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Will-to-live in older people's medical decisions: immediate and delayed effects of

aging stereotypes

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Abstract

This research explores the duration of age stereotype priming effects on individuals' will-to-live when faced with a medical terminal illness decision. Study 1 established the content of stereotypes of older and younger age groups in Portugal. Study 2 tested the effects of priming positive or negative age stereotype on older and younger individuals' will-to-live, immediately after priming or after a delay. Results showed significant effects of stereotype valence on older people's will-to-live. As expected, immediate and delayed will-to-live scores were lower in the negative than in the positive condition. In contrast, among younger people there were no significant effects of stereotype valence. These findings demonstrate the robustness of these types of unconscious influences on older people's fundamental decisions.

Key-words: aging stereotypes, will-to-live, medical decisions

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Population aging is undoubtedly one of the biggest challenges of this century. By 2045 the number of older people is expected to exceed the number of children in the world (WHO, 2002). One of the issues that has been raised is the potential burden on health care posed by the aging population. Health promotion has thus become a major focus of active aging policies in order to help people to live longer and active lives (WHO, 2002). Adherence to medical treatment is a fundamental issue with major implications for the way older people cope with illness and disability and, at the extreme whether older people will decide to continue their own existence.

Studies suggest that this *will-to-live* is a psychological construct that can be affected by several kinds of beliefs. For example, it is more likely that elderly people die after an important religious celebration (e.g., Passover for Jewish individuals and Harvest Moon Festival for Chinese American) than before (Phillips & King, 1988; Phillips & Smith, 1990). In one important study, Levy, Ashman and Dror (1999-2000) showed that will-to-live could be affected by aging stereotypes in an automatic manner. Using a subliminal priming paradigm, these authors showed that older people primed with negative age stereotypes were less accepting of a medical treatment when faced with a hypothetical terminal illness than those primed with positive age stereotypes. These effects are interesting because they show that basic survival outcomes in older people may be affected by subtle manipulations of the social context. This is important because many times contexts pose insufficient conditions (such as dim lights or half-sentences) that make the influence of these types of effects very difficult to detect and that may still significantly affect fundamental outcomes. The use of subliminal primes in this research is important because it clearly shows the

automatic character of these types of effects, demonstrating that older people need not to be aware of such influences for these effects to occur (Levy, 2009).

These subtle effects seem especially meaningful given other evidence regarding medical decision making among older people. Studies show that this age group seem to use systematically a heuristic mode of decision-making in natural medical contexts, making them more subject to subliminal or subtle influences (Liu & Gonzalez, 2007; Meyer, Talbot, & Ranalli, 2007).

According to Levy (2003) these findings demonstrate that there is an effect of implicit *self-stereotyping*. Negative and positive aging stereotypes are internalized during childhood and reinforced throughout life then become self-stereotypes at old age. These can be activated automatically by subtle contextual cues, which thereby influence performance and one's self-concept. The assumption that findings reflect the operation of implicit *self*-stereotypes of aging is supported by the fact that these priming effects do not seem to occur in people for whom the older stereotype is not relevant. Specifically, Levy and colleagues (1999-2000) did not find any significant differences between younger people's will-to-live scores as a function of positive or negative aging stereotype primes.

In the present paper we explore Levy et al.'s (1999-2000) proposition in more detail. Specifically, we are interested in examining the durability of these types of effects. Does the automatic activation of negative age stereotypes necessarily reduce, and can the automatic activation of positive age stereotypes sustainably increase, older people's willingness to accept a medical treatment when their survival is at stake?

 Some studies suggest that aging stereotypes may have important long-lasting effects on fundamental outcomes. Findings based on the Ohio Longitudinal Study of

Aging showed that participants sharing more positive self-perceptions of aging at baseline had better functional health over the course of the study and lived an average of 7.5 years longer than those with more negative self-perceptions of aging (Levy, Slade, Kunkel, & Kasl, 2002). This is consistent with the idea that age stereotypes internalized at earlier ages may have significant effects on the long run.

The present paper complements longitudinal studies and earlier priming studies by examining the potential limits of the unconscious situational activation of aging stereotypes (Levy, 2009). Hence, we are interested in understanding whether these type of effects persist even after introducing a period of time performing another task. As far as we know, this is the first time a test such as this has been conducted within the aging stereotype priming research.

Research in other domains shows that temporal delay reduces the likelihood that a primed construct will affect processing of a subsequent stimulus (Higgins & King, 1981; Wyer & Srull, 1981). For example, Bargh, Lombardi and Higgins (1988) showed that a delay of 180s can be sufficient for a prime to dissipate, particularly if individuals engage in a secondary distracting task. Similar results have been found in the priming literature using race or national identity stereotypes in younger participants (Lepore & Brown, 1997, 1999). This evidence raises a question regarding the scope of Levy´s (1999-2000) findings. Specifically, while priming of age stereotypes may affect older people's immediate responses, it is unknown whether this has any lasting consequences or is only a very brief, immediate, effect. This issue is important because real life situations involve multiple cues that compete for attention (Bargh, 2006). Therefore the question remains as to whether these unconscious stereotype activation can affect older people's performances once their attention is directed somewhere else? We examine the durability of stereotype

automatic activation by exploring the effects of aging stereotypes on older people's medical decisions, either immediately after the priming episode - the typical Levy experimental situation (Levy, 1996; Levy, et al., 1999-2000), or after a significant delay.

