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Using social media-based positive education to challenge negative stereotypes of aging: a quasi-experimental approach

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Abstract

Background Negative stereotypes towards aging are widespread, and positive psychoeducation could play a role in reducing these beliefs. This study aims to assess the effectiveness of positive psychoeducation regarding aging, disseminated through social media channels, in mitigating negative stereotypes. Additionally, it seeks to explore potential associations between various sociodemographic variables and the prevalence of negative stereotypes towards the elderly.

Methods A quasi-experimental design was used, with an experimental group undergoing a 7-day intervention. Daily positive messages about aging were posted on a social media account, and the impact on negative stereotypes was assessed both before and after the intervention using the Questionnaire for Evaluating Negative Stereotypes towards Aging. Sociodemographic data were collected through an additional questionnaire. A snowball sampling method via social media recruited 109 participants.

Results Participants who followed the intervention demonstrated a reduction in negative stereotypes, as evidenced by lower scores on the questionnaire. No significant interaction was found between sociodemographic variables and changes in stereotypes before and after the intervention.

Conclusion Positive psychoeducation through social media shows promise in reducing negative stereotypes about aging. Although the study has limitations, the findings suggest that educational efforts on social media can positively influence attitudes towards aging and potentially enhance well-being across different age groups.

Trial registration The Clinical Trial Registration Number for the study titled 'Positive Education through Social Media to Reduce Negative Stereotypes towards Old Age A QuasiExperimental Study' is NCT06574243. It was retrospectively registered on August 23, 2024.

Keywords Healthy/active aging, Ageism, Negative stereotypes, Social media

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Introduction

Around the world, the older population is growing rapidly. By the year 2050, estimates predict that the global over-65 population will nearly triple. Given these nearly universal demographic patterns, the issue of how societies worldwide will perceive, treat, and accommodate their elderly is garnering global attention [1].

At the core of this issue is ageism, defined as “discrimination based on age encompassing stereotypes and discrimination against individuals or groups due to their age” [2], negatively impacts the mental and physical health of older individuals. Ageism is a subtle and complex phenomenon that can target individuals of any age. However, empirical research predominantly focuses on attitudes toward older adults, who are the group most negatively affected by ageism. These attitudes encompass stereotypes, prejudices, discriminatory actions, or negative evaluations directed at the older population. Additionally, people’s knowledge or attitudes toward the aging process and the societal and cultural norms regarding the expected social roles of older individuals also constitute aspects of ageism [3].

Events such as the COVID-19 pandemic revealed a public discourse in which people over the age of 70 are portrayed as uniformly helpless, frail, incapable of contributing to society but also highlighted the hardships younger people must endure to protect them [4, 5]. These views are being spread through social media, the press, and public announcements, intensifying the need to intervene against ageism through these channels [4].

Research suggests that believing in negative stereotypes poses a direct threat to cognition, as described by Levy (1996) [6], who found that stereotypes like “I am forgetful due to my age” or “I am experiencing memory decline as a result of advancing age” can become self-fulfilling prophecies, worsening memory performance. Other studies showed that a younger subjective age buffered the negative effect of ageism on subjective health, while perceiving aging as social loss increased its effect on life satisfaction [5]. Additionally, older adults may see themselves as burdens, leading to depression and social isolation, thus reducing their will to live and interest in healthy behaviors. Negative stereotypes also affect physical health, impeding disease recovery, increasing cardiovascular stress, and reducing longevity. Holding negative perceptions of aging also predicts poor mental health [3, 7–9].

It is important to note that younger individuals are similarly affected by these stereotypes, which can influence their aging process and interactions with older adults [8, 10] believe negative attitudes toward aging do not just appear in later years, they are adopted at an early age and manifest as negative attitudes toward an out-group before becoming self-relevant when individuals

reach later life. Hence, it is our responsibility to educate the public about its dangers rather than pitting generations against each other and to facilitate intergenerational knowledge, exchange, and solidarity [11]. Young people could be encouraged to develop healthy views of aging [12], via an “aging education.” If this is done from an early age, it should help to reduce ageism and improve that generations’ own experience of aging. Crawford (2015) [12] recommends a number of learning outcomes for education on aging around appreciating diversity between and within age groups, as well as understanding the important contributions that people of all ages make to society (for example through pictures of people from all age groups and open discussion about aging). Also, some meta-analysis suggests that intervention based on education, intergenerational contact, and combined programs provide broadly generalizable benefits [9].

Additionally, Levy (2020) [11] emphasizes the importance for behavioral scientists to utilize research evidence to influence the current public discourse and its broad age-based categorizations, resulting in excessive generalizations and lack of differentiation. Introducing positive age stereotypes such as “older people are wise,” and their activation can lead to beneficial behaviors and attitudes [3, 6].

Considering the widespread proliferation of social media which has facilitated the dissemination of health-related information and interventions, it emerges as a promising avenue for promoting healthy aging [13], and potentially shaping public discourse (especially in younger individuals).

