

Undergraduate nursing students' knowledge of Alzheimer's disease and related dementias care

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ABSTRACT

Background: The increase in the number of people with Alzheimer's disease and Related Dementias (ADRD) will result in an increased need for nurses with up-to-date knowledge of ADRD and who are well-educated in ADRD care. Therefore, it is important to be sure that this topic is covered in the undergraduate nursing curriculum.

Purpose: To assess undergraduate nursing students' knowledge of Alzheimer's disease and related dementias care.

Method: Cross-sectional study carried out among nursing students at two universities in southern Spain. The University of Jaen (UJA)-Alzheimer's Care scale was used to measure their knowledge.

Results: The mean age of the students was 21.39 years, and 83.2% of the 678 students were women. For students, the UJA-Alzheimer's Care scale has a good fit and reliability of 0.99 for the items and 0.74 for the persons, according to the Rasch model. The mean knowledge score of nursing students was 15.33 (SD 3.69) out of 23; (95%CI: 15.06–15.61). The value of the latent variable (theta) was 1.16 (SD 1.21); (95%CI: 1.06–1.25). The factors positively associated with students' knowledge were the number of years in the program, experience in caring for a patient with ADRD during their placements, and the education on ADRD received in the nursing program as self-rated by the students.

Conclusion: The UJA-Alzheimer's Care scale is a useful tool for measuring knowledge of ADRD care among nursing students in Spain and other Spanish-speaking countries. Nursing students at the two universities reached moderate scores in the knowledge of ADRD care. More years in the nursing program, practical experience in clinical placements, and higher self-rated level of education on ADRD received during the program were associated with higher scores on knowledge.

Introduction

Deterioration in memory, cognition, behavior, and the ability to perform everyday activities are some of the symptoms caused by dementia (World Health Organization, 2020). Alzheimer's disease is the most common cause of dementia, accounting for 60% to 80% of cases (Alzheimer's Association, 2020). Patients with Alzheimer's disease and Related Dementias (ADRD) are increasing in number all over the world; currently, 50 million people worldwide are believed to live with ADRD. If science cannot find any solution by 2030, these numbers will continue increasing, reaching almost 82 million patients, and by 2050, the number could exceed 152 million patients (World Health Organization, 2020). In Spain, it is estimated that in 2030 the figure will reach almost

600,000 people and close to one million sufferers by 2050; affecting the lives of 4,500,000 people (Villarejo Galende et al., 2021). There is a high incidence and prevalence of dementia in the community in Spain and it is common for people with dementia to be cared for at home with their family for a long time (Ponjoan et al., 2019).

The WHO recognizes ADRD as a public health priority through the Global Action Plan on the Public Health Response to Dementia 2017–2025, which aims to prevent ADRD and enable people with ADRD and their caregivers to live well and receive the care and support they need to develop their potential with dignity, respect, autonomy, and equality (World Health Organization, 2017).

Nurses play an important role in the care of both the patient and their caregivers and relatives. The provision of optimal care requires that

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hospital, community and long-term services are integrated to support and help people with AD and their caregivers meet their needs (Alzheimer's Disease International, 2016). ADRD care requires nurses to have specific skills, attitudes, and knowledge (Kimzey et al., 2016). Person-centered care interventions reduce agitation, neuropsychiatric symptoms and depression, and improve quality of life. However, an educational strategy that promotes learning and skill development among care staff is needed to improve patients' quality of life (Kim & Park, 2017). In particular, more awareness-raising efforts are still needed, with up to 62% of health professionals worldwide incorrectly think that ADRD is part of normal aging (Alzheimer's Association, 2020), and >50% of health professionals agree that their own colleagues ignore people living with ADRD (Lynch, 2020).

Students' preference for working with older people seems to decrease over the years of the nursing program and is influenced by several factors, such as completing clinical placements and the content of the courses they received. As a result, this specialty is considered low status, working with older people considered unattractive, and it is even less valued and challenging to work with people with ADRD; therefore, there is a clear need to improve education on ADRD (Hebditch et al., 2020). In addition, it is important to have well-qualified and specialized faculty to motivate students to work with the elderly after graduation (Wyman et al., 2019). Undergraduate nursing students frequently report their need for additional education to improve communication with ADRD patients (Kimzey et al., 2016; Scerri & Scerri, 2013). Furthermore, the need to educate health care workers in the care of persons with disabilities has been described as a crucial element of the Global Action Plan on the Public Health Response to Dementia 2017–2025, published by the World Health Organization (Evripidou et al., 2019).

