

Implicit ageism in dental students: General representations of ageing health and specific representations of the mouth

Abstract

Background/Aims: By 2040, more than one in four Europeans is expected to be over 65. Despite improvements in older patients' care, oral healthcare is still neglected. One of the major obstacles could be the negative representations associated with aging: ageism. The present study aims to quantify and qualify ageism for general and specific representations of ageing associated with the mouth of an older patient compared to a young patient in dental students. **Method:** Undergraduate students at the French dental school of (*blinded) were invited to participate in the study. Ageism was quantified by asking the students to estimate how many older adults have some negative conditions, which were then compared to real data. Representations of the mouth of a young vs. an older adult were collected by asking each student to write the first five words that came to their mind when they thought about the mouth of a young person and then the mouth of an older person. **Results:** The students exhibited a large overestimation of health problems in the older adult population. The words given for a young adult were positive 49% of the time (vs. 23% negative), whereas 69% of the words were negative for an older adult (vs. 8% positive). The students in the second year were less negative than students in higher years. **Conclusions:** Our study contributes to assessing how dental students could exhibit implicit ageism. They show very negative representations of aging from the beginning of their training, which get even worse after they are exposed to clinical training with older patients.

Keywords: Ageism, ageing, older adults, oral health, mouth representation

The number of older people in the world's population has been steadily increasing over the past few decades. It is estimated that, by 2040, more than a quarter of Europeans will be over 65 years old (INSEE, 2016). Medical progress has led to better prevention and management of age-related pathologies. However, older adults do not always receive the best care, partly due to psychosocial factors. Age is indeed one of the main reasons for discrimination against individuals (Adam et al., 2013), but it remains less known and studied compared to other forms of discriminations (Nelson, 2004). The notion of ageism was first mentioned in 1969 by the gerontologist Robert Neil Butler (Butler, 1969) as "all the stereotypes and discrimination made toward a person or a group of persons based on their age". Ageism includes stereotypes, prejudice, and discrimination (Palmore, 2001) that can affect anyone who lives long enough.

Ageism has significant consequences in the healthcare field, both at medical and psychological levels (Adam et al., 2013). Negative age stereotypes can influence attitudes toward older adults in ways that are often unconscious. Ageism can operate consciously as well. Some people have negative attitudes that they have no hesitation about stating directly. Unfortunately, caregivers can also be influenced by their age-related beliefs. The lack of awareness among health professionals about aging appears to be a major obstacle to providing quality care for older adults. Certain behaviors resulting from ageism, such as providing care based only on age, can directly contribute to this issue. For example, in a study, medical students were asked to choose a treatment for eight breast cancer patients who varied in age, ethnicity, and marital status (Madan et al., 2001). The results showed that, given the same clinical situation, the students proposed breast reconstruction for 95% of the patients under 31 years of age, whereas this recommendation was only made in 65% of cases for patients over 59 years old. Similarly, two experiments presented a list of fictional patients with kidney disease to different participants (Wiseman, 2007). The patients had different

characteristics, including parental status, age, and mental health status. Participants ranked the patients in order of priority for treatment. Participants favored patients who had children, were young, and were mentally healthy. Age was a stronger determinant of participants' choices than mental health status, meaning that people who were childless, older, and mentally ill suffered from deleterious consequences.

Recently, a meta-analysis (Chang et al., 2020), offering the most comprehensive review of health consequences of ageism including over 7 million participants, revealed the detrimental impact of ageism on older persons' health has been occurring simultaneously at the structural and individual levels in the five continents. Their results showed that ageism leads to detrimental health outcomes almost systematically. The evidence of ageism has been associated in 11 health domains: exclusion from health research, devalued lives of older persons, lack-of-work opportunities, denied access to healthcare and treatments, reduced longevity, poor quality-of-life, risky health behaviors, poor social relationships, physical illness, mental illness, and cognitive impairment. Worryingly, the prevalence of ageism has intensified in both less and more developed countries. The authors show that the proportions of significant associations between ageism and adverse health increase over the time 51.3% from 1970-1989, 66.8% from 1990-2009, 86.6% from 2010-2017, $p < 0.0001$.