Also, various studies with successful outcomes that have employed social media to intervene with the population highlight how these types of platforms offer many advantages over more traditional methods. They provide an innovative approach that can reach diverse individuals with different income levels, reduce the burden of the intervention, and lower the associated costs. Furthermore, they were useful for improving the knowledge, attitudes, and self-care activities of those who participated. Finally, they used social media platforms such as Facebook or WhatsApp, belonging to the same social media conglomerate as Instagram (Meta Platforms), were used for this research [14–20].

Ageism can be overcome by emphasizing that we are all in this together and by considering that older adults can be a highly heterogeneous group [21]. They differ in life experiences, cultural backgrounds, genetics, and health histories. Similarly, the process of aging can vary significantly for each person and depends on the context [5, 22]. Finally, interventions using friendly formats that incorporate visual images can significantly enhance outreach and impact when trying to communicate positive

messaging about aging that can benefit both individuals and communities [6, 7].

This study aims to explore three primary objectives: first, to examine the stereotypes towards aging within a sample of participants; second, to assess the relationship between these stereotypes and various sociodemographic factors such as age, sex, and educational level; and finally, to evaluate the potential of an intervention delivered through social media platforms in reducing stigma associated with aging. Through this investigation, we hope to gain insights into the complex interplay between societal perceptions of aging, individual characteristics, and the efficacy of novel and updated interventions in challenging age-related stereotypes.

Methods

Ethical aspect and study design

The study was approved by the ethics committee of the Hospital Clínico San Carlos in Madrid and was compliant with the research ethics principles of the Declaration of Helsinki (7th revision, 2013). The study was conducted during the months of February and March of 2023.

This was a quasi-experimental prospective study that used snowball sampling to recruit participants. To observe the main objective of studying the intervention's effectiveness, it was expected that there would be a mean difference of approximately 4 points with a standard deviation of 7, given the potential variability in scores. With this in mind, the minimum sample required to achieve a 95% confidence level and 80% statistical power was 33 subjects. Based on this sample size, a strategy of not limiting the number of survey participants was adopted to gather as many responses as possible, thereby increasing the study's power. Regarding the biases in the snowball sampling method is that the sample may be too homogeneous and may not represent the general population. Therefore, conclusions are always drawn in relation to our specific sample and its characteristics. The results are never generalized to the broader population, and a future goal is to expand the intervention to other population types.

The snowball sampling method used in this study led to a predominantly female sample (97%), as participation depended on individuals voluntarily joining the project. This outcome reflects typical Instagram demographics, where 53.8% of users in Spain in 2022 were women [1]. Moreover, the type of content consumed by men and women on this platform likely influenced the sample composition. While this limits the generalizability of the findings to men, the study demonstrates the efficacy of the intervention among women. Future studies could address this limitation by employing alternative sampling methods to achieve a more gender-balanced and representative sample.

The study was publicized through Instagram accounts of two authors with a combined following of over 100,000. The researchers posted an image with a series of instructions and a link for 7 days as a reminder so that participants could access the account that would later be used for the research. They also established a set of criteria shown below.

Of the initial 250 participants, 109 completed the study. Inclusion criteria included:

1. Being over 18 years old.
2. Participating in both the PRE and POST questionnaires of the *Negative Stereotypes towards Old Age Questionnaire* (CENVE).
3. Following the Instagram posts related to the intervention for 3 days or more.

Instruments

The evaluation instruments for this study included two online Google Forms questionnaires (See in Supplementary Material) designed for pre- and post-assessment. The pre-assessment questionnaire consisted of two sections: 16 items on sociodemographic data and 15 items from the Negative Stereotypes towards Old Age Questionnaire (CENVE) (Blanca et al., 2005). This instrument assesses individuals' stereotypes towards the older population using a Likert-type response scale ranging from 1 to 4 (1 = Strongly Disagree, 2 = Somewhat Disagree, 3 = Somewhat Agree, 4 = Strongly Agree). It provides a total score and three dimensions: Health Dimension, Social Motivation Dimension, and Character/Personality Dimension. The maximum score on this questionnaire is 60 points (indicating a high presence of negative stereotypes towards old age), and the minimum score is 15 points (indicating a low presence of such stereotypes).

Procedure

Both at the initial and final questionnaire stages, that is, before and after the 7-day intervention period of reading the posts, was administered the questionnaire CENVE. Additionally, the post-intervention evaluation included a new question that gathered data on the frequency with which the participant had followed the intervention (0–2, 3–4, and 5–7 days).

Intervention

The intervention consisted of daily positive messages about aging posted on an Instagram account (@laeta-paplateada), created specifically for this study, and was conducted over the course of a week. Examples included "The ability to make decisions improves with age" and "Emotional regulation improves with age" (David, 2017). These posts were accompanied by their respective author references (see Table 1).

