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Nursing students' knowledge, attitudes, and behaviors toward aging and ageism in Palestine

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Abstract

Background Nursing students, as future healthcare professionals, hold a crucial role in delivering high-quality care to older adults. Their ability to provide effective geriatric care depends significantly on comprehensive knowledge and the cultivation of positive attitudes, and behaviors. Recognizing this critical responsibility, this study aimed to assess nursing students' attitudes, behaviors, and knowledge regarding aging and ageism.

Methods A cross sectional study was conducted with a convenience sample from 334 nursing students during Spring 2024. Data were collected using a self-administered questionnaire, including the Facts on Aging Quiz (knowledge assessment), the Relating to Older People Evaluation (ageist behaviors), and Kogan's Attitudes toward Older People Scale.

Results Results revealed significant knowledge gaps, with only a small percentage achieving an acceptable knowledge level. Ageist attitudes were prevalent, though positive attitudes outweighed negative ones. Students generally held somewhat positive views of aging, but negative behaviors persisted, particularly among female students. Work experience with older adults and a family history of caregiving were positively associated with higher knowledge scores. Additionally, satisfaction with nursing education and Confidence in caring for older adults were strongly associated with positive behaviors, attitudes, and knowledge regarding older adults. Correlation analysis showed positive relationships between knowledge, attitudes, and behaviors, with attitudes significantly predicting behaviors in regression analysis.

Conclusion Nursing students demonstrated insufficient knowledge about older adults, with positive attitudes and behaviors prevailing despite persistent negative behaviors. Female students exhibited higher negative behaviors, while work experience and caregiving history correlated with better knowledge but did not influence attitudes or behaviors. Satisfaction with nursing education and confidence in geriatric caring were strongly linked to positive outcomes. Enhancing nursing curricula with practical, relevant content and opportunities for meaningful interaction with older adults is essential to improve students' preparedness and foster quality care.

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Background

Globally, the aging population is rapidly increasing, with adults aged 60 + being the fastest growing group, especially in developing countries [1]. By 2050, the older adult population is projected to reach two billion, with 80% residing in developing nations [2]. The body undergoes physiological, chronological, psychological, and social changes as it ages, which are normal and irreversible [3]. The older adult's population constitutes approximately 6% of the total population. In Palestine, around 76% of older adult individuals suffer from chronic diseases, according to the 2024 report by the Palestinian Central Bureau of Statistics (PCBS) [4]. Advances in treatment and disease management have increased life expectancy. However, living longer doesn't always mean a better quality of life. While many people age well, older adults are more likely to face declining health and greater dependence [5]. Increasingly negative attitudes toward older adults may stem from common misconceptions that associate aging with dependency [6].

Fostering positive attitudes and acquiring knowledge about aging and older adult healthcare are key priorities for nurses. Positive attitudes influence behavior, encouraging favorable perceptions of older adults. A sentiment toward something or someone is referred to as an attitude [7]. Attitude influences an individual's willingness to care for older adults [8]. An individual's intention or willingness to perform an action depends on their attitude toward a given behavior [9]. Moreover, changes in attitude can impact behavioral intention [7]. If nursing students hold positive attitudes toward the care of older adults, they are more likely to provide such care. Developing curricula that effectively prepare nursing students to manage, coordinate, and deliver healthcare for older adults remains an ongoing challenge for nursing schools. Providing care to this population requires qualified and competent nurses [10]. The quality of healthcare delivery is influenced by several factors, including nurses' perceptions, attitudes toward older adults, and their knowledge of the aging process [11]. The substantial demographic shift toward an aging population increases the demand for healthcare tailored to older adults. It is anticipated that the majority of nursing students are expected to work primarily with older adults after graduation [12]. To meet the complicated healthcare demands of this population, it is imperative that nursing students are adequately educated with the necessary knowledge, and attitudes ensuring they can provide compassionate, high-quality care and address the unique challenges of aging. Several studies have been examined nursing students' knowledge of and attitudes toward older adults [13–16]. However, the majority of studies reported that nursing students possess knowledge deficits and negative attitudes and are less motivated to care for older adults [16–18].

To our knowledge, no previous study has addressed this issue within the context of Palestinian students. Providing optimal and quality care for geriatric adults requires understanding nursing students' knowledge, behaviors, and attitudes. Therefore, our study aimed to assess nursing students' attitudes, behaviors, and knowledge regarding aging and ageism. The results of this study can inform nursing education by guiding curriculum reforms and emphasizing the importance of geriatric care.

The Theory of Planned Behavior (TPB) serves as a guiding framework for the current study, offering a structured approach to understanding nursing students' knowledge, attitudes, and behaviors regarding aging and ageism [19]. TPB hypothesizes that an individual's behavior is influenced by three key components: attitudes, subjective norms, and perceived behavioral control. Attitudes toward aging influence students' willingness to care for older adults, while subjective norms - such as societal and professional expectations - shape their perceptions and interactions with this population. Additionally, perceived behavioral control, or the confidence in one's ability to provide geriatric care, plays an important role in determining actual caregiving behaviors. By applying TPB, this study explores how these interrelated factors influence nursing students' readiness and motivation to work with older adults, thereby informing strategies for refining geriatric nursing education.

Methods

Design, setting, population, and sample

This study used a descriptive cross-sectional design employing self-administered questionnaires. This design was well-suited for capturing nursing students' knowledge, attitudes, and behaviors regarding aging and ageism at a single point in time. It effectively identified key associations and provided insights to inform future research. The study was carried out among nursing students at the Arab American University in Palestine during the Spring semester, 2024. A convenience sampling technique was utilized for data collection. The sample size was calculated using Raosoft online sample size calculator (http://www.raosoft.com/ samplesize.html), with a 95% confidence interval, a population size of 800, and a 5% accepted margin error. The initial sample size was set at 260 students, but to account for potential attrition, it was increased to 350. Ultimately, 334 completed surveys were returned, yielding a response rate of 89%.

Instruments

The quaternaries were administered to all nursing students in English, as it is the second language in Palestine and the primary language of instruction in their nursing education. To ensure the questionnaire's relevance and appropriateness for the Palestinian context, it was reviewed by three faculty members from the nursing department, all holding PhDs and specializing in teaching geriatric courses. Based on their feedback, no modifications were made, as the questionnaire was deemed clear, culturally appropriate, and suitable for assessing nursing students' knowledge, attitudes, and behaviors toward aging. Additionally, the selected scales were chosen for their validity and reliability in assessing nursing students' knowledge, attitudes, and behaviors toward aging.