Becoming older does not wipe out the other stigmatization so people may suffer from multiple discriminations, called intersectionality (Rocha et al., 2022). For instance, intersectionality between age and at least another "ism" concerns about 10% of US older adults (Lu et al., 2022). The cumulative stereotypes represent an important challenge for psychological (e.g. for older black women, Taylor & Richards, 2019), and physical health (e.g., for African Americans, Lewis & Van Dyke, 2018).

Ageism occurs mainly through implicit bias (e.g. Levy & Banaji, 2002). Implicit bias designs unconscious and non-verbal negative behaviors toward others due to their

characteristics (race, sex, age...). It could arise in opposition to explicit belief (“treat everybody equally”). Yet, a recent meta-analysis confirms that healthcare professionals exhibit similar negative implicit bias (FitzGerald & Hurst, 2017). These biases are “likely to influence diagnosis and treatment decisions and levels of care in some circumstances” (p. 1). As implicit biases are particularly difficult to self-identify, the first step to counter these biases is to become aware of them (Sabin, 2022). No intervention has been proven to be effective to date (Greenwald et al., 2022). Fortunately, multiple interventions have produced promising results to diminish ageism (Burnes et al., 2019). Therefore, it is crucial to provide tools to allow the practitioners to become aware of their implicit biases, including toward aging, and then to propose effective interventions to counter them. Nonetheless, ageism is not systematically studied and very little is known in some fields such as in oral health (Beck et al., 1979, Gilbert, 1989, Warpeha, 2011).

The oldest work published on ageism in dental care is from 1979 (Beck et al., 1979). This study concluded that exposure of dental students to older adults with poor oral health resulted in a more negative attitude toward patients of this age. Student’s ageism was measured using the Ageing Semantic Differential (ASD, Rosencranz & McNevin, 1969), an instrument that has proven useful in assessing representation toward older adults. This 32-item scale uses a seven-point Likert scale to qualify an older adult between bipolar pairs of adjectives describing attributes or behavioural characteristics thought to be equally applicable to persons of all ages (e.g. Happy/Sad, Resilient/Vulnerable, etc.). A pre-test was used to establish baseline representation and a post-test was then administered after the class was exposed to pictures of older individuals with varying statuses of oral health. Six weeks after the pre-test, the students were randomly divided into three groups. The first group saw four slides of older individuals with very poor oral status. The second group also saw four slides of the same older individuals after they had been restored to good oral status, and the

101 third group saw no pictures. The group exposed to pictures of poor oral health had a rather
102 dramatic negative representation change toward the older adults on all dimensions of the
103 ASD. Ten years after, it was stated that ageism had probable implications in the delivery of
104 dental care, due to the attitudes that older people own the ageing process (Gilbert, 1989). The
105 author proposed a more appropriate definition of ageism and discusses the forms ageism can
106 take in the dental care setting in his article. He suggested providing the patient the full benefit
107 of healthcare, the goal is not to advocate a positive outlook toward older adults but rather to
108 instill a realistic view toward older people based on an understanding of the ageing process
109 and the environment of the older dental patient. Warpeha (2011) highlighted that ageism may
110 be one of the possible explanations for the exclusion of older people from complex
111 prosthodontics treatments including dental implants. Nowadays, most European countries do
112 not dedicate a significant part of dental studies to aging and health disorders related to age.
113 Although 86% of European dental schools include care for older people in their curricula,
114 only 37% of them have specific, dedicated, courses on this subject (Kossioni et al., 2017).
115 Most of the time, this teaching would be distilled into different disciplines like oral surgery,
116 prosthodontics, or periodontology. In addition, the concept of ageism seems to be excluded,
117 or very little addressed during training. However, it must be recognized that some dental
118 pathologies are more present in older adults, such as periodontal diseases, and oral cancer,
119 and the risk of having consequences of all the pathologies accumulated during our life
120 increases with age. The need for dental prostheses to replace missing teeth regularly increases
121 over the decades.

