The mediating role of attitudes towards dementia on the relationship between dementia knowledge and behaviors towards persons with dementia: A cross-sectional study

Hsiu-Li Huang (hsiuli@ntunhs.edu.tw)
National Taipei University of Nursing and Health Science
Yang-Tzu Li
National Taipei University of Nursing and Health Science
Jing-Xuan Bai
National Taipei University of Nursing and Health Science
Jia-Ming He
National Taipei University of Nursing and Health Science
Shao-Wei Yang
Tzu Chi University of Science and Technology

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Abstract

Background

The rising prevalence of dementia is a global health issue due to the worldwide increase in the number of adults over the age of 65 years. Persons living with dementia often experience discrimination in their life; thus, building a dementia-friendly community is important for reducing biases towards this population. The relationship between dementia knowledge, attitudes, and behaviors towards persons with dementia are significant factors in creating a dementia-friendly community. However, limited research has prevented a better understanding of the relationships among these variables. This study aimed to examine the mediating effect of attitudes towards dementia on the relationship between dementia knowledge and behaviors towards persons with dementia.

Methods

This was a cross-sectional survey with participants recruited from Wanhua District, Taipei City using a non-probability sampling method. Data were collected regarding dementia knowledge, attitudes, and behaviors using the Alzheimer's Disease Knowledge Scale (ADKS), Approaches to Dementia Questionnaire (ADQ), and two researcher-developed self-administered survey questions on unfriendly behaviors towards persons with dementia, respectively. The correlation between dementia knowledge, attitudes, and unfriendly behaviors towards persons with dementia was determined with Pearson's correlation coefficient. Multiple linear regressions investigated predictors of unfriendly behaviors towards persons with dementia. A simple mediation model was used to examine the mediation effect of attitudes on the relationship between dementia knowledge and unfriendly behaviors towards persons with dementia.

Results

A total of 313 participants were surveyed and the mean age of the respondents was 53.24 years (SD = 17.20; range = 20 to 90 years). Scores for dementia knowledge, attitudes and unfriendly behaviors towards persons with dementia were significantly correlated. Higher scores for knowledge (β=-0.16, $p < 0.01$) and attitudes towards dementia (β=-0.32, $p < 0.001$) were significantly associated with lower scores for unfriendly behaviors towards persons with dementia. A significant mediating effect of attitudes towards dementia was observed.

Conclusions

Attitudes towards dementia was a significant mediator in the relationship between dementia knowledge and unfriendly behaviors towards persons with dementia. Our findings suggest that increasing public awareness and knowledge about dementia could help the general population develop better attitudes towards dementia, which could subsequently help improve behaviors towards persons with dementia.

Background

Globally, the number of older adults aged ≥ 65 years has grown rapidly due to the increasing longevity resulting from improved medical care. Population aging has become a common phenomenon especially in developed countries. However, the cognitive ability of older adults declines with age, leading to an increased risk of dementia among older adults. According to Alzheimer's Disease International (ADI) and the World Health Organization (WHO), in 2020 there were approximately 55 million persons living with dementia worldwide, with the number growing at a rate of 10 million new cases every year, implying an average of one new case every 3 seconds [1, 2]. Taiwan has entered the stage of an aged society. In 2021 there were a total of 312,166 persons living with dementia in Taiwan, accounting for 7.64% of the population above 65 years of age; the number is expected to rise to 800,000 by 2051, which will be approximately 10.15% of the over-65 population [3].

Dementia is a cognitive impairment with progressive deterioration of brain function that involves a range of symptoms such as memory loss, difficulties with concentrating, planning, and communicating, as well as problems with visual perception and orientation. Persons living with dementia are often faced with mental and physical impairments that cause decreases in functional abilities and increases in physical and psychological challenges, which can result in conduct from others that discriminates and violates their human rights.

A global survey conducted by ADI in 2019, found that between 35% and 57% of persons living with dementia had experienced unfair treatment by another in social or intimate relationships, which included being avoided, ignored, neglected, and excluded because of the stigma associated with dementia [4]. The stigma of dementia has been shown to be associated with depression, anxiety, low self-esteem, which can also delay help-seeking and in turn affects the quality of life and disease adaptation of persons living with dementia [5, 6]. The stigma of dementia affects not only persons with dementia, but also how caregivers respond to a family member with dementia. A study conducted in Japan by Aihara et al. (2020) found that half of older adults would feel ashamed of a family member with dementia [7]. This stigma of dementia is global, with over 35% of caregivers worldwide reporting that they have hidden a family member's diagnosis of dementia from others [4].

