Original Article

Developing and testing a draft scale evaluating older adults' perceptions of community-based connectedness with people: A pilot study

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Objective　Connectedness is essential for maintaining the physical and mental health of older adults. However, measurements that consider the presence of community-dwelling people and explicitly focus on an individual's subjective sense of connectedness have not yet been established. This pilot study aimed to develop a draft scale that comprehensively measured older adults' perceptions of community-based connectedness with people.

Methods　The scale development comprised three phases; item review, pre-test, and field verification. Phase 1 (item review) involved creating an item pool and evaluating content validity. Phase 2 (pretest) involved evaluating face validity and conducting item analysis on the preliminary version of the scale. Phase 3 (field verification) involved distributing the preliminary scale to 800 Japanese men and women aged ≥ 65 years residing in Asahikawa, Hokkaido, Japan. Validity was assessed by factorial validity using exploratory factor analysis and concurrent validity using correlation analysis. Reliability was confirmed by Cronbach's α coefficient using the internal consistency method.

Results　The evaluation of content validity in Phase 1 and face validity in Phase 2 yielded 30 items. In phase 3, of the 800 questionnaires that were distributed, 343 were returned, of which 309 included responses to all items and were analyzed. Exploratory factor analysis resulted in a 22-item scale comprising three factors that assessed perceptions of community-based connectedness. The Cronbach's α for the total scale was 0.967, and the α coefficients for inclusion, reciprocity through provision, and reciprocity through reception were 0.941, 0.915, and 0.928, respectively. The total scale scores were significantly positively correlated with purpose in life ($rs = .453, P < .001$) and negatively correlated with loneliness ($rs = -.307, P < .001$).

Conclusion　The 22-item draft scale exhibited adequate reliability and validity. Perceptions of connectedness measured by this scale can be used to support public healthcare interventions for community-dwelling older adults.

Key words：aged, community, connectedness, scale development, healthcare

I. INTRODUCTION

Connectedness is relevant to older adults' health and well-being and amenable to care interventions[1]. Register and Herman[2] referred to connectedness as "self-regulating, facing aging, engaging life by being part of a family, having friends, and being spiritual." Although connectedness is universally essential to people's physical and mental health, irrespective of generation[3], there is a growing body of knowledge examining its relationship with multiple aspects of health particularly in older adults. Connections contribute to the maintenance of activity[4], cognitive function[5,6], agency[7], and purpose in life[8]. Incorporating the concept of connectedness in community development can help ensure the effectiveness and maintenance of interventions to maintain and improve older adults' overall health.

To measure connectedness, previous studies have utilized objective indicators that quantitatively measure network size and contact frequency, such as the frequency of participation in social activities[9] and the presence and number of confidants[6]. However, network size tends to shrink with age, and older adults are believed to acquire

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Figure 1　Research design
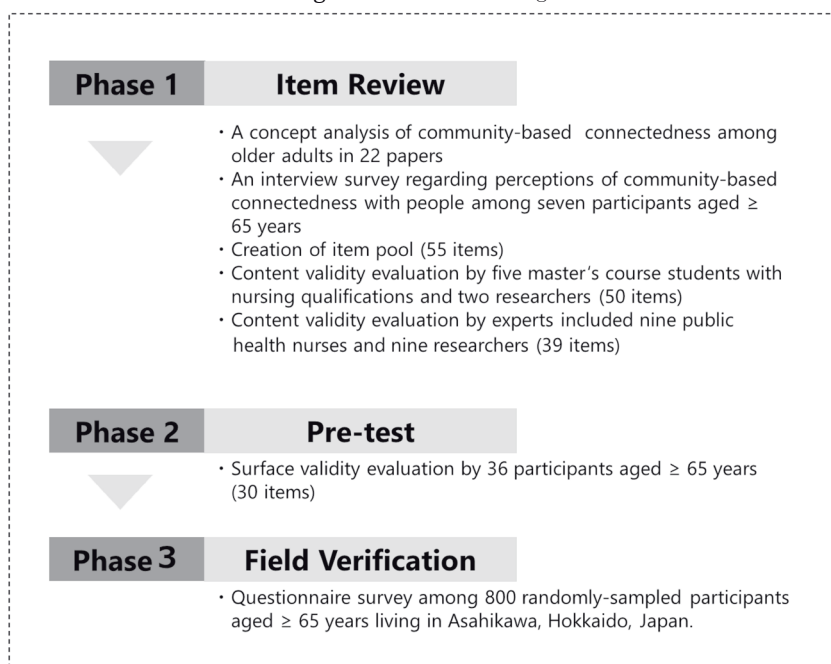
positive experiences and well-being by choosing to reduce their network size and value their personal networks more[10]. Accordingly, scholars have emphasized the importance of both qualitative and quantitative assessments of connectedness[11]. Furthermore, given the characteristics of the developmental challenges of older adults, subjective indicators of connectedness may be important for related examinations in this population.