Table 1 Positive messages about aging posted at “La Etapa plateada” account over the course of a week

MONDAY	“The ability to make decisions improves with age” (David, 2017).
TUESDAY	“Emotional regulation improves with age” (David, 2017).
WEDNESDAY	“The 67% of individuals aged 60 and above in the USA are satisfied with their life” (David, 2017).
THURSDAY	“The contribution of older individuals to the social economy exceeds the cost of pensions and healthcare expenses” (David, 2017).
FRIDAY	“Older adults can have the same mental capacity as a person of 20 years old” (OMS, 2015).
SATURDAY	“Older adults have an active sex life” (Arias y Polizzi, 2011).
SUNDAY	“The majority of older adults are independent and contribute to both their families and society” (OMS, 2015).

Note. Source: own elaboration

Statistical analysis

A paired samples t-test was conducted to compare each subject’s total score on the CENVE scale before and after the intervention. To determine if certain sociodemographic variables were associated with the presence of negative stereotypes towards old age, the scores obtained in the PRE questionnaire for each study group were analyzed using descriptive statistics and hypothesis testing. This analysis was performed using Student’s t-test (for variables with 2 categories) or ANOVA (for variables with more than 2 categories). The analysis of the “sex” variable was omitted due to low male participation.

Furthermore, to examine if various demographic variables were associated with pre-post differences in the presentation of negative stereotypes towards older people, a Repeated Measures ANOVA was performed for each of the sociodemographic variables collected in the questionnaires: sex, age, marital status, place of residence, cohabitants, religion, education level, occupation, frequency of contact with older people, area of contact with older people, cohabitation with older people, relationship with grandparents, significance level of that relationship, knowledge of any of their grandparents’ loss of abilities (physical/mental), frequency of viewing intervention posts on Instagram, etc.

All tests were analyzed using the statistical software Jamovi 2.3.21. Data for the assessment of negative stereotypes towards old age were collected in February and March 2023.

Results

A total of 109 individuals responded to both questionnaires and participated in the intervention for three days or more. Among them, 97.2% were women, and 2.8% were men, residing in Spain (95.4%) (see Table 2). The participants’ ages ranged from 22 to 69 years, with an

average age of 44.63 years (standard deviation of 11.23). Given that the frequency of contact with older adults can influence stereotypes towards this population, we investigated this contact, finding that nearly half of the subjects (49.5%) had daily interactions with older adults, primarily within the family setting (72.5%). Additionally, 37.6% of the participants lived with someone in this age group. Regarding their grandparents, 99.1% of the participants reported knowing at least one grandparent, with 51.9% describing a significant relationship where the grandparent actively participated in their upbringing. Furthermore, 74.3% of the subjects were aware that at least one grandparent had experienced a decline in physical and/or mental capacity, with more than half of these cases (53.1%) involving both physical and mental declines.

However, none of the sociodemographic variables collected in the questionnaires appeared to be associated with the pre-intervention questionnaire scores (Table 2) or with the differences in scores before and after the intervention (Table 3).

The primary objective of this study was to analyze whether positive education about aging disseminated through social media could reduce negative stereotypes towards older adults. To this end, we collected data on the participants’ engagement with the intervention. It was found that 59.6% of them followed the intervention for 3–4 days, while 40.4% did so for 5–7 days. The results demonstrated that after the 7-day intervention, during which positive messages about aging were posted on the social media platform Instagram, participants had lower scores on the Negative Stereotypes towards Old Age Questionnaire (CENVE) than before the intervention. Hence, individuals who completed the study exhibited fewer negative stereotypes towards aging post-intervention (see Table 4; Fig. 1).

Key trends and subgroup analyses

- Gender:** While the majority of participants were women, both men and women showed reductions in CENVE scores post-intervention. Women exhibited an average reduction of 3.78 points, whereas men demonstrated a smaller reduction of 1.33 points.
- Age:** Participants in the youngest age group (22–39 years) experienced the largest reduction in scores, with a mean decrease of 5.43 points. In contrast, the oldest age group (60–69 years) had a more modest reduction of 2.87 points.
- Contact with older adults:** Participants with daily contact with older adults had the lowest baseline scores in the pre-intervention evaluation (28.24) and exhibited an average reduction of 3.2 points post-intervention. Conversely, participants with monthly or no contact had higher baseline scores (31.94).