In line with Levy et al. study (Levy, et al., 1999-2000), we test both older and younger participants, thus allowing us to explore the role of self-relevance. Some authors (e.g., Dijksterhuis, Chartrand, & Aarts, 2007) suggest that although it is possible to demonstrate old age stereotype priming effects in younger people in some situations, effects should be stronger and last longer in targets for whom the prime is more self-relevant and chronic (i.e., older people). In fact, targets should show a lower threshold of activation for self-relevant primes and these effects should be more sustained over time than in non-targets. The rationale behind this idea is that for targets the self-relevant category should be more frequently used and hence should share a stronger associative strength making it responsive and more enduring following subtle activation (Shih, Ambady, Richeson, Fujita, & Gray, 2002).

Overview of Present Studies

The present research extends the study conducted by Levy et al. (1999-2000). We expect a differentiated effect of old age primes in older and younger individuals' will-to-live scores in the immediate context and after the delay. Immediately after priming, and in line with Levy et al.'s (1999-2000) initial predictions, older people should show lower will-to-live in the negative than in the positive stereotype condition. Moreover, since the old age stereotype is chronically relevant for older people, we expect these effects to persist regardless of a delay. On the other hand, younger people, for whom the aging stereotype is not so meaningful, should not be affected by the valence of the priming in either immediate context or after the delay.

To test these propositions Study 1 established the relevant stereotypic content for positive and negatively valenced primes and Study 2 tested our hypotheses experimentally.

Study 1

Levy (1996) used as primes stereotypic traits elicited from a relatively small sample of participants (N = 20 distributed across the younger and older age groups), although the sample size used to pre-test stereotypical contents associated with older people may have been justified given the existence of previous research on North-American age stereotypes (Brewer, Dull, & Lui, 1981; Hummert, 1990; Kite, Deaux, & Miele, 1991; Levy, 1996; Levy & Langer, 1994; Schmidt & Boland, 1986). The present research was conducted in Portugal and although, there is reason to believe that ageism against older people is widespread and a meaningful phenomenon in the Portuguese culture (Marques, 2011), just as it is in North America, there is only limited evidence regarding Portuguese age stereotypes (Neto, 1992; Paúl, 2002; Simões, 1985). For instance, data collected in the "Experiences and Expression of Ageism" module included in the 2009 European Social Survey (ESS) revealed that in Portugal, 20.8% of individuals between 65-79 years and 31.6% of the individuals aged 80 and over experienced age discrimination during the previous year (Abrams, Russell, Vauclair, & Swift, 2011). In addition results of the 2009 Eurobarometer revealed that 53% of the Portuguese think that age discrimination is a serious problem in their society and 57% believe that is more serious now than 5 years ago (European Comission, 2009). Therefore, for the present research an opportunity was taken to establish a more robust basis for stereotype priming that attended both to the content and valence of aging stereotypes. Moreover, Study 1 takes into account differences associated with gender. Kite et al. (2005) argue that it is essential to take the target's

gender in consideration when investigating age stereotypes. Indeed Matlin's (2004) evidence suggests that when we refer to a general category such as "older person" participants will tend to consider only elderly men. Hence, it is important to ensure that stereotype studies should account for this by asking individuals to evaluate both older men and women. As described in more detail below, we addressed this issue by asking groups of older and younger individuals to evaluate older and younger males and females in a preliminary exploratory phase. In a following phase where traits were rated for typicality and valence, we only included traits that were characteristic of both older men and women, on one hand, and younger men and women, on the other.

Method

Participants. Younger participants were college students from the universities in the Lisbon area who were invited to participate in the study. Older people were recruited through personal contacts. Participants were 62 younger individuals (M_{age} = 21.6 years; SD = 2.0) and 62 older individuals (M_{age} = 70.4 years; SD = 4.7). Among younger participants a small majority were female (64.5%), single (95.1%), students (90.3%), had at least 12 years of education (100%) and lived in urban neighbourhoods (91.9%). Among older participants most were also females (64.5%), almost were married (68.3%), widows (16.7%) or single (11.7%), had at least 12 years of education (66.1%) and lived in urban neighbourhoods (96.7%).