In this study, a set of instruments were used to measure various variables. The first section was developed by researchers based on the literature [20], it contained students' characteristics, including gender, age, previous experience working with the older adults, and family history of caregiving for older adult relatives. Additionally, it included questions about geriatric nursing engagement, such as completion of geriatric nursing coursework or training, interest in pursuing a career in geriatrics, participation in training or workshops on aging or ageism, perceptions of stereotypes in healthcare, confidence in providing compassionate and respectful care to older adults, and satisfaction with geriatric nursing education.

The second section assessed participants' level of knowledge regarding aging using the Facts on Aging Quiz [21]. This tool comprises 50 True/False items, with one point awarded for each correct answer. Incorrect responses received zero points. The maximum possible score is 50, with higher scores indicating greater knowledge about aging. Cronbach's α reliability for the Facts on Aging Quiz was calculated at 0.78.

In the third section, ageist behaviors were evaluated by the Relating to Older People Evaluation (ROPE) [22]. This 20-item survey measures ageist behaviors reported by nursing students toward older adults. The ROPE consists of six positively worded items and 14 negatively-worded items. Students rate each item on a 3-point Likert scale (2 = Often, 1 = Sometimes, and 0 = Never). Scores for both positive and negative items are summed and divided by their respective maximum scores, yielding higher scores indicative of greater ageism. For the current study, Cronbach's α reliability for the overall ROPE score was calculated at 0.87.

In the last section, the Kogan's Attitudes toward Older People Scale (KAOP) was administered to assess participants' attitudes towards older adults [23]. This 34-item instrument comprises 17 positively and 17 negatively worded statements about older adults, rated on a 6-point Likert scale (1 = strongly disagree, 6 = strongly agree). Negative items were reverse-scored. Higher KAOP scores indicate more positive attitudes toward older adults [23]. The scale demonstrated satisfactory internal consistency, with Cronbach's alpha coefficients of 0.84 and 0.90 for the positive and negative subscales, respectively.

Ethical considerations

All methods in this study adhered to the Declaration of Helsinki and its revisions, as well as the ethical standards of the institutional research committee. Prior to data collection, ethical approval was obtained from the Ethics Committee at Arab American University (2024/A/10/N). Written informed consent was obtained from participants after they were provided with detailed information about the study's objectives and benefits. Participants were assured of anonymity, voluntary participation, and the confidentiality of their data. They were also informed of their right to withdraw from the study at any time without penalties or any impact on their academic achievements.

Data collection

Once ethical approval was obtained, the principal researcher visited the students in their lecture rooms to invite them to participate in the study. During this meeting, they were thoroughly informed about its objectives and nature before providing consent. The study exclusively included third- and fourth-year students, as they were eligible to enroll in the geriatric course, while students from other academic years were excluded. Those who agreed to participate received a questionnaire package accompanied by a cover letter explaining the purpose of the research. Students were instructed to complete the questionnaires and return them to the researcher. The return of completed questionnaires was considered an implied consent for participation in the study.

Data analysis

The data was analyzed using SPSS version 26. Descriptive statistics (means, standard deviations, frequencies, and percentages) were used to summarize demographic data. Prior to conducting inferential analyses, normality of the data distribution was assessed using skewness, kurtosis, and visual inspection of histograms. Statistical analyses were performed accordingly to ensure the appropriate application of parametric tests. T-tests and ANOVA were employed to compare means. A P-value < 0.05 was considered statistically significant.

Demographic characteristics

The sample consisted of 334 nursing students, primarily female (62.6%). Their average age was 22.33 years (SD = 1.37). Over half (56% $n = 187$) had previous

experience working with the older adults, and nearly 70% (*n* = 232) had a family history of caregiving for older adults' relatives. Despite 70.7% (*n* = 236) having completed geriatric nursing coursework or training, only 24.6% (*n* = 82) expressed interest in pursuing a career in geriatrics. Furthermore, while 32.3% (*n* = 108) had received training or attended workshops on aging or ageism, a significant portion (67.7%) had not. Regarding perceptions of stereotypes in healthcare, nearly half of the participants (47%, *n* = 157) acknowledged their existence. The majority expressed confidence in their ability to provide compassionate and respectful care to older adults, with 52.1% (*n* = 174) feeling very confident and 35.3% (*n* = 118) feeling somewhat confident. However, while 57.8% (*n* = 193) were satisfied with their geriatric nursing education, 42.2% *n* = 141) expressed dissatisfaction (Table 1).

Nursing students' knowledge about aging

The analysis of nursing students' responses to knowledge statements about aging revealed both areas of strength and significant knowledge gaps. The overall mean

Table 1 Demographic characteristics of nursing students (*N* = 334)

Variable	% (*n*)
Age, Mean (SD)	22.33 (1.37)
Gender	
Male	37.4 (125)
Female	62.6 (209)
Previous experience working with older adults	
Yes	56.0 (187)
No	44.0 (147)
Family history of caregiving for older adult relatives	
Yes	69.5 (232)
No	30.5 (102)
Exposure to geriatric nursing coursework or training	
Yes	70.7 (236)
No	29.3 (98)
Interest in pursuing a career in geriatric nursing	
Yes	24.6 (82)
No	75.4 (252)
Training or workshops on aging or ageism	
Yes	32.3 (108)
No	67.7 (226)
Belief in stereotypes about aging in healthcare	
Yes	47.0 (157)
No	53.0 (177)
Confidence in providing care to older adult patients	
Not confident	12.6 (42)
Somewhat confident	35.3 (118)
Very confident	52.1 (174)
Satisfaction with geriatric nursing education	
Satisfied	57.8 (193)
Not satisfied	42.2 (141)

knowledge score was 24.27 (SD = 4.8) and none of the students scored 100%. Only 17.1% (*n* = 57) of nursing students achieved an acceptable knowledge score (≥ 60%). as evidenced by the high percentage of correct responses to statements like " Older people tend to become more religious as they grow older " (75.4%), "Retirement is often detrimental to health" (76.0%), and " Bladder capacity decreases with age, leading to frequent urination " (74.3%). However, many students exhibited persistent misconceptions regarding the onset of old age, physiological changes, and cognitive decline. This was evident in the low percentage of correct responses to statements such as "Research shows old age begins at 65" (27.5%) and "Older people perspire less, making them more likely to suffer from hyperthermia" (29.6%). On the other hand, the highest percentages of incorrect responses were observed for statements such as "Memory loss is a normal part of aging" (70.1%) and "Older adults have higher rates of criminal victimization than adults under 65" (64.7%), (Table 2).

