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Women's Cognitive and Emotional Appraisal of Sex Pictures: The Predictive Role of Age, Exposure Time, and Sexual Beliefs

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ABSTRACT

This study researched how age predicts women's cognitive and emotional appraisal of sex pictures. One hundred and fifty five women were exposed to romantic, sexually moderate and sexually explicit pictures. Women reported on the emotional valence, subjective sexual arousal, and level of sexual content attributed to the pictures; women's sexual beliefs were further evaluated. Findings revealed that age predicted increased pleasantness to sexually moderate and explicit pictures, as well as higher subjective sexual arousal to all type of pictures. Some predictions were moderated by sexual beliefs and exposure time, pointing the role of contextual factors in women's appraisal of erotica.

Despite increasing scientific interest in the field of sexuality and the aging process, there is still a significant gap pertaining to the effects of age in sexual behavior or functioning. While this area remains little explored (Koh & Sewell, 2015), several myths about the effects of age persist, influencing the practice of many professionals working in the health and well-being domains (Estill, Mock, Schryer, & Eibach, 2018). There is a generalized idea that people became asexual as they get older (Fileborn et al., 2015; Gott, Hinchliff, & Galena, 2004), albeit research has shown that age does not always translate into negative outcomes in many behaviors concerning the expression of sexuality and bonding (Ferris et al., 2008; Fileborn et al., 2015; Freak-Poli et al., 2017; Schick et al., 2010). Indeed, there is evidence that men and women are sexually active up to the 80's (DeLamater, 2012). In women, evidence has partially suggested they may increase sexual functioning and activity as they aged (Hayes & Dennerstein, 2005). However, it is worth noting that most research on the effects of age has targeted issues concerning sexual dysfunction and frequency of sexual activity, instead of aspects regarding closeness and intimacy (Freak-Poli et al., 2017; Štulhofer, Jurin, Graham, Jassen, & Traeen, 2020) and, to our knowledge, to the appraisal of sexual contents. This kind of gap in the scientific literature may limit the understanding of how age affects sexual behavior, and eventually, on how sexual contents can be used as an intervention tool. Indeed, exposure to sexual contents may be used to increase intimacy and enhance sexual arousal (Fisher & Kohut, 2017), but the way age shapes the appraisal of these contents has not been scientifically established. We believe establishing knowledge on the role of age in the cognitive and emotional appraisal of sex pictures could be a preliminary step, given that women remain sexually active despite age (Woloski-Wruble, Oliel, Leefsa, &

Hochner-Celnikier, 2010), and want to achieve sexual needs such as sexual pleasure (Fileborn et al., 2015).

Studies conducted within the realm of experimental sex research, targeting basic processes underpinning individuals' sexual behavior, often consist of the presentation of sexual stimuli (e.g., pictures or film-clips displaying sexual content) within a specific experimental paradigm. Some of these research paradigms explore the effects of romantic *versus* sexually explicit stimuli in the emotional and sexual responses of women (while romantic stimuli have an emphasis on affection and intimacy, sexually explicit stimuli have an emphasis on the genital interaction between actors) (e.g., Carvalho, Quinta-Gomes, et al., 2013; Heiman, 1977; Janssen, Carpenter, & Graham, 2003). In accordance, past research has shown that women appraise romantic stimuli more positively than sexually explicit stimuli, reporting higher levels of subjective sexual arousal to the romantic stimuli, but more physiological/genital arousal to the sexually explicit stimuli (Laan, Everaerd, Bellen, & Hanewald, 1994). Evidence on women's appraisal of erotica may add to the promotion of sexual well-being given that it informs on how to use erotica as a means to improve sexual arousal and satisfaction in women.