In 2017, the WHO called for national public health agendas to highlight dementia as a priority and to better respond to the needs of the rapidly rising population with dementia [8]. The need for building dementia-friendly communities is increasingly important as the concern and awareness of dementia grows in many countries of the world. Dementia-friendly communities provide support that allows persons living with dementia to actively engaged and regarded as valued citizens [9]. Attitudes and behaviors of the public towards persons with dementia that encourage inclusivity are the key factors in building a dementia-friendly community. Although two previous studies showed that dementia knowledge was significantly associated with attitudes towards persons with dementia [10, 11], two studies found an insignificant association between dementia knowledge and attitudes towards persons with dementia [12, 13], making the association inconclusive. A recent study in South Korea on the relationship between dementia knowledge, attitudes, and behaviors found a positive attitude towards dementia reduced negative behaviors indirectly; whereas a

negative behavioral attitude towards dementia indirectly increased negative behavior attitudes [14], indicating a significant effect of attitude on dementia knowledge and behavioral intention.

Previous studies showed that healthcare professionals' knowledge and attitudes are important in providing optimum dementia care [11, 15, 16]. However, there is limited research about dementia knowledge, attitudes and behaviors in the context of the general population in the community. Taiwan's Ministry of Health and Welfare initiated an active response to the global action plan of the WHO in 2018 by formulating guidelines for building dementia-friendly communities [17]. However, there is limited data on the relationship between dementia knowledge, attitudes and behaviors towards persons with dementia in the Taiwanese community. Understanding how knowledge and attitudes affect behaviors toward persons with dementia can provide information that will enable communities to become dementia-friendly. Therefore, the present study aimed to investigate the relationships and examine the potential mediating effect of attitudes towards dementia on the relationship between dementia knowledge and unfriendly behaviors towards persons with dementia. Results from this research may help to better target public health messaging campaigns designed to reduce the stigma for persons living with dementia.

Methods

Study design and setting

This was a cross-sectional study reported according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations [18]. Residents were recruited from the Wanhua District of Taipei City from hospital family medicine clinics, community service centers, and supermarkets using a non-probability convenience sampling method. Wanhua District is not only the oldest developed area in Taipei City but is also the district with the largest number of older adults and low-income households. The number of residents living with dementia in this district is estimated to be one of the highest in Taipei City. The continued growth of this population indicates the urgent need to build a community that is dementia-friendly.

Participants and procedure

The following were inclusion criteria for residents to participate: (1) currently living in Wanhua District, Taipei City; (2) age more than 20 years; and (3) able to communicate in Chinese or Taiwanese. The researchers explained the purpose of the research and the time required for the survey to each resident. Residents willing to participate provided written informed consent before data were collected.

During the study period, 429 potentially eligible participants were contacted and invited to be screened to determine whether they met the inclusion criteria for the study; of those, 328 fit the inclusion criteria, provided informed consent, and agreed to fill out the questionnaires. Among the 328 participants, 15 did not complete the questionnaires due to lack of time or interest. Consequently, 313 participants who met the inclusion criteria provided completed questionnaires for this study (Fig. 1).

A self-administered survey questionnaire collected information on participants' demographic characteristics, which included gender, age, educational level, employment status, living arrangement, health status and experience with caregiving for persons with dementia. Validated instruments collected participants' self-perceived levels of dementia knowledge and attitudes towards dementia; two researcher-developed questions were used to evaluate unfriendly behaviors towards persons with dementia. Details are provided below.

Assessment of dementia knowledge

Knowledge about dementia was assessed using the 30-item Alzheimer's Disease Knowledge Scale (ADKS), which is a self-rated questionnaire originally developed for assessing knowledge about Alzheimer's disease [19]. The ADKS is used is used worldwide and has been translated into multiple languages with good psychometric properties, indicating that it is a reliable instrument for assessing knowledge of Alzheimer's disease [20–22]. The scale items assess seven key areas of knowledge about the disease: risk factors, assessments and diagnoses, the course of the disease, symptoms, life impact, caregiving, treatment, and management. Each item is answered true or false (1 or 0). In the present study, total scores were obtained by summing the number of correct responses; scores ranged from 0 to 30, with higher scores indicating a greater level of knowledge about dementia.