Materials and procedure. A questionnaire was devised to examine the typicality and valence of the attributes associated with the categories "young" and "old" following a procedure based on Brazão and Garcia-Marques (2004). The questionnaire assessed: i) the degree to which each attribute was associated with each group; and ii) the degree to which they were perceived as positive or negative. The

items consisted of 56 attributes drawn from the age stereotypes in the USA (Levy, 1996; Levy, et al., 1999-2000) together with attributes referred in the most representative study regarding age stereotypes in Portugal (Neto, 1992); and attributes from pilot work in which 67 younger individuals (M_{age} = 19 years; SD = 0.7) and 85 older individuals (M_{age} = 76 years; SD = 0.6) answered a "free-response task" regarding the stereotypical traits associated with older men and women and younger men and women. The stereotypical attributes were coded by two independent judges with agreement index of at least 85% in the coding of attributes for the four groups. Disagreements were resolved though open discussion. We included in the 56 traits used for Study 1 the traits indicated by younger and older participants that were common to both the male and female gender of each age group.

To evaluate typicality, the list of attributes was presented twice, once for each age group (younger and older) in a random order. Participants were asked to evaluate, on an 11 point scale, the degree to which they thought that people in Portuguese society associated each characteristic with the groups of younger and older people (0 = not at all, 10 = completely). Next, we presented the same list of attributes and asked participants to evaluate the degree to which they thought that people in Portuguese society considered each attribute as positive or negative when evaluating people in general (0 = totally negative, 10 = totally positive).

Younger participants answered the questionnaire by themselves in a university laboratory. Older participants answered the questionnaires at their homes and returned the questionnaires to the researchers either personally or by mail.

Results and discussion

Table 1 summarize the attributes that were considered stereotypic of the older age target group by both groups of participants. We considered an attribute to be

stereotypic if it was significantly higher than 5 on the typicality scale. We considered an attribute to be positive if it was significantly higher than 5 on the valence scale, and negative if it was significantly lower than 5 on the valence scale.

Typicality. In the case of the older stereotype, it is interesting to see that this list included only 9 of the 24 attributes originally used in Levy's (1996) study. These 9 traits were synonymous with the traits used by Levy (positive traits: wise, sage, insightful, counsellor, calm; negative traits: dependent; decline; ill; forgetful) (Levy, 1996; Levy, et al., 1999-2000). The remaining attributes were specific to the content of age stereotypes in Portugal, which highlights that there is not complete generalizability and there is some cultural variability in such stereotypes.

Valence. In line with the results found in North-American studies (Brewer, Dull, & Lui, 1981; Hummert, 1990; Kite, Deaux, & Miele, 1991; Levy, 1996; Levy & Langer, 1994; Schmidt & Boland, 1986), Portuguese aging stereotypes are mixed, including both positive (e.g., mature, wise) and negative (e.g., ill, dependent, forgetful) traits.

Study 2

Study 2 was an experiment designed to explore the differences in will-to-live scores in younger and older participants in two conditions: immediately after stereotype priming and after a delay. The design was factorial between-subjects with 2 (Stereotype Valence: negative and positive stereotypical attributes) x 2 (Age Group: younger and older individuals) x 2 (Delay: immediately after the prime (i.e., non-delay) or after 180s (i.e., delay)).

We expected differences between will-to-live scores in older and younger people. Older people, for whom the aging stereotype is self-relevant and more chronic, should show lower will-to-live in the negative than in the positive stereotype

condition immediately after priming and after the delay. On the other hand, younger

people, for whom the aging stereotype is not self-relevant, should not be affected by

the valence of old age stereotype priming neither in the immediate context nor after

the delay.

Method

Participants. This study included 115 participants: 54 older adults ($M_{age}=$

71.1 years, SD = 5.9) and 61 younger adults (M_{age} = 20.1 years; SD = 3.3). Within the

older adults group, 35.9% were female and 64.1% were male. Within the younger

adults group, 61.8% were female and 38.2% were male. As we explain in more detail,

10 individuals of each age group were included in a condition to evaluate perception-

without-awareness. Younger adults participated in this study as part of a Research

Methods course in the 1st year of a Psychology degree, and received credits for it.

Older adults were recruited by word-of-mouth by these students and agreed to

participate voluntarily in the study. The majority of older adults were living

independently in the community with their families (55.7%) or by themselves

(37.7%).

The two criteria for inclusion in the study were being native Portuguese

speakers, ability to read and write Portuguese, and inability to consciously recognize

any of the words that were flashed on the computer screen during the priming task.

Five young participants and three old participants were removed from the initial

sample because they indicated that they could read the words being primed.

The older and younger participants differed numerically in gender, χ^2 (1, $N =$

115) = 4.15, p < .05 and years of education, t (112) = 5.40, p < .001. Older

participants were mostly men and had significantly fewer years of education ($M =$

8.50; SD = 4.91) than younger participants (M = 12.00; SD = 0.00). A preliminary

analysis revealed that gender did not significantly affect will-to-live scores, $F(1, 93) =$ 1.42, $p = .23$, $\eta^2_p = .02$. In the same vein, years of education were unrelated to the will-to-live scores of older participants, $r(42) = -.33$, $p = .25$ (this analysis was not performed for younger participants given that there was no variability in younger participants' years of education),.