Table 2 Sociodemographic variables and CENVE (PRE) mean with the contrast according to these variables

variable under study	frequency (N = 109)	% of the Total	CENVE mean (PRE)	p.*
Gender				
Women	106	97.20%	29.12	
Men	3	2.80%	29	
Age				
22–39	35	31.90%	29.86	,574
40–59	66	60.70%	28.59	
60–69	8	7.30%	30.25	
Marital status				
Single	39	35.8%	30.13	,140
Married	60	55.0%	27.93	
Divorced	9	8.3%	31.22	
Widowed	1	0.9%	42	
Are you currently residing in Spain?				
Sí	104	95.40%	29.1	,867
No	5	4.60%	29.6	
current cohabitation				
Alone	14	19.40%	29.64	,430
Couple	42	58.30%	28.71	
Parents	7	9.70%	32.14	
Friends	2	2.80%	24.5	
Others	7	9.70%	30	
Religion				
Christianity	58	53.2%	28.72	,404
None	47	43.1%	29.81	
Other	3	2.8%	26.75	
educational attainment				
high school education	2	1.8%	32	,447
bachelor's degree	16	14.70%	30.25	
university degree	89	81.70%	28.88	
special regime education	2	1.80%	28	
work-related status				
Unemployed	10	10.0%	27.7	,776
Employed	75	75.0%	29.37	
Students	4	4.0%	31.5	
Retired	3	3.0%	27.67	
Other	8	8.0%	27.25	
contact with older adults				
daily	54	49.50%	28.24	,123
weekly	36	33.00%	28.92	
monthly	17	15.60%	31.94	
None	2	1.80%	32.5	
scope or context of contact				
Family	50	72.50%	30.2	,210
Work	15	21.70%	27.67	
Other	2	2.90%	24.5	
None	2	2.9%	32.5	
Have you lived with older adults?				
Yes	41	37.60%	27.98	,155
No	68	62.40%	29.81	
Did you meet any of your grandparents?				
Yes	108	99.10%	29.12	
No	1	0.90%	29	
relationship with grandparents				
				,814

Table 2 (continued)

variable under study	frequency (N = 109)	% of the Total	CENVE mean (PRE)	p.*
periodic visits	43	39.80%	28.7	
There was hardly any contact	8	7.40%	28.25	
participated in parenting	56	51.90%	29.41	
There was no contact	1	0.90%	38	
Loss of abilities of a grandparent				,378
Yes	81	74.30%	29.44	
No	28	25.70%	28.18	
Which ones?				,051
Physical	20	24.7%	31.35	
mental	18	22.2%	31.06	
both	43	53.1%	27.88	
Frequency of posts				
3–4 days	65	59.6%		
5–7 days	44	40.4%		

Note. Source: own elaboration. *Sig: Analyze the differences in CENVE scores for the different categories of each variable, significant if sig < 0.05

and 32.50, respectively) and experienced smaller reductions (see Fig. 2).

Relationship with grandparents Participants who reported significant relationships with their grandparents during childhood showed greater reductions in scores (mean decrease of 4.3 points) compared to those with limited contact (mean decrease of 2.2 points).

Discussion

To the best of our knowledge, this is one of the few quasi-experimental prospective studies to analyze the impact of an educational intervention through social media on negative stereotypes about aging in a Spanish sample. The most striking finding suggests that participants in the intervention exhibited a reduction in their negative stereotypes about aging after a 7-day intervention. Our results indicate the potential of social media platforms like Instagram for a beneficial avenue in modifying negative age stereotypes by disseminating positive and scientifically validated information via social media. This finding aligns with existing scientific literature, which indicates that social media has the potential to reshape stereotypical narratives about older adults by showcasing examples of active, resilient, and socially engaged individuals. These representations can challenge common beliefs that associate aging solely with physical decline, social isolation, and dependency. For instance, campaigns or older influencers sharing their experiences help highlight the diversity within this demographic, defying the notion that aging inevitably entails a loss of abilities.

Similarly, integrating older adults into the digital sphere is crucial for enabling them to reap the benefits of social media. However, the digital divide and a lack of technological skills often pose significant barriers. According to research, when older individuals receive proper training,

they not only engage more actively on these platforms but also experience improvements in self-esteem and psychological well-being. Digital education can serve as a powerful tool to empower older adults, dispelling the myth that technology is exclusive to younger generations.

Moreover, promoting positive representations of aging on social media can foster a more balanced perception of this life stage. These portrayals emphasize qualities such as wisdom, experience, and the ability to adapt to new challenges. This approach not only benefits older adults but also educates younger generations, demonstrating that aging is not exclusively negative but rather a natural and valuable part of life. Advertising campaigns and educational projects that depict older adults in active, creative, and socially significant roles are essential to counter the pessimistic outlook often associated with aging [23, 24].

In summary, technology, especially when used inclusively through intergenerational programs and digital literacy initiatives, has the power to challenge and change negative stereotypes about aging, fostering a more positive and realistic view of older adults [25–29].