Public health practitioners require a connectedness scale that considers the connectedness of older adults with people in their community. Therefore, we sought to develop a Japanese scale to measure older adults' perceptions of community-based connectedness with people. We developed a draft scale as a pilot study and assessed its reliability and validity. Our study design was based on classic test theory (Figure 1) and comprised the following three phases: (1) item review, (2) pre-test, and (3) field verification.

II.　METHODS

1.　Phase 1: Item review

For the item review, we conducted a concept analysis[12] and interview survey and created an item pool. A concept analysis was conducted using Walker and Avant's[13] approach to identify the concept of older people's connectedness in the community. We searched for peer-reviewed articles written in English and published until 2023, and subsequently analyzed 25 eligible articles that met the inclusion criteria. Inclusion criteria included participants being older adults living in the community and a description of the connectedness, as shown in Table 1. We interviewed seven participants (three men and four women; average age: 69.9 years) aged ≥ 65 years, living in town A, Hokkaido, Japan, using a qualitative descriptive research design[14]. The interview contents were deductively analyzed using concept analysis. The interviews revealed that the concept comprised the following three categories: "a sense of being together," "a desire to live alongside," and "a positive acceptance of mutual support." Based on these results, a three-factor structure was hypothesized for this concept.

Subsequently, according to Walker and Avant's[13] assertion that concept analysis results can be used to develop scale items, we created a pool of 55 items, which were verified by seven professionals in the field of public health nursing (i.e., five master's course students who are qualified nurses and two researchers). Validity was assessed using the content validity index CVI[15] and item-level CVI (I-CVI), which is a four-point scale ranging from 1–4, and the percentage of experts who assigned a score of 3 (adequate but revision needed) or 4 (adequate) was calculated. The tolerance value was set at ≥ 0.78[15], and the scale-level CVI (S-CVI) was calculated as the mean I-CVI. The allowed value was set at ≥ 0.90[15]. The results revealed an I-CVI range of 0.714–1.000 and an S-CVI of 0.943. Five items with an I-CVI below the acceptable value were excluded. Thus, the scale was revised to include 50 items (I-CVI: 0.857~1.000; S-CVI: 0.957).

The item pool was then content validated by 18 experts. Since the draft scale was intended for use in the context of nursing care assessment for community-dwelling older adults, its content validity needed to be examined by its future users: public health nurses. Thus, we enrolled nine public health nurses and nine researchers. Each of the public health nurses selected had at least 10 years' experience in healthcare for older adults, with an average of 20 years of experience. Researchers were recruited from the field of public health nursing, currently

Table 1　Item review details

Step 1	Concept analysis	Initially, we conducted a concept analysis of target concepts. This concept analysis was defined and analyzed in English because it was intended to include concepts commonly used internationally. Concept analysis helps create items that accurately reflect concept attributes. As aforementioned, a concept analysis was conducted using Walker and Avant's approach to identify the concept of older people's connectedness in the community. The concept analysis searched for peer-reviewed articles published until 2023 and written in English, then analyzed 25 eligible articles that met the inclusion criteria. Inclusion criteria were that participants be older adults living in the community and that there be a description of the connectedness. The concept analysis process led to defining older adults' connectedness as the "perception of sense of belonging to the community achieved through interactions and feeling of togetherness through interrelationships," and to defining people in the community as "people in an older adult's neighborhood or town." The current study applied both definitions.
Step 2	Creating the item pool	Subsequently, according to Walker and Avant's assertion that concept analysis results can be used to develop scale items, an item pool was created based on the results of our past concept analysis. Although it was theoretically possible to create an item pool using only concept analysis evidence, we deemed that data from the existing literature alone would not sufficiently reflect older adults' perceptions. Therefore, an interview survey was conducted to strengthen the validity of the item pool.
Step 3	Interview survey	We interviewed seven participants. The reason for targeting Japanese was that, in developing a scale written in Japanese, it was necessary to ensure that the results of the concept analysis using existing English literature adequately reflected the Japanese older adults' perceptions of connectedness in their context. The results of the concept analysis, which was used as a frame of reference in the interview survey, were translated in the preparation of the interview guide. The translation was performed by the first author, who holds a master's degree in public health nursing, and the quality of the translation was ensured through thorough review with the last author, who is an educator and researcher with practical experience in the field of public health nursing. The interview survey was designed to identify perceptions of community-based connections with people. Semi-structured interviews allowed the participants to speak freely about their own experiences related to the theme.