Background

Several teaching approaches have been described for specific education of nursing students on ADRD care, such as three weeks of clinical placements in nursing homes (Eccleston et al., 2015), scenario-based simulation training (Haugland & Reime, 2018) or hybrid learning methods (clinical experience, online training module or no specific interventions) (Kimzey et al., 2016). Previous studies concluded that there were significant improvements in ADRD knowledge regardless of the educational method used (Kimzey et al., 2019). When nursing students have opportunities to have some specific clinical experience in ADRD care, through placements; not only does their knowledge increase, but also their empathy and attitudes improve (Kimzey et al., 2016; Scerri & Scerri, 2013). The same is true for other disciplines; medical and pharmacy students who participated in a virtual ADRD simulation experience described it as useful and impactful and they reported improved knowledge and attitudes toward people with ADRD (Gilmartin-Thomas et al., 2020).

Assessment of students' level of knowledge on ADRD provides evidence for the need to improve learning about this disease in the nursing curriculum (Eccleston et al., 2015; Scerri & Scerri, 2013). In the literature, some studies have measured the knowledge of ADRD of nursing students in different countries, such as in China (Wang et al., 2020), South Korea (Shin et al., 2015), Caribbean (Rawlins et al., 2015) or the United States (Kimzey et al., 2019). These studies have used questionnaires developed or adapted to each context, such as the Alzheimer's Disease Knowledge Scale (ADKS) (Wang et al., 2020), the Korean version of the Dementia Knowledge Questionnaire (Shin et al., 2015) and the Dementia Knowledge Assessment Tool Version 2 (DKAT2) (Kimzey et al., 2019).

However, despite the importance of nursing students acquiring up-to-date knowledge about the care of people with ADRD in the undergraduate nursing program; to our knowledge, there is no published study that has studied this issue in Spain using a validated tool. The University of Jaén (UJA) Alzheimer's Care scale (Parra-Anguaita, Sánchez-García, et al., 2019) was developed and tested in registered

nurses (RN) and assistant nurses (AN) working in nursing homes in Spain, but further validation in nursing students was needed. In addition, identifying factors associated with students' knowledge could be very useful for tailoring educational interventions. The initial version of this scale was developed in Spanish, with an English-version published (Parra-Anguaita, Sánchez-García, et al., 2019).

The aims of this study were: a) To evaluate the psychometric properties of the UJA-Alzheimer's Care scale to measure the knowledge about ADRD in nursing students, b) To establish the level of knowledge about care of people with ADRD in undergraduate nursing students, and c) To explore which educational and sociodemographic factors are associated with the level of knowledge about ADRD care.

Method

Design

A cross-sectional study was carried out to measure the level of knowledge of ADRD among undergraduate nursing students at the University of Jaén and University of Seville (southern Spain). The STrengthening the Reporting of OBServational studies in Epidemiology (STROBE) guideline was used for reporting this study (Von Elm et al., 2007).

Setting and participants

This study was conducted at the Faculty of Health Sciences of the University of Jaén and the Faculty of Nursing, Physiotherapy and Podiatry of the University of Seville. The sample was composed of all the students enrolled in any year of the nursing bachelor program (four years) at these two universities (1520 students). No exclusion criteria were applied.

In Spain, the core competences and the structure of nursing program are regulated by national standards that ensure the achievement of a common level upon graduation (Ministry of Science and Innovation, 2008). The program requires a course with content on caring for the elderly, so both universities have that course during the 3rd year. The contents on dementia (as a syndrome related to aging) are included in this course, as specific themes. In addition to theoretical learning in the classroom, students have a total of 48 weeks of compulsory practical learning through placements in different settings (hospitals, primary care and nursing homes) (in their 2nd, 3rd and 4th year). At both universities, the faculty teaching these courses had specialized qualifications in gerontology and extensive practical experience.

Variables and instruments

The data were collected by a self-administered form with two sections, by paper and pencil:

- Sociodemographic and educational variables: gender, age, university, having a relative with ADRD, caring for a relative with AD (as informal caregiver), caring for a patient with ADRD during clinical placements, and specific education on ADRD received in the nursing program as self-rated by the students.
- Knowledge about ADRD care: the UJA-Alzheimer's Care scale (Spanish version) (Parra-Anguaita, Sánchez-García, et al., 2019). This scale consists of 23 items with three answer options: "Yes" "No" and "Don't know". Score: 0 to 23 (more points indicates more knowledge). Its internal consistency Cronbach's alpha = 0.70; test-retest reliability by the intraclass correlation coefficient (ICC) was 0.83, and the convergent validity with the Spanish version of the Dementia Knowledge Assessment Tool 2 (DKAT2-Sp) was ICC = 0.62 (Parra-Anguaita et al., 2018). It is easy to administer and can usually be completed in around 10 minutes.