122 Targeting education is precisely one mechanism to decreasing ageism. Inouye (2021)
123 proposes some recommendations to create an anti-ageist healthcare system to improve health
124 outcomes for older adults following the pandemic. ~~Life-sustaining care has become explicit-~~
125 ~~during the time of COVID-19. Many healthcare systems worldwide have faced critical-~~

126 shortages of ventilators and intensive care unit beds and have proposed age-based rationing
 127 as the solution. Lack of knowledge of healthcare professionals, barriers to access to
 128 healthcare, underutilization of preventive care, and exclusion from clinical trials appear to
 129 explain this discrimination. The author highlighted how improving the education and training
 130 of healthcare professionals is essential to provide appropriate care, fight ageist attitudes,
 131 targeted the unique aspects of older adults, and be free of age-related bias.

132 Interdisciplinary team training programs can improve learners' knowledge and
 133 attitudes about aging, geriatric care, team skills, and interprofessional communication.
 134 Although healthcare professionals are often required to work in team environments, most of
 135 them did not have sufficient opportunities to learn with, from, and about other healthcare
 136 professionals. Geriatrics interdisciplinary training should occur throughout the learning
 137 spectrum—from students in the health professions to postgraduate trainees to actively
 138 practicing professionals— and in all disciplines involved in the care of older adults
 139 (Partnership for Health in Aging Workgroup on Interdisciplinary Team Training in
 140 Geriatrics, 2014).

141 Faced with this phenomenon, assessing the level of students' ageism is important,
 142 because it can make them aware of their feelings and attitudes toward older people and it can
 143 also allow teachers to adapt their teaching in the field of gerodontology according to the
 144 students' stereotypes toward older people. It seems particularly important to target students as
 145 future health professionals to fight ageism (Inouye, 2021). The first step is then to assess the
 146 ageist stereotypes of dental students.

147 A recent literature review focused on published and validated ageism scales found
 148 that only 11 scales had sufficient psychometric criteria and only one measured all three
 149 dimensions of ageism (stereotypes, prejudice, and discrimination, (Ayalon et al., 2019). None
 150 of those scales were field-specific, particularly in the context of oral healthcare. Recently, a

scale to assess the level of ageism of dental students has been validated in several languages (Kossioni et al., 2019; Popovac et al., 2022; Rucker et al., 2020; Veenstra et al., 2020) (ASDS: Ageism Scale for Dental Students), including French (Piaton et al., 2021). These results suggest that the level of ageism among dental students is higher when expressed in the professional context (Piaton et al., 2023). This suggests that specialized scales may assess a form of ageism that is not captured by more general scales. For example, a person with a low level of ageism in everyday life might still exhibit ageist stereotypes and attitudes in the occupational setting (here in the oral health field). It has been shown that feelings of ageism could have deleterious effects on the quantity and quality of care provided to older adults, particularly in the field of oral healthcare. However, this phenomenon could be underestimated if some health practitioners only develop this feeling during their professional activities and not in their social life.

Evaluating the level of ageism among students, as well as knowing its basis and its evolution during the period of training, is therefore crucial. On the one hand, this allows students to self-assess on the subject, and on the other hand, it should help to build a learning program targeting the representations and attitudes that have been identified within the student population. The aim of the present study is then to quantify ageism using a less explicit task than a questionnaire (i.e. percentage estimations of the proportion of older adults with...) and to qualify the representations of dental students about the oral health of the older adults. Different variables are controlled such as personal and professional experience with older adults, year of training, and sex of the individual as these factors are recognized to modulate ageism. A systematic review has identified a total of 14 determinants of ageism with the most robust determinants being individuals' "anxiety of ageing" and "fear of death" (Marques et al., 2020). Their findings point to the importance of the quality of the contact, over their frequency, and the importance of how older individuals are presented.

When validating the ASDS-Fr (Piaton et al., 2023), the results suggest that the level of ageism among the dental students in our sample is higher when expressed in the professional context. The clinical activity of the dental students in our study shows an increase in ageism as they experience older patients. However, it is not clear whether these results depend on the explicitness of the questionnaire. The ASDS is indeed quite transparent in its assessment of ageism, which could lead some students to provide answers that are considered more socially favourable. It would therefore be necessary to assess the ageism of these students more implicitly. Furthermore, it remains to characterize the more specific representations that students have of the oral cavity of their young or older patients to target possible interventions to combat ageism in dentistry. These interventions should raise awareness of oral health in older persons without reinforcing ageist stereotypes.

The aim of the present study is, therefore, to quantify ageism using a task that is less explicit than a questionnaire targeting the representations of ageing. To this end, we used the percentage estimation task to quantify the possible overestimation of the difficulties of older people and also to qualify the representations of dental students regarding the oral health of older people.

