ORIGINAL RESEARCH ARTICLE

A Best–Worst Scaling Study of the General Population's Preferences for Activities in Living Arrangements for Persons With Dementia

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Abstract

Background Activity involvement is a central element of dementia care. However, few studies have examined preferences for types of activities for persons who may be in need of care in the future. In this study, a best–worst scaling (BWS) was conducted to gather insights on preferred activities in small-scale living arrangements for dementia in the general population aged 50–65 years from rural and urban regions.

Methods BWS tasks were developed based on literature searches and focus groups. The final BWS contains ten activities, namely 'interaction with animals', 'gardening', 'painting, handicrafts, manual activities', 'household activities (e.g., folding laundry, cooking)', 'watching television', 'practicing religion', 'listening to music and singing familiar songs', 'conversations about the past', 'walks and excursions', 'sport activities (e.g., gymnastics)'. Each participant had to fill out subsets of four objects each and identify them as best and worst. A postal survey was sent to a total of 4390 persons from rural and urban regions aged between 50 and 65 years. Results were analyzed by count analysis and logit models. It was examined if preferences differ with respect to gender, religiousness, and informal caregiving experience.

Results A total of 840 questionnaires were returned, and 627 surveys were included in the analysis. In the rural sample, the highest relative importance (RI) was assigned to 'walks and excursions' (RI: 100%), 'sport activities (e.g., gymnastics)' (RI: 56%), 'gardening' (RI: 28%), and 'interaction with animals' (26%). In the urban sample, 'walks and excursions' (RI: 100%), 'sport activities (e.g., gymnastics)' (RI: 37%), 'interaction with animals' (25%) and 'gardening' (RI: 22%) were perceived as most important. In both groups, household activities and practicing religion were of lowest importance. Importance ranks differed between subgroups. Results of the logit models with random effects showed the same order as results from the count analyses.

Discussion Our findings show that respondents generally favored activities with an outdoor component, while the household activities that are part of many concepts were of low importance to respondents. Thus, our study can inform the design of a preference-based specific range of activities in small-scale living arrangements for dementia.

Key Points for Decision Makers

A best–worst scaling study investigated preferences for activities in small-scale living arrangements for dementia and found strong preferences for 'walks and excursions', 'sport activities', 'gardening' and 'interaction with animals', while 'household activities' and 'practicing religion' were of lowest importance.

Respondents favored activities with an outdoor component, while the household activities that are part of many concepts are of low importance. By considering subgroup-specific activity preferences, our findings can contribute to the development of preference-based care for persons with dementia.

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1 Background

Dementia is a progressive disease comprising a range of disorders characterized by memory loss and loss of other mental abilities, which poses a substantial burden on individuals, their families, and society in general [1, 2]. Because of aging societies, the absolute number of global cases is projected to increase by a factor of 2.7 between 2019 and 2050 [3]. Decline in the ability to perform activities of daily living leads to care dependence [4]. When care at home is not possible, institutional care is necessary.

In the last decades, several new models for institutional long-term care have been developed, many of which provide small-scale homelike environments (hereafter referred to as small-scale living arrangements) [5]. What these living arrangements have in common is that they differ from traditional nursing home settings, inter alia regarding physical environment and care philosophy. Internationally, a variety of models exist, which differ from one another in terms of architecture and organization, among other things. Examples include the small-scale living concept in the Netherlands [6], the Japanese Group Home concept [7], and the Green House concept in the US [8]. Engagement of residents in meaningful activities is an important element of many models, which are principally centered around tasks of daily living [9–11]. Staff roles do not focus on care alone, but the nursing personnel have integrated tasks, including household tasks and organizing activities [12]. Small-scale living arrangements are, for example, staffed with nurses [6, 13, 14], nursing assistants [10, 15], social workers [16], or multipurpose staff [9, 17]. In contrast to more traditional living concepts (which mostly use an 'expert model' of episodic therapist interventions), staff in small-scale living arrangements have multiple roles [11].

A large proportion of institutionalized people diagnosed with dementia suffer have behavioral and psychological symptoms of the disease (BPSD) [18]. It is thought that only 10% of BPSD are caused by the dementia itself, while 90% are caused by the way the residents are cared for and the living environment [18]. It has been shown that involvement in activities such as walking, sports, playing cards, gardening, or singing has beneficial effects on persons with dementia, including decreased neuropsychiatric symptoms and functional dependence, less depression, and reduced use of psychotropic drugs [19, 21, 22]. In addition, involvement in activities that match the resident's preferences or that the resident has enjoyed in the past is thought to improve quality of life [20].

In line with this, the dementia guidance of the UK's National Institute for Health and Care Excellence (NICE) recommends offering persons with dementia a range of activities tailored to their preferences, in order to increase wellbeing [23]. Similarly, the German 'Nationale Demenzstrategie' advocates to support a person with dementia in pursuing everyday activities and occupations by identifying opportunities for occupation that meet needs and anchoring them in everyday life [24].

The aging baby boomer generation in industrialized countries will lead to an increasing number of people with dementia in the future [25]. Projections of the declining care potential of adult children for their parents in need of care lead to inconsistent forecasts; however, a decline in informal care potential of about 30–40% can be assumed in the long term [26]. In this context, institutionalized care should not be seen as static, but should evolve and be sensitive to the preferences of those in need of care [27]. Thus, as part of a larger research project, this study aimed to gather insights on preferred activities in future living arrangements for dementia in the general population aged 50–65 years. The project is part of a research network investigating health care in demographically declining regions in Germany [28]. Accordingly, individuals from rural and urban regions were surveyed to capture potential differences in preferences.

It was also of interest whether activity preferences differ between respondents, e.g., with regards to gender. Furthermore, one's own informal caregiving experience leads to deep insights into caregiving routines and is often associated with high levels of burden [29] and therefore, this study also aimed to examine any differences in preferences between individuals with and without informal caregiving experience. Identifying a person's religious background is considered important to ensure good person-centered care [30] and thus, it was also examined whether differences exist between religious and non-religious subjects.