Data collection

The data collection was carried out in January–February 2017 at the University of Jaen and in March–April 2018 at the University of Seville (due to logistical reasons it was not possible to collect the data at the same time at both universities). The procedure for data collection was as follows: First, a lecturer from one course in each year of the nursing program was contacted to request collaboration to hand out the questionnaires to the students during a teaching session. Students were then informed of the study's objective and provided with questionnaires on paper and pencil with instructions for completing them; each group was allotted sufficient time (around 40 min) to fill in the questionnaire. Data were anonymous; no identifiable personal data were included in the questionnaire. Students were asked to participate on a voluntary basis; the questionnaire was not a course assignment and had no influence on their grades.

Data analysis

Once the questionnaires were collected, they were coded, tabulated into an Excel database, and revised for any errors and inconsistencies. Each correct answer was scored with 1 point and incorrect or “don't know” answer scored with 0 points (but the number of “don't know” answers was also registered).

Psychometric analysis was based on model fit by Rasch analysis. Rasch analysis is a modern psychometric method based on Item Response Theory (IRT). The IRT refers to a class of mathematical models that attempt to explain the relationship between latent traits (unobservable characteristic) and their manifestations (observed outcomes or responses) (Van der Linden et al., 1997). This method provides several advantages over traditional methods derived from Classical Test Theory; the scores obtained are invariant (independent of the sampling distribution of the items), produce individual standard errors for the items and allow differentiation between the scores concerning the items and the person's performance (Hendriks et al., 2017; Pallant & Tennant, 2007). With Rasch analysis, it is possible to obtain a more robust measurement of scores by applying a mathematical approach based on a logit model. Rasch's model can estimate the relationship between respondent ability and item difficulty because it measures both people and items in a single dimension. This method has previously been used in the psychometric analysis of instruments to measure the knowledge and quality of life of people with ADRD (Hendriks et al., 2017; Parra-Anguaita, Sánchez-García, et al., 2019; Smith et al., 2020).

Rasch analysis was conducted by JMetrik software using the joint maximum likelihood method (Meyer, 2014). The model fit was estimated by the square of the unweighted mean square of the standardized residuals (UMS) and the weighted mean square of the standardized residuals (WMS). The value 1 denotes a perfect fit; UMS and WMS values between 0.5 and 1.5 were deemed acceptable (Linacre, 2012). The ability of the person (θ) is the probability of endorsing the correct answer for that item. The true values of the latent variable measured (ability) were estimated by this model from the observed scores. An S-shape curve is displayed when plotting the observed scores against the theta scores.

For descriptive statistics, frequencies and percentages were calculated for categorical variables, and mean and standard deviation for continuous variables. The mean, standard deviation, 95% confidence interval (CI) and the percentages of correct, incorrect, and don't know answers were calculated to obtain knowledge scores. The association between demographic or educational variables and the knowledge score was tested using the Student's *t*-test or one-way ANOVA. The effect size was estimated using the eta squared statistic. Data were analyzed using SPSS 22. A value of $p < 0.05$ was used as the level of statistical significance.

Ethical consideration

The Committee of Research Ethics in Jaen approved the protocol for this study (number 25102012). The data obtained were anonymous according to the Spanish Law on Personal Data Protection.

Results

Study sample characteristics

The final sample was 678 nursing students (response rate 44.60%), of which 364 belonged to the University of Jaen and 314 to the University of Seville. Table 1 shows the main characteristics of the participants. Because in Spain it is not uncommon for people with ADRD to stay at home with the family as much as possible, there were a number of students (52.1%) with a relative with ADRD and some of these students (33.6%) had collaborated in the care of these relatives.

Psychometric characteristics

Table 2 shows the descriptive analysis of the questionnaire with the percentages of correct, incorrect and “don't know” responses for each item. This analysis allows identifying what topics the students know best, but also which ones are wrong or unknown.

- Rasch Model

Table 3 shows the fit indices and difficulty score of each item. Item difficulty is a parameter that determines how the item performs along the ability scale, so a difficulty of 0 means the ability at which 50% of respondents endorse the correct answer. Positive difficulty values mean more difficult items (people need more ability or knowledge to get the correct answer), while negative values mean less difficult items. All the items fit well in the WMS (values < 1.5). Additionally, the items of the

Table 1
Sociodemographic characteristics of the nursing students^a.