There was higher variability in the ages of older participants ($M_{age} = 71.1$ years, $SD = 5.9$) than younger participants ($M_{age} = 20.1$ years; $SD = 3.3$), therefore we tested whether age was related to will-to-live scores among older participants. Correlation analysis found age was significantly negatively related to older participant's will-to-live, $r(42) = -.18$, $p < .05$. Therefore, we controlled age in subsequent analyses.

Apparatus and materials.

Development of the implicit stereotyping paradigm. We followed procedures based on Levy et al.'s studies (Levy, 1996; Levy, et al., 1999-2000). Individuals completed a visual detection task in the computer, requiring them to indicate whether a pattern appeared above or below a bulls-eye. The patterns were presented in a random order and masked for words that flashed sufficiently quickly in the computer to ensure only subliminal perception: participants may see "something" flashing in the computer but they cannot see the actual words. Here we present only the details regarding the adaptation of the self-stereotyping paradigm to our cultural context, but see Levy (1996) for a detailed description of technical characteristics.

The elderly priming words were selected from Study 1 according to the requirements of the priming stereotype paradigm. The 12 positive words were *wise, sage, accomplished, advise*, *insightful, astute, calm, mature, experienced, grandparents, sociable,* and *fun* (this corresponds to the English translation of the

Portuguese terms). The 12 negative words were *decline, dependent, forgetful, confused, diseased, superstitious, lonely, slow, grumpy, pitiful, boring* and *unable* (see note before). Taking into consideration the ratings of the two age groups the positive and negative words matched in degree of stereotypicality, word length (mean of eight letters per word) and mean level of frequency in Portuguese language (Nascimento, Casteleiro, Marques, Barreto, & Amaro, 1995). Also, the mean typicality of the traits used in the positive and negative priming condition was significantly and consistently rated above 5 for both age groups, *p* < .01, demonstrating that, for both older and younger participants, the primes are activating stereotypic representations of the old age stereotype.

Selection of proper speed for test trials that allowed perception-without-awareness was based on Levy (1999-2000), adapted to the properties of the computer. Prime speed was adjusted for each older participant to guarantee perception-without-awareness conditions. Following the procedure of Levy (1996) every older individual started at 50 ms. If in the first block they said that could not see anything flashing in the computer screen we adjusted the prime speed to 67 ms. We continued slowing down prime speeds until individuals stated that they could see something flashing in the computer. Individual adjustments were as follows: 50 ms (4.5%), 67 ms (45.5%), 83 ms (30.5%), 100 ms (8.1%), 133 ms (11.4%). All older participants included in the analysis of test condition reported that they could only see flashes and blurs. Priming speeds did not have a significant influence on will-to-live scores.

The use of a standard speed that guarantees "perception-without-awareness" is much better established for younger than older participants. In line with previous research (Levy, 1996), for younger participants we used the speed of 33 ms. Previous pre-tests have revealed that this speed allowed young subjects to see the flash without

recognizing the actual words. All young participants included in the analysis of test conditions later reported they had only seen flashes and blurs. Priming speeds for older participants are more complex to establish because, as Levy (1996) points out, with age there is greater variation in processing speed and visual abilities. This visual variability makes it challenging to find a proper speed to allow subliminal priming. Therefore, for older participants it is important to make individual adjustments in order to guarantee "perception-without-awareness".

The two priming conditions consisted of five blocks, each containing 20 words. Each block began with 1 of two category words: either *old* or *senior*. After the category word, the next 19 words (including the other category word) were randomly presented by the computer. Following the ratios proposed by Levy et al. (1996, 1999-2000), 80.0% of the words were stereotype-related, and 20.0% were neutral or non stereotype-related. The neutral words consisted of high-frequency words matched in length to the stereotype-related words (Nascimento et al., 1995). The same neutral words were presented in the positive and negative condition. Those words were: *also*, *number*, *some*, and *different*. To increase priming power (Devine, 1989; Levy et al., 1996, 1999-2000) two words were repeated within blocks (positive condition: *wise* and *experienced*; negative condition: *pitiful* and *unable*).

We conducted two 2 (positive vs negative prime) x 2 (older vs. younger participants) factorial ANOVAs with Reaction time and Accuracy as dependent variables. We found that younger participants were significantly faster to respond to the computer task than older participants, $F(1, 104) = 92.05$, $p < .001$, $\eta^2_p = .47$. However, results indicated that younger adults were also marginally less accurate than older participants, $F(1, 104) = 3.17$, $p < .08$, $\eta^2_p = .03$. We did not find any significant effects of stereotypical valence.

Perception-without-awareness control conditions. To make sure that the primes were activated subliminally, we included a perception-without awareness control condition. 10 old and 10 young participants individually participated in the guess and in the recognition tasks. The tasks were similar to the ones used originally in Levy's study (see Levy, 1996 for a detailed description of this procedure).

