        |
| Social mutual help in agricultural district area | | | | |
| Mutualism with the nature    |       |           |                                               |        |
| Low (4–8 points)             | 57    | 5.9       | 22 (38.6)                                     | 0.088  |
| High (9–16 points)           | 828   | 85.0      | 232 (28.7)                                    |        |
| Maintenance of confidential relationship that could be seen only in the rural district | | | | |
| Low (5–10 points)            | 58    | 6.0       | 10 (17.2)                                     | 0.041  |
| High (11–20 points)          | 817   | 83.9      | 244 (29.9)                                    |        |
| Respect the social norm of the rural district | | | | |
| Low (6–12 points)            | 145   | 14.9      | 40 (27.6)                                     | 0.695  |
| High (13–24 points)          | 695   | 71.4      | 203 (29.2)                                    |        |
| Social participation and network utilizing the advantage of rural district | | | | |
| Low (5–10 points)            | 249   | 25.6      | 82 (32.9)                                     | 0.082  |
| High (11–20 points)          | 618   | 63.4      | 167 (27.0)                                    |        |
| **Utilization of the health service** | | | | |
| Participating group           |       |           |                                               |        |
| Participate in group          | 459   | 47.1      | 101 (22.0)                                    | <0.001 |
| Not participate in community groups | | | | |
| Not participate in community groups | | | | |

Mann-Whitney’s U test was used for comparison of the two groups. Kruskal-Wallis test of for three comparison. The total does not reach 974 for some item due to missing values.
The contents, quantity, and quality of community health nurse activities have changed. Nakamura et al. held a workshop to share ideas with local residents regarding tasks that could be performed to prevent the need for resident-based nursing care. Volunteers in the local area had tasks in mind that they could perform and took a significant step toward prevention of the need for resident-based nursing care by sharing their ideas. The ideas generated in the workshop led to attempts to promote cooperation among volunteers and increased support for resident-based activity. Changed were also observed in nursing prevention practices in the local community.

### Table 3: Result of multiple logistic-regression analysis with psychological stress (K6) as dependent variable

|                                | Odds ratio | 95% confidence interval |
|--------------------------------|------------|-------------------------|
|                                | Lower      | Upper                   |
| **Individual Characteristics** |            |                         |
| Predisposing                   |            |                         |
| Demographic Characteristics    |            |                         |
| Age (years) 65-74              | 1.00       |                         |
| 75 ≤                           | 1.41       | 1.00 2.01               |
| Sex                            | 1.00       |                         |
| Male                           |            |                         |
| Female                         | 1.19       | 0.83 1.71               |
| living status                  | 1.00       |                         |
| Alone                          |            |                         |
| With someone else              | 0.79       | 0.56 1.24               |
| Place of residence             | 1.00       |                         |
| Region A                       |            |                         |
| Region B                       | 0.66       | 0.47 0.94               |
| Region C                       | 0.81       | 0.53 1.25               |
| Social support                 | 1.00       |                         |
| Low (8-16 points)              |            |                         |
| High (17-32 points)            | 2.53       | 1.62 3.94               |
| Social Characteristics         |            |                         |
| Employment state               | 1.00       |                         |
| Employed                       |            |                         |
| Unemployed                     | 1.33       | 0.94 1.88               |
| Residence year for the current local community | 1.00 |                         |
| Less than 50 years             |            |                         |
| More than 50 years             | 0.88       | 0.63 1.23               |
| Enabling                       |            |                         |
| Financial characteristic       |            |                         |
| Economical living              | Not        |                         |
| Facing economic hardship        | 2.32       | 1.67 3.21               |
| I don’t know.                  | 1.94       | 0.74 5.14               |
| Organized characteristic, health practice |            |                         |
| Family doctor                  | 1.00       |                         |
| Have family doctor             |            |                         |
| Have no family doctor          | 1.27       | 0.80 2.02               |
| Recreation activity            | 1.00       |                         |
| Do recreation activity          |            |                         |
| Do not do recreation activity   | 1.98       | 1.39 2.82               |
| Need                           |            |                         |
| Objective evaluation           |            |                         |
| Treatment status               | Under treatment | 1.00 |                         |
| Not treated                    | 1.76       | 1.09 2.84               |
| Drinking habit                 |            |                         |
| Have drinking habit            | 1.00       |                         |
| Have no drinking habit         | 0.89       | 0.61 1.30               |
| Contextual Characteristics     |            |                         |
| Social factor                  |            |                         |
| Social mutual help in agricultural district area | Low (4-8 points) | 1.00 |                         |
| Mutualism with the nature      |            |                         |
| High (9-16 points)             | 2.14       | 1.10 4.17               |
| Maintenance of confidential relationship that could be seen only in the rural district | Low (5-10 points) | 1.00 |                         |
| High (11-20 points)            | 0.36       | 0.17 0.79               |
| Respect the social norm of the rural district | Low (6-12 points) | 1.00 |                         |
| High (13-24 points)            | 0.77       | 0.46 1.28               |
| Social participation and network utilizing the advantage of rural district | Low (5-10 points) | 1.00 |                         |
| High (11-20 points)            | 1.09       | 0.73 1.63               |
| Utilization of the health service | Participate in group | 1.00 |                         |
| Subjective assessment          |            |                         |
| Participating group            |            |                         |
| Not participate in community groups | 1.11 | 0.78 1.58 |