In light of the absent knowledge on the relationship between age and women's processing of sexual contents, the aim of the present study was to test the predictive role of age in the cognitive and emotional appraisal of sex pictures in women. We tested if age predicted women's judgments of emotional valence, subjective sexual arousal, and sexual content to three classes of pictures: romantic, sexually moderate, and sexually explicit. We further considered women's endorsement of dysfunctional sexual beliefs and exposure time to pictures. Dysfunctional sexual beliefs target different aspects of sexuality (e.g., age and sexuality, pregnancy/motherhood, relationships and gender roles) and mostly beliefs denote a conservative approach regarding sex, i.e., sexual desire and pleasure regarded as a sin, sex exclusively within intimate relationships, masturbation, oral or anal sex as deviant and sinful practices (Nobre, Pinto-Gouveia, & Gomes, 2003). Dysfunctional sexual beliefs may be impacted by women's individual and interpersonal experiences, and translate cultural scripts that are taught to women across generations. Dysfunctional sexual beliefs are known to be related to the impairment of different components of female sexual response, including sexual desire and arousal (e.g., Carvalho & Nobre, 2010; Carvalho, Veríssimo, & Nobre, 2013). Additionally, it has been shown that women reporting consumption of erotic themes present more attitudes of sexual openness and disinhibition (Emmers-Sommer, Hertlein, & Kennedy, 2013). In this context, is worth noting that the effects of age and cohort are overlapped in cross-sectional data (Hayes & Dennerstein, 2005). While the effect of age is most often reported, the effects of being part of a specific generation are difficult to disentangle; yet, cohort effects surly underlie most of the age effects found in research, as they capture common values and rules emerging in a given historical moment (Kontula & Haavio-Mannila, 2009). By adding the role of sexual beliefs to age effects, we will not isolate cohort effects from age effects. However, we can account for women's beliefs as these are a product of their culture and life experience.

Accordingly, we expect age to predict more negative valence and less sexual arousal to the most explicit pictures, as older women are believed to have received a more conservative education regarding sex.¹ We further expect age to predict the appraisal of pictures as "more sexual". In addition, we expect that dysfunctional sexual beliefs will have an intervening role, moderating the relationship between age and the appraisal of pictures, predicting more negative appraisals. Also, is worth noting that experimental psychology research reveals that exposure time may influence individuals' processing of affective stimuli (Genetti, Khateb, Heinzer, Michel, & Pegna, 2009; Pegna, Landis, & Khateb, 2008); acknowledging such effects is of practical interest to establish paradigms and interpret findings (Brisson & Jolicoeur, 2007). Length of exposure to sexual contents may also have a role in individuals' emotional response; previous studies using dynamic presentations, i.e., film clips, have revealed decreased emotional (Carvalho & Rosa, 2020) and sexual psychophysiological responses (Rosen & Beck, 1988) during the course of stimulus presentation. Because of such potential effects, two exposure time conditions were used

(20 and 40 seconds exposure time). Since we are using static presentations rather than dynamic ones, and targeting subjective appraisals rather than psychophysiological metrics, we followed an exploratory vein, aimed to test whether exposure time interacts with age, predicting the appraisal of pictures. Such data may shed some light on the processing of static sexual stimuli using self-report metrics, and help to design future experiments aimed at testing the cognitive or emotional appraisal of sex pictures, during passive visualizations.

Method

Participants

One hundred and fifty five Portuguese heterosexual women, with age ranging from 18 to 77 years participated in the study ($M_{\text{age}} = 37, SD = 16.9$). The age distribution was as follows: 41.9% aged between 18 and 29, 27.1% aged between 30 and 45, and 31% aged over 45 (among women older than 45, 21 were aged over 60 years old). Inclusion criteria were age ≥ 18 , being heterosexual (measured by the Kinsey's Likert scale), and signing the informed consent. The study was advertised through informal social networks, and through institutional networks (University of Aveiro). Additionally, specific contacts were made at local senior universities. Data collection took place in the PsyLab, at the University of Aveiro, between January 2015 and December 2019. No compensation was given to participants. All participants signed the informed consent; the study was approved by the Ethics Committee of the same university and data collection was conducted according to the Declaration of Helsinki. Socio-demographics are displayed in [Table 1](#).