affiliated with a university with experience in public health nursing activities. Validity was assessed using CVI[15]. Additionally, a free response box was provided for each item to solicit opinions on the draft scale's comprehensiveness in complying with COSMIN Bias Risk Checklist[16]. The results revealed an I-CVI range of 0.833–1.000 and an S-CVI of 0.949, both of which were within the acceptable range. We considered all items that were commented upon in the free response box by experts as needing improvements for comprehensiveness, even if they were within the standard range. 17 items were revised based on comments regarding wording; five items were added based on comments regarding additions; and 16 items were deleted based on comments regarding semantic content duplication. Finally, the draft scale was refined to include 39 items.

2.　Phase 2: Pretest

A pretest was conducted to confirm the face validity of the 39 items created in Phase 1. 36 participants（19 men and 17 women, mean age: 78.4 years）aged 65 or older and living at home—selected through convenience sampling—were asked to participate; responses were obtained from all participants. In addition to responding to the draft scale, participants were free to comment on the time required to answer the questions, as well as the clarity of the instructional text, items, and answer choices. In the instructional text, the definition of community identified in the concept analysis[12] was clearly stated, and the survey was designed to avoid any discrepancies in the scope of community assumed by the target respondents. In the free text, participants provided no requests for modifications to item wording, and all items were seemingly con-

gruent with the older adults' perceptions. Responses were subjected to item analysis to assess scores and inter-item correlations' distribution, resulting in the exclusion of nine items. Pre-test results showed that scores tended to be concentrated on two or three points with low variability. Based on the distribution of responses, we increased the number of response options to create a scale with a normal distribution and increased the Likert scale from four to six points. After these procedures, the draft scale featured 30 items.

3.　Phase 3: Field verification

The participants included 800 men and women aged ≥ 65 years, residing in Asahikawa, Hokkaido, Japan. In Japan, older adults are defined as people 65 years of age and older who are provided with healthcare and other services[17]. As this study was conducted in Japan, conforming to the Japanese definition was considered appropriate.

The sample size was decided by adopting the participant-to-item ratio methodology used for a priori determination. Since the recommended ratio ranged from 2–20 participants[18,19] or 10 participants[20] per item, 10 participants per item were required for this study, implying a minimum sample of 300 participants. Since the study sampling method allowed the inclusion of participants who could incur difficulties in responding to the questionnaire, response rates were expected to be around 40–50%, and thus 800 participants were considered necessary.

During the first step of sampling, we stratified all 14 districts in Asahikawa based on district population size（strata of under 10,000, 10,001–20,000, 20,001–30,000, 30,001–40,000, 40,001–50,000, and 50,001 or more）. One district was then randomly selected from each stra-

tum, leading to the selection of six districts. This ensured that the selection was representative of all the population classifications of the districts in Asahikawa. Second, we stratified those aged 65 and older residing within each of the six extracted districts by sex (men/women strata) and age (65–74/75–84+ strata). Third, we calculated the required number of people that we needed to extract from each stratum based on the population composition of each district. Fourth, we randomly selected the first survey target participant. Finally, for the second and subsequent targets, we systematically extracted one target participant from every 10 people on the list of the basic resident registration ledger.