The hit rates for the guess condition were higher than in Levy's (1996) study, although significantly below the chance level: overall hit rate for older (15.2%), and younger (5.2%); stereotype hit rate for older (16.0%) and younger (4.7%); neutral hit rate for older (13.3%) and younger (5.3%). Analysis of the hit rates in the recognition task revealed that results were close to those obtained by Levy (1996) and also close to chance level: overall hit rate for older (42.7%), and younger (22.7%); stereotype hit rate for older (35.7%) and younger (22.1%); neutral hit rate for older (55.0%) and younger (25.0%).

In line with Levy (1996) we conclude that the combined results from the guess and recognition task suggest that older and younger participants were not aware of the prime content and that the priming paradigm successfully allowed perception-without-awareness.

Non-delay/Delay condition. In line with Lepore and Brown (1999) the condition without delay meant that participants answered the questionnaire with the dependent variables immediately after the computer priming task. On the other hand, the situation with delay meant that participants answered the questionnaire 180s after the computer priming task. During these 180s, participants were required to count backwards starting in a designated number (i.e., 380). The purpose of this interference task was to completely clear working memory after the conclusion of the priming task (Peterson & Peterson, 1959; Reitman, 1974). The choice of the 180s period as the

delay condition was based on the recommendations by (Bargh, et al., 1988)) and

seems to be the maximum amount of time that the counting-backward task is still

effective in maintaining subject's motivation (Higgins, Bargh, & Lombardi, 1985).

Will-to-live. Will-to-live was measured with an adaptation of Levy et al.'s (1999-

2000) questionnaire. Participants were asked if they would accept a medical treatment

if they were to die with terminal illness. This option comprised a scenario involving

equations that weighed costs and benefits of a life and death decision. Participants

were instructed to think of a hypothetical situation where the treatment was very

expensive and required most all of their own savings and a considerable portion of

his/her family's savings. Then they had to answer three items considering that they

would have different chances of recovering after the treatment: 25%, 50% or 75%.

Each participant responded on a Likert-type scale with "1" representing a refusal of

life-prolonging treatment and "7" representing an acceptance of the treatment. This

three-item scale revealed good psychometric properties. The index showed good

internal consistency (Cronbach's α = .89) and factor analyses confirmed that the

answers to the three items formed a single factor, explaining 84.5 per cent of the

variance, with an eigenvalue = 2.54. All communalities were > .76 and factor loadings

were all greater than .87. A summary score was calculated by averaging scores across

the three items.[1]

      Procedure. Participants were tested individually in a quiet room of the

psychology laboratory. Participants first answered background questions and were

informed that they were to participate in two separate and unrelated studies: the first

study was said to be a measure of visual perception and memory, whereas the second

was said to be a validation of a translation of an English questionnaire.

In the first study participants performed the computer priming task (half in the positive condition and half in the negative condition). After this task participants in the non-delay condition directly proceeded to the second study while participants in the delay condition, performed what was said to be a 'memory task' that consisted in counting backwards from 380 until the experimenter told them to stop (i.e., during 180s) before proceeding to the second study. In the 'second study' participants completed the will-to-live questionnaire.

At the end of each session, participants answered a post-experimental questionnaire regarding what they thought these studies were about and whether they had recognized anything in the computer screen during the first study. Finally, they were debriefed.

Results and Discussion

Effect of stereotype priming and delay on will-to-live of older and younger participants. To analyse the effects of stereotype valence and delay on will-to-live of older and younger participants, we conducted a 2 x 2 x 2 factorial ANOVA with Age group, Stereotype Valence and Delay as between-subjects factors and will-to-live as the dependent variable. We found a main effect of Stereotype Valence, F (1, 87) = 9.15, $p < .01$, $\eta^2_p = .10$, showing that will-to-live was higher in the positive ($M = 5.99$; $SD = 1.13$) than in the negative stereotype priming condition ($M = 5.14$; $SD = 1.76$). We found no other significant main effects. As expected, results also revealed a Stereotype Valence by Age group interaction, F (1, 87) = 4.26, $p < .05$, $\eta^2_p = .05$. In line with Levy et al. (1999-2000) we found significantly higher will-to-live scores among older participants primed with positive stereotypic traits ($M = 6.32$; $SD = 0.92$) than among older participants primed with negative stereotypic traits ($M = 4.78$; $SD = 2.18$), F (1, 87) = 11.44, $p < .001$, $\eta^2_p = .12$. Also in line with Levy's hypotheses, we

did not find any significant differences between younger participants' will-to-live

scores in the positive ($M = 5.70$; $SD = 1.24$) and negative stereotype priming ($M =$

5.46; $SD = 1.24$) condition.