Assessment of attitudes towards dementia

Participants' attitudes towards dementia were assessed with the 19-item self-report Approaches to Dementia Questionnaire (ADQ), which has been shown to have good reliability and internal consistency [15]. The ADQ is comprised of the domains of hopefulness and person-centeredness [23, 24]. Each item is a statement, which is rated on 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Eight items ask the participant about their attitude towards hopefulness, which addresses the degree of hope for persons living with dementia; the 11 items on person-centeredness assess the degree the participant endorses person-centered care as opposed to considering that all persons living with dementia have the same strengths and limitations. The total score ranges between 19 and 95, with higher total scores indicating a more positive attitudes towards persons with dementia.

Assessment of unfriendly behaviors towards persons with dementia

Two questions were asked in the survey to assess a participant's unfriendly behaviors towards persons with dementia: (1) "If a family member is diagnosed with dementia, it is better to keep it a secret from friends and other family members" and (2) "If I were given a choice, I would prefer not to interact or participate in activities together with a person living with dementia". The respondents were asked to rate the two questions on a 5-point Likert scale: 1 = Strongly disagree; 2 = disagree; 3 = uncertain; 4 = agree; and 5 = strongly agree. Scores ranged from 1 to 5, with higher scores indicating participants were more likely to want to hide a diagnosis of dementia of a family member and less likely to want to interact with persons with dementia; higher total scores for the two questions indicated a greater level of unfriendly behavior towards persons with dementia.

Data collection

Data were collected from September 2020 to December 2020 by three research assistants trained in interviewing participants. The study objective, research process, and participants' rights were explained to potential participants in detail after initiating contact. After obtaining informed consent, participants could choose to fill out the questionnaire by themselves or via a face-to-face interview with one of the research assistants. The questionnaires were coded to maintain anonymity and protect patient privacy.

Statistical analyses

Statistical analyses were performed using SPSS version 22.0 and a p-value < 0.05 was considered significant. Descriptive statistics were used to report the socio-demographic characteristic of the respondents, which included frequency (percentage), mean, and standard deviation. Independent sample t-test and one-way analysis of variance (ANOVA) were performed to examine the differences in behaviors towards persons with dementia among participants with different demographic characteristics. We also performed Pearson's correlation analysis to measure the strength of the linear relationship between dementia knowledge, attitudes and behaviors towards persons with dementia. Multiple linear regression analysis was used to identify predictors of behaviors towards persons with dementia and investigate the association between dementia knowledge and behaviors towards persons with dementia. In examining the mediating effect of attitudes towards persons with dementia, a simple mediation model proposed by Baron and Kenny was adopted [25]. Hierarchical regression and Sobel test were performed to evaluate the significance and strength of the mediation effect.

Results

Demographic characteristics of participants

Demographic characteristics of the 313 respondents are shown in Table 1. A total of 108 participants (34.5%) were male and 205 (65.5%) were female; the mean age was 53.24 years old; most (66.1%) were $\leq$ 64 years of age. Most participants had an educational level of college or greater (60.7%); more than half were unemployed (56.2%) and 41.0% were living with an adult $\geq$ 65 years old. Most participants perceived their health status as normal (58.8%) and had no dementia caregiving experience (61.5%).

Table 1
Demographic characteristics of the study participants (N = 313)

Variable	n	%	Mean	SD	Range
Age, years	313		53.24	17.20	20–90
≤ 64 years	207	66.1			
≥ 65 years	106	33.9			
Gender					
Male	108	34.5			
Female	205	65.5			
Education					
≤ Senior high school	123	39.3			
College	151	48.2			
Graduate or above	39	12.5			
Chronic diseases			.78	.97	0–6
No	162	51.8			
Yes	151	48.2			
Perceived health status			3.22	.76	1–5
Poor or very poor	37	11.8			
Normal	184	58.8			
Good or very good	92	29.4			
Employment status					
Unemployed	176	56.2			
Employed	137	43.8			
Living with an adult ≥ 65 years old					
No	184	59.0			
Yes	128	41.0			
Experience with dementia caregiving					
No	192	61.5			
Yes	120	38.5			

Knowledge, attitudes, and unfriendly behaviors related to dementia

Participants' responses to the self-report questionnaires are shown in Table 2. The mean score for dementia knowledge was 15.15 (SD = 5.40), showing an average of 50% correct responses to the 30 questions on the ADKS. The mean scores for attitudes towards dementia and unfriendly behaviors towards persons with dementia were 66.65 (SD = 7.13) and 4.12 (SD = 1.28), respectively. When we grouped the item scores for unfriendly behaviors into three categories (disagree or strongly disagree, uncertain, and agree or strongly agree), most participants (90.7%) reported they disagreed with the idea of hiding family member's diagnosis of dementia and most (70.3%) were willing to interact with persons with dementia.