Ageist behaviors among nursing students

Nursing students demonstrated significant ageist attitudes, as indicated by an overall mean score of 25.95 (SD = 11.23) on the Ageism Scale. While positive attitudes were more prevalent (mean score 69.33, SD = 3.70) compared to negative ones (mean score 67.96, SD = 8.25), concerning negative behaviors persisted. For instance, a majority of students (53.3%) agreed with the statement "When I find out an old person's age, I may say, 'You don't look that old,'" reflecting a tendency to make dismissive comments about older adults' appearance. Additionally, 54.5% admitted to using the phrase "Senior Moment," as illustrated by the statement "When an old person can't remember something, I may say, 'That's what they call a 'Senior Moment.'" A concerning 53.6% expressed a desire to avoid older individuals solely based on age, as indicated by their agreement with the statement "Avoid old people because of their age." While less frequent, negative behaviors were reported, such as "sending birthday cards that make light of age" (47.3%) and "voting against older candidates due to their age" (50.9%).

On the other hand, nursing students displayed a stronger inclination toward positive ageism, reflecting behaviors that convey respect and admiration for older individuals. A significant number of students agreed with statements like "complimenting older people on their appearance" (57.2%) and "enjoying conversations with older people" (59.3%). However, a lower percentage of students agreed with "voting for an older person because of their age" (44.6%). Overall, nursing students generally demonstrate positive attitudes toward older adults, particularly in terms of acknowledging their worth and engaging with them respectfully (Table 3).

Table 2 Nursing students' responses to the aging knowledge assessment (*N* = 334)

Statement	True % (*n*)	False % (*n*)
1. The majority of old people (past 65 years) have Alzheimer's disease.	38.6 (129)	61.4 (205)
2. As people grow older, their intelligence declines significantly.	38.3 (128)	61.7 (206)
3. It is very difficult for older adults to learn new things.	30.8 (103)	69.2 (231)
4. Personality changes with age.	27.5 (92)	72.5 (242)
5. Memory loss is a normal part of aging.	70.1 (234)	29.9 (100)
6. As adults grow older, reaction time increases.	74.9 (250)	25.1 (84)
7. Clinical depression occurs more frequently in older than younger people.	27.5 (92)	72.5 (242)
8. Older adults are at risk for HIV/AIDS.	61.4 (205)	38.6 (129)
9. Alcoholism and alcohol abuse are greater problems in adults over 65.	36.2 (121)	63.8 (213)
10. Older adults have more trouble sleeping than younger adults do.	70.4 (235)	29.6 (99)
11. Older adults have the highest suicide rate of any age group.	57.8 (193)	42.2 (141)
12. High blood pressure increases with age.	69.5 (232)	30.5 (102)
13. Older people perspire less, so they are more likely to suffer hyperthermia.	70.4 (235)	29.6 (99)
14. All women develop osteoporosis as they age.	31.7 (106)	68.3 (228)
15. A person's height tends to decline in old age.	74.0 (247)	26.0 (87)
16. Physical strength declines in old age.	74.0 (247)	26.0 (87)
17. Most old people lose interest in and capacity for sexual relations.	24.9 (83)	75.1 (251)
18. Bladder capacity decreases with age, leading to frequent urination.	74.3 (248)	25.7 (86)
19. Kidney function is not affected by age.	43.1 (144)	56.9 (190)
20. Constipation increases in more people as they get older.	27.5 (92)	72.5 (242)
21. All five senses tend to decline with age.	73.1 (244)	26.9 (90)
22. As people live longer, they face fewer acute and more chronic conditions.	72.2 (241)	27.8 (93)
23. Retirement is often detrimental to health.	24.0 (80)	76.0 (254)
24. Older adults are less anxious about death than younger adults.	65.9 (220)	34.1 (114)
25. People 65 years of age and older make up about 20 of the U.S. population.	26.3 (88)	73.7 (246)
26. Most older people are living in nursing homes.	34.4 (115)	65.6 (219)
27. The modern family no longer takes care of its elderly.	30.5 (102)	69.5 (232)
28. The life expectancy of men at age 65 is about the same as that of women.	33.5 (112)	66.5 (222)
29. Remaining life expectancy of blacks at age 85 is about the same as whites.	72.5 (242)	27.5 (92)
30. Social Security benefits automatically increase with inflation.	71.3 (238)	28.7 (96)
31. Living below/near poverty level is no longer a problem for older Americans.	32.9 (110)	67.1 (224)
32. Most older drivers are capable of safely operating a motor vehicle.	62.9 (210)	37.1 (124)
33. Older workers cannot work as effectively as younger workers.	29.6 (99)	70.4 (235)
34. Most old people are set in their ways and unable to change.	26.3 (88)	73.7 (246)
35. The majority of old people are bored.	29.3 (98)	70.7 (236)
36. In general, most old people are pretty much alike.	26.6 (89)	73.4 (245)
37. Older adults (65+) have higher rates of criminal victimization.	35.3 (118)	64.7 (216)
38. Older people tend to become more religious as they grow older.	24.6 (82)	75.4 (252)
39. Older adults (65+) are more fearful of crime than younger adults.	23.4 (78)	76.6 (256)
40. Older people do not adapt as well as younger people to relocation.	28.7 (96)	71.3 (238)
41. Participation in voluntary organizations declines with age.	30.2 (101)	69.8 (233)
42. Older people are happier if they disengage from society.	37.4 (125)	62.6 (209)
43. Geriatrics is a specialty in American medicine.	74.6 (249)	25.4 (85)
44. All medical schools require courses in geriatrics and gerontology.	27.5 (92)	72.5 (242)
45. Abuse of older adults is not a significant problem in the U.S.	37.4 (125)	62.6 (209)
46. Grandparents today take less responsibility for grandchildren.	30.5 (102)	69.5 (232)
47. Older persons take longer to recover from stress.	71.3 (238)	28.7 (96)
48. Most older adults consider their health to be good.	60.5 (202)	39.5 (132)
49. Older females exhibit better health care practices than males.	72.2 (241)	27.8 (93)
50. Research has shown that old age begins at 65.	27.5 (92)	72.5 (242)
Knowledge total score M (SD)	**24.72 (4.8)**	