Materials

Besides the socio-demographic questionnaire, women have responded to the Dysfunctional Sexual Beliefs Questionnaire (Nobre et al., 2003). This is a 40-item self-report questionnaire assessing women's beliefs about sexuality. The items include the endorsement of beliefs relating to sexual conservatism, sexual desire and pleasure as a sin, age-related beliefs (i.e., about the negative impact of age in women's sexuality), body-image beliefs, affection primacy beliefs (i.e., sex *only* in the context of love and intimacy), motherhood primacy beliefs (sex *only* in the context of reproduction). Psychometrics from the original version supported test-retest reliability ($r = .80$), and internal consistency (Cronbach's alpha = .081) (Nobre, Pinto-Gouveia, & Gomes, 2003). In the present study, the Cronbach's alpha was .85. Higher scores indicate increased endorsement of dysfunctional sexual beliefs.

The sex pictures were retrieved from the EROSimage/UP-UA.PT database, which is a Portuguese database containing sex pictures validated in Portugal (Carvalho, Pereira, Nobre, & Santos, 2014). A total of 60 pictures were selected, 20 from each category (romantic, sexually moderate, and sexually explicit), and all pictures portrayed heterosexual couples. Romantic pictures had a focus on intimacy (there was no nudity or display of sexual intercourse; couples are in a *romantic environment*); sexually moderate pictures revealed part of the actors' bodies, but without showing or focusing the genital component; the sexually explicit pictures displayed sexual intercourse (penile-vaginal intercourse), and complete display of the genitals.

In order to collect the ratings (i.e., women's appraisal of pictures) during the exposure to the pictures (see Procedures section), a booklet was created with rating scales where women reported the emotional valence attributed to each image (using a 9-point Likert scale ranging from 1 – *Extremely Unpleasant* to 9 – *Extremely Pleasant*), their subjective sexual arousal to the pictures (using a 9-point Likert scale ranging from 1 – *Not Sexually Aroused* to 9 – *Extremely Aroused*), and the level of sexual content attributed to the pictures (using a 9-point Likert scale ranging from 1 – *Extremely Low Sexual Content* to 9 – *Extremely High Sexual Content*). The booklet contained 60 rating scales for each characteristic, corresponding to the 60 images that were visualized (see [Table 2](#) for the mean ratings).

Table 1. Socio-demographic characteristics of the participants in the study (N=155).

	20seconds exposure (n=73)		40seconds exposure (n=82)	
	M	SD	M	SD
<i>Age</i>	36.5	14.77	37.8	18.81
	N	%	N	%
<i>Civil status</i>				
Single	40	54.8	43	52.4
Married	20	27.4	29	35.4
Cohabiting	5	6.8	3	3.7
Divorced	5	6.8	3	3.7
Widow	3	4.1	4	4.9
<i>School education</i>				
4 years	2	2.7	11	13.4
5–6 years	–	–	3	3.7
7–9 years	3	4.1	3	3.7
10–12 years	33	45.2	24	29.3
More than 12 years	35	47.9	41	50.0
Did not respond	–	–	–	–
<i>Sexual partner</i>				
None	24	32.9	23	28
Husband/boyfriend	49	67.1	57	69.5
Multiple masculine partners	–	–	2	2.4
<i>Frequency of sexual activity</i>				
Never	16	21.9	18	23.1
Rarely	11	15.1	11	14.1
Less than once a month	2	2.7	6	7.7
One-to-three times per month	12	16.4	24	30.8
One-to-three times per week	28	38.4	18	23.1
(Almost) Every day	4	5.5	1	1.3
Did not respond	–	–	4	4.9
<i>Satisfaction with sexual partner</i>				
Very low	2	3.8	4	7.1
Low	–	–	3	5.4
Medium low	2	3.8	5	8.9
Medium	4	7.5	2	3.6
Medium high	7	13.2	10	17.9
High	21	39.6	19	33.9
Very high	17	32.1	13	23.2
Did not respond	20	27.4	26	31.7
<i>Frequency of visualization of sexual contents (e.g., movies)</i>				
Never	25	35.2	28	34.6
Rarely	40	56.3	34	42.0
Less than once a month	1	1.4	8	9.9
One-to-three times per month	5	7.0	9	11.1
(Almost) Every day	–	–	2	2.5
Did not respond	2	2.7	1	1.2
<i>Professes a religion</i>				
Yes	57	78.1	56	69.1
No	16	21.9	25	30.9
Did not respond	–	–	1	1.2

Table 2. Descriptive statistics for the ratings of the three types of pictures (romantic, sexually moderate and sexually explicit) in valence, sexual arousal and sexual content.