A self-administered, anonymous questionnaire was distributed by mail to the participants. They were asked to respond to the questionnaire and return it to the university via a self-addressed, stamped envelope form. Data were collected from October 1 to December 1, 2022. The questionnaire comprised questions on demographic characteristics (i.e., age, sex, family structure, residential history, educational background, employment status, economic status, and level of care needed), a draft of the "community-based perception of connectedness with people" scale, and scales for assessing concurrent validity. The level of care needed is a health indicator used in Japan[17] and had the following response options: "not applicable," "required support certification (including 1 or 2)," and "long-term care certification (including 1 to 5)."

The scales for confirming concurrent validity—specifically, ikigai (a Japanese word for the concept of purpose in life) and loneliness—were selected based on the previous concept analysis[12]. Ikigai was predicted to exhibit a significant positive correlation with connectedness, and loneliness was predicted to exhibit a significant negative correlation with connectedness. The nine-item Ikigai-9[21], an awareness scale, was used to measure sense of purpose in life and rated on a five-point Likert scale ranging from 1–5 (hardly applicable–very applicable). Higher scores indicated a higher sense of purpose in life (score range: 9–45). The Japanese version of the Three-Item Loneliness Scale[22] was used to assess loneliness and rated on a three-point Likert scale ranging from 1–3 (rarely–often). Higher scores indicated higher loneliness (score range: 3–9). Both scales were tested for reliability and validity[21,22].

All data analyses were performed using SPSS Statistics (version 26.0 J; IBM SPSS Inc.). A significance level of 5% (two-sided) was used. Initially, we performed descriptive statistics for demographic characteristics, and compared them to check for bias while excluding data from participants categorized as invalid respondents. A t-test was performed for age; and χ^2 tests for sex, family structure, residential history, educational background, employment status, economic status, and level of care were needed in the valid and invalid respondent groups.

Simple tabulations were performed to ensure that the items were appropriate and internally consistent. The analysis details included ceiling effect, floor effect, good-poor (G-P) analysis, and item-total correlation (I-T) analysis. The exclusion criteria were as follows: ceiling effect (mean +1SD > 6 points), floor effect (mean −1SD < 1 point), G-P analysis (no significant difference between the high-scoring [good] and low-scoring [poor] groups), and I-T analysis (correlation coefficient $r < 0.3$). Additionally, Spearman's rank correlation analysis was performed to examine overlapping items; when $r > 0.8$, the items were considered extremely similar, and one item was excluded.

After item analysis, an exploratory factor analysis (EFA) was performed to construct the factor structure with a maximum likelihood promax rotation. Sample size adequacy was assessed by performing the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. Eigenvalues were set above 1, and factors were extracted. Items with a commonality of < 0.3 and factor loadings of < 0.4 were excluded, and the analysis was repeated. For reliability, Cronbach's α was used to verify internal consistency (criterion ≥ 0.7). Concurrent validity was confirmed using the ikigai and loneliness scales, and correlation coefficients were calculated for the entire scale and subscales.

4. Ethical considerations

This study was performed in accordance with the Declaration of Helsinki. This study was approved by the Ethics Review Committee of the Faculty of Health Sciences, Hokkaido University (approval number: 22–48; approval date: September 1st, 2022). The participants were informed of the guarantees of anonymity, data confidentiality, and free participation in the study; the return of a completed questionnaire was considered as consent to participate.

III. RESULTS

800 participants were sent questionnaires. Overall, 343 responses were collected (response rate: 42.9%); responses with missing items on the draft scale were excluded. Finally, 309 valid responses were received (valid response rate = 38.6%).

1. Demographic characteristics

The participants included 145 men (46.9%) and 164 women (53.1%), with an average age of 74.0 years. Of the participants, 18.1% lived alone and 9.7% had lived at their current address for less than 10 years. Additionally, a group comparison for valid respondents vs. invalid respondents was performed, showing 28 invalid respondents—9 men (32.1%) and 19 women (67.9%)—with a mean age of 75.3 years. The analysis revealed no significant differences for demographic characteristics: age ($P = 0.245$), sex ($P = 0.133$), family structure ($P = 0.765$), residential history ($P = 0.964$), educational background ($P = 0.283$), employment status ($P = 0.153$), economic status ($P = 0.354$), and level of care needed ($P = 0.464$; Table 2).