% Percentage, *SD* Standard Deviation, *M* Mean

Table 3 Ageist behaviors reported by nursing students (*N* = 334)

Item	Never % (*n*)	Sometimes % (*n*)	Often % (*n*)
1. Compliment old people on how well they look, despite their age.	16.8 (56)	26.0 (87)	57.2 (191)
2. Send birthday cards to old people that joke about their age.	15.3 (51)	37.4 (125)	47.3 (158)
3. Enjoy conversations with old people because of their age.	14.1 (47)	26.6 (89)	59.3 (198)
4. Tell old people jokes about old age.	21.0 (70)	32.6 (109)	46.4 (155)
5. Hold doors open for old people because of their age.	12.3 (41)	33.8 (113)	53.9 (180)
6. Tell an old person, "You're too old for that."	17.4 (58)	30.5 (102)	52.1 (174)
7. Offer to help an old person across the street because of their age.	14.1 (47)	34.4 (115)	51.5 (172)
8. When I find out an old person's age, I may say, "You don't look that old."	13.8 (46)	32.9 (110)	53.3 (178)
9. Ask an old person for advice because of their age.	15.3 (51)	33.5 (112)	51.2 (171)
10. When an old person has an ailment, I may say, "That's normal at your age."	18.0 (60)	32.9 (110)	49.1 (164)
11. When an old person can't remember something, I may say, "That's what they call a 'Senior Moment.'"	12.3 (41)	33.2 (111)	54.5 (182)
12. Talk louder or slower to old people because of their age.	15.0 (50)	36.2 (121)	48.8 (163)
13. Use simple words when talking to old people.	11.4 (38)	36.2 (121)	52.4 (175)
14. Ignore old people because of their age.	11.1 (37)	37.7 (126)	51.2 (171)
15. Vote for an old person because of their age.	12.9 (43)	42.5 (142)	44.6 (149)
16. Vote against an old person because of their age.	11.4 (38)	37.7 (126)	50.9 (170)
17. Avoid old people because of their age.	13.2 (44)	33.2 (111)	53.6 (179)
18. Avoid old people because they are cranky.	12.9 (43)	42.5 (142)	44.6 (149)
19. When a slow driver is in front of me, I may think, "It must be an old person."	10.8 (36)	44.3 (148)	44.9 (150)
20. Call an old woman, "young lady," or call an old man, "young man."	12.0 (40)	38.9 (130)	49.1 (164)
Ageist behaviors overall score M (SD)	25.95 (11.23)		
Ageist positive behaviors M (SD)	69.33 (3.70)		
Ageist negative behaviors M (SD)	67.96 (8.25)		

% Percentage, *SD* Standard Deviation, *M* Mean

Attitudes of nursing students toward aging

Nursing students demonstrated a somewhat positive attitude towards aging, as evidenced by the mean score of 58.62% (119.6/204). The majority of students (69.8%) agreed that "Most old people are capable of new adjustments when the situation demands it", and 56.2% of students viewed older individuals as adaptable and easy to be around as reflected by their agreement on "Most old people are very relaxing to be with". Conversely, 73.7% of students strongly disagreed with negative stereotypes, such as "Most old people get set in their ways and are unable to change", and the statement "Most old people tend to let their homes become shabby and unattractive" was strongly disagreed by 59% of students, challenging the stereotype of neglectful aging. On the other hand, nursing students were skeptical of negative stereotypes about aging. A substantial majority (63.8%) disagreed with the statement "It is foolish to claim that wisdom comes with old age," and 61.4% agreed that "Most old people tend to keep to themselves and give advice only when asked." Additionally, only 79.3% agreed that "Most old people make one feel ill at ease." Furthermore, 65.5% of students generally rejected the statement that "Most old people should be more concerned with their personal appearance; they're too untidy," (Table 4).

Factors influencing nurses' attitudes, behaviors, and knowledge regarding aging and ageism

The results reveal several significant findings regarding the factors influencing attitudes, behaviors, and knowledge Regarding Aging and Ageism. Gender differences were observed, with females exhibiting significantly higher negative behaviors toward older adults compared to males ($p < 0.05$). Work experience with the older adults and a family history of caregiving were found to be significant predictors of higher knowledge scores ($p < 0.001$). However, neither of these factors significantly influenced attitudes or behaviors toward older adults ($p > 0.05$).

Nursing students endorsing stereotypes in healthcare exhibited significantly higher negative and positive behaviors towards older adults compared to those who did not ($p < 0.001$). However, no significant differences were found in attitudes and knowledge between the two groups ($p > 0.05$). Additionally, satisfaction with education was significantly associated with positive behaviors, attitudes, and knowledge. Participants satisfied with their education reported higher scores in these areas compared to those who were less satisfied ($p < 0.05$).