	Frequency (%)		
	University of Jaen (N = 364)	University of Seville (N = 314)	Total sample (N = 678)
Age; mean (SD)	21.82 (5.52)	20.90 (4.10)	21.39 (4.92)
Gender			
Female	296 (81.3%)	268 (85.4%)	564 (83.2%)
Male	65 (17.9%)	46 (14.6%)	111 (16.4%)
Program year			
1°	73 (20.1%)	127 (40.4%)	200 (29.5%)
2°	117 (32.1%)	87 (27.7%)	204 (30.1%)
3°	84 (23.1%)	68 (21.7%)	152 (22.4%)
4°	89 (24.5%)	32 (10.2%)	121 (17.8%)
Relative with ADRD			
Yes	207 (56.9%)	146 (46.5%)	353 (52.1%)
No	157 (43.1%)	168 (53.5%)	325 (47.9%)
Experience caring for a relative with ADRD			
Yes	156 (42.9%)	72 (22.9%)	228 (33.6%)
No	206 (56.6%)	241 (76.8%)	447 (65.9%)
Caring for a patient with ADRD in placements			
Yes	190 (52.2%)	109 (34.7%)	299 (44.1%)
No	158 (43.4%)	204 (65%)	362 (53.4%)
Education on ADRD received in the program			
None	83 (22.8%)	103 (32.8%)	186 (27.4%)
Low	214 (58.8%)	162 (51.6%)	376 (55.5%)
Good	67 (18.4%)	49 (15.6%)	116 (17.1%)

^a The missing percentage in the variables up to 100% corresponds to the non-responses.

Table 2

Percentage of corrects, incorrect and “don't know” for the items of the UJA-Alzheimer's Care scale (N = 678).

	Correct	Incorrect	Don't know
14. Inform the caregiver about the disease and its possible complications, and the social resources and support systems available. (TRUE)	95.7%	0.3%	3.8%
21. Record in the Patient Medical Record data on the form of onset, progression, psychological and behavioural symptoms. (TRUE)	94.4%	0.4%	5.2%
16. Identify who is the patient's representative to include him or her in decision-making and care planning. (TRUE)	94%	0.9%	5%
19. Provide comprehensive care to the caregiver, including counselling and emotional support. (TRUE)	92.8%	1.5%	5.3%
10. Palliative care must include psychosocial, spiritual, cultural and family support aspects. (TRUE)	92%	1.2%	6.6%
17. Caregivers should be informed and trained to prevent the onset of behavioural and psychological symptoms of dementia. (TRUE)	90.1%	1.6%	8.3%
22. Care plans should address activities of daily living to maximize independent activity, maintain function and adapt and develop skills. (TRUE)	90.1%	0.9%	9%
11. Conduct long-term physical activity programs to maintain the functional capacity of institutionalized dementia patients. (TRUE)	81.7%	1.5%	16.7%
6. Reporting the existence or suspicion of abuse is not a matter for nurses or elderly care workers, but for other professionals. (FALSE)	81.3%	12.7%	0.1%
9. The application of mechanical restraints, type and date of application, reason, care provided and informed consent should be recorded in the Patient Medical Record. (TRUE)	79.1%	2.1%	18.7%
5. Non-pharmacological and pharmacological measures should be used together to manage the different behavioural and psychological symptoms of dementia. (TRUE)	78.6%	3.1%	18%
18. Advise the person with dementia, to prepare a living will document in the early stages of the disease. (TRUE)	64.5%	4.9%	30.4%
3. When families cannot guarantee care for people with dementia, admission to a facility may avoid social isolation and prevent abuse. (TRUE)	60.8%	23.2%	15.9%
7. The management of extreme agitation, violence and aggressiveness must take place in a safe, low-stimulation environment, separate from other users of the service. (TRUE)	56.3%	10.9%	32.2%
12. Use the oral route for fluid supply at the end of life, whenever possible. (TRUE)	54.9%	13.6%	31.6%
8. Specific drugs are the first option for treatment of psychological and behavioural disorders. (FALSE)	51.9%	15.2%	32.9%
4. Provide a normal diet, while assessing the causes of dysphagia. (FALSE)	47.5%	14.9%	37.3%
2. The Zarit scale is used to quantify the caregiver's burden. (TRUE)	46.3%	1.3%	52.2%
1. If needed, mechanical restraints can be used as a substitute for surveillance or for the convenience of professionals. (FALSE)	45.9%	13.4%	40.1%
20. Intervention programs in activities of daily living do not reduce the caregiver burden in the medium term. (FALSE)	45.4%	17.4%	36.9%
13. Informing family and caregivers of the near death status does not improve care in the last few days. (FALSE)	44.4%	26.5%	29.1%
23. Use nasogastric tube or percutaneous gastrostomy in the patient with advanced dementia as a regular feeding route, if dysphagia. (FALSE)	23.9%	24.8%	51.3%
15. Behavior modification, programmed hygiene and induced urination increase urinary incontinence in patients with dementia. (FALSE)	22%	28.5%	49.6%

Ordered from highest to lowest percentage of correct answers. Between brackets the correct option.