We also found a significant Age group by Delay interaction, $F (1, 87) = 5.66$,

$p < .05$, $\eta^2_p = .06$. Results showed that younger people's will-to-live scores tended to

increase after delay (Non-delay: $M = 5.26$; $SD = 1.19$; Delay: $M = 5.88$; $SD = 1.23$),

whereas older people's tend to decrease (Non-delay: $M = 5.94$; $SD = 1.78$; Delay: $M =$

5.13; $SD = 1.88$).

The three-way interaction between Stereotype Valence, Age group and Delay

was not significant. In accordance with our hypotheses, planned comparisons revealed

that the effect of Stereotype Valence was significant for older people both in the Non-

Delay, $F (1, 87) = 3.60$, $p < .05$ (one-tailed), $\eta^2_p = .04$, and in the Delay, $F (1, 87) =$

9.24, $p < .001$ (one-tailed), $\eta^2_p = .09$, condition. Also, as expected, we did not find any

significant differences between younger participants' will-to-live scores as a function

of Stereotype Valence either in the Non-Delay or in the Delay condition (Table 2).

To account for the higher age variation among older participants, and the fact

that the preliminary analyses revealed age was significantly negatively related to older

participants' will-to-live scores we decided to repeat the analysis for the older age

sample including age as a covariate. The ANCOVA with Stereotype Valence and

Delay as between-subjects factors, will-to-live as the dependent variable and age as a

covariate variable, and the planned comparisons, revealed the same pattern of results.

The data revealed some degree of heteroscedaticity of variance between

conditions, Fmax $= 9.76$. This value is still within the acceptable limits proposed by

Tabachnick & Fidell, (2001), of Fmax < 10, to guarantee homogeneity of variance

between experimental conditions. Nevertheless, we repeated the main analysis using

a transformation of the will-to-live measure in order to increase variance homogeneity and check the robustness of the ANOVA and ANCOVA results. Since our data revealed a moderate negative skew we performed a square root transformation of the reflected will-to-live variable as suggested by Tabachinick and Fidell (2001) (square root transformation of the reverse variable (SQRT(K-X), with K being a constant from which each score is subtracted so that the smallest score is 1). This substantially improved variance homogeneity across conditions with Fmax = 6.28, well below the advised limit (Fmax < 10).

Both analyses using the transformed variable revealed the same pattern of significant results, thereby demonstrating the robustness of our findings.

General Discussion

The main objective of this study was to examine the sustainability of automatic stereotype activation on older people's will-to-live in a medical terminal illness condition. Our hypothesis was that given that old age is a chronic and self-relevant category for participants, valence effects should occur even after a delay in time while performing a distracting task. Moreover, we also expected these effects to be specific to this age group in the sense that we did not expect these stereotype valence effects to occur in younger participants.

The results support these hypotheses. As expected, older people showed lower will-to-live scores after they had been primed with the negative than with the positive stereotype primes both immediately after priming and after the delay. This result is interesting and extends the results previously found by Levy and colleagues (Levy, et al., 1999-2000). First of all, this study established the stereotype valence effect on older people in a new cultural context within which the specific content of the older

stereotype was somewhat different from that in Levy's research. This substantially increases our confidence in the generalizability of this phenomenon.

Importantly, the present research also shows that stereotype valence effects may have more *lasting* consequences on older people's engagement with life and death medical decisions. Recently, there has been some debate in the literature regarding the external validity of priming paradigms and the replicability of priming effects (Doyen, Klein, Pichon, & Cleeremans, 2012). It has been argued that these types of paradigms involve very simple manipulations that do not reflect the multiple contextual constraints present in real life situations (Bargh, 2006). We believe that by showing that old age stereotype priming affects older people's will-to-live even after a delay, while having performed an interference task, this research presents compelling evidence of the power of unconscious activation of stereotypes to affect older people's decision making and behaviours in more complex real-life situations.

The literature on medical decision making in older people shows that this age group is especially prone to use a more heuristic mode of processing and making relatively quicker decisions than younger people (Leventhal, Leventhal, Schaefer, & Easterling, 1993; Liu & Gonzalez, 2007). Usually, when asked about whether they would want to be subjected to a surgical procedure or intervention they decide within the same appointment when this type of question is asked, whereas younger people typically take more days or weeks before deciding. Several reasons are given to explain these results such as the lack of cognitive resources that allow for a more elaborated decision (Park, et al., 1996; Salthouse & Babcock, 1991), because they have already more expertise on the matter which makes the decision easier to make (Hershey, Walsh, Read, & Chulef, 1990; Klein, 1997; Willis, 1996) or because they share a more passive doctor-patient mode of interaction (Cassileth, Zupkis, Sutton-

Smith, & March, 1980). Given this evidence our results have the value of showing an effect of the unconscious activation of aging stereotypes within the timing that older people typically take to make these kinds of decisions - if not immediately after the question, they are made at least within the length of the appointment. In this sense it is important that the effects of aging stereotypes still occur even after performing a distracting task, which emphasizes their pervasive influence.