Confidence in caring for older adults emerged as a significant predictor of positive attitudes, behaviors, and knowledge among nursing students. Those who expressed high levels of confidence demonstrated superior knowledge ($p < 0.001$), more positive attitudes

Table 4 Nursing students' attitudes toward aging (N = 334)

Items	Strongly Disagree % (n)	Disagree % (n)	Slightly Disagree % (n)	Slightly Agree % (n)	Agree % (n)	Strongly Agree % (n)
1. It would probably be better if most old people lived in residential units with people of their own age.	15.6 (52)	25.7 (86)	28.1 (94)	14.7 (49)	7.8 (26)	8.1 (27)
2. It would probably be better if most old people lived in residential units that also housed younger people.	6.0 (20)	5.4 (18)	21.0 (70)	26.6 (89)	26.6 (89)	14.4 (48)
3. There is something different about most old people: it's hard to figure out what makes them tick.	15.0 (50)	27.5 (92)	27.2 (91)	17.4 (58)	6.6 (22)	6.3 (21)
4. Most old people are really no different from anybody else: they're as easy to understand as younger people.	6.0 (20)	7.2 (24)	18.0 (60)	30.5 (102)	23.1 (77)	15.3 (51)
5. Most old people get set in their ways and are unable to change.	15.0 (50)	23.4 (78)	35.3 (118)	15.6 (52)	4.5 (15)	6.3 (21)
6. Most old people are capable of new adjustments when the situation demands it.	5.1 (17)	8.1 (27)	17.1 (57)	32.9 (110)	20.7 (69)	16.2 (54)
7. Most old people would prefer to quit work as soon as pensions or their children can support them.	14.7 (49)	20.7 (69)	36.8 (123)	16.8 (56)	5.4 (18)	5.7 (19)
8. Most old people would prefer to continue working just as long as they possibly can rather than be dependent on anybody.	5.4 (18)	7.2 (24)	21.3 (71)	30.8 (103)	20.4 (68)	15.0 (50)
9. Most old people tend to let their homes become shabby and unattractive.	12.0 (40)	19.8 (66)	27.2 (91)	21.6 (72)	12.0 (40)	7.5 (25)
10. Most old people can generally be counted on to maintain a clean, attractive home.	6.3 (21)	8.4 (28)	15.0 (50)	30.8 (103)	25.4 (85)	14.1 (47)
11. It is foolish to claim that wisdom comes with old age.	13.2 (44)	19.8 (66)	30.8 (103)	21.0 (70)	9.0 (30)	6.3 (21)
12. People grow wiser with the coming of old age.	6.0 (20)	6.3 (21)	18.9 (63)	32.0 (107)	24.0 (80)	12.9 (43)
13. Old people have too much power in business and politics.	14.7 (49)	22.8 (76)	33.5 (112)	16.5 (55)	6.6 (22)	6.0 (20)
14. Old people should have more power in business and politics.	6.6 (22)	7.5 (25)	20.4 (68)	30.2 (101)	22.8 (76)	12.6 (42)
15. Most old people make one feel ill at ease.	12.6 (42)	22.5 (75)	26.6 (89)	17.7 (59)	14.1 (47)	6.6 (22)
16. Most old people are very relaxing to be with.	8.4 (28)	10.5 (35)	12.9 (43)	34.1 (114)	21.9 (73)	12.3 (41)
17. Most old people bore others by their insistence on talking about the "good old days."	15.0 (50)	22.5 (75)	29.9 (100)	15.3 (51)	10.5 (35)	6.9 (23)
18. One of the most interesting and entertaining qualities of most old people is their accounts of their past experiences.	7.2 (24)	8.4 (28)	15.0 (50)	31.1 (104)	22.8 (76)	15.6 (52)
19. Most old people spend too much time prying into the affairs of others and giving unsought advice.	14.4 (48)	21.9 (73)	27.5 (92)	18.3 (61)	11.1 (37)	6.9 (23)
20. Most old people tend to keep to themselves and give advice only when asked.	6.9 (23)	11.4 (38)	20.4 (68)	28.4 (95)	19.8 (66)	13.2 (44)
21. If old people expect to be liked, their first step is to try to get rid of their irritating faults.	12.3 (41)	23.1 (77)	27.5 (92)	18.3 (61)	10.8 (36)	8.1 (27)
22. When you think about it, old people have the same faults as anybody else.	7.2 (24)	10.8 (36)	17.4 (58)	27.8 (93)	21.9 (73)	15.0 (50)
23. In order to maintain a nice residential neighborhood, it would be best if too many old people did not live in it.	12.6 (42)	21.3 (71)	29.3 (98)	16.2 (54)	13.2 (44)	7.5 (25)
24. You can count on finding a nice residential neighborhood when there is a sizeable number of old people living in it.	7.2 (24)	10.8 (36)	16.5 (55)	30.8 (103)	19.8 (66)	15.0 (50)
25. There are a few exceptions, but in general most old people are pretty much alike.	11.7 (39)	25.1 (84)	30.2 (101)	15.0 (50)	10.2 (34)	7.8 (26)
26. It is evident that most old people are very different from one another.	6.6 (22)	9.3 (31)	15.3 (51)	31.4 (105)	22.8 (76)	14.5 (49)
27. Most old people should be more concerned with their personal appearance; they're too untidy.	6.3 (21)	10.5 (35)	17.7 (59)	35.3 (118)	21.9 (73)	8.4 (28)
28. Most old people seem to be quite clean and neat in their personal appearance.	6.3 (21)	13.2 (44)	27.5 (92)	27.5 (92)	16.2 (54)	9.3 (31)
29. Most old people are irritable, grouchy, and unpleasant.	8.1 (27)	14.4 (48)	26.0 (87)	29.3 (98)	14.7 (49)	7.5 (25)
30. Most old people are cheerful, agreeable, and good humored.	3.6 (12)	6.3 (21)	15.3 (51)	36.8 (123)	27.2 (91)	10.8 (36)
31. Most old people are constantly complaining about the behavior of the younger generation.	7.2 (24)	10.8 (36)	17.4 (58)	29.3 (98)	24.4 (82)	11.0 (37)
32. One seldom hears old people complaining about the behavior of the younger generation.	12.9 (43)	21.9 (73)	31.1 (104)	20.4 (68)	7.5 (25)	6.0 (20)
33. Most old people make excessive demands for love and reassurance.	3.0 (10)	5.4 (18)	14.4 (48)	35.3 (118)	28.4 (95)	13.2 (44)
34. Most old people need no more love and reassurance than anyone else.	9.3 (31)	16.5 (55)	27.2 (91)	27.8 (93)	14.7 (49)	4.5 (15)

% Percentage, *SD* Standard Deviation, *M* Mean

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Table 5 Comparison of variables with the mean scores of attitudes, behaviors, and knowledge about aging ($N = 334$)