Table 3

Rasch model for UJA-Alzheimer's Care scale.

Item	Difficulty (standard error)	WMS (infit)	UMS (outfit)
1	1.37 (0.09)	1.04	1.15
2	1.36 (0.09)	0.95	0.90
3	0.65 (0.09)	1.28	1.54
4	1.31 (0.09)	1.03	1.19
5	−0.42 (0.10)	0.98	1.07
6	−0.66 (0.11)	1.16	1.23
7	0.86 (0.09)	1.06	1.12
8	1.09 (0.09)	1.04	1.16
9	−0.45 (0.10)	0.96	0.84
10	−1.84 (0.16)	0.96	0.71
11	−0.65 (0.11)	0.93	0.79
12	−0.95 (0.9)	0.99	1.03
13	1.46 (0.09)	0.96	1.03
14	−2.67 (0.21)	0.80	0.46
15	2.74 (0.10)	1.00	1.94
16	−2.21 (0.18)	0.88	0.64
17	−1.52 (0.14)	0.96	1.04
18	0.45 (0.09)	0.98	1.00
19	−2.02 (0.17)	0.85	0.61
20	1.41 (0.09)	0.92	0.89
21	−2.28 (0.19)	0.86	0.63
22	−1.52 (0.14)	0.92	0.78
23	2.61 (0.10)	0.95	0.93

Item difficulty equal to 0 means median probability of people to get the correct answer. WMS: Weighted mean square of standardized residuals; UMS: Un-weighted mean square of standardized residuals; values from 0.5 to 1.5 mean acceptable fit.

UJA-Alzheimer's Care scale have a wide range of difficulty, from the most difficult (Item 15 “Behavior modification, programmed hygiene and induced urination increase urinary incontinence in patients with dementia” (false), difficulty: 2.74) to the easiest (item 14 “Inform the caregiver about the disease and its possible complications, and the social resources and support systems available.” (true), difficulty: −2.67).

Overall, the UJA Alzheimer's Care scale has good quality indices and high reliability for both for items and persons. (Table 4).

Fig. 1 shows the curve of the scores obtained in the questionnaire versus the values of the ability (latent variable; theta score) estimated by the model. This shape reflects that small increases in score imply larger increases in the latent variable measured (knowledge of ADRD care).

Knowledge of ADRD care

The level of knowledge of the care of people with ADRD was measured with the UJA-Alzheimer's Care scale. Table 5 shows the values of the scores of students at both universities (knowledge score and ability) and the percentages of correct, incorrect and “I don't know” answers for the items of the questionnaire.

Factors associated with knowledge of ADRD care

The association between the score on the UJA-Alzheimer's Care scale and several demographic and educational factors was tested. Table 6

Table 4

Statistics for the UJA-Alzheimer's Care Scale.

Statistic	Items	Persons
Observed variance	2.51	1.29
Adjusted variance	2.50	2.95
Separation index	12.84	1.68
Number of strata	17.46	2.57
Reliability	0.99	0.74

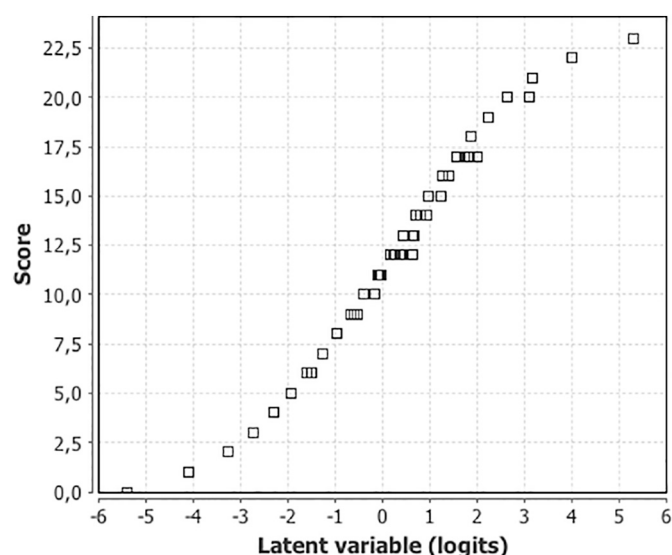


Fig. 1. Graphic of the direct score (observed values) of the UJA Alzheimer's Care scale (Y axis) versus the true score of the latent variable measured (theta) (X axis). In the upper part of the graphic, a small increase in direct score means a higher increase in the latent variable measured (knowledge).