Method

Participants

This study was carried out under the recommendations of the French Law, with informed consent being obtained from all the participants under the Declaration of Helsinki and by agreeing to fill voluntarily the questionnaire. An ethics approval was not required for the current study as per applicable institutional and national guidelines.

The study population was all the undergraduate dental students ($N=368$) of the University of (*blinded) (2nd to 6th years, year 2021-2022). The inclusion started in the 2nd year because the first year of dental studies in France is common with other health studies (Medicine, Pharmacy, Midwife, Physiotherapy). Of all the dental students of (*blinded), a total of 188 students (51%) agreed to complete the study (see Table 1).

[Insert Table 1 about here]

Material and Procedure

An email was sent to all dental students from the 2nd to 6th year with the link to access the questionnaire developed with LimeSurvey and hosted on the server of the laboratory. Each cohort received a personal link. Two reminders, at least one week apart, were made to increase the participation rate in the study. All replies were anonymous and confidential.

After the informed consent, the participants started with the image-of-aging (Levy & Langer, 1994). This task consisted of asking each student to write the first five words that came into their mind when they thought about the mouth of a young person and then the mouth of an older person. Age to consider was not specified to allow the participants to base their judgment on their perception of youth or old age. The order of presentation was randomized across the participants to avoid any biases: Young/Old or Old/Young.

218 Furthermore, the two parts of the image-of-aging task were separated by the percentage task
 219 (Marquet et al., 2021) to decrease the risk of contagion from one part to the second.

220 This task requires participants to answer freely about the percentage estimation within
 221 the population of adults aged 65 years old and more who suffer from depression, loneliness,
 222 dementia, or hearing loss; live in a community-dwelling or medically assisted housing
 223 institutions; are dependent (require assistance in their daily life), and use the Internet easily.
 224 They were also asked to estimate the percentage of 80+ older adults within the population
 225 who suffer from dementia and live in community-dwelling or medically assisted housing
 226 institutions. The participants were also asked to indicate “In your opinion, at what age do we
 227 stop being young? Beginning to be old? At the end of the study, the respondents fill out a
 228 simple form on their sex, professional and personal experience with older adults, and if any
 229 the quality of their relationship with older adults.

230

231 **Statistical Analyses**

232 Data was processed with R and RStudio (version 3.4, RStudio Team, 2020). The
 233 words from the image-of-aging task were first regrouped with semantically associated words
 234 for the young and the older adults after a consensus meeting (SP, VRL, and GTV). For
 235 example, the words “attrition” “erosion” “old tooth” and “used” were regrouped in “tooth
 236 wear”. The words with an occurrence at least equal to 4 (78 words) were then evaluated by 12
 237 independent judges to assess their valence on an 11 items scale ranging from -5 (extremely
 238 negative) to +5 (extremely positive). For instance, the word “edentulousness” received a
 239 mean valence of -3.08 by the experts, and the word “healthy” +3.75. Three judges were oral
 240 health professionals (experts in the field), 2 were more than 65 years old (opinion of people
 241 targeted in the study as recommended by the citizen science principles) and 3 were

professionals not associated with oral health (opinion of the general population as recommended by the citizen science principles) and the remaining were Ph.D. students in psychology (experts in psycholinguistic words' evaluation). The intraclass correlation coefficient (ICC) for two-way mixed effects, ICC (3, k) was used to assess the interrater reliability and showed good reliability (ICC = 0.895).

The summed words' valence per age group was computed for each participant, with a higher score indicating a more positive vision. The possible difference between the summed valence of the words (across emotional categories) given for a young vs. older adult's mouth was assessed by a *t*-test for paired-samples. The effect of age was also explored for each valence category (positive and negative) by running paired-sample *t*-tests.

The possible effect of sex and personal experience with older adults on the summed valence of the words given to an older adult was explored by Welch tests for independent samples (homogeneity of variance not met). An analysis of variance (ANOVA) was conducted on the summed valence of the words given for an older adult with the kind of experience with the training year (2, 3, 4, 5, or 6), with the older adults (very good, good, neutral, bad, very bad), and with the professional experience with older adults (not at all, not much experience, some experience, a lot of experience) as between participants variables. The relation between the subjective perception of aging (stop of being young and beginning to be old) and valence of the words given was explored through a correlation analysis.