Variable	Negative Behavior (M ± SD)	Positive Behavior (M ± SD)	Attitudes (M ± SD)	Knowledge (M ± SD)
Gender				
Male	17.86 ± 8.41	7.83 ± 3.78	119.18 ± 3.27	24.39 ± 4.90
Female	19.73 ± 8.09	8.62 ± 3.62	119.86 ± 4.31	24.19 ± 4.74
	t = 2.020	t = 1.887	t = 1.503	t = 0.369
	p = 0.044	p = 0.060	p = 0.134	p = 0.712
Work Experience with older adults				
Yes	18.95 ± 8.06	8.31 ± 3.56	119.75 ± 4.22	25.73 ± 4.87
No	19.14 ± 8.52	8.34 ± 3.88	119.42 ± 3.62	22.41 ± 4.00
	t = 0.208	t = 0.073	t = 0.748	t = 6.677
	p = 0.835	p = 0.941	p = 0.455	p = < 0.001
Family History of Caregiving				
Yes	18.91 ± 8.07	8.32 ± 3.59	119.65 ± 4.16	25.10 ± 4.89
No	19.30 ± 8.68	8.33 ± 3.93	119.50 ± 3.50	22.37 ± 3.98
	t = 0.402	t = 0.033	t = 0.320	t = 4.951
	p = 0.688	p = 0.974	p = 0.749	p = < 0.001
Geriatric Nursing Training				
Yes	19.32 ± 8.35	8.47 ± 3.73	119.75 ± 4.27	24.15 ± 4.78
No	18.33 ± 8.01	7.96 ± 3.61	119.26 ± 3.09	24.54 ± 4.85
	t = 1.004	t = 1.161	t = 1.039	t = 0.673
	p = 0.316	p = 0.246	p = 0.300	p = 0.501
Career in Geriatric Nursing				
Yes	20.10 ± 8.02	8.98 ± 3.54	119.87 ± 3.48	24.29 ± 4.74
No	18.68 ± 8.31	8.11 ± 3.73	119.52 ± 4.11	24.26 ± 4.82
	t = 1.351	t = 1.847	t = 0.686	t = 0.057
	p = 0.178	p = 0.066	p = 0.493	p = 0.955
Aging/Ageism Training				
Yes	19.80 ± 7.87	8.85 ± 3.47	119.82 ± 3.66	24.35 ± 4.79
No	18.66 ± 8.42	8.07 ± 3.78	119.50 ± 4.11	24.23 ± 4.81
	t = 1.174	t = 1.813	t = 0.698	t = 0.225
	p = 0.241	p = 0.071	p = 0.486	p = 0.822
Stereotypes in Healthcare				
Yes	22.25 ± 6.71	9.66 ± 3.07	119.92 ± 4.36	24.28 ± 4.66
No	16.17 ± 8.45	7.14 ± 3.80	119.32 ± 3.56	24.25 ± 4.92
	t = 7.227	t = 6.627	t = 1.386	t = 0.049
	p = < 0.001	p = < 0.001	p = 0.167	p = 0.961
Satisfaction with Education				
Yes	19.71 ± 7.71	8.68 ± 3.51	120.11 ± 4.34	24.83 ± 5.04
No	18.09 ± 8.88	7.83 ± 3.90	118.91 ± 3.28	23.50 ± 4.34
	t = 1.781	t = 2.097	t = 2.774	t = 2.528
	p = 0.076	p = 0.037	p = 0.006	p = 0.012
Confidence in Caring				
Not Confident	16.29 ± 9.14	6.86 ± 4.05	120.29 ± 3.29	22.17 ± 4.03
Somewhat Confident	19.47 ± 9.27	8.51 ± 4.01	118.77 ± 2.79	22.78 ± 4.05
Confident	19.40 ± 7.15	8.55 ± 3.31	120.01 ± 4.66	25.78 ± 4.96
	F = 2.687	F = 3.851	F = 4.197	F = 20.536
	p = 0.07	p = 0.022	p = 0.016	p = 0.001

% Percentage, SD Standard Deviation, M Mean, p-value

($p < 0.05$), and more positive behaviors ($p < 0.05$) towards older adults. While the impact of confidence on negative behaviors did not reach statistical significance ($p > 0.05$), these findings underscore the importance of fostering confidence in nursing students to enhance their geriatric care practices (Table 5).

The correlation analysis reveals significant positive correlations between knowledge, attitudes, and behaviors related to older adults' care. Specifically, a moderate positive relationship was found between knowledge and attitudes, with a correlation of ($r = 0.45$, $p < 0.01$). A strong positive relationship was observed between attitudes and behaviors ($r = 0.62$, $p < 0.01$). Furthermore, a moderate positive relationship was identified between knowledge and behaviors ($r = 0.39$, $p < 0.01$).

A regression analysis was conducted to identify predictors of behaviors related to older adults' care. Independent variables in the model included Total Knowledge score and Total Attitudes toward Aging score. The overall model was statistically significant ($p < 0.05$, $R = 0.153$, $R^2 = 0.023$, adjusted $R^2 = 0.018$), indicating that these variables explained 2.3% of the variance in behaviors. The analysis revealed that Total Attitudes toward Aging score was a significant predictor of behavior ($\beta = 0.121$, $p < 0.05$), suggesting that higher attitudes toward aging were associated with more favorable behaviors. However, Total Knowledge score was not a significant predictor ($\beta = 0.087$, $p > 0.05$), as seen in Table 6.

Discussion

This study underscores the importance of nursing students possessing sufficient knowledge, attitudes, and behaviors toward older adults to ensure optimal and high-quality care. Therefore, this study aims to assess nursing students' attitudes, behaviors, and knowledge regarding aging and ageism. The findings of this study revealed both strengths and significant gaps in nursing students' knowledge regarding aging. The overall mean knowledge score indicates a moderate level of understanding, with only a small percentage of students achieving an acceptable score ($\geq 60\%$). This is consistent with a previous study conducted in Saudi Arabia, where the overall knowledge was found to be low [24]. Similarly, another study aligns with our study findings, revealing that nursing students have insufficient knowledge about the older adults, with the majority of students demonstrating unsatisfactory knowledge levels [14]. Furthermore, a recent study in Singapore found that nursing students have a moderate understanding of aging [25]. This underscores the need for nursing education reforms, emphasizing the importance of geriatric care and guiding curriculum improvements to address these knowledge gaps [14, 24, 26].