Table 2
Responses to self-report questionnaires about dementia (N = 313)

Variable	n	%	Mean	SD	Range
Dementia knowledge			15.15	5.40	0–27
Attitudes towards dementia			66.66	7.13	44–89
Unfriendly behaviors towards persons with dementia (total)			4.12	1.28	2–8
Hide the diagnosis of a family member with dementia					
Disagree or strongly disagree	284	90.7			
Uncertain	19	6.1			
Agree or strongly agree	10	3.2			
Prefer not to interact with persons living with dementia					
Disagree or strongly disagree	220	70.3			
Uncertain	51	16.3			
Agree or strongly agree	42	13.4			

Factors correlated with scores for unfriendly behaviors towards persons with dementia

We examined if there were associations between scores for unfriendly behaviors towards persons with dementia and demographic characteristics as well as dementia knowledge and attitudes of the participants (Table 3). Analysis indicated age, education and employment status were significantly associated with scores for unfriendly behaviors. Participants 64 years of age and younger were less likely to want to hide a family member's diagnosis of dementia and were more willing to interact with persons with dementia ($t=-5.11$, $p < 0.001$) compared with participants ≥ 65 years old. In terms of educational level, respondents who completed high school or below had higher scores for unfriendly behaviors towards persons with dementia ($F = 3.04$, $p = 0.049$) compared with those holding a graduate degree or above. However, post hoc analysis was not significant.

Pearson's correlation demonstrated scores for dementia knowledge were negatively correlated with scores for unfriendly behaviors towards persons with dementia ($r=-0.25$, $p < 0.001$). A negative correlation was also

observed between scores for attitudes and unfriendly behaviors towards persons with dementia ($r=-0.41$, $p < 0.001$). This indicated that participants with less knowledge and more negative attitudes towards dementia had a greater tendency for wanting to hide a family member's diagnosis of dementia and being reluctant to interact with persons with dementia.

Table 3
Associations between scores for behaviors towards persons with dementia and demographics, dementia knowledge and attitudes

	Score for unfriendly behaviors towards persons with dementia				
Variable	**Mean (SD)**	**F/t**	p	r	p
Age, years		-5.11	< .001		
≤ 64 years old	3.86 (1.16)				
≥ 65 years old	4.64 (1.34)				
Gender		.74	.463		
Male	4.19 (1.31)				
Female	4.08 (1.26)				
Education		3.04	.049		
≤ Senior high school	4.33 (1.35)				
College	4.03 (1.22)				
Graduate or above	3.85 (1.18)				
Chronic diseases		1.18	.240	.06	.318
No	4.20 (1.29)				
Yes	4.03 (1.26)				
Perceived health status		.22	.802	.05	.404
Poor or very poor	4.16 (1.36)				
Normal	4.08 (1.18)				
Good or very good	4.19 (1.42)				
Employment status		2.95	.003		
Unemployed	4.31 (1.29)				
Employed	3.89 (1.21)				
Living with an adult ≥ 65 years old		1.70	.090		
No	4.22 (1.29)				
Yes	3.97 (1.24)				
Experience with dementia caregiving		1.06	.291		
No	4.18 (1.27)				
Yes	4.03 (1.29)				

	Score for unfriendly behaviors towards persons with dementia	
Dementia knowledge	− .25	< .001
Attitudes towards dementia	− .41	< .001

Factors correlated with scores for dementia knowledge and attitudes towards persons with dementia

We found a positive and significant correlation between scores for dementia knowledge and attitudes towards dementia ($r = 0.16$, $p = 0.006$), indicating that persons with greater knowledge about dementia had a more positive attitude towards persons with dementia. Pearson's correlation indicated older participants had significantly lower scores for dementia knowledge and attitude ($r=-0.15$, $p < 0.01$ and $r=-0.42$, $p < 0.001$, respectively), and unfriendly behaviors ($r=-0.26$, $p < 0.001$), compared with younger participants. Participants with less than a high school education had significantly lower scores for knowledge ($F = 8.81$, $p < 0.001$) and attitude ($F = 8.88$, $p < 0.001$) than those with an education of college or above. Participants with experience caring for persons with dementia had higher knowledge scores ($t = 2.25$, $p = 0.023$), but not significantly higher scores for attitude ($t = 0.61$, $p = 0.542$) compared with participants with no dementia caregiving experience.