The percentage estimation task was analyzed by running single *t*-tests against the values reported in the literature or official governmental reports for France (Appendix). The same analyses as those conducted on the mean valence of the words given for an older adult were conducted on the percentage estimations to explore the effect of sex, personal experience, training year, quality of the relationship with the older adults, professional experience with older adults and with the subjective perception of youth and aging.

The Holm method was used to control for multiple tests and a corrected *p-value* < 0.05 was considered as significant.

Results

Image-of-Aging

A total of 191 different words were produced by the students in the Image-of-Ageing task. Figure 1 illustrates the 40 most cited words when students thought about a mouth of an older person and of a young adult. The color of each word represents its valence. The words given for a young adult are 49% of the time positive (vs. 23% negative), whereas 69% of them were negative for an older adult (vs. only 8% positive). More negative words are thus given for an older adult than for a young adult, $\chi^2(2) = 19.449, p < 0.001$. The three most cited words for a young adult were “healthy” ($n=103$), “caries” (tooth decay, dental cavity) ($n=88$), and “orthodontics” ($n=60$). Only one (“caries”) of them was negative for two positive words. The three most cited words for an older adult were “edentulousness” (missing teeth) ($n=133$), “prosthesis” (false teeth) ($n=97$), and “periodontitis” (gum and socket bone disease) ($n=57$). None of them was positive as two were negative and one was neutral.

Insert Figure 1: Word clouds of the most frequent words given by dentistry students when they thought about the mouth of a young adult (A) and of an older adult (B). Note. Red denotes negative words $[-5 \text{ to } -1]$, green denotes positive words $[+1 \text{ to } +5]$, and blue denotes neutral words $[-1 \text{ to } +1]$.

The relative percentages of negative, neutral, and positive words that students associate with the mouths of young or older adults (see Table 2) were similar across the training year ($p = 1$).

Insert Table 2 about here

The words associated with a young adult's mouth are significantly more positive than those given in an older adult's mouth ($t(101) = 3.74, p < .001, d = .74$). Across the age groups, the favourable words given for a young adult are more positive than those given for an older adult ($t(4,77) = -3.24, p = .02, d = -1.215$), whereas no significant difference was found for the negative words ($t(14,33) = -.06, p = .95, d = .02$).

The analyses revealed an effect of the training year or the words' valence given for an older adult ($F(1,177) = 11.888, p < .001, \eta^2_g = .06$). The words given by students in the second year are less negative than those given by the 3rd, 4th, and 6th years ($p < .01$), whereas the other comparisons were non-significant (see Figure 2). On the contrary, the analyses did not reveal any difference in the summed valence for the words given to a younger adult according to the training year, the sex of the students, the existence of a relationship with an older adult, or according to the quality of this relationship (all $p_{corrected} > .20$). No relation was found between the subjective perception of aging and the valence of the given words (all $p > .20$).

Insert Figure 2: Boxplot of the summed valence of the words given for the mouth of an older adult according to the training year

Percentage task

The percentage estimations given by the students showed a systematic and large effect of ageism with an overestimation of the prevalence of health and psychological troubles and an underestimation of the ability of older adults to use modern technology as shown in Figure 3 (all $t(127) > 10, p < .001, d > .95$).

The analyses did not reveal any difference in the percentage estimation task according to the training year (all $p_{corrected} > .50$), the sex of the students (all $p_{corrected} > .20$), the existence of a relationship with an older adult (all $p_{corrected} > .50$), nor according to the quality of this relationship (all $p_{corrected} > .20$). No relation was found between the subjective perception of aging and the valence of the given words (all $p > .20$).

Insert Figure 3: Percentage estimation task about adults aged of 65 years old and more and 80 years old and more compared to real estimations from epidemiological data

Discussion

Discrimination against older adults has deleterious consequences on their somatic and psychological health especially when ageism comes from health professionals (Chang et al., 2020; Lamont et al., 2015). Therefore, it is mandatory to assess ageism among these professionals and more precisely to target the moment when those representations may be the more easily changed, namely their education. The aim of the present study was then to evaluate quickly and easily the level of ageism of dental students. The choice was made to use tools that do not transparently assess ageism as explicit questionnaires as the ASDS (Piaton et al., 2021; Rucker et al., 2018). The image-of-aging was adapted to collect their representations of the mouth of a young and an older adult. The percentage estimation task was also proposed to compare their level of ageism with other health professionals.