Respondents were presented with a case vignette of an elderly person with dementia who can no longer cope in his or her home and were asked to put themselves in that person`s place. Our study uses the method of best–worst scaling (BWS). BWS is an emerging discrete-choice method which is grounded in random utility theory and allows for a relatively efficient comparison of a number of objects [31]. A number of BWS studies have successfully been conducted for comparable topics, for example to elicit preferences for exercise programs in older persons [32] and to understand the importance of preserving functional activities in dementia [33].

2 Methods

The general German population aged 50 to 65 years from rural and urban regions was surveyed via BWS to gather insights on preferred activities in small-scale living arrangements for dementia. Different approaches to BWS exist,

namely object case, profile case, and multi-profile case [34]. As we sought to investigate preferences for ten distinct activities as such, object case BWS was used. Object case BWS is considered to be appropriate when the relative value associated with a single attribute in a list of attributes is of interest [35].

2.1 Instrument Design

First, a raw list of activities was developed based on findings from a systematic review of living concepts. The systematic review identified and characterized different concepts of small-scale living arrangements for persons with dementia [36]. In-depth analysis of these concepts gave a first impression of possible activities in living arrangements for persons with dementia. Identified activities were discussed in focus groups with a total of 32 participants aged from 50 years onwards, who were interested individuals from the general public. Recruitment was carried out through various channels, including regional newspapers, outreach on regional websites, mayors and press offices of the respective municipalities, churches and social organizations. Of the 32 participants, 17 were male and 15 were female, 17 were from rural areas and 15 were from urban areas, and seven had a migration background.

The participants discussed various topics for a hypothetical situation in which they themselves suffer from dementia and have to move into a living arrangement, including preferred location, spatial design, group size and composition, care concept, and which activities should be offered. Detailed results of the focus groups will be published elsewhere. Themes emerging from this preliminary stage were reduced as proposed by Coast et al. [37]. Wording of the attributes and levels was refined by three researchers (CS, CA, and KH) and discussed in the team. The ten final objects met certain requirements, including lacking dominance, are realistic, and are substitutive [38]. The final list contained ten activities, which were included in the study. An overview of these ten alternatives is depicted in Table 1. A list of the original tasks in German language can be found in Online Resource 1 (see Electronic Supplementary Material [ESM]).

2.2 Study Design

A balanced incomplete block design (BIBD) with a set size of four and a total of 15 sets was constructed in SAS V9.4 (SAS Institute Inc., Cary, NC, USA). Each attribute appears six times and the pairwise frequencies are all two, meaning that each object is presented with each of the other objects exactly twice. The 15 sets were split into three groups of five each. Thus, in each of the three versions of the survey, respondents had to complete five BWS tasks consisting of four options. For each of the five BWS tasks, respondents

Table 1 Final list of ten activities

1	Interaction with animals
2	Painting, handicrafts, manual activities
3	Watching television
4	Listening to music and singing familiar songs
5	Walks and excursions
6	Gardening
7	Household activities (e.g., folding laundry, cooking)
8	Practicing religion
9	Conversations about the past
10	Sport activities (e.g., gymnastics)

were asked to identify both the activities they most ('best') and least prefer ('worst'). By dividing the design into three groups, each respondent saw each object twice, on average. Respondents were provided with instructions on how to fill out the tasks (see Fig. 1). The survey was pilot-tested with persons between the age of 50 and 65 years of age in two rounds and revised accordingly. An exemplary choice task in the German language can be found in Online Resource 2 (see ESM).

2.3 Survey Administration

No guidance for the minimum sample size in BWS studies exists in the literature [39]. A sample size of 60 persons was suggested for each of the three variants according to the %MktBSize macro [40]. This would have resulted in a minimum of 180 responses each for the rural and the urban sample. However, apart from the five BWS tasks and a number of sociodemographic questions, the questionnaire also contained tasks of a Discrete Choice Experiment (DCE) [41]. The DCE stipulated a larger sample size. We contacted resident registration offices and requested address data for residents aged 50 to 65 years. Resident registration offices are government agencies in which information related to the compulsory resident registration in Germany is lodged. Information was provided in accordance with Section 34 (3) of the German Registration Act (Meldegesetz). For the rural sample, the three municipalities with lowest population density in the Münsterland (inhabitants per square kilometer in 2019), namely Hopsten, Schöppingen, and Wadersloh, were contacted. For the urban sample, the resident registration office of Gelsenkirchen was contacted. Gelsenkirchen is part of the Ruhr Area, one of Europe's most densely populated areas. A postal survey was sent to a total of 2020 individuals from the rural and 2020 persons from the urban population in May 2022. Due to comparably low response for one of the versions sent to the urban population, a further 350 surveys of this version were printed and sent.

Fig. 1 Instruction on how to fill
out BWS tasks

Please tick which activities are most and least important to you. Please tick only one activity each (tick one box for "Most important", tick one box for "Least important").
Example: If "painting, handicrafts, manual activities" is most important to you and "walks and excursions" the least important, you would answer the question like this:

Most important		Least important
☐	Walks and excursions	☒
☐	Interaction with animals	☐
☒	Painting, handicrafts, manual activities	☐
☐	Practicing religion	☐

2.4 Statistical Analysis

Analysis was performed separately for the rural and the urban sample using Microsoft Excel and SAS V9.4. As a starting point, count analyses were performed. This simple analysis method provides easy-to-interpret information [42, 43], facilitates the understanding of preference heterogeneity [35] and is used by many researchers as the sole method of data analysis [39, 44, 45]. First, the total number of times each object was chosen as worst was subtracted from the total number of times each object was chosen as best [46]. The resulting best–worst scores were divided by the number of respondents to receive average best–worst scores. Choice probabilities relative to the most important object were calculated. For this, the square root best/worst ratios of each score were calculated by dividing total best by total worst scores and taking the square root of the result. The underlying assumption is that worst estimates equal minus best estimates. If this holds true, the square root best/worst ratio is proportional to best [43]. The result was then scaled by a common factor so that the most important object attained 100. The resulting scores can be interpreted as having ratio properties and thus objects can be compared with each other by their relative square root best/worst ratios [47–49].