Table 5

Knowledge of nursing students about caring for people with ADRD.

	Mean (SD); CI 95%		Total sample (N = 678)
	University of Jaen (N = 364)	University of Seville (N = 314)	
Knowledge score	15.16 (3.42); (14.81–15.51)	15.54 (3.98); (15.10–15.98)	15.33 (3.69); (15.06–15.61)
Ability (latent variable score) (θ)	1.09 (1.13); (0.97–1.21)	1.24 (1.30); (1.09–1.38)	1.16 (1.21); (1.06–1.25)
Correct answer (%)	48.05 (26.83); (45.29–50.82)	52.25 (30.75); (48.83–55.66)	50.0 (28.80); (47.83–52.16)
Incorrect answer (%)	2.59 (1.99); (2.39–2.80)	1.76 (1.45); (1.60–1.92)	2.21 (1.80); (2.07–2.34)
Don't know answer (%)	5.19 (3.91); (4.79–5.59)	5.67 (4.25); (5.20–6.14)	5.41 (4.08); (5.10–5.72)

compares the mean knowledge scores in the total sample according to the variables tested.

Discussion

The aim of this study was to assess knowledge about ADRD care among undergraduate nursing students, to identify factors influencing this knowledge, and, in addition, to evaluate the psychometric properties of the UJA-Alzheimer's Care scale, in the original Spanish version.

The UJA-Alzheimer's Care Scale has good quality indices and high reliability according to the Rasch model. This study confirms that this scale can be used to evaluate ADRD care knowledge among undergraduate nursing students.

The UJA-Alzheimer's care scale shows good psychometric properties for validity and reliability in nursing students. The scale comprises 23 items based on recommendations extracted from current clinical practice guidelines on ADRD care and treatment. The scale could be used with nursing staff and nursing students. It is an easy-to-administer scale and requires less than ten minutes to be answered. The scale can be obtained through the project website ([CuiDsSalud. Knowledge of Alzheimer's disease and dementia care, 2017](#)).

It should be highlighted that this scale has three response options, including the answer "I don't know." Thus, respondents have the

Table 6

Association between demographic and educational factors and the knowledge score measured with the UJA-Alzheimer-Care scale.

	Nursing students (N = 678)		
	Score mean (SD)	p-value ¹	Effect size (eta squared)
Gender			
Female	15.44 (3.59)	0.122	
Male	14.85 (4.17)		
Program year			
1°	13.51 (3.79)	<0.0001 ²	0.24
2°	14.25 (3.37)		
3°	17.55 (2.47)		
4	17.40 (2.82)		
Relative with ADRD			
Yes	15.35 (3.61)	0.904	
No	15.32 (3.77)		
Experience caring for a relative with ADRD			
Yes	15.59 (3.58)	0.210	
No	15.21 (3.75)		
Caring for a patient with ADRD in placements			
Yes	16.39 (3.06)	<0.0001	0.07
No	14.48 (3.95)		
Education on ADRD received in the program			
None	13.82 (4.07)	<0.0001 ³	0.17
Low	15.38 (3.36)		
Good	17.62 (2.78)		

¹ t test or ANOVA.

² DMS post-hoc test. 1° vs. 2° $p = 0.020$; 1° vs. 3° $p \leq 0.0001$; 1° vs. 4° $p \leq 0.0001$; 2° vs. 3° $p \leq 0.0001$; 2° vs. 4° $p \leq 0.0001$; 3° vs. 4° $p = 0.693$.

³ DMS post-hoc test. None vs. Low $p \leq 0.0001$; None vs. Good $p \leq 0.0001$; Low vs. Good $p \leq 0.0001$.

opportunity to acknowledge their lack of knowledge, avoiding the random marking of Yes or No. Different authors recognize this option as advantageous ([Cherry et al., 2003](#); [Dolnicar & Rossiter, 2009](#)). This characteristic can help educators when planning educational activities. We believe that identifying the topics in which students have erroneous knowledge versus those in which they recognize they have no knowledge is very useful.