Regarding the sociodemographic variables collected in the questionnaires, none seemed to be associated with the CENVE scores prior to the intervention (Table 2) or with the pre-post differences in CENVE scores (Table 3), in contrast to previous scientific literature findings (24) (25) (26). This could be attributed to the relatively homogeneous distribution of the sample in some of these variables, such as gender (97.2% female), education level (81.7% with university studies), occupation (75% employed), contact area with older adults (72.5% family), and cohabitation with an older adult (37.6%). However, it should be noted that the sample was mainly collected through “Instagram” accounts, where followers were predominantly women: @dr.rosamolina with 90.4% female

Table 3 Differential PRE-POST scores on CENVE by socio-demographic variables

Variable under study	Frequency (N= 109)	%of the Total	Differential PRE-POST scores on CENVE
Gender			0.351
Women	29.12	25.34	
Men	29.00	28.67	
Age			0.210
22–39	29.86	24.43	
40–59	28.59	25.73	
60–69	30.25	27.38	
Marital status			0.584
Single	30.13	25.62	
Married	27.93	24.87	
Divorced	31.22	27.56	
Widowed	42.00	33.00	
Are you currently residing in Spain?			0.541
Sí	29.10	25.33	
No	29.60	27.60	
current cohabitation			0.636
Alone	29.64	25.29	
Couple	28.71	24.60	
Parents	32.14	24.00	
Friends	24.50	20.00	
Others			0.167
Religion	28.72	26.14	
Christianity	29.81	24.62	
None	26.75	24.75	
Other			0.309
educational attainment	32.00	24.50	
high school education	30.25	28.88	
bachelor's degree	28.88	24.80	
university degree	28.00	27.00	
special regime education			0.091
work-related status	27.70	25.30	
Unemployed	29.37	25.28	
	31.50	22.25	
Employed	27.67	30.67	
Students	27.25	25.63	
Retired			0.350
Other	28.24		
contact with older adults	28.92		
daily	31.94		
weekly	32.50		
monthly			0.736
None	30.20	25.46	
scope or context of contact	27.67	22.67	
Family	24.50	24.50	
Work	32.50	30.00	
Other			0.185
None	27.98	25.32	
Have you lived with older adults?	29.81	25.50	
Yes			0.960
No	29.12	25.44	
Did you meet any of your grandparents?	29.00	25.00	
Yes			0.700
No	28.70	25.86	

Table 3 (continued)

Variable under study	Frequency (N=109)	%of the Total	Differential PRE-POST scores on CENVE
relationship with grandparents	28.25	24.63	
periodic visits	29.41	25.11	
There was hardly any contact	38.00	32.00	
participated in parenting			0.293
There was no contact	29.44	25.38	
Loss of abilities of a grandparent	28.18	25.57	
Yes			0.743
No	31.35	26.45	
Which ones?	31.06	27.72	
Physical	27.88	23.91	

Note. Source: own elaboration.*P: Analyzes if the differences in total CENVE score PRE-POST are associated with each of the sociodemographic variables. Significant if sig < 0.001

Table 4 Comparison of pre and post-test scores on the CENVE scale after intervention. The total score variable of each subject on the CENVE scale has been compared before and after the intervention. The differences obtained in the PRE and the POST after intervention are significant, so positive education about old age disseminated through social media can reduce negative stereotypes towards this age group

	MEDIA	DE	p
TOTAL PRE	29.1	6.51	< 0.001
TOTAL POST	25.4	7.36	

Note. Source: own elaboration

followers, and @neuropsiquiatriazgz with 87.2% female followers, both with an age range between 25 and 54 years, with 85.3% and 85.1% respectively.

Based on scientific literature, it was expected that women would have fewer stereotypes than men, considering that women have been victims of significant stereotypes throughout history and in modern society [30]. They would be more empathetic and considerate towards other stigmatized groups, such as older adults. However, the low participation of men in this study did not allow us