Potential heterogeneity according to gender (female, male), religiousness (yes, no), and experience in informal caregiving (yes, no) was explored by conducting additional count analyses. To compare each of these populations, the Mann-Whitney U test was used with statistically significant differences defined by a p-value ≤ 0.05 [45].

In a second step, logit models were estimated as a sensitivity analysis, in order to compare the results with the findings from the count analysis [47]. Discrete choice hierarchical Bayesian models with fixed (multinomial model) and random effects were estimated and model fit was compared. The prior of the regression coefficients was specified to be normally distributed. Data was formatted by coding the response variable as equal to 1 when chosen as most important, − 1 when chosen as least important, and 0 for the two alternatives that were not chosen. Resulting part-worth values allow a ranking of the alternatives compared with a reference alternative, which is structural 0. The object which was identified as the least important category in the counting approach was set as reference. This means average preference weights for the remaining nine objects are positive, as they are compared with the reference level, and results can be interpreted as a measure of strength of preference of the nine remaining objects relative to this reference [50–52]. Modeling was based on the Markov Chain Monte Carlo (MCMC) algorithm using random walk Metropolis sampling [53]. The models were specified to perform 50,000 posterior simulation iterations after a burn-in phase of 5000 MCMC draws.

3 Results

A total of 428 and 412 questionnaires were returned from rural and urban respondents, respectively, corresponding to an overall participation rate of 19%. Only responses in which all five BWS tasks were completed correctly were included. Responses were excluded if one or more BWS tasks were not answered and/or BWS tasks were answered incorrectly by ticking more than one box for best/worst. In the rural sample, 110 respondents did not fill out the BWS tasks correctly and in the urban sample, 103 persons did not. Comparison between the characteristics of respondents who filled out the survey correctly and those who did not showed no statistically significant differences with regard to gender in the rural (Chi^2 0.19; p-value 0.67) and the urban sample (Chi^2 0.51; p-value 0.47) or with regard to age group in the rural (Chi^2 0.87; p-value 0.64) and the urban sample (Chi^2 1.02; p-value 0.60). Finally, 318 surveys from the rural and 309 surveys from the urban sample have been included, resulting in a total of 627 included surveys. Respondents from the rural and urban sample answered a total of 1590 and 1545 BWS tasks, respectively. Sociodemographic characteristics of respondents can be found in Online Resource 3 (see ESM). In brief, the majority of the total included sample was

Table 2 Results of the counting approach for the urban and the rural sample

Object	Best	Worst	B–W score	Average B–W score	SE	Sqrt (B/W)	Relative importance	Rank
Rural sample								
Walks and excursions	404	22	382	1.20	0.049	4.29	100.0	1
Sport activities (…)	295	52	243	0.76	0.059	2.38	55.6	2
Gardening	178	120	58	0.18	0.062	1.22	28.4	3
Interaction with animals	181	142	39	0.12	0.070	1.13	26.3	4
Painting (…)	155	141	14	0.04	0.062	1.05	24.5	5
Listening to music (…)	114	141	−27	−0.08	0.058	0.90	21.0	6
Conversations (…)	93	139	−46	−0.14	0.057	0.82	19.1	7
Watching television	104	169	−65	−0.20	0.063	0.78	18.3	8
Household activities (…)	36	238	−202	−0.64	0.053	0.39	9.1	9
Practicing religion	30	426	−396	−1.25	0.069	0.27	6.2	10
Urban sample								
Walks and excursions	385	13	372	1.20	0.045	5.44	100.0	1
Sport activities (…)	274	66	208	0.67	0.064	2.04	37.4	2
Gardening	164	115	49	0.16	0.065	1.19	21.9	4
Interaction with animals	199	108	91	0.29	0.069	1.36	24.9	3
Painting (…)	146	109	37	0.12	0.059	1.16	21.3	5
Listening to music (…)	123	122	1	0.00	0.060	1.00	18.5	6
Watching television	114	162	− 48	−0.16	0.064	0.84	15.4	7
Conversations (…)	69	174	− 105	−0.34	0.061	0.63	11.6	8
Household activities (…)	42	252	− 210	−0.68	0.060	0.41	7.5	9
Practicing religion	29	424	− 395	− 1.28	0.071	0.26	4.8	10

B-W score best–worst score, *SE* standard error, *Sqrt(B/W)* square root best/worst ratio

female (58.3%) and married (71.8%). In the rural sample, 30.8% of respondents reported having informal caregiving experience and in the urban sample, 31.7% had. In the rural sample, 5.4% had a migration background and in the urban sample, 11.5% had. Results of the count analyses can be found in Table 2. An examination of the best and worst columns reveals that they mirror each other in the sense that high values of one are opposed by low values of the other. For example, 'walks and excursions' was selected as best most often and as worst least often, while the opposite is true for 'practicing religion'.

For both samples, average scores show a comparable order of preferences, with 'walks and excursions' being perceived as most important. When compared with 'walks and excursions', 'sport activities (e.g., gymnastics)' attained a relative importance of 56% in the rural and 37% in the urban sample, respectively. In the rural sample, this is followed by 'gardening' (28%), 'interaction with animals' (26%), 'painting, handicrafts, manual activities' (25%), 'listening to music and singing familiar songs' (21%), 'conversations about the past' (19%), 'watching television' (18%), and 'household activities (e.g., folding laundry, cooking)' (9%). The object 'practicing religion' was perceived as least important (6%). In the urban sample, the 'sport activities (e.g., gymnastics)' is followed by 'interaction with animals' (25%), 'gardening'

(22%), 'painting, handicrafts, manual activities' (21%), 'listening to music and singing familiar songs' (19%), 'watching television' (15%), 'conversations about the past' (12%), and 'household activities (e.g., folding laundry, cooking)' (8%). Again, 'practicing religion' was of lowest importance (5%).