Finally, our results support the notion that self-relevance does seem to play an important role in the way the automatic activation of aging stereotypes affect older people's medical decisions. In fact, our study shows that valence effects do not occur in younger people either in the immediate situation following priming or after the delay. Hence, these results are consistent with the findings of Levy and colleagues within the aging priming literature (Levy, 1996; Levy, et al., 1999-2000).

However, it is important to note the unexpected effects that delay had on younger and older people's responses. The significant interaction between age group and delay suggest that the primes are having differentiated effects on both age groups as a function of delay. For younger participants, will-to-live (regardless of stereotype valence) was lower immediately after priming than after the delay. This result shows that the activation of the old age category, regardless of stereotype valence, seems to be enough to cause a decrement in younger people's will-to-live immediately after priming. In this case, and contrary to Levy et al. (1999-2000) claim, it seems that the priming is having an effect on non self-relevant targets (i.e., younger people). This is an unexpected result but that seems to be in accordance with other references in the literature showing that non-targets may be affected by the activation of stereotypes (Bargh, Chen & Burrows, 1996; Dijksterhuis, Aarts, Bargh, & Van Knippenberg, 2000). More recently, authors within this approach (e.g., Dijksterhuis, et al., 2007),

have concluded that although it is possible to have old age stereotype priming effects

in non targets of the stereotype (e.g., younger people being primed with the old age

stereotype), these effects should be stronger and last longer in targets (e.g., older

people being primed with the old age stereotype).

There is some comparable evidence showing an interaction between stereotype

priming, delay and belonginess to the targeted stereotyped category (Bargh, et al.,

1988). In this context, targets, for whom the stereotype is self-relevant, are supposed

to have a more chronic and long-lasting representation of the primed category than do

non-targets. Given this difference, the durability of effects of stereotype priming on

performance should differ in targets and non-targets. In support of this prediction,

Lepore and Brown (1999) showed that although there were similar effects of

subliminal priming of the Black stereotype on high and low prejudiced people in the

immediate context, prime effects seemed to last longer in high prejudiced individuals.

In a similar vein, but this time using a self-stereotyping paradigm, Lepore and Brown

(1999) showed that British stereotypical primes affected both high and low identified

individuals with Britain in the short term, but there were significant differences

between the ratings of these groups after a delay in time. In sum, these studies show

that both targets and non-targets may be affected by priming in the short-term, but

these effects should only endure among targets.

For the present research an important question arises: how to reconcile the

apparently contradictory findings based on Levy et al. (1999-2000) with those of

Bargh et al. (1996) and Dijksterhuis et al. (2000)? We believe that there seems to be

an important factor that distinguishes between these two sets of studies: the type and

scope of traits that are being activated. Levy (1999-2000) explored the effects of old

age stereotype valence on will-to-live, showing no differences in younger people's

will-to-live scores between the *positive* and *negative* subliminal traits; Bargh et al.

(1996) and Dijksterhuis et al. (2000) showed significant deterioration in younger

people's performance when they were primed with the aging stereotype *as a whole*

(including both positive and negative traits) in comparison with a control condition.

From our perspective it might be possible that younger people may be affected

by the activation of the old age category per se whereas they may be somewhat

insensitive to specific valence activations of the content of old age stereotypes.

Activating the category of "old age" and its associated stereotypic representation may

be responsible for a general assimilation to the older age category, resulting in a

decrement in performance below normal levels for younger people. However,

younger people are less likely to be chronically susceptible to the old age stereotype,

and therefore subtle differences in the valence of the traits that are activated should

not make any difference in performance. On the other hand, older people, for whom

the stereotype is more chronic and self-relevant, should be more susceptible to the

activation of distinct traits (such as changes of valence) within the aging stereotype.

We believe this is the reason there were differences between these two age groups

when we introduce a delay. These findings support the view that self-relevance plays

an important role in old age stereotype priming effects (Levy, 2003) and provide

further insight regarding the specific type of influence this variable may play in this

process.

A second important consideration is that the delay manipulation / distractor task

may have a differential impact on older participants. The delay manipulation that was

chosen in this study has been traditionally used in the context of studies conducted

with younger participants as a way to ensure prime decay (Bargh, et al., 1988;

Higgins, et al., 1985; Lepore & Brown, 1999). Unsurprisingly, this type of task was

effective in the case of younger participants in this study. The effect of the prime was eliminated after individuals engaged in the distracting task. However, that this type of task might have additional effects on older participants, because older people may have a slower rate of prime activation and decay (Bowles, 1994). It is also conceivable that asking older people to count backwards may have sustained negative stereotypes of aging. The backward counting "memory" task might have activated more negative representations of aging through stereotype threat. Previous research shown that numerical and memory performance are domains in which older people are vulnerable to stereotype threat (Abrams, et al., 2008; Abrams, Eller, & Bryant, 2006; Desrichard & Köpetz, 2005; Steele & Aronson, 1995). Being subliminally primed with the negative stereotype condition *and* then performing a stereotype relevant task may have perpetuated the effect of the subliminal negative prime. However, engaging in the potential threatening task did not seem to have an effect if older people had first been primed with positive stereotypes.