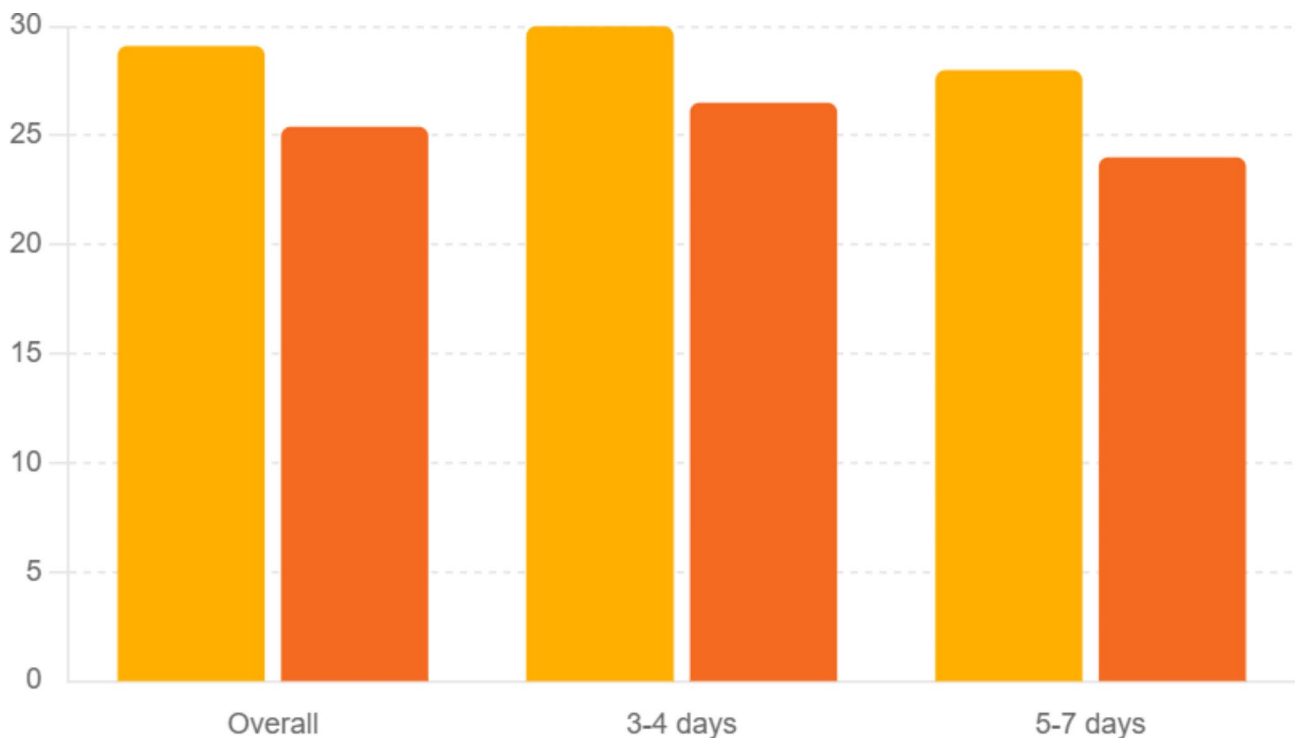


Fig. 1 Reduction in CENVE Scores Before and After the Intervention*

This figure illustrates the overall reduction in CENVE scores among participants after the 7-day intervention. The pre-intervention scores (PRE-CENVE) were significantly higher than the post-intervention scores (POST-CENVE), indicating a decrease in negative stereotypes towards aging following exposure to positive messages on social media

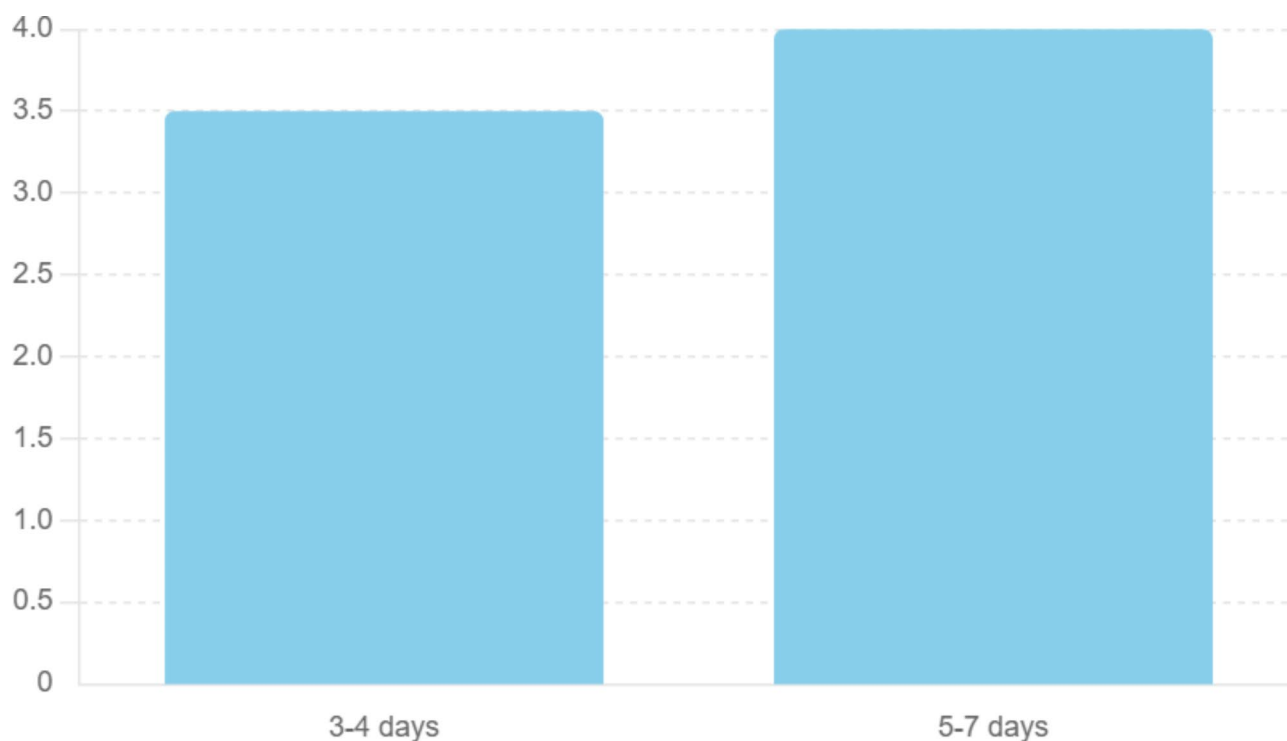


Fig. 2 “Reduction in CENVE Scores by Participation Level”

This figure shows the reduction in CENVE scores stratified by participants’ level of engagement with the intervention. Participants exposed to the intervention for 5–7 days exhibited a greater reduction in negative stereotypes compared to those who participated for 3–4 days, highlighting the importance of sustained engagement with positive educational content

to identify significant differences in the male population concerning the reduction of negative age stereotypes.