Analysis with a modern psychometric method, such as the Rasch model confirmed that the final 23-item version has a good fit and has items with different levels of difficulty what allows for a full exploration of knowledge about this topic. The scale also has evidence of reliability, high internal consistency with values similar to other scales for nursing students, such as DQ ([Gilleard & Groom, 1994](#)), DKAS ([Annear et al., 2015](#)) and KAML-C ([Kuhn et al., 2005](#)).

This study shows that nursing students have a moderate level of knowledge about ADRD care. The level of knowledge of our students is similar to that reported by other authors as acceptable and adequate ([Kimzey et al., 2016](#); [Scerri & Scerri, 2013](#); [Wang et al., 2020](#)) (around 65%). Although, our results differed with those in other studies where the students had a low or insufficient level of knowledge ([Eccleston et al., 2015](#); [Poreddi et al., 2015](#); [Sunaryo et al., 2020](#)). However, these studies have some differences in terms of the knowledge measurement instruments (Dementia Knowledge Assessment Tool 2, Alzheimer's Disease Knowledge scale (ADKS) and Dementia Knowledge Assessment Scale (DKAS) respectively), the context and the number of years enrolled in the nursing program of the students (most of the studies did not include first year students). These differences may explain the discrepancies in findings on the level of knowledge.

If we compare our results with the level of knowledge of nursing professionals (registered nurses and assistant nurses) ([Parra-Anguila, García-Fernández, et al., 2019](#)) it is lower, as expected. However, the level of knowledge of the final year students was similar or even higher

than the score obtained by assistant nurses and elderly cares workers. This circumstance is likely due to both jobs; assistant nurses and elderly care workers have technical educational programs but are not included in university education.

More than 80% of our students consider that their specific education on ADRD is scarce or low, so it would be necessary to do specific education with a higher number of hours of care practice in geriatrics and gerontology units to achieve better preparation (Kimzey et al., 2016; Scerri & Scerri, 2013). In addition, if these practical placements are performed in residential centers where more interaction with people with ADRD can be experienced (Kimzey et al., 2016) and with well-trained tutors, this can improve the education and attitude of students (Eccleston et al., 2015). Several factors have been identified in the literature that prevents nursing students from choosing a specialization in elderly care as a career option. These factors include: lack of positive experiences with older adults, negative faculty attitudes, inappropriate clinical placements that reinforce nursing students' biases and stereotypical attitudes toward caring for older adults, perceptions related to lack of necessary technical skills, and curricula that focus primarily on acute and intensive care (Wyman et al., 2019). It is important to have a well-educated and informed faculty to provide adequate education.

In our study, the factors that are associated with the level of knowledge were the program year, experience in caring for a patient with ADRD during their placements, and the self-rated level of specific education on ADRD. Our results agree with those presented by others (Scerri & Scerri, 2013; Wang et al., 2020), which identified academic year, education, and caring for patients with ADRD during an internship as factors. Although, they also found associations with age (Scerri & Scerri, 2013), gender, and specialization (Wang et al., 2020). These results suggest that a well-structured and supervised experience in caring for people with ADRD (as in clinical placements) increases the knowledge but not just the experience in caring for relatives without supervision.

When we compare our results on students' level of knowledge after receiving education in the nursing program with those of other authors, we find that our results are similar to those of the control group (without any specific intervention) of the Eccleston's study. In contrast, the improvement in the level of knowledge was greater in the intervention group in which specific education was carried out with practices caring for patients with ADRD (Eccleston et al., 2015). This may be because the learning of the students in our study was about caring for the elderly, in general, with only some lessons on ADRD care. The nursing degree curricula of the universities included in this study included a compulsory course of gerontological nursing. The contents of this course focus on the aging process, satisfactory aging, healthy elderly, resources and organization for the care of the elderly, and a module on sick or disabled elderly. In this module, one of the contents is about the care of people with ADRD. Therefore, it is likely not adequately developed or very in depth.

To ensure that the education provided is the most appropriate, some authors have recommended to develop a research study whose objectives would be to carry out a curriculum mapping; and thus, evaluate the specific content on the care of people with ADRD, learning experiences and learning assessments; identifying specific curricular gaps on dementia (Michael et al., 2019).

As expected, students in the last years of the program (3rd and 4th year) obtained better scores than those in the first and second years after receiving education in the course of gerontological nursing and having carried out some placements in different settings. In the same line, another study conducted in fourth-year nursing students scored slightly higher than third-year students (Poreddi et al., 2015; Scerri & Scerri, 2013).