As expected, the words given when the students think in the mouth of a young person are much more positive than those given to an older person. However, if the positive words are more positive for the young person than for the older adult, there is no difference in the negative words. Given that negative words given for both young and older adults' mouth are mostly related to pathology (carie, plaque, gingivitis...), the same negative representations may be associated with them. On the contrary, the positive words given for a young adult

344 often related to aesthetic (beautiful, smile, alignment...) or good health (healthy,
 345 prevention...), which is not the case for an older adult (care, tooth...). Valences for the first
 346 case may then be more positive than in the second case. Our study shows that there is no
 347 significant difference in responses according to the gender of the respondents, although
 348 women tend to be more ageist (but see Bodner et al., 2012, for a reverse pattern). Second-
 349 year students, who have had no patient contact and very little dental experience, appear to be
 350 less ageist than their more advanced colleagues. When this study began, only students of the
 351 4th, 5th and 6th were in contact with patients; 3rd-year students, even though they had no
 352 contact with patients, had courses and practical work on the theme of dentistry. 2nd-year
 353 students were the only ones with no patient contact and very little dental practice experience
 354 because the study began at the very beginning of the academic year.

355 This result suggests that exposition to dental care for older adults may reinforce their
 356 negative beliefs about them. Accordingly, Beck et al. (1979) investigated the attitude of first-
 357 year dental students toward older adults. It was found that exposure to the poor oral health of
 358 older people through photographs resulted in a negative attitude among the students. Thus,
 359 the traditional approach of training programs to care for older adults by confronting them
 360 with poor oral health may generate negative attitudes in students and be counterproductive.
 361 The basis for training students in gerodontology should begin with an understanding of the
 362 social, psychological, economic, and political aspects of ageing (Partnership for Health in
 363 Aging Workgroup on Interdisciplinary Team Training in Geriatrics, 2014). This information
 364 combined with teaching about the physiological changes associated with ageing would enable
 365 students to better understand the reasons why many older people neglect their oral health and
 366 may help to change students' misconceptions and negative attitudes. An annual, anonymous
 367 questionnaire survey was conducted by Nitschke et al. (2022) among dental students at the
 368 end of the 10th semester each year between 2008 and 2021. The questionnaire surveyed

369 personal attitudes toward ageing, the assessment of seniors, and personal experience with
 370 seniors (images of ageing, “Ageing Semantic Differential”) who received education in
 371 gerodontology, showed a positive image of ageing in dental students, which has remained
 372 almost constant over the years.

373 This is even more important since, in our study, students have a misconception of
 374 reality and overestimated the rates of dementia, dependency, depression, hearing loss,
 375 institutionalized people, loneliness, or inability to use technology. They have prejudices about
 376 older people, especially when they are over 80 years old. The pattern of overestimations
 377 found in dental students is very similar to the one reported for psychology students (see
 378 Marquet et al, 2021). They both are more negative than the general population. These results
 379 could be compared to those get from the general Belgian population (3,600 persons, csee
 380 Missotten et al., 2016 and see the Appendix for a direct comparison). Psychology students,
 381 who exhibit similar ageism to those in the present study in dentistry, showed overestimation
 382 that are more importance that could be found in the general population. This suggests that
 383 (future) healthcare professionals are more exposed to negative representations of aging which
 384 in turn increase the likelihood to exhibit ageist behaviours toward this population (São José et
 385 al., 2019). As reported by Crutzen et al. (2022), healthcare professionals show more negative
 386 representations of older people than the general population. The main explanation of this
 387 result is that these professionals are more exposed to the frailest older adults.