Table 2　Participants' demographic characteristics

(*N* = 309)

		n	%
Gender	Men	145	46.9
	Women	164	53.1
Age	< 69 years	83	26.9
（Mean age: 74.0 ± 5.4 years）	70–74 years	75	24.3
	75–79 years	95	30.7
	≥ 80–84 years	56	18.1
Family structure	Living alone	56	18.1
	Living with spouse	175	56.6
	Living with two or three generations	73	23.6
	Others	2	0.6
	N/A	3	1
Residential history	< 10 years	30	9.7
	11–20 years	46	14.9
	21–30 years	63	20.4
	31–40 years	63	20.4
	41–50 years	56	18.1
	≥ 51 years	48	15.5
	N/A	3	1
Educational background	Junior high school	56	18.1
	High school	179	57.9
	Junior college/University	72	23.3
	N/A	2	0.6
Employment status	No	211	68.3
	Yes	95	30.7
	N/A	3	1
Economic status	Very concerned	38	12.3
	Slightly concerned	131	42.4
	Not so concerned	107	34.6
	Not at all concerned	29	9.4
	N/A	4	1.3
Level of care needed	Not applicable	287	92.9
	Required support certification	18	5.8
	Long-term care certification	4	1.3

2. Item analysis

The mean score for the 30 items was 117.5 ± 23.5 points, with a total score range of 33–170 points (score range: 30–180 points). In the ceiling effect, floor effect, G-P analysis, and I-T correlation analysis, no item fulfilled the exclusion criteria. In the inter-item correlation analysis, items with $r \geq .800$ were considered. Initially, three items that had strong correlations of $r \geq .800$ with

more than one item were excluded. Subsequently, we excluded one of the pairs for combinations that were strongly correlated with only one item of the pair at $r \geq .800$, leading to the exclusion of four items. Finally, 23 items were retained, excluding seven that fulfilled the exclusion criteria (Table 3 and 4).

3. Reliability and validity

We conducted an EFA of 23 items (Table 5); the sample validity of the 23-item KMO was 0.960. A three-factor structure was suggested with an eigenvalue of 1 or more. One item, with a factor loading of less than 0.4 was excluded and rerun for analysis. Consequently, 22 three-factor items were extracted, with a commonality of > 0.3 and factor loadings of > 0.4 for all items. Factors 1, 2, and 3 were "perception of inclusion" (nine items), "perception of reciprocity through provision" (seven items), and "perception of reciprocity through reception" (six items), respectively. Factor 1 is defined as the perception of being among the people of the community. Factor 2 is defined as the perception that one can be helpful to those in the community in their daily lives. Factor 3 is defined as the perception that one's life is maintained and supported by others in the community. The correlation coefficients between factors ranged from 0.733–0.767.

The developed draft scale's reliability and validity were tested, with Cronbach's *α* coefficients of 0.967, 0.941, 0.915, and 0.928 for the entire scale, first, second, and third factor, respectively. Regarding concurrent validity, the total scale score was significantly positively and negatively correlated with ikigai ($rs = 0.453$, $P < .001$) and loneliness ($rs = -.307$, $P < .001$), respectively.

IV. DISCUSSION

This study identified the connectedness concept as having a three-factor structure. The EFA showed similar results to the three themes identified by the interview survey. Factor 1 included the perception of being among the people of the community; it also included items on positive feelings pertaining to being among them, such as happiness, security, and enjoyment. The items in Factor 1 partially overlap with the concept of a sense of belonging[4], which is the basis for commitment[23]. Additionally, a sense of belonging and security are important for achieving healthy aging[24]. Researchers have used the social connectedness scale[25] and sense of belonging instrument[26] to assess a sense of belonging. However, its inclusion as a component of the perceptions of connectedness captured in this study can be visualized not only as "I am" (i.e., belonging) but also as "accept that I am here."