Table 6 Predictors of nursing students' behaviors toward older adults' care

Predictor	B	SE	β	t	*p*-value	95% CI (Lower–Upper)
Constant	-20.842	19.440	—	-1.072	0.284	-58.998–17.314
Total Knowledge Score	0.213	0.134	0.087	1.593	0.112	-0.050–0.476
Total Attitudes Score	0.360	0.162	0.121	2.222	0.027	0.041–0.679

B = Unstandardized coefficient; SE = Standard error; β = Standardized coefficient.

$R^2 = 0.023$ (2.3% of variance explained); Adjusted $R^2 = 0.018$; $F(2, 331) = 3.980$, $p = 0.020$

Students demonstrated a thorough understanding of certain aspects of aging, as evidenced by the high percentage of correct responses to statements such as "Older adults are less anxious about death than younger adults," "Retirement is often detrimental to health," and "Bladder capacity decreases with age, leading to frequent urination." These findings suggest that nursing students demonstrate a good understanding of some psychological aspects of aging, including the health impacts of retirement, as well as physiological changes, such as the loss of bladder elasticity and tone resulting in frequent urination. Similar to our findings, a previous study conducted in Greece indicated that nursing students possess a solid understanding of the physiological aspects of aging, which can be attributed to the emphasis on biomedical aspects of aging in the nursing curriculum [27]. Furthermore, the misconceptions surrounding cognitive decline and victimization among older adults were particularly concerning, as an example "Memory loss is a normal part of aging" and "Older adults have higher rates of criminal victimization than adults under 65" In addition to reflecting deficits in fundamental knowledge, these misconceptions reinforce preconceived notions that could adversely affect the quality of care provided to older adults. A study conducted in Zanzibar Island further revealed that nursing students exhibited poor levels of knowledge across all aspects of aging, including physical, psychological, and social changes [14]. Therefore, it is essential to understand the psychological, physical, and cognitive changes associated with aging and how the curriculum can be enhanced to enable students to provide comprehensive care for the older adults [27, 28].

Ageist behaviors among nursing students
The findings of this study demonstrated significant ageist attitudes among nursing students, as reflected in the overall mean score on the Ageism Scale. While positive behaviors were more prevalent, concerning negative behaviors about older adults persisted. The higher prevalence of positive ageist behaviors in this study is consistent with earlier research conducted in Jordan [16]. This can be attributed to the distinct characteristics of Arabic culture, which places a strong emphasis on religious values and close family ties [29, 30]. A notable example of ageist behaviors was that many of the students agreed with the statement, "When I find out an old person's age, I may say, 'You don't look that old,'" reflecting a tendency to make dismissive comments about older adults' appearance. Additionally, some students expressed a concerning desire to avoid older individuals solely based on age, as indicated by their agreement with the statement, "Avoid old people because of their age." These gaps are essential and could be achieved by conducting in-depth qualitative studies to better understand the biases perpetuated against older adults. Such research would provide valuable insights for developing strategies to provide equitable care for this population.

Attitudes of nursing students toward aging
Furthermore, the findings revealed that nursing students demonstrated a somewhat positive attitude towards aging. Several studies conducted in Egypt, Jordan, and Saudi Arabia [14, 16, 24] found the majority of students held more negative attitudes toward older adults than compared to our study. The differences could be attributed to the use of different scales in our study compared to those used in the other studies. A significant majority of students agreed with the statement, "Most old people are capable of new adjustments when the situation demands it," reflecting their recognition of the adaptability of older adults. Additionally, the majority of students strongly disagreed with negative stereotypes, such as "Most old people get set in their ways and are unable to change", further emphasizing their rejection of ageist misconceptions. On the other hand, nursing students were skeptical of negative stereotypes about aging. A substantial majority disagreed with the statement, "It is foolish to claim that wisdom comes with old age., reflecting the value of older adults' experience and knowledge". However, negative attitudes were still present, as evidenced by the agreement with the statement, "Most old people make one feel ill at ease," indicating students' discomfort in interactions with older adults. Nevertheless, these findings suggest that while some negative attitudes persist, nursing students generally hold more positive views of aging. This may reflect the cultural context of Palestinian society, where extended families are common, and older adults often live with their children, fostering more positive attitudes toward aging and older individuals [30]. Additionally, it aligns with the cultural

and socioeconomic beliefs of low- and middle-income nations, which place a high value on older adults [31].

Factors influencing nurses' attitudes, behaviors, and knowledge regarding aging and ageism

The results reveal several significant findings regarding the factors influencing attitudes, behaviors, and knowledge regarding aging and ageism, offering valuable insights into areas for targeted intervention in geriatric education. Gender differences were observed, with female nursing students exhibiting significantly higher levels of negative behaviors toward older adults. These results align with previous studies [14, 29], which reported that male students tended to exhibit more positive attitudes toward older adults. Future research is warranted to address the underlying factors contributing to these gender disparities, as addressing these issues could help reduce negative behaviors in geriatric care.

Work experience with older adults and a family history of caregiving were significant predictors of higher knowledge scores. This may be explained by the fact that direct exposure to older adults enhances students' understanding of their needs and challenges, which is consistent with the findings of Mohammed et al. [28]. However, neither of these factors significantly influenced attitudes or behaviors toward older adults. This underscores the complexity of converting knowledge into attitudes and behaviors, highlighting the need for interventions that bridge this gap.

Nursing students who endorsed stereotypes in healthcare exhibited significantly higher levels of both negative and positive behaviors towards older adults. This contradictory finding may reflect the dual nature of stereotypes, which can drive both dismissive and protective behavior. However, no significant differences were found in attitudes and knowledge between the two groups. This suggests that implicit biases may influence behavior more so than explicit attitudes or knowledge, warranting the need for educational strategies to address these biases.

Additionally, satisfaction with nursing education was significantly associated with positive behaviors, attitudes, and knowledge regarding older adults. Participants who reported higher satisfaction with their education reported higher scores in these areas, highlighting the critical role of curriculum design in fostering geriatric care practices. Ensuring that educational content is relevant and practical and offers chances for constructive interaction with older adults to improve students' preparedness for geriatric care. Confidence in caring for older adults emerged as a significant predictor of positive attitudes, behaviors, and knowledge. This finding underscores the importance of building nursing students' confidence to enhance their geriatric care practices. This can

be achieved through simulation labs, enhanced clinical practice, and caregiving experiences.