Factors associated with unfriendly behaviors towards persons with dementia

Analysis with multiple linear regressions also showed a significant negative association between scores for unfriendly behaviors towards persons with dementia and dementia knowledge ($\beta=-0.16$, $p < 0.01$), after adjusting for the potential confounding factors of gender, age, gender, educational level, employment status, living arrangement, and caregiving experience (Table 4). Participants with higher scores for dementia knowledge were more likely to have lower scores for unfriendly behaviors towards persons with dementia. Other significant predictors of scores for unfriendly behaviors towards persons with dementia included age ($\beta=-0.19$, $p < 0.01$), living with an older adult ($\beta=-0.15$, $p < 0.01$) and attitudes towards dementia ($\beta=-0.32$, $p < 0.001$).

Table 4
Multiple linear regression demonstrating relationships between scores for behaviors towards persons with dementia, demographics, dementia knowledge, and attitudes towards dementia

	Scores for unfriendly behaviors towards persons with dementia		
Variable	β	SE	p
Age (**vs.** ≤ 64 years old)			
≥ 65 years old	.19	.17	.003
Gender (vs. Male)			
Female	− .04	.14	.467
Education(vs. Graduate or above**)**			
≤ Senior High school	− .05	.23	.603
College	− .01	.21	.898
Employment status (vs. Unemployed**)**			
Employed	− .03	.15	.585
Living with older adults (vs. No)			
Yes	− .15	.14	.005
Dementia knowledge	− .16	.01	.003
Attitudes towards dementia	− .32	.01	< .001

Mediating effect of attitudes towards dementia

The mediating effect of attitudes towards dementia was examined using the four steps approach proposed by Baron and Kenny (1986) [25]. Table 5 demonstrates the results for hierarchical regression models performed to test the mediating effect of attitudes in the relationship between scores for dementia knowledge and scores for unfriendly behaviors towards persons with dementia. In the simple linear regression, higher scores for dementia knowledge were found to be significantly associated with higher scores for attitudes towards dementia ($\beta = 0.16$, $p < 0.01$), indicating a more positive attitude. In model 1, scores for dementia knowledge were significantly associated with scores for unfriendly behaviors towards persons with dementia ($\beta=-0.25$, $p < 0.001$), indicating participants with higher scores for dementia knowledge were more likely to be accepting of persons with dementia. In model 2, there was also a significant association between scores for attitudes towards dementia and unfriendly behaviors towards persons with dementia ($\beta=-0.41$, $p < 0.001$). In model 3, both scores for dementia knowledge ($\beta=-0.19$, $p < 0.01$) and attitudes towards dementia ($\beta=-0.38$, $p < 0.001$) were shown to significantly predict scores for unfriendly behaviors towards persons with dementia. The weight of the regression coefficient in model 3 between scores for dementia knowledge and behaviors towards persons with dementia was reduced but remained significant after controlling for scores for attitudes towards dementia, indicating a partial mediation. The z-score for the Sobel test was > 1.96, which indicated that the strength of the mediating

effect or indirect effect of scores for dementia knowledge on unfriendly behaviors towards persons with dementia through attitudes about dementia was significant (z-score = 3.042, p = 0.002).

Table 5
Hierarchical regression models for evaluation of mediating effect of attitudes towards dementia

	Unfriendly behaviors towards persons with dementia											
	Attitudes towards dementia			Model 1			Model 2			Model 3		
Variable	β	SE	p	β	SE	p	β	SE	p	β	SE	p
Dementia Knowledge	.16	.07	.006	− .25	.01	< .001				− .19	.01	< .001
Attitudes towards dementia							− .41	.01	< .001	− .38	.01	< .001