	Romantic pictures	Sexually moderate pictures	Sexually explicit pictures
	M (SD)	M (SD)	M (SD)
Valence	7.33 (1.44)	6.39 (1.26)	5.28 (1.77)
Sexual arousal	3.00 (1.69)	5.26 (1.41)	6.03 (1.70)
Sexual content	2.60 (1.70)	5.26 (1.41)	7.67 (1.14)

Note. M=Mean; SD=Standard Deviation.

Procedures

Upon arrival, participants were informed about the aims of the study, what was required, and were asked to sign the informed consent. Each participant was exposed to 60 pictures, which were presented sequentially and randomly on a computer screen, using E-prime software, version 2.0.8.22, from Psychology Software Tools (Schneider, Eschman, & Zuccolotto, 2002). Women were randomly distributed across two exposure time conditions, 20 and 40 seconds conditions. Participants were expected to complete the three scales assessing emotional valence, subjective sexual arousal, and sexual content, in a paper-pencil format, while each picture was being displayed. Afterwards, participants completed the Dysfunctional Sexual Beliefs Questionnaire (paper-pencil format). Each session lasted approximately 40 to 60 minutes. After the lab session, a debriefing was conducted in order to ensure that participants left the study without any kind of distress associated with the task. There were no dropouts.

Statistical approach

A series of hierarchical multiple regressions, containing interaction terms for testing moderation effects were conducted (see Aiken & West, 1991; Marsh, Hau, Wen, Nagengast, & Morin, 2011). Each series of regressions considered age, exposure time and dysfunctional sexual beliefs as predictor variables, while emotional valence, subjective sexual arousal, and sexual content were the criterion variable, respectively, in each analysis. While age was introduced in Step 1 (along with exposure time and sexual beliefs), the following interaction terms were introduced in Step 2: age x exposure time, age x dysfunctional sexual beliefs, exposure time x dysfunctional sexual beliefs, and the 3-way interaction term age x exposure time x dysfunctional sexual beliefs. Exposure time was coded as dummy variable, with "0" corresponding to the 20 seconds condition, and "1" corresponding to the 40 seconds condition. Slopes in the visual representation of moderation effects were plotted at one standard deviation above and below mean. This process was carried out for the three sets of pictures (romantic, sexually moderate, and sexually explicit). Findings will be presented according to each criterion variable (emotional valence, subjective sexual arousal, and sexual content). Also, it is worth noting that age was considered as a continuous variable rather than a categorical variable, because there is evidence pointing to the continuous assessment of age as a better methodological approach, in this research topic (c.f., Hayes & Dennerstein, 2005).