Factors 2 and 3 were presented as paired phenomena. Factor 2 reflected feelings of pride and desire to do something for people in the community. By contrast, Factor 3 reflected feelings of security and trust in receiving help from people in the community. The four-item Social Cohesion Scale[27], considered a subjective measure of older adults' connectedness, includes items such as "Most people in this area can be trusted." These items overlap with

Table 3　Item analysis

$(N = 309)$

No	Mean (points)	SD (points)	Ceiling effect (points)	Floor effect (points)	Removed items
1	4.54	0.99	5.53	3.54	
2	4.17	1.12	5.29	3.05	
3	4.02	1.12	5.14	2.9	
4	3.52	1.17	4.69	2.35	
5	3.78	1.17	4.95	2.61	
6	4.03	1.04	5.07	2.99	
7	3.8	1.14	4.94	2.66	*
8	3.58	1.13	4.71	2.45	
9	4.09	1.04	5.13	3.05	
10	3.93	1.06	4.99	2.86	
11	4.03	0.98	5.01	3.06	*
12	4.69	0.84	5.53	3.85	*
13	4.64	0.85	5.5	3.79	
14	3.39	1.1	4.49	2.3	
15	3.78	1.04	4.82	2.74	
16	4.11	0.93	5.04	3.18	
17	4.25	0.9	5.15	3.34	
18	4.36	0.9	5.25	3.46	
19	3.79	0.93	4.72	2.86	
20	3.67	1.03	4.7	2.64	
21	3.97	0.98	4.95	2.99	
22	3.92	0.96	4.88	2.95	*
23	3.71	1.07	4.78	2.64	
24	4.05	1	5.05	3.05	*
25	4.02	0.99	5.01	3.04	
26	3.32	1.11	4.42	2.21	
27	3.19	1.17	4.37	2.02	*
28	3.2	1.16	4.35	2.04	*
29	3.86	0.94	4.81	2.92	
30	4.3	0.83	5.13	3.47	

Note: After removing seven items, 23 were retained in the final version

Table 4　Item analysis（continued）

$(N = 309)$

No	G-P analysis Mean difference	P	I-T correlation analysis r	Cronbach α after removing items
1	1.01	<.001	0.66	0.97
2	1.3	<.001	0.76	0.97
3	1.34	<.001	0.75	0.97
4	1.45	<.001	0.74	0.97
5	1.53	<.001	0.82	0.97
6	1.25	<.001	0.77	0.97
8	1.48	<.001	0.79	0.97
9	1.17	<.001	0.67	0.97
10	1.34	<.001	0.75	0.97
13	0.89	<.001	0.69	0.97
14	1.47	<.001	0.78	0.97
15	1.28	<.001	0.76	0.97
16	1.08	<.001	0.7	0.97
17	0.98	<.001	0.67	0.97
18	1.05	<.001	0.71	0.97
19	1.08	<.001	0.72	0.97
20	1.32	<.001	0.78	0.97
21	1.27	<.001	0.80	0.97
23	1.32	<.001	0.77	0.97
25	1.21	<.001	0.79	0.97
26	1.43	<.001	0.75	0.97
29	1.13	<.001	0.80	0.97
30	0.83	<.001	0.62	0.98

Note: After removing seven items, 23 were retained in the final version.

those in Factor 3, but none were like those in Factor 2. This indicates that the perception of community-based connectedness as measured by the current draft scale differs from the concept of social cohesion, which focuses on the perception of acceptance, and that older adults are also connected to people as supporters of others.

The draft scale showed similarities with several existing public health measurement scales used in Japan（e.g., the Scale to Measure Attachment to the Local Community[28] or the Health-related Social Capital Scale[29]）. Some items in Factor 1 were similar to those in the Scale to Measure Attachment to the Local Community[28] and some items in Factors 2 and 3 were similar to those found in the Health-related Social Capital Scale[29]. Contrary to the abovementioned scales, our draft scale quantitatively assesses social connectedness in terms of presence, absence, and frequency. Furthermore, previous research has described social connectedness as a multifactorial structure including three elements: structure, function, and quality[11]. Therefore, it can be inferred that social capital and its related concepts（such as community attachment