Results of the comparison between subgroups are shown in Table 3. A graphical representation of the importance ranks for the entire samples and the subgroups according to gender, religiousness, and informal caregiving experience is shown in Figs. 2 and 3. Compared with female respondents, male respondents in the rural sample rated 'watching television' higher and 'household activities (e.g., folding laundry, cooking)' lower. Respondents from the rural sample who considered themselves religious rated 'interaction with animals' and 'painting, handicrafts, manual activities' lower, while they rated 'listening to music' and 'practicing religion' higher than respondents who did not consider themselves religious. Respondents from the rural sample with experience in informal caregiving rated 'listening to music' higher than respondents without such experience.

In the urban sample, female respondents rated 'sport activities (e.g., gymnastics)' and 'watching television' lower and 'listening to music' higher than male respondents. Respondents from the urban sample who considered themselves religious rated 'interaction with animals' and

Table 3 Comparison of mean best–worst scores between gender, religiousness and informal care experience

	Gender			Religiousness			Informal care experience		
	Female (±SE)	Male (± SE)	*p*-score	Yes (±SE)	No (±SE)	*p*-score	Yes (± SE)	No (±SE)	*p*-score
Rural sample	***n* = 188**	***n* = 121**		***n* = 148**	***n* = 124**		***n* = 98**	***n* = 220**	
Walks and excursions	1.22 (0.063)	1.14 (0.078)	0.363	1.23 (0.070)	1.14 (0.082)	0.484	1.21 (0.087)	1.19 (0.059)	0.881
Sport activities (…)	0.81 (0.071)	0.70 (0.104)	0.617	0.76 (0.084)	0.76 (0.099)	0.960	0.80 (0.105)	0.75 (0.072)	0.683
Gardening	0.15 (0.082)	0.27 (0.095)	0.522	0.17 (0.100)	0.20 (0.094)	0.826	0.26 (0.094)	0.15 (0.079)	0.472
Interaction with animals	0.10 (0.095)	0.17 (0.107)	0.728	− 0.12 (0.105)	0.42 (0.104)	**0.001**	0.17 (0.115)	0.10 (0.088)	0.772
Painting(…)	0.04 (0.079)	0.02 (0.104)	0.741	− 0.14 (0.085)	0.26 (0.101)	**0.002**	0.08 (0.112)	0.03 (0.075)	0.646
Listening to music (…)	− 0.02 (0.072)	− 0.19 (0.100)	0.150	0.03 (0.091)	− 0.24 (0.090)	**0.039**	0.11 (0.088)	− 0.17 (0.073)	**0.029**
Conversations (…)	− 0.10 (0.074)	− 0.21 (0.092)	0.242	− 0.18 (0.088)	− 0.16 (0.086)	0.757	− 0.18 (0.105)	− 0.13 (0.068)	0.857
Watching television	− 0.34 (0.077)	0.00 (0.108)	**0.013**	− 0.30 (0.100)	− 0.09 (0.092)	0.184	− 0.28 (0.119)	− 0.17 (0.074)	0.549
Household activities (…)	− 0.53 (0.067)	− 0.83 (0.086)	**0.003**	− 0.72 (0.080)	− 0.52 (0.075)	0.159	− 0.79 (0.096)	− 0.57 (0.062)	0.070
Practicing religion	− 1.35 (0.089)	− 1.11 (0.115)	0.082	− 0.72 (0.100)	− 1.76 (0.096)	**< 0.001**	− 1.39 (0.122)	− 1.18 (0.084)	0.177
Urban sample	***n* = 174**	***n* = 128**		***n* = 102**	***n* = 157**		***n* = 99**	***n* = 210**	
Walks and excursions	1.21 (0.061)	1.20 (0.069)	0.810	1.15 (0.084)	1.27 (0.060)	0.368	1.16 (0.078)	1.22 (0.055)	0.459
Sport activities (…)	0.57 (0.083)	0.84 (0.102)	**0.032**	0.54 (0.118)	0.78 (0.086)	0.139	0.60 (0.116)	0.71 (0.077)	0.478
Gardening	0.14 (0.085)	0.18 (0.102)	0.928	0.11 (0.115)	0.13 (0.089)	0.818	0.13 (0.118)	0.17 (0.077)	0.905
Interaction with animals	0.37 (0.095)	0.21 (0.103)	0.208	− 0.03 (0.130)	0.45 (0.090)	**0.008**	0.39 (0.116)	0.25 (0.086)	0.347
Painting(…)	0.15 (0.079)	0.06 (0.091)	0.384	0.03 (0.112)	0.15 (0.077)	0.603	− 0.05 (0.108)	0.20 (0.070)	0.085
Listening to music (…)	0.13 (0.079)	− 0.19 (0.095)	**0.005**	0.04 (0.108)	− 0.03 (0.088)	0.453	0.15 (0.106)	− 0.07 (0.073)	0.114
Watching television	− 0.33 (0.080)	0.06 (0.104)	**0.002**	− 0.32 (0.113)	0.03 (0.088)	**0.023**	− 0.42 (0.115)	− 0.03 (0.075)	**0.006**
Conversations (…)	− 0.35 (0.080)	− 0.33 (0.095)	0.897	− 0.23 (0.103)	− 0.39 (0.085)	0.337	− 0.18 (0.107)	− 0.41 (0.073)	0.121
Household activities (…)	− 0.61 (0.080)	− 0.77 (0.092)	0.263	− 0.78 (0.116)	− 0.65 (0.078)	0.390	− 0.62 (0.111)	− 0.71 (0.071)	0.332
Practicing religion	− 1.28 (0.094)	− 1.27 (0.111)	0.818	− 0.50 (0.128)	− 1.73 (0.080)	**< .001**	− 1.16 (0.116)	− 1.33 (0.088)	0.234

SE standard error

p-Scores calculated using the Mann-Whitney *U* test

Bold values indicate significance

'watching television' lower, while they rated 'practicing religion' higher than respondents who did not consider themselves religious. Respondents experienced in informal caregiving from the urban sample considered 'watching television' as less important by comparison.