Predictors behaviors related to older adults' care

The regression analysis revealed that while attitudes toward aging significantly predicted behaviors, knowledge about aging was not a significant predictor. These findings support the Theory of Planned Behavior, which hypothesizes that attitudes are a key determinant of behavioral intentions and actions [19]. The significant association between positive attitudes and behavior implies that nursing students who have more positive attitudes toward aging are more likely to act appropriately and respectfully toward older adults. This finding is consistent with a study conducted in Ardabil [32]. Nursing program should emphasize that educational curricula must enhance nurses' compassion for elderly care. Conversely, the non-significant relationship between knowledge and behavior indicates that factual knowledge alone is inadequate to drive behavioral change unless it influences attitudes, subjective norms, or perceived behavioral control [19]. This result underscore the need for nursing education programs to go beyond simply imparting knowledge and instead focus on fostering positive attitudes toward aging through experiential learning, reflective practice, and mentorship with older adults. Integrating structured clinical exposure and age-friendly initiatives could enhance students' perceptions and interactions with the elderly, ultimately improving geriatric care practices. Additionally, incorporating simulation-based learning in geriatric settings would provide hands-on experience and foster empathy among nursing students [33, 34]. Given the increasing aging population in Palestine, these findings emphasize the importance of shaping nursing curricula to address ageism, promote empathy, and ensure that future nurses are well-equipped to provide holistic and dignified care for older adults.

Limitation

Several limitations were identified in this study. First, the cross-sectional design allows for identifying associations but cannot establish causality between knowledge, attitudes, behaviors, and education. Future research should consider longitudinal studies to track changes over time or experimental designs, such as pre-test/post-test analyses, to assess the impact of geriatric education. Additionally, the nursing students' year level was not accounted for, which may have influenced the findings. Although convenience sampling along with self-administered questionnaires are suitable for the academic and clinical research, but may limit generalizability and introduce selection bias. Future studies should consider random or stratified sampling across multiple university to enhance representativeness. Furthermore, as the study

was conducted at a single university, the findings may not be broadly generalizable. Finally, relying solely on quantitative data limits the depth of understanding regarding the underlying reasons for students' attitudes. Future research should integrate qualitative methods to provide richer insights.

Implications for nursing
The findings of this study emphasize several implications for nursing education and practice, particularly in relation to geriatric care and ageism. First, the moderate knowledge levels noted among nursing students, with significant gaps in understanding, particularly regarding misconceptions about aging and cognitive decline, draw attention to the need for curriculum reforms. To mitigate these gaps, it is suggested that nursing programs incorporate more comprehensive content on aging, ageism, and geriatric care, ensuring that students develop a thorough understanding of the physical, psychological, and social changes accompanying with aging. Additionally, the study found that negative behaviors and ageist attitudes were prevalent, which could influence the quality of care delivered to older adults. To reduce these negative attitudes, nursing programs should highlight cultural competency and engage students in interactive, experiential learning activities with older adults, such as clinical rotations or community-based projects. Moreover, fostering greater empathy and reducing ageism through workshops and discussions on stereotypes, biases, and their effects on healthcare delivery could be effective strategies.

In terms of improving nursing practice, the findings highlight the importance of developing nursing students' confidence in geriatric care. Simulation-based learning and hands-on experiences with older adults should be prioritized to ensure that students feel adequately prepared to care for this population. Nursing programs should also focus on providing exposure to diverse caregiving environments, which can positively influence students' attitudes and behaviors toward older adults. Consequently, students can develop a greater understanding of the complexities of aging and the related healthcare needs. Lastly, it is vital to address gender disparities in attitudes and behaviors, as female students were found to show more negative behaviors toward older adults. Future studies should explore the underlying factors contributing to this trend and design interventions to mitigate these biases, ensuring that all nursing students are adequately prepared to provide equitable and compassionate care to older adults.

Conclusion
The findings of the current study revealed that the majority of nursing students had an insufficient level of knowledge regarding older adults. While positive behaviors were more prevalent, negative behaviors about older adults persisted, alongside generally positive attitudes among undergraduate nurses in Palestine. Notably, female nursing students exhibited significantly higher levels of negative behaviors toward older adults. Work experience with older adults and a family history of caregiving were significant predictors of higher knowledge scores. However, neither of these factors significantly influenced attitudes or behaviors toward older adults. Additionally, satisfaction with nursing education and confidence in caring for older adults were significantly associated with positive behaviors, attitudes, and knowledge regarding older adults. Therefore, it is crucial to integrate comprehensive geriatric content, including courses on aging, ageism, and the needs of older adults. Simulation-based learning and clinical placements in geriatric settings would provide hands-on experience and foster empathy. The study highlights the importance of actively involving nursing students with older adults during their training and reinforcing their exposure to this population. Ensuring that educational content is relevant and practical and offers chances for constructive interaction with older adults to improve students' preparedness for geriatric care. Such efforts may ensure that future nurses develop a strong understanding of the older adult's population and foster positivty, ultimately enhancing the quality of care and the overall general well-being of older adults.

Abbreviations
PCBS   Palestinian Central Bureau of Statistics
ROPE   Relating to Older People Evaluation
KAOP   Kogan's Attitudes toward Older People Scale
SPSS   Statistical Package for the Social Sciences
ANOVA   Analysis of variance

Author contributions
B.S and BE.H, designed and conducted the study. BE. H, A.A, performed the analysis and drafted the manuscript. A.A, I.F, and B.S advised on the study design, facilitated data collection and revised the manuscript. F.E, BE.H, M E.H.E and I.F helped in data collection. BE.H, A.A, I.F, and B.S interpretation of data and revised the manuscript. All authors reviewed and approved the manuscript.

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

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Declarations

Ethics approval and consent to participate
All methods in this study adhered to the Declaration of Helsinki and its revisions, as well as the ethical standards of the institutional research committee. Prior to data collection, ethical approval was obtained from the Ethics Committee at Arab American University (2024/A/10/N). Written informed consent was obtained from participants after they were provided with detailed information about the study's objectives and benefits. Participants were assured of anonymity, voluntary participation, and the confidentiality of their data. They were also informed of their right to withdraw from the study at any time without penalties or any impact on their academic achievements.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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