Table 5　Exploratory factor analysis

$(N = 309)$

Items		Factor loading			Communality
		1	2	3	
Factor 1: Perception of inclusion					
2	I am glad that I am part of the community members	**0.947**	0.056	−0.154	0.764
3	I am relieved that I am part of the community members	**0.809**	−0.014	0.049	0.701
4	I share the same time with community members	**0.796**	−0.199	0.214	0.688
5	I have fun with community members	**0.794**	0.033	0.077	0.774
6	I am accepted by the community members	**0.715**	−0.006	0.136	0.673
8	I have something in common with community members	**0.612**	0.069	0.192	0.677
1	I am a part of the community members	**0.582**	0.303	−0.141	0.517
9	I wish to get involved with the community members in my own way	**0.522**	0.131	0.094	0.491
14	I am relied upon by the community members	**0.476**	0.304	0.086	0.637
Factor 2: Perception of reciprocity through provision					
17	I wish to provide help to community members when they have problems, if there is something I can do	0.002	**0.956**	−0.154	0.720
18	I wish to return the favor I received from community members in my own way	−0.056	**0.848**	0.033	0.692
19	I cannot leave community members alone	−0.030	**0.703**	0.143	0.625
16	I am glad when community members are satisfied by doing what I can do	0.008	**0.656**	0.145	0.601
10	I care about the health of community members	0.130	**0.508**	0.221	0.585
13	I am relieved when community members are doing well	0.241	**0.508**	0.077	0.512
15	I am glad when community members rely on me	0.211	**0.496**	0.062	0.630
Factor 3: Perception of reciprocity through reception					
23	I am supported by the community members	0.085	−0.113	**0.875**	0.740
25	I am relieved to have the support of community members	−0.126	0.164	**0.836**	0.752
26	I rely on community members when I have a problem	0.125	−0.081	**0.762**	0.643
21	I am glad community members care for me	−0.020	0.215	**0.700**	0.728
20	I am cared for by community members	0.155	0.081	**0.623**	0.658
29	I trust the community members on a daily basis	0.197	0.132	**0.548**	0.665
	Factor contribution	11.112	10.281	10.622	
	Factor Correlations F1		0.725	0.767	
	F2			0.733	
Removed 30	I always feel I am a natural to help community members each other				

Note: Maximum likelihood promax rotation

and social support）, which are commonly used in Japan, are indicators that fall under the "function" category. Conversely, the perception of connectedness may reflect social inclusion and exclusion and our scale is an evaluation index corresponding to "quality." This scale, written in Japanese and positioned as a new scale for clarifying the "quality" of connectedness, is considered significant because it contributes a novel perspective to existing scales in Japanese public health policy.

As a pilot study, the developed draft scale's reliability and validity were evaluated. The reliability coefficients for the overall scale scores and subscales were calculated separately, and all exhibited a sufficient internal consistency of .700 or higher[20]. Criterion-related validity was tested by calculating correlation coefficients using the two scales applied to confirm concurrent validity. A significant

positive and negative correlation was found with ikigai and loneliness, respectively, suggesting adequate criterion-related validity. Therefore, the developed draft scale exhibited adequate reliability and validity.

By being established as a useful scale within public health nursing and other related settings, the draft scale is expected to contribute to community development considering the subjective assessment of older adult connectedness. The scale can be used for cross-sectional or longitudinal regional analysis to help analyze trends in health issues among older adults in the region.

However, this study was a pilot study aimed at developing the scale and ascertaining its reliability and validity, and the scale is yet to be completed. Therefore, further evaluation of untested reliability and validity—such as its stability using the test-retest method and factorial validity using confirmatory factor analysis—is needed for different populations and regions. Therefore, the number of items and the factor structure of the constructed draft scale may be modified in future.

This study had some limitations. Regarding concurrent validity, it cannot be ruled out that the correlation coefficients may have been influenced by the sample size. However, the correlation coefficients do represent correlations assumed based on concept analysis data and were considered adequate to establish scale validity. Second, this study was conducted during the COVID-19 pandemic, and participants' perceptions may differ from those prior to the pandemic. This needs to be confirmed in future surveys. Third, owing to the mail survey method, participants were limited to those who could respond. This may not reflect the characteristics of numerous older adults who may have difficulty responding to or returning the survey on their own. Finally, the applicable percentages of participants who lived alone and those who had lived in their homes for a short period, which are assumedly related to their community-based connectedness with other people, were low. The opinions of older adults with these backgrounds may not be sufficiently reflected.

This new 22-item draft scale was reliable and valid. Older adults' perceptions of connectedness with people living in the community comprised the following three perception factors: inclusion, reciprocity through provision, and reciprocity through reception. However, this pilot study aimed to develop a draft scale and test its reliability and validity, meaning the scale is not complete. This draft scale is expected to contribute to public health care interventions for older adults residing in the community through further future scale development processes.

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