Since our research was primarily composed of women, the reduction of negative stereotypes towards aging could have been enhanced due to this factor. The fact that 92.6% of the participants are women implies that the study’s conclusions primarily apply to a female population. Additionally, we conducted hypothesis tests to determine if there were significant differences in responses between sexes and the effect this might have on the main objective. We also analyzed whether gender could be a confounding variable, and found that it is not, as the few men who participated behaved and responded similarly to the women. Having a predominantly female and diverse age group might have increased the efficacy of the program, as suggested by scientific literature, which indicates that interventions to reduce negative age stereotypes are particularly effective among groups consisting mainly of adults and women [9]. In this study, 68% of the participants were aged over 40, and 97.2% were women. Additionally, our intervention was based on one of the fundamental pillars of various anti-ageism intervention programs: education about aging myths, presenting aging as a time of activity, growth, and optimism for the future [7]. For example, by posting messages such as:

“The ability to make decisions improves with age”; “emotional regulation improves with age”.

Regarding educational levels, we decided to collect this variable rather than by years to avoid the bias of not remembering the exact number of years, as people are more likely to recall the highest level of education they achieved. Additionally, this approach aligns with most studies, allowing for easier comparison with them. Our results did not show any differences related to education level, contrary to the findings of Menéndez et al. (2016) [31], who concluded that individuals with higher educational levels scored lower on the CENVE questionnaire compared to those with medium or low educational levels, indicating fewer ageist stereotypes. Similarly, Sánchez et al. (2004) [32] found that individuals with lower educational levels displayed more ageist stereotypes. Although our study did not find significant differences in CENVE scores based on educational level, participants with a university degree did have a lower average score on the questionnaire before analysis (indicating fewer stereotypes) than those with a lower level of education, suggesting a trend, even though it was not statistically significant.

Given that some research indicated that the negative impact of age discrimination is less pronounced among adults living in European countries with a greater context

of religiosity, which may serve as a source of social support, leading to a more positive perception of aging [33, 34], an association was anticipated between ageist attitudes and the participants' religious beliefs, with 56% adhering to some form of faith. However, no significant differences were found. Authors like Steven-Long and Commons (1992) [35] have suggested that this protective aspect has been overestimated, and in fact, greater religiosity among older adults does not necessarily associate with fewer stereotypes, indicating that this belief may be erroneous and not necessarily linked to this life stage, as religious individuals also harbor negative stereotypes about aging.

Surprisingly, no relationship was observed between the presence of negative stereotypes and contact with older adults, despite existing literature indicating that increased opportunities for interaction are associated with a more positive and reality-based perception, replacing the negative image frequently propagated by the media and society regarding this age group [36, 37]. However, a trend was observed in the reduction of average negative stereotypes towards older adults on the PRE questionnaire as the frequency of contact increased, with those with daily contact obtaining the lowest scores and those with monthly or no contact obtaining higher scores.

In relation to the previous point, 99.1% of the participants in this research knew at least one of their grandparents. Consequently, those who did not have the opportunity to know their grandparents might not have been as interested in participating in the survey, potentially having less motivation towards this topic. Thus, this could introduce a significant bias in our study, as the majority of participants had close contact with older adults, and as mentioned earlier, more opportunities for intergenerational contact (assuming it is positive) increase the likelihood of having a better perception of aging and may even reduce the development of ageist attitudes [7, 36]. In fact, according to the results obtained in the PRE questionnaire, individuals with a closer and more significant relationship with their grandparents (although in different ways) scored lower than those without any contact (up to 10 points lower than those with a closer relationship), though once again, these differences were not statistically significant.

Strengths and limitations of the study

This research presents a novel format both nationally and internationally, as interventions addressing this topic that have used social media are scarce, such as the one carried out by Peiró (2020) to reduce ageist attitudes via the "TikTok" social media platform. Also, it employs social media, demonstrating its usefulness for psychoeducational purposes and health promotion and prevention.

Moreover, the rapid dissemination of information facilitates its spread to a relatively large number of individuals across various regions of Spain. Finally, once again, it highlights how education-based interventions can be a potential tool for reducing negative stereotypes about aging.