The present findings suggest important new avenues for future research. One question of interest for researchers concerned with cognitive aging is whether different lengths of delay moderate the prime continuation differently. It would be interesting to see whether the effect of stereotype threat on older people might differ when they have been primed with positive versus negative traits. The present evidence is consistent with the idea that breaking the link between self and negative age stereotypes can eliminate potential threat (Abrams, et al., 2008; Crisp & Abrams, 2008) – a finding with implications for older people's well-being.

Finally, we believe it is also important to further explore the use of the will-to-live measure. First of all, we may question whether the scenario measure is a valid way to evaluate this concept. The new policies of privatization of public health

services (Observatório Português dos Sistemas de Saúde, 2003) seem to suggest that these are the type of dilemmas that older people will have to face in the future where much more treatments will have to be covered by them or by their families. In this sense, we think that this measure is useful and resembles possible future real life situations. Nevertheless, it may be possible to simplify the will-to-live measure in the future in order to make it easier to answer. For instance, in her studies with older people Carmel (2011) has shown that the use of a measure asking directly participants they desire to live longer (a single item ranging from 1 to 5) was a very good predictor of important outcomes such as subjective well-being and survival among older people. Given the relative easiness of use of this measure this could be a valid alternative for future experimental studies.

We believe that this research makes an important contribution to the literature on older people's medical decisions. First of all, it shows that the subtle activation of aging stereotypes may have effects on older people's will-to-live beyond just the immediate context. Secondly, it clarifies the role played by self-relevance in stereotype priming effects by showing that whereas younger people may be affected by the activation of old age stereotypes, these effects seem nevertheless to affect older people in a more persistent and varied manner. The good news from a policy-making perspective is that not only negative, but also positive stereotype activation, tends to persist over time. This suggests that it may be possible to "boost" older people's performances and motivation in a more long lasting manner (Swift, Abrams, & Marques, 2012).

Notes

 1. Readers might wonder whether the will-to-live measure is similarly valid in different national contexts, given that health care policies and structure can vary between countries. We believe that the measure does at least have good face validity in Portugal because increasing privatization of public health services (Observatório Português dos Sistemas de Saúde, 2003) does mean that older people face such dilemmas in Portugal, even if to a lesser degree than in the United States.

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Table 1

Attributes that Younger (*n*=62) and Older Participants (*n*=62) Consider to be

Associated with the Older Age Group (by decreasing values of typicality)

Stereotypical attributes of the older age group	*Typicality*		*Valence*	
	M	*SD*	*M*	*SD*
Grandparents	8.6	1.7	6.4	2.6
Retired	8.4	2.3	4.3	2.1
Experienced	8.1	1.7	7.9	1.8
Mature	8.0	1.5	7.7	1.9
Conservative	8.0	1.6	4.6	2.3
Advise	7.8	1.8	7.0	2.0
Wise	7.4	1.8	7.6	2.1
Old	7.4	2.6	3.5	2.4
Lonely	7.3	2.3	2.9	2.2
Forgetful	7.2	2.2	2.7	1.9
Dependent	6.8	2.2	3.1	2.2
Superstitious	6.8	2.2	3.7	2.1
Decline	6.8	2.4	2.1	2.0
Diseased	6.7	2.3	2.4	2.2
Slow	6.7	2.2	3.0	1.6
Grumpy	6.4	2.3	2.5	1.9
Calm	6.2	2.0	7.1	1.9
Boring	6.2	2.4	2.3	2.0

Sociable	6.1	1.9	7.0	2.0
Sage	6.0	2.1	6.4	2.1
Unable	5.9	2.5	1.9	1.9
Confused	5.8	2.3	2.6	1.8
Insightful	5.8	2.4	6.4	2.1
Astute	5.6	2.0	6.8	1.9
Non-excited	5.6	2.5	3.0	2.1
Mentors	5.5	2.2	6.7	1.8
Workers	5.4	2.4	7.8	1.9
Accomplished	5.4	2.0	7.5	2.0
Alzheimer	5.3	2.8	1.5	2.0
Educated	5.2	2.2	8.0	1.9
Pitiful	5.2	3.1	1.7	1.8
Enlighten	5.1	2.1	7.4	2.0
Fun	5.0	2.0	7.9	1.7

Table 2. Means and Standard Deviations for Will-to-live as a Function of Age Group, Stereotype Valence and Delay

| | Non-delay | | | | Delay | | | |
| | Positive | | Negative | | Positive | | Negative | |
Age Group	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Older participants	6.57	0.72	5.36	2.25	6.09	1.05	4.25	2.06
Younger participants	5.54	1.17	4.97	1.19	5.89	1.34	5.88	1.17

Note: Higher values indicate higher will-to-live scores (untransformed scores)