The workshop led to attempts to promote cooperation among volunteers and increased support for resident-based activity. Changed were also observed in nursing prevention practices in the local community.
The above described strategy may be ideal in its approach to the prevention of nursing care needs\(^{25}\). On the other hand, this study found that the use of health services was unrelated to psychological stress though the ratio of high psychological stress was high (more than 5 points) and “participation group” (no group) was high. This result suggests that psychological stress of local residents is reduced by promoting social involvement through connecting residents with one another while supporting the social mutual aid between them.

In the future, in order to improve living functions among the elderly living in rural districts, it is necessary to classify not only individual characteristics but also contextual characteristics such as population size, culture, historic strength, and geographical situation, and to foster community development based on the characteristics of the area. With regard to the association between social mutual aid and living function, the association between individual characteristics (e.g., sex and age) and living function has been clarified in previous studies\(^{3–6}\). According to a report by the 2013 Community Health Total Promotion Program\(^{26}\), titled “Study on Ideal Health Service for Breeding and Utilization of Social Capital”, on the development of social capital of community health nurses and their effects on local communities, “promotion of self-help and mutual assistance”, “improvement of local activity”, and “improvement of local power” were recognized by approximately 80% of the community health nurses, and community health nurses were more aware of the overall local effects than the individual effects. It is indicated that community health nurse activity that is informed by contextual characteristics is influenced not only by the relations at individual levels but also by those at local levels. Though the importance of community improvement is recognized\(^{7–10}\), it is also necessary to incorporate individual health indices and the social mutual aid that surrounds individuals into community development, in order to effectively utilize the limited social resources of rural districts and to construct community comprehensive care systems unique to rural districts.

This study had one important limitation. Because the participants were all elderly residents of City A in Akita Prefecture, it is difficult to generalize the study results. However, studies that investigate both individual characteristics and contextual characteristics\(^{10}\) are limited in Japan. A significant finding of this study is the importance of community development that focuses on social mutual aid.

### Conclusion

When social mutual aid is low, psychological stress is high. Factors related to psychological stress were “aged 75 years or older”, “economical living” (worry), “organization- or recreational activity” (did not perform the activities), “treatment status” (treated), “mutual relationship with nature” (low), which is a form of social mutual aid, “maintenance of confidential relationships that could only be formed in the rural district” (low), and “social support” (low).

Use of health service had no association with psychological stress. However, when psychological stress was high (5 points or higher), the rate for “not participating in community groups” (no) was high.

It is necessary to objectively evaluate the self-help and mutual help roles assumed by elderly adults living in rural districts and the mutual help and public help functions represented by health service, and develop districts that enhance social mutual aid that fully utilizes them.

### Conflict of interest

The authors declare no conflicts of interest.

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