Our findings, like others, show acceptable but incomplete learning on ADRD care, so more specialized education is needed. However, the general nursing curricula probably do not meet this need; as some authors highlight current curricula might not adequately prepare students

to meet the needs of people with ADRD (Gilmartin-Thomas et al., 2020).

We propose that more hours of learning and specific contents are needed to increase knowledge about care for people with ADRD, especially through person-centered care, which is internationally recognized as a best practice. Person-centered care is a treatment approach that recognizes the individuality of the patient in relation to the attitudes and care practices that surround him/her (Kim & Park, 2017). There is a common denominator, recognizing the cared-for person as an active agent and owner of his or her life, considering his or her autonomy. It is a professionalized care that seeks the quality of life of people in need of care, but prioritizing respect for their individuality, way of life, and preferences. Person-centered care interventions reduce agitation, neuropsychiatric symptoms, and depression, and improve the quality of life for people with ADRD (Kim & Park, 2017).

Limitations

Limitations of this study include the self-reported nature of the data because it is a self-administered scale, which has the potential for misclassification. There is also a possibility that participants may have shared information. The data from the two universities that participated in this study were collected one year apart, but the procedure and analysis were the same, so we do not believe that this affects the results.

The sample of nursing students used in this research was obtained from only two universities in Spain, using convenience sampling, so the findings on the level of knowledge of the students cannot be generalized, but may be used for comparison purposes. However, the data on the psychometric properties of the questionnaire are robust and could be used in other Spanish-speaking contexts and, after validation of the English version, in other countries. However, despite these limitations, we believe that this study includes significant findings for researchers and nurse educators in ADRD curriculum planning.

Future research

This study has opened up some questions that need further research to be answered. The English version of the UJA-Alzheimer's Care scale should be tested in other contexts and countries and its psychometric properties evaluated to confirm its features. Studies with larger samples from several nursing schools, from one or several countries, would give a better insight into the level of knowledge of nursing students about the care of people with ADRD and the alignment of content in nursing curricula with current guidelines.

Another area of research is the assessment of the knowledge of faculty in nursing schools in charge of curriculum development about this health problem. Studies to measure this knowledge using this scale could help to check whether or not the faculty has up-to-date knowledge.

Implication for nursing education

The number of people with DAD is progressively increasing in most countries of the world and the complexity of the care they require is also growing. In this context, it is of paramount importance that nurses acquire during their undergraduate education sound knowledge and good skills to care for these patients in the future. The UJA-Alzheimer's Care scale provides educators with a useful tool to monitor the impact of students' learning and to modify curricula if necessary. This scale permits the identification of specific points or topics that students have misunderstood, have errors or directly recognize their lack of knowledge.

This study has shown the significant effect of clinical placements in improving students' knowledge of RDA, together with the content taught in theoretical courses. For general nurses, the learning and competencies acquired through the undergraduate curricula might be not enough to fully meet the needs of patients with ADRD, so faculty should consider

increasing the number of teaching hours focused on dementia and also updating and specializing the content.

Conclusions

The UJA-Alzheimer's Care scale is a useful tool to measure knowledge of ADRD care among nursing students in Spain and other Spanish-speaking countries. The scale obtained good psychometric properties of validity and reliability in the sample of nursing students. This scale could be used as a tool to identify areas in need of improvement and to plan educational activities.

The nursing students in these two Spanish universities obtained a moderate score on the knowledge scale, with several aspects of ADRD care being either unknown or incorrect.

The factors associated with the level of knowledge among the undergraduate nursing students were the nursing program year, previous experience caring for a patient with ADRD during their nursing practice, and the self-rated level of specific education on ADRD.

These findings have implications for curriculum development and further research to strengthen learning about ADRD care for nursing students, especially considering the progressive aging of the population and the demand for high-quality care for people with ADRD. Our results support, although indirectly, the need for specialized education. The findings of our observational study need to be further evaluated by an intervention design where specific teaching and learning strategies on specialized care for people with ADRD are implemented in undergraduate nursing students.

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Ethical approval

The research protocol was approved by Jaen Research Ethics Committee (project code 25102012).

CRediT authorship contribution statement

Parra-Anguita Laura: Conceptualization, Data curation, Investigation Writing- Original draft preparation. López-Franco María Dolores: Formal analysis, Writing - Review & Editing. Del-Pino-Casado Rafael: Investigation, Writing - Review & Editing, Visualization. García-Fernández Francisco Pedro: Data curation, Writing - Review & Editing. Pancorbo-Hidalgo Pedro L.: Conceptualization, Methodology, Formal analysis, Writing- Reviewing and Editing.

Declaration of competing interest

The authors declare no conflict of interest.

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