Discussion

Analysis of the data indicated that less than 10% of the participants were either uncertain or were likely to hide the diagnosis of dementia of a family member. This result is in line with the ADI global survey of 2019, which reported that about 91% of survey respondents thought a diagnosis of dementia should not be concealed [4]. However, our findings are in contrast to surveys from residents of Kobe, Japan and Shanghai, China that showed half of respondents would feel ashamed of a family member with dementia and would be inclined to hide the diagnosis from others [7, 26]. The small proportion of participants in our study who would be likely to hide a diagnosis of dementia of a family member might be due to the implementation of the Dementia Plan and Action Plan by the Ministry of Health and Welfare in Taiwan [27]. The policy focuses on improving the public awareness of dementia and building a dementia-friendly society that ensures the quality of life among persons with dementia. Despite the low proportion of our participants who reported that they were likely to conceal a family member's diagnosis of dementia, it is not close enough to the goal of the ADI, which is zero concealment [4].

Nearly one-third of participants in this study (27.7%) were uncertain or agreed that they would choose not to interact with persons with dementia. This result is slightly less than the ADI global survey, which reported about 43% of respondents avoided or shunned persons with dementia [4]. Therefore, although Taiwan is making efforts to promote a dementia-friendly community, the phenomenon of differential treatment or discrimination still exists in the community.

The mean scores for knowledge (15.15) and attitudes (66.65) towards dementia in this study were lower than the mean scores obtained in most previous studies that used the ADKS to measure dementia knowledge [11, 19, 20, 28–30] and ADQ to measure attitudes toward dementia [31–33]. One explanation for the lower scores in this study may be the older age of the respondents, which may make it more likely that these participants have retained negative feelings towards dementia because of the stigma associated with

the disease [4]. However, our findings are similar to previous studies, which have shown older adults are more likely to have lower scores for knowledge and a more negative attitude about dementia compared with younger adults [32, 34, 35].

One other explanation for the lower scores for knowledge and attitudes in our study compared with others is that many previous studies included a partial or total sample of health professionals [11, 16, 19, 20, 29, 30]. All participants in our study were from the general population in the community, whose scores for knowledge are more likely to be lower. Compared with health professionals, a lay person, especially one who has never taken care of a person with dementia, has more difficulty empathizing with a person with dementia, or having a “hopefulness” and “person-centeredness” attitude, which is due to a lack of knowledge and skills one would obtain from providing support for a person with dementia [15, 16, 33].

Finally, the lower scores for knowledge and attitude toward dementia might be due to cultural or socioeconomic factors [4, 5, 34]. Wanhua District has a relatively low socioeconomic status compared to other districts in Taipei city.

Our results revealed that participants who had personal experience with dementia had significantly higher scores for knowledge compared with those with no personal experience. Although previous studies have reported that personal experience with dementia was significantly associated with attitudes and behaviors toward dementia [32, 35], this was not supported by our study findings. Our analysis indicated that personal experience with dementia was not significantly associated with higher scores for attitude or unfriendly behavior towards persons with dementia, suggesting that personal experience may not necessarily lead to positive attitudes and behaviors [35]. Our findings are supported by Chang & Hsu (2020), who found that participants with experience of caring for persons with dementia were more likely have the negative attitude towards dementia of feeling ashamed [10]. Another report also indicated that caregivers of persons with dementia often view dementia as a stigma [36]. Therefore, caregiving experience may not provide adequate knowledge about dementia to reduce negative attitudes or unfriendly behaviors, suggesting that other interventions may be needed to reduce the stigma of dementia [4, 35, 36].

Relationship between dementia knowledge, attitude and unfriendly behaviors towards persons with dementia

Our data indicated that higher dementia knowledge and positive attitude were significantly associated with lower levels of unfriendly behaviors towards persons with dementia. Participants with higher scores for knowledge and a more positive attitude about dementia were less likely to want to hide the diagnosis of dementia of a family member from others and were more willing to have social interactions with persons living with dementia. The finding is partially consistent with a recent study, which found that participants with less knowledge of dementia were more likely to feel ashamed of persons with dementia [10]. However, the same study showed no significant relationship between knowledge of dementia and avoidance of persons with dementia. A study by Lim (2020) revealed an insignificant direct effect of dementia knowledge on behavioral intention [14].