However, despite efforts to improve and enhance research on ageist stereotype interventions, this study has some limitations that should be addressed in future studies. Firstly, the intervention was only carried out in Spain, which may introduce location-based bias and limitations when generalizing the results to other countries or cultures. Related to the previous point, the study had a fairly homogeneous sample of 109 individuals, with only 3 being male and most in a range of age between 23 and 39 years old, we could not reach older people through our social media profiles. We believe the sample had a higher population of women than men because the dissemination accounts through which the research was advertised have a larger number of female followers. All these could have limited the finding of significant associations with ageist attitudes by gender or age. Moreover, older adults were underrepresented in our sample, consequently the findings may not reflect the experiences and perspectives of the older population. Furthermore, since the intervention required completing two questionnaires separated in time and following an Instagram account, a significant portion of the initial sample (141 participants) was lost, considerably reducing our sample size and precluding the finding of significant results. Another limitation is the lack of a No control group, that makes it difficult to know whether the small changes were associated with the intervention or some other variable not controlled for in the study. We have also to acknowledge as limitation that the intervention duration was short (1 week), possibly not providing enough time for a visible change in participants' negative stereotypes, and could have led to a social desirability effect, with respondents attempting to answer both questionnaires based on what they believe the evaluator expects of them [38]. Moreover, we cannot ascertain the exact level of attention paid by participants to the intervention-related posts, as the follow-up relied on self-reported information, which may also be associated with a social desirability bias. So that we wrongly attribute change in their response to our intervention. Finally, due to the short duration of the study, we do not know if the positive effects of the intervention are maintained in the long term.

This study demonstrated the efficacy of the intervention, as participants showed a reduction in negative stereotypes post-intervention. In contrast, a control group with no intervention would likely not exhibit significant changes in stereotypes towards older adults. Future research could adopt a controlled clinical trial

design with randomized sampling to compare intervention effects between experimental and control groups. Although such a study would provide stronger causal inferences, it would also require greater resources and logistical planning to ensure feasibility.

Future lines of research

This study opens up several future research avenues. Future studies may overcome these limitations including larger samples of different countries or cultures (and controlling the effect of this variable); spreading the study to other profiles or social media that include more heterogeneous population regarding gender and age or using a controlled randomized method of sampling; comparing results with a control group that are not invited to follow the account through which intervention is published; keeping a longer intervention and reevaluating subjects after a while of finishing it, in order to know if effects are sustained at medium and long term.

Furthermore, this research once again highlights education-based interventions as a potential tool for reducing negative stereotypes about aging. Considering the use of social media platforms, which allows for rapid and easy dissemination of information to a larger number of people, it would be interesting to continue using such platforms in future studies. These practices could contribute to improving the health, social support, and self-perception of both older adults and younger or middle-aged individuals (Nelson, 2016).

The findings of this study suggest that social media-based interventions could be integrated into national aging policies and healthcare educational programs. For instance, digital campaigns led by governmental organizations could promote positive representations of aging through educational and accessible content on popular platforms like Instagram. Additionally, incorporating modules on ageism and healthy aging into health sciences curricula and intergenerational training programs could foster a more balanced and realistic perception of aging in society. This approach would not only help combat negative stereotypes but also improve the psychological and social well-being of older adults by increasing their digital inclusion and participation in community initiatives.

Conclusions

Addressing and mitigating negative stereotypes related to aging is a paramount concern for public health and society at large. Research endeavors such as the present study underscore the potential efficacy of positive psychoeducation interventions on aging, particularly when disseminated through social media platforms, in attenuating these stereotypes. Although our study did not find an association between the analyzed sociodemographic

variables and the presence of negative age stereotypes both before and after the intervention, future research in this area may help identify target populations for more specific interventions.

Despite the limitations of our study, our results indicate the potential of programs aimed at improving the health and well-being of older adults, as well as promoting healthy aging among younger and middle-aged individuals. However, further longitudinal studies with larger populations, more incisive and prolonged interventions, and more comprehensive follow-up are needed to confirm our preliminary results.

Abbreviations

CENVE Questionnaires of the Negative Stereotypes towards Old Age Questionnaire

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Author contributions

1) LFH: Responsible for developing the research question, conducting the study, and composing the article.2) EFR: Involved in shaping the research question, executing the study, and drafting the article.3) PGG: Involved in charge of study design and overseeing data collection.4) ISG: Responsible for statistical analysis.5) MAAM: Involved in the process of article writing.6) RMMR: Took part in study design and overseeing data collection.

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Data availability

The data used to support the findings of the present study are available from the corresponding author upon request.

Declarations

Ethics approval and consent to participate

The study was approved by the ethics committee of the Hospital Clínico San Carlos in Madrid (reference number C.I. 23/054-E_TFM).

All participants, prior to engaging in the study and just before filling out the form, had to check a box indicating their acceptance of the informed consent. Without checking it, they could not access the initial survey. Additionally, the study underwent an ethics committee review, the details of which are attached in the supplementary materials section.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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