Conditional logit models and logit models with random effects were estimated. Based on findings from the counting approach, 'practicing religion' was set as reference object in the analyses. As expected, the average preference weights of the nine remaining objects are positive (i.e., preferred over 'practicing religion'). Logit models with random effects showed better model fit than conditional logit models for both the rural and the urban sample. Results of the logit models with random effects are shown in Table 4 and results of the conditional logit models can be found in Online Resource 4 (see ESM). For both scenarios, results of the logit models with random

Fig. 2 Ranking flow plot of all ten activities in the rural sample (full sample and subsamples)
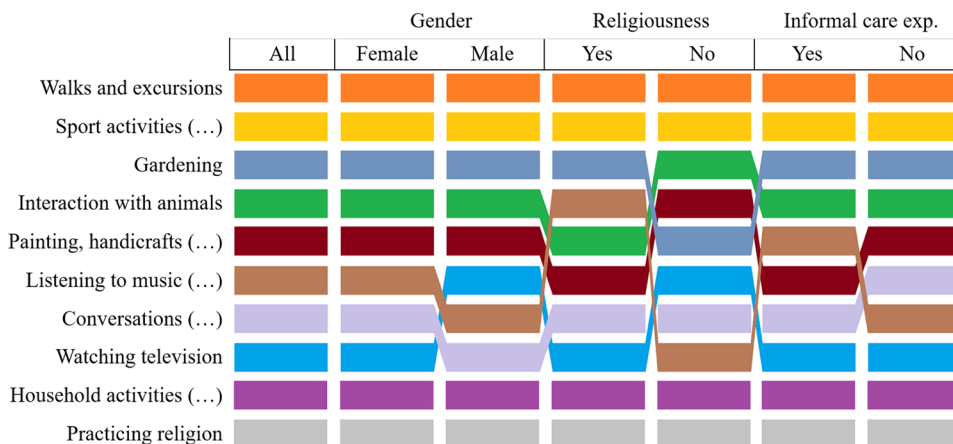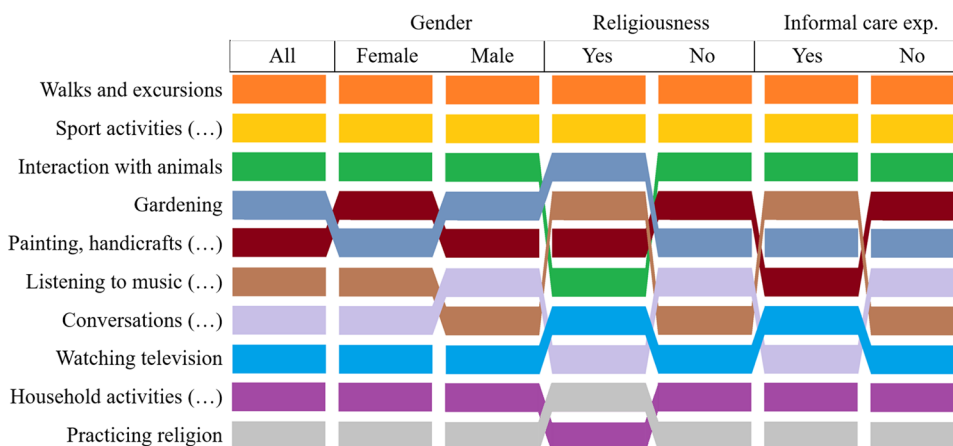
		Gender		Religiousness		Informal care exp.	
	All	Female	Male	Yes	No	Yes	No

Walks and excursions
Sport activities (…)
Gardening
Interaction with animals
Painting, handicrafts (…)
Listening to music (…)
Conversations (…)
Watching television
Household activities (…)
Practicing religion

Fig. 3 Ranking flow plot of all ten activities in the urban sample (full sample and subsamples)

		Gender		Religiousness		Informal care exp.	
	All	Female	Male	Yes	No	Yes	No

Walks and excursions
Sport activities (…)
Interaction with animals
Gardening
Painting, handicrafts (…)
Listening to music (…)
Conversations (…)
Watching television
Household activities (…)
Practicing religion

effects show the same order as results from the count analyses.

4 Discussion

This study examined preferences for activities in living arrangements for persons with dementia in the general population aged 50 to 65 years from rural and urban regions in Germany by means of a BWS.

From the perspectives of persons with dementia and caregivers, engagement in enjoyable activities is a key component of a good quality of life in persons with dementia [54]. Involvement of residents in meaningful activity is an integral part of the small-scale living concept. The French Cantou (Centre d'Activités Naturelles Tirées d'Occupations Utiles; English: Center for Natural Activities Derived from Useful Occupations) even carries this priority in its name [55]. Typical activities offered in small-scale living arrangements include participation in tasks of daily living such as cleaning, doing laundry,

caring for pets, and gardening [9, 10]. Research shows that persons residing in facilities with more characteristics of small-scale care were more involved in physical exercise, interaction with others, and task-related, outdoor and leisure activities when compared with residents in traditional nursing home care [56]. However, apart from evoking positive emotions, research on the effect of increased activity involvement also found negative effects for certain groups of residents, including lower positive self-image, more social isolation, anxiety and sadness [19, 57]. Increased activation of residents leads to higher alertness, but might also confront residents with their lack of abilities [19]. Activities have to be tailored to the remaining abilities in order to contribute to wellbeing and the impact of any activity upon the person's wellbeing has to be closely monitored [58]. Hence, appropriate activities could also counteract behavioral symptoms, which are often a cause for excluding residents from activities [59]. Thus, planning and implementing activities is demanding and in this context, our study can contribute to providing desirable activities.