388 Such negative representations of aging are known to lead to inappropriate behaviour
 389 diminishing older adults’ self-esteem, confidence, and performance (Levy et al., 2000). If we
 390 take the simple example of hearing loss, which is largely overestimated by the students, the
 391 consequence of the prejudice that "an older adult necessarily understands or hears less well"
 392 leads to talking to them too loudly, or with simplistic and infantilizing language. Fortunately,
 393 it is possible to reverse these misconceptions through psychoeducation and contact with older

394 adults in good health (Burnes et al., 2019). It appears necessary to conduct awareness
395 sessions for our students to correct existing myths and stereotypes about older people:
396 fighting ageism by promoting a positive image of ageing.

397 The Positive Education about Aging and Contact Experiences (PEACE, Levy, 2018)
398 model developed by Levy et al. in 2016 can be a solution to fight stereotypes and negative
399 beliefs but also all the behaviours that result from them. This theoretical model of integration
400 of older people is based on intergenerational contact and education on ageing. It focuses on
401 two key contributing factors: - education about aging including facts on ageing along with
402 positive older role models that dispel negative and inaccurate images of older adulthood; and
403 positive contact experiences with older adults that are individualized, provide or promote
404 equal status, are cooperative, involves sharing of personal information, and are sanctioned
405 within the setting. These two key contributing factors have the potential to be interconnected
406 and work together to reduce negative stereotypes, ageing anxiety, prejudice, and
407 discrimination associated with older adults and aging.

408 The attitudes and beliefs of dental practitioners toward older people are important to
409 assess because they will be partly responsible for access to dental care for this population. A
410 link between ageing view and care attitudes has been demonstrated in a study with nurses, but
411 it may well exist in other health professionals (Schroyen et al., 2015). For example, among
412 dentists who say they are willing to work with older people, one of the reasons given for not
413 doing so is the negative attitudes they might have toward them (Kiyak et al., 1982; Kiyak &
414 Reichmuth, 2005). Highlighting ageism during dental studies is crucial because it is a key
415 step in changing students' perceptions of older adults and thus preventing the negative effects
416 that ageism may have on the medical and, more specifically, oral care of this population.
417 Most health professionals recognize that training in the care of young children is an essential
418 part of medical training, but there is currently little awareness of the need for training in the

419 care of older adults. Inouye (2021) points to the fact that current medical students spend three
420 times as much time training in pediatrics as in geriatrics.

421 Gerodontology was taught as a subject in most European dental schools (86,2% of the
422 respondent schools (Kossioni et al., 2017), but generally not as an independent subject but
423 embedded in other disciplines like prosthodontics, preventive and community dentistry,
424 special care, operative dentistry, periodontics, and oral surgery. The teaching of this
425 discipline takes place in the last semesters of training rather than in the first and the concept
426 of ageism is not part of the subjects taught. Teaching gerodontology as an independent
427 discipline is essential and interprofessional education is needed for all the health
428 professionals who take care of older people (Partnership for Health in Aging Workgroup on
429 Interdisciplinary Team Training in Geriatrics, 2014). Therefore, it is mandatory to offer more
430 training opportunities to students, especially given the increased proportion of older adults in
431 our society. Most countries, except for Japan, lack adequate numbers of dentists with
432 advanced training in geriatric dentistry to treat their increasingly frail older populations, and
433 this includes many industrialized countries (Marchini et al., 2018).

434 The negative attitude toward older adults must be detected as early as possible during
435 dental studies to adapt the training by teaching students what ageism is, in the same way as
436 racism and sexism, and by familiarizing them with the care of the older patient to improve
437 their oral health. However, very little is known about the level of ageism among dental
438 students, how it is expressed in the course of study, and whether it changes throughout the
439 curriculum. Our study contributes to assessing how dental students could exhibit implicit
440 ageism which is similar to recent findings on more explicit measures (Piaton et al., 2023). Of
441 course, our study has some limitations that should be considered. The most important ones
442 are the lack of more objective measures of ageism, the limited sample size, the relatively low
443 participation rate, and the fact that it was restricted to a single French dental school.

444 Moreover, the valence of the given words was not assessed by the participants themselves (as
445 previously done in the literature) which does not allow to conclude on their valence on these
446 representations. Finally, the questions asked about the experience of the students with older
447 adults and on their practice are not coming from validated questionnaires which may limit the
448 interpretation that could be done on these data.

449 Research is needed in this area to generalize our results to other universities and countries.

450

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Appendix

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Comparison of the dental students with psychology students and the Belgium general

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population for the percentage estimation's task

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