The present study found a significant association between dementia knowledge and attitudes towards dementia. Our result is in line with a previous study that also showed professional staff with poor dementia knowledge tended not to use a person-centered care approach [11, 16], suggesting a negative attitude about dementia. However, an online and paper survey in the UK, found that having had contact with persons with dementia was associated with a positive attitude about dementia and the level of dementia knowledge was not significant [38]. However, one study indicated knowledge about dementia was not positively correlated with attitudes. When a sample of citizens of Cambodia, the Philippines, and Fiji were surveyed, attitudes towards persons with dementia were positive despite low levels of dementia knowledge, and predictors of positive attitudes were country specific [37]. Therefore, knowledge and attitude might be independent domains in certain social and cultural environments [10].

Mediating effect of attitudes towards dementia

To our knowledge, the present study is the first to demonstrate attitudes towards dementia as a significant mediator in the relationship between dementia knowledge and unfriendly behaviors towards persons with dementia in Taiwan. The effect of dementia knowledge on unfriendly behaviors was partially mediated by attitudes towards dementia. Our findings suggest that individuals with higher scores for dementia knowledge are more likely to show better behaviors towards persons with dementia through positive attitude about dementia.

Our results are consistent with a recent study in South Korea, which showed that dementia knowledge reduced a negative behavioral intention through a positive cognitive attitude [14]. However, dementia knowledge was also shown to increase the negative behavioral intention through a negative affection and behavioral attitude towards dementia after controlling the variables in some studies [10, 14, 35]. This indicates that an intervention that simply provides knowledge about dementia will not necessarily be beneficial for reducing unfriendly behaviors, and there may even be a negative relationship between awareness and unfriendliness. Therefore, interventions that increase contact with persons with dementia to allow them to be viewed with a positive, hopeful attitude could encourage a willingness to interact, thus increasing person-centeredness, which could help develop dementia friendly behaviors.

Therefore, interventions should not only be focused on disease-related knowledge but also on assisting in understanding how to interact with persons with dementia. Understanding can help to resolve fear and provide experiences of successfully coexisting with persons with dementia through various virtual simulation methods or with actual in-person contact [31, 40], which can help improve positive attitudes and increase the willingness to interact with persons with dementia. In addition, providing adequate post-diagnosis support and friendly service can help reduce the desire to conceal a family member’s diagnosis of dementia.

Limitations and future research

First, the present study was a cross-sectional survey design, which prevents determining the causal relationship between dementia knowledge and unfriendly behaviors towards persons with dementia. Second, the study participants were collected from the Wanhua District through convenience sampling and

thus the findings may not be generalizable to other regions of Taiwan. Third, the ADKS was used to assess dementia knowledge of the participants. Dementia is a general term used to describe a number of symptoms affecting the brain. Alzheimer's disease is a common type of dementia but not the only one. Other types of dementia include vascular dementia, dementia with Lewy bodies, frontotemporal dementia. The ADKS was developed to assess the knowledge of Alzheimer's disease and thus may not reflect the real level of dementia knowledge of the respondents in this study. In addition, although the ADQ is a validated instrument, it may not be suitable for assessing attitudes of the population in Taiwan towards dementia. A localized assessment tool is needed in future studies to measure the attitudes towards dementia of Taiwanese people, who have cultural differences from other Asian countries. Fourth, our findings are limited by the quantitative nature of the study in assessing the participants' attitudes and unfriendly behaviors towards persons with dementia. A qualitative study should be conducted in the future to explore perceptions, attitudes and unfriendly behaviors towards persons with dementia, which would strengthen the findings of this study. Finally, the results obtained need to be interpreted with caution due to the small sample size. Thus, future studies with a larger sample size are warranted to support these findings.

Conclusion

Dementia knowledge was significantly associated with attitudes and behaviors towards persons with dementia. Attitude towards dementia was a significant mediator in the relationship between dementia knowledge and unfriendly behaviors towards persons with dementia. It is recommended that the general publics' level of dementia knowledge be increased to improve attitudes and reduce unfriendly behaviors towards persons with dementia. Changes in these variables could help create a more dementia-friendly community and diminish the stigma of dementia, allowing persons with dementia to be accepted, respected and supported in their life. However, more research is needed to establish effective strategies to increase knowledge and attitude toward dementia and increase contact among the general population and persons with dementia.

Abbreviations

ADI
Alzheimer's Disease International
ADKS
Alzheimer's Disease Knowledge Scale
ADQ
Approaches to Dementia Questionnaire (ADQ)
ANOVA
one-way analysis of variance
WHO
World Health Organization

Declarations

Ethics approval and consent to participate

All participants provided informed written consent forms before participation in this study. The study protocol complied with the guidelines of the 2013 version of the Helsinki Declaration. The study protocol was approved by the Research Ethics Committee National Taiwan University prior to data collection (IRB case number: 202005EM056).