Table 4 Results of the logit models with random effects

Parameter	Rural sample			Urban sample		
	APW	95% HPD		APW	95% HPD	
Walks and excursions	6.843	6.201	7.503	8.171	7.270	9.190
Sport activities (…)	5.673	5.041	6.346	6.630	5.706	7.519
Gardening	4.345	3.676	4.987	5.380	4.545	6.267
Interaction with animals	4.150	3.432	4.906	5.609	4.710	6.553
Painting (…)	3.530	2.868	4.194	4.745	3.881	5.620
Listening to music (…)	3.364	2.796	3.951	4.543	3.728	5.375
Conversations (…)	3.191	2.544	3.794	3.482	2.743	4.217
Watching television	3.067	2.435	3.673	4.073	3.294	4.857
Household activities (…)	2.264	1.657	2.870	2.808	2.114	3.541
Practicing religion	*Reference object*			*Reference object*		
Model hit rate	0.769			0.791		
DIC	3,970			3,894		

95% HPD 95% highest posterior density interval, *APW* average preference weights, *DIC* deviance information criterion

Results of our BWS study show strong preferences for walks and excursions, sport activities, interaction with animals, and gardening. These activities include a certain outdoor component and these preferences are in line with findings from the accompanying DCE [41]. The DCE asked respondents to choose a preferred option for a living and care arrangement from two alternatives consisting of seven attributes, which differed in their levels. Results of the DCE show that all-time access to a garden was the attribute with highest preference. Higher levels of the attribute "religious practice is supported, if desired" were least preferred in the DCE, which also mirrors the findings from the BWS study in which the object 'practicing religion' had lowest importance. While preferences for the two most preferred objects are constant between subgroups, preferences for other activities have been shown to significantly differ between subgroups.

To our knowledge, no BWS study on activity preferences in small-scale living arrangements for persons with dementia has been conducted to date. In a study published in 2012, Menne et al. examined self-reported activity preferences of 216 home-dwelling persons with dementia in the United States. The most frequent answers to the question 'what kinds of activities do you like to do now?' were 'socialize' (19.8%), 'tv/music/radio' (13.9%), and 'exercise/recreation' (11.2%), while 'housework/chores' (6.2%) and 'yard work/garden/enjoy nature' (5.9%), for example, were mentioned less frequently. The authors concluded that these activity preferences reported by persons with dementia are similar to the activities reported by the general population of older adults [60]. However, the order of preferences differs from the observations made in our study, which might be due to the different preference elicitation methods or sociocultural differences. It might also be that certain activities like 'gardening' received a higher priority in our study, as we asked

the general public for wishful thinking, while actual activity behavior of persons with dementia might differ from what the general population expects.

Our study has several limitations. First, the external validity of our findings might be impaired. Compared with official population statistics, disproportionally more female respondents, fewer people with a migration background, fewer people with a low educational status and fewer unemployed individuals seem to have participated. Second, our study surveyed people from the general population and it is unclear whether respondents' activity preferences change in the event of dementia. Of note, a study which investigated current and past preferences of persons with dementia for leisure activities found that current preferences were significantly related to past preferences in a sense that persons with dementia tend to prefer activities they had practiced in the premorbid past [61, 62]. Third, despite the careful design of the survey, a large proportion of respondents left BWS tasks blank and/or had difficulties completing the BWS tasks correctly. While the overall response rate to the postal survey was higher than expected with a total of 840 returned questionnaires (19%), only 627 (14%) correctly answered questionnaires could be included in the analysis of the BWS study. Whereas most BWS studies are often seen as relatively straightforward to fill out, a number of studies employing BWS also report difficulties in filling out the tasks or high drop-out rates [63–65]. One explanation for this study might be the fairly long questionnaire, which in addition to the BWS questions also contained nine DCE items and several sociodemographic questions, as well as other questions related to preferences for living arrangements. Fourth, respondents were forced to decide between a list of ten pre-specified objects, which necessitated the omission of other activities and did not necessarily include

all preferred activities of each individual participant. Nevertheless, the high degree of reciprocity of best and worst columns, in the sense that best and worst scores are inversely related, shows the consistency of answers for these ten activities. This is related to the inherent characteristics of the interview method. In contrast to traditional Likert scale questions, in which the scores are interpreted differently by different respondents, BWS produces scale-free and thus reliable data [46]. Fifth, it is not clear to what extent each of the ten activities may contribute to residents' well-being and this could be further explored in future research projects. The results of the overall project will be discussed in a stakeholder workshop with experts in the field, in order to derive recommendations for health policy. In this context, a good practices report which was recently issued by the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) might help to increase usefulness and impact of future patient-preference studies in decision making [66].

5 Conclusion

Our study can facilitate a better understanding of which activities in small-scale living arrangements for persons with dementia are preferred by the general population. Walks and excursions as well as sport activities consistently had the highest importance ratings, while household activities and religious practice had lowest. For example, given the strong focus on household activities in living arrangements for dementia, these insights should be considered when designing activities in future housing facilities. In conjunction with the accompanying DCE and the systematic literature review, our findings can thus contribute to the development of target group-specific activities and might inform architectural design, for example by offering outdoor areas.

Declarations

References

1. Reimers K. The Clinician's Guide to Geriatric Forensic Evaluations. 1st Edition - June 15, 2019, ISBN: 9780128150344.
2. Winblad B, Amouyel P, Andrieu, et al. Defeating Alzheimer's disease and other dementias: a priority for European science and society. Lancet Neurol. 2016;15(5):455–532.
3. GBD. Dementia Forecasting Collaborators (2022) Estimation of the global prevalence of dementia in 2019 and forecasted prevalence in 2050: an analysis for the Global Burden of Disease Study 2019. Lancet Public Health. 2019;7(2):e105–25.
4. Fitzsimons D, Mullan D, Wilson JS, et al. The challenge of patients' unmet palliative care needs in the final stages of chronic illness. Palliat Med. 2007;21(4):313–22.
5. Fahsold A, Fleming R, Verbeek H, Holle B, Palm R. German translation, linguistic validation, and cultural adaptation of the environmental audit tool-high care. HERD. 2022;15(2):262–76.
6. Te Boekhorst S, Depla MFIA, de Lange J, Pot AMP, Eefsting JA. The effects of group living homes on older people with dementia: a comparison with traditional nursing home care. Int J Geriatr Psychiatry. 2009;24(9):970–8.
7. Yokota O, Fujisawa Y, Takahashi J, Terada S, Ishihara T, Nakashima H, et al. Effects of group-home care on behavioral symptoms, quality of life, and psychotropic drug use in patients with frontotemporal dementia. J Am Med Dir Assoc. 2006;7(5):335–7.
8. Yoon JY, Brown RL, Bowers BJ, Sharkey SS, Horn SD. The effects of the green house nursing home model on ADL function trajectory: a retrospective longitudinal study. Int J Nurs Stud. 2016;53:238–47.
9. Ritchie K, Ledésert B. The measurement of incapacity in the severely demented elderly: The validation of a behavioural assessment scale. Int J Geriatric Psychiat. 1992;6:217–66.

10. Rabig J, Thomas W, Kane RA, Cutler LJ, McAlilly JD. Radical redesign of nursing homes: applying the green house concept in Tupelo, Mississippi. Gerontologist. 2006;46(4):533–9.

11. Reimer MA, Slaughter S, Donaldson C, Currie G, Eliasziw M. Special care facility compared with traditional environments for dementia care: a longitudinal study of quality of life. J Am Geriatr Soc. 2004;52:1085–92.

12. Verbeek H, Zwakhalen SMG, van Rossum E, Kempen GIJM, Hamers JPH. Small-scale, homelike facilities in dementia care: a process evaluation into the experiences of family caregivers and nursing staff. Int J Nurs Stud. 2012;49(1):21–9.

13. Nakanishi M, Nakashima T, Sawamura K. Quality of life of residents with dementia in a group-living situation: an approach to creating small, homelike environments in traditional nursing homes in Japan. Nihon Koshu Eisei Zasshi. 2012;59(1):3–10.

14. Reggentin H, Dettbarn-Reggentin J. Belastung wird durch Motivation kompensiert Pflegezeitschrift. 2004;7:489–92.

15. Sharkey SS, Hudak S, Horn SD, James B, Howes J. Frontline caregiver daily practices: a comparison study of traditional nursing homes and the Green House project sites. J Am Geriatr Soc. 2011;59(1):126–31.

16. Auer S, Kienberger U, Pascher P, Geck M, Hoffmann B, Viereckl C, Span E. Wohngemeinschaft versus traditionelles Pflegeheim für Personen mit Demenz-Eine vergleichende Beobachtungsstudie. Pflegewissenschaft. 2017;19(3):156–65.

17. Warren S, Janzen W, Andiel-Hett C, Liu L, McKim HR, Schalm C. Innovative dementia care: functional status over time of persons with alzheimer disease in a residential care centre compared to special care units. Dement Geriatr Cogn Disord. 2001;12:340–7.

18. Margallo-Lana M, Swann A, O'Brien J, et al. Prevalence and pharmacological management of behavioural and psychological symptoms amongst dementia sufferers living in care environments. Int J Geriatr Psychiatry. 2001;16(1):39–44.

19. Smit D, de Lange J, Willemse B, et al. Activity involvement and quality of life of people at different stages of dementia in long term care facilities. Aging Ment Health. 2016;20(1):100–9.

20. Vernooij-Dassen M, Vasse E, Zuidema S, Cohen-Mansfield J, Moyle W. Psychosocial interventions for dementia patients in long-term care. Int Psychogeriatr. 2010;22(7):1121–8.

21. Gitlin LN, Marx K, Verrier Piersol C, et al. Effects of the tailored activity program (TAP) on dementia-related symptoms, health events and caregiver wellbeing: a randomized controlled trial. BMC Geriatr. 2021;21(1):581.

22. Verkaik R, Francke AL, van Meijel B, et al. The effects of a nursing guideline on depression in psychogeriatric nursing home residents with dementia. Int J Geriatr Psychiatry. 2011;26(7):723–32.

23. National Institute for Health and Care Excellence (NICE). Dementia: Assessment, management and support for people living with dementia and their carers. London; 2018 Jun. (NICE Guideline, No. 97.) Context.

24. Nationale Demenzstrategie. Online: https://www.nationale-demenzstrategie.de/. Accessed 20 Jan 2023.

25. Doblhammer G, Fink A, Fritze T, Günster C. The demography and epidemiology of dementia. Geriatric Mental Health Care. 2013;1(2):29–33.

26. Dudel C. Vorausberechnung des Pflegepotentials von erwachsenen Kindern für ihre pflegebedürftigen Eltern. Sozialer Fortschritt. 2015;64(1–2):14–24.

27. Knickman JR, Snell EK. The 2030 problem: caring for aging baby boomers. Health Serv Res. 2002;37(4):849–84.

28. Leibniz Science Campus Ruhr. Online: https://lscr.rwi-essen.de/en/. Accessed 20 Sep 2023.

29. Chiao CY, Wu HS, Hsiao RN. Caregiver burden for informal caregivers of patients with dementia: A systematic review. Int Nurs Rev. 2015;62(3):340–50.

30. Britt KC, Boateng ACO, Zhao H, et al. Spiritual needs of older adults living with dementia: an integrative review. Healthcare (Basel). 2023;11(9):1319.

31. Hollin IL, Paskett J, Schuster ALR, Crossnohere NL, Bridges JFP. Best-worst scaling and the prioritization of objects in health: a systematic review. Pharmacoeconomics. 2022;40(9):883–99.

32. Franco MR, Howard K, Sherrington C, et al. Eliciting older people's preferences for exercise programs: a best-worst scaling choice experiment. J Physiother. 2015;61(1):34–41.

33. Hauber AB, Mohamed AF, Johnson FR, et al. Understanding the relative importance of preserving functional abilities in Alzheimer's disease in the United States and Germany. Qual Life Res. 2014;23(6):1813–21.

34. Cheung KL, Wijnen BFM, Hollin IL, et al. Using best-worst scaling to investigate preferences in health care. Pharmacoeconomics. 2016;34(12):1195–209.

35. Flynn TN, Marley AAJ. Chapter 8: Best-worst scaling: theory and methods. In: Handbook of choice modelling, 2014. Online: https://www.unisa.edu.au/siteassets/episerver-6-files/global/business/centres/i4c/docs/papers/wp12-002.pdf. Accessed 23 Jan 2023.

36. Speckemeier C, Niemann A, Weitzel M, Abels C, Höfer K, Walendzik A, Wasem J, Neusser S. Assessment of innovative living and care arrangements for persons with dementia: a systematic review. BMC Geriatr. 2023;23(1):464.