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Authors' contributions

Y.L. and H.H. wrote the main manuscript text. J.B. and J.H. collected the data and prepared figures. S.Y. analyzed the data and prepared figures. All authors have read and approved the manuscript.

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Figures

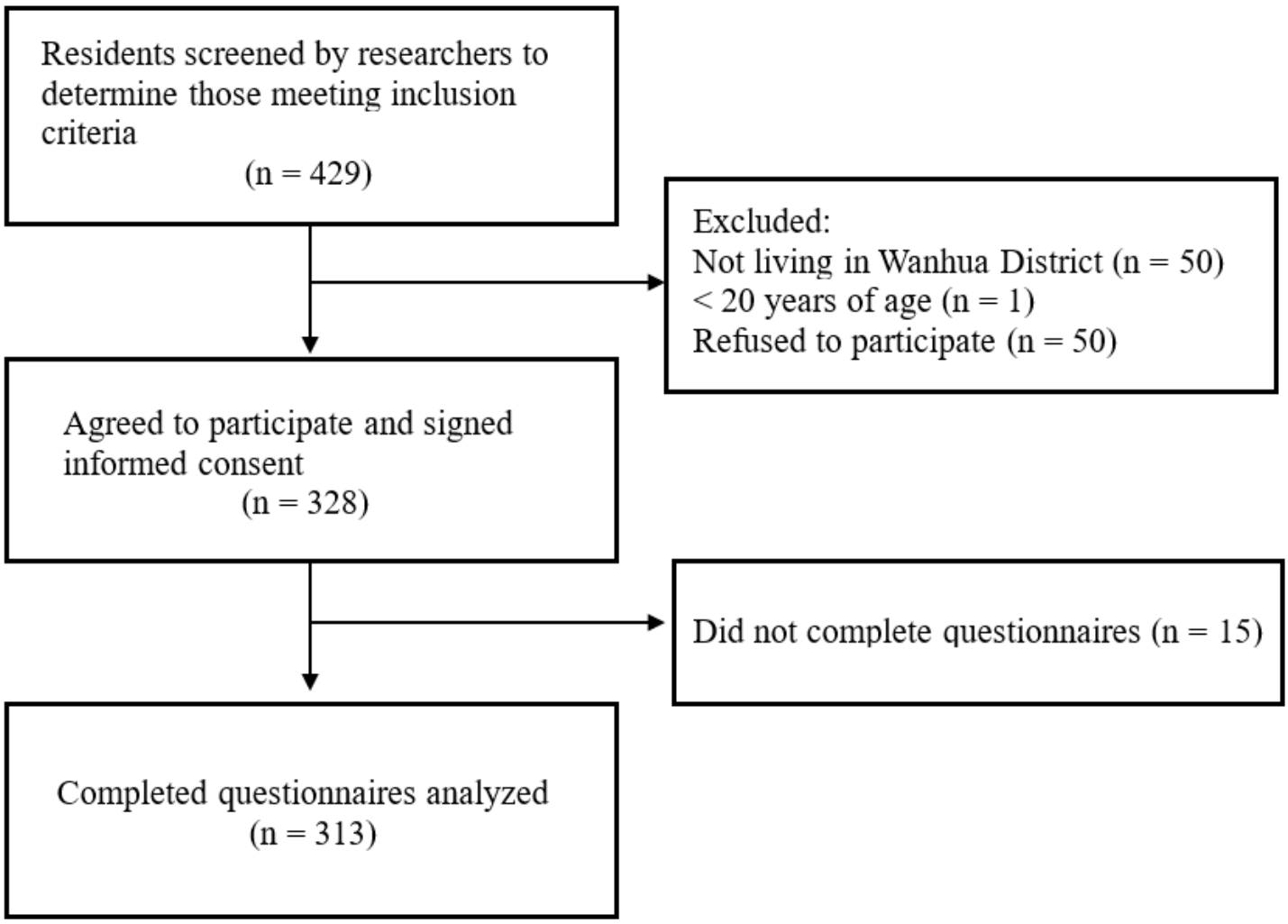

Figure 1

Participant screening and recruitment