37. Coast J, Al-Janabi H, Sutton EJ, Horrocks SA, Vosper AJ, Swancutt DR, Flynn TN. Using qualitative methods for attribute development for discrete choice experiments: issues and recommendations. Health Econ. 2012;21(6):730–41.

38. Mühlbacher A, Kaczynski A, Zweifel P, Johnson FR. Experimental measurement of preferences in health and healthcare using best-worst scaling: an overview. Health Econ Rev. 2016;6(1):5.

39. Vaanholt MCW, Kok MM, von Birgelen C, Weernink MGM, van Til JA. Are component endpoints equal? A preference study into the practice of composite endpoints in clinical trials. Health Expect. 2018;21(6):1046–55.

40. SAS. The %MktBSize Macro. Online: https://support.sas.com/rnd/app/macros/MktBSize/mktbsize.pdf. Accessed 22 May 2023.

41. Speckemeier C, Abels C, Höfer K, Niemann A, Wasem J, Walendzik A, Neusser S. Preferences for living arrangements in dementia: a discrete choice experiment. PharmacoEconomics Open. (**in press**).

42. Finn A, Louviere J. Determining the appropriate response to evidence of public concern: the case of food safety. J Public Policy Mark. 1992;11:12–25.

43. Louviere JJ, Flynn TN. Using best-worst scaling choice experiments to measure public perceptions and preferences for healthcare reform in Australia. Patient. 2010;3(4):275–83.

44. Lee JA, Sneddon SN, Daly TM, et al. Testing and extending schwartz refined value theory using a best-worst scaling approach. Assessment. 2019;26(2):166–80.

45. Wang T, Wong B, Huang A, Khatri P, Ng C, Forgie M, Lanpher JH, O'Neill PJ. Factors affecting residency rank-listing: a Maxdiff survey of graduating Canadian medical students. BMC Med Educ. 2011;25(11):61.

46. Coltman TR, Devinney TM, Keating BW. Best–worst scaling approach to predict customer choice for 3PL services. J Bus Logist. 2011;32(2):139–52.

47. Uy EJB, Bautista DC, Xin X, et al. Using best-worst scaling choice experiments to elicit the most important domains of health for health-related quality of life in Singapore. PLoS ONE. 2018;13(2): e0189687.

48. Burke PF, Schuck S, Aubusson P, et al. Why do early career teachers choose to remain in the profession? The use of best–worst scaling to quantify key factors. Int J Educ Res. 2013;62:259–68.

49. Cohen E. Applying best-worst scaling to wine marketing. Int J Wine Bus Res. 2009;21(1):8–23.

50. Torbica A, de Allegri M, Belemsaga D, Medina-Lara A, Ridde V. What criteria guide national entrepreneurs' policy decisions on user fee removal for maternal health care services? Use of a best-worst scaling choice experiment in West Africa. J Health Serv Res Policy. 2014;19(4):208–15.

51. O'Hara N, Roy L, O'Hara, et al. Healthcare worker preferences for active tuberculosis case finding programs in south africa: a best-worst scaling choice experiment. PLoS ONE. 2015;10(7):e0133304.

52. Lynd LD, Traboulsee A, Marra C, et al. Quantitative analysis of multiple sclerosis patients' preferences for drug treatment: a best-worst scaling study. Ther Adv Neurol Disord. 2016;9(4):287–96.

53. Rossi PE, Allenby GM, McCulloch R. Bayesian statistics and marketing. Chichester: Wiley; 2005.

54. Logsdon R, McCurry S, Teri L. Evidence-Based Interventions to Improve Quality of Life for Individuals with Dementia. Alzheimers care today. 2007;8(4):309–18.

55. Del Alamo S. Prise en charge de la maladie d'Alzheimer par l'assistant de soins en gérontologie. L'Aide-Soignante. 2014;28(169):27–9.

56. Smit D, de Lange J, Willemse B, Pot AM. The relationship between small-scale care and activity involvement of residents with dementia. Int Psychogeriatr. 2012;24(5):722–32.

57. Fritsch T, Kwak J, Grant S, Lang J, Montgomery RR, Basting AD. Impact of TimeSlips, a creative expression intervention program, on nursing home residents with dementia and their caregivers. Gerontologist. 2009;49(1):117–27.

58. Perrin T, May H, Anderson E. Wellbeing in dementia. 2nd ed. Edinburgh: Churchill Livingstone Elsevier; 2008.

59. Kolanovski A, Buettner L, Litaker M, Yu F. Factors that relate to activity engagement in nursing home residents. Am J Alzheimers Dis Other Demen. 2006;21(1):15–22.

60. Menne HL, Johnson JD, Whitlach CJ, Schwartz SM. Activity preferences of persons with dementia. Act Adapt Aging. 2012;36(3):195–213.

61. Cohen-Mansfield J, Gavendo R, Blackburn E. Activity preferences of persons with dementia: an examination of reports by formal and informal caregivers. Dementia (London). 2019;18(6):2036–48.

62. Lepper S, Rädke A, Wehrmann H, Michalowsky B, Hoffmann W. Preferences of cognitively impaired patients and patients living with dementia: a systematic review of quantitative patient preference studies. J Alzheimers Dis. 2020;77(2):885–901.

63. Pollitt A, Potoglu D, Patil S, Burge P, Guthrie S, King A, Wooding S, Grant J. Understanding the relative valuation of research impact: a best-worst scaling experiment of the general public and biomedical and health researchers. BMJ Open. 2016;6(8):e010916.

64. Wranik WD, Székely RR, Mayer S, Hiligsmann M, Cheung KL. The most important facilitators and barriers to the use of Health Technology Assessment in Canada: a best-worst scaling approach. J Med Econ. 2021;24(1):846–56.

65. Beltman HF. Place of birth – preference, motivating factors and influence of educational level. Bachelor Thesis, University of Twente, 2016. Online: https://essay.utwente.nl/69512/1/Beltman_MA_BMS.pdf. Accessed 20 Feb 2023.

66. Bridges JFP, de Bekker-Grob E, Hauber B, et al. A Roadmap for increasing the usefulness and impact of patient-preference studies in decision making in health: a good practices report of an ISPOR Task Force. Value Health. 2023;26(2):153–62.