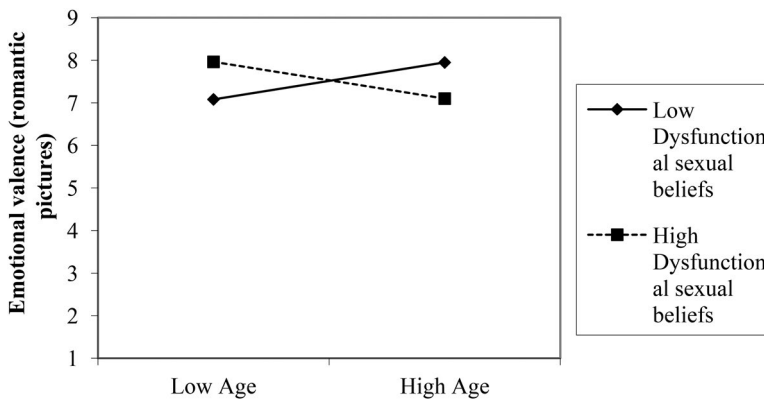
Results

Emotional valence

Findings regarding the effects of age (Step 1) and the interaction terms age x exposure time and age x dysfunctional sexual beliefs (Step 2) on the emotional valence attributed to the romantic pictures revealed non-significant models [$F_{\text{Step 1}}(3, 148) = .99, p = .397$; $F_{\text{Step 2}}(7, 148) = 1.50, p = .171$], explaining 2% ($R^2 = .020$) and 7% ($R^2 = .069$) of the variance, respectively. The inclusion of the interaction terms in Step 2 did not result in a significant change of the explained variance $\Delta R^2 = .049, F_{\text{chg}}(4, 141) = 1.87, p = .120$ (see Table 3 for the statistics pertaining all predictors). Even so, the interaction term age x dysfunctional sexual beliefs significantly predicted the emotional valence attributed to the romantic pictures ($\beta = -1.48, p = .013$). The moderating role of sexual beliefs revealed that in younger women, dysfunctional sexual beliefs yield more positive valence toward romantic pictures. On the other hand, older women appraise romantic pictures more positively in the low dysfunctional sexual beliefs condition ($t = 2.53; p = .012$) (see Figure 1). Findings regarding sexually moderate pictures revealed significant models for both Steps, $F_{\text{Step 1}}(3, 148) = 4.24, p = .007$ and $F_{\text{Step 2}}(7, 148) = 2.837, p = .008$], explaining 8% ($R^2 = .081$) and 12% ($R^2 = .123$) of the

Table 3. Age, exposure time and dysfunctional sexual beliefs as predictors of the emotional valence to sexual stimuli.

	Romantic pictures		Sexually moderate pictures		Sexually explicit pictures	
	β	p	β	p	β	p
<i>Step 1</i>						
Age	-.01	.878	.22	.008	.25	.002
Exposure time	-.14	.090	-.11	.172	-.03	.740
Dysfunctional sexual beliefs	-.03	.769	-.21	.012	-.25	.002
<i>Step 2</i>						
Age	.95	.034	.87	.046	.46	.290
Exposure time	.64	.431	-.25	.757	-.60	.448
Dysfunctional sexual beliefs	.66	.035	.14	.650	-.19	.525
Age x Exposure time	-.98	.218	-.39	.610	.22	.774
Age x Dysfunctional sexual beliefs	-1.48	.013	-1.02	.075	-.31	.587
Exposure time x dysfunctional sexual beliefs	-.88	.299	.15	.861	.68	.411
Age x Exposure time x Dysfunctional sexual beliefs	.133	.145	.55	.534	-.32	.719

**Figure 1.** Emotional valence to romantic pictures: moderation by dysfunctional sexual beliefs.

variance, respectively. However, model 2 did not yield a significant change to model 1, revealing no moderation effects, $\Delta R^2 = .043$, $F_{\text{chg}}(4, 141) = 1.72$, $p = .148$. Accordingly, while age predicted more pleasantness to the sexually moderate pictures ($\beta = .22$, $p = .008$), dysfunctional sexual beliefs ($\beta = -.21$, $p = .012$) predicted more unpleasantness. Finally, similar findings emerged regarding the emotional valence attributed to the sexually explicit pictures. While both models yielded significant effects, $F_{\text{Step 1}}(3, 148) = 5.39$, $p = .002$, $F_{\text{Step 2}}(7, 148) = 2.63$, $p = .014$ accounting for 10% ($R^2 = .100$) and 11% ($R^2 = .116$) of the variance, respectively, model 2 did not add significantly to model 1, revealing no moderation effects, $\Delta R^2 = .015$, $F_{\text{chg}}(4, 141) = .61$, $p = .656$. Accordingly, while age predicted more pleasantness to the sexually explicit pictures ($\beta = .25$, $p = .002$), dysfunctional sexual beliefs ($\beta = -.25$, $p = .002$) predicted more unpleasantness (see Table 3).

Subjective sexual arousal

Findings regarding the effects of age (Step 1) and the interaction terms age x exposure time and age x dysfunctional sexual beliefs (Step 2) on the subjective sexual arousal to the romantic pictures, revealed significant models in both steps, $F_{\text{Step 1}}(3, 148) = 16.99$, $p < .0001$, $F_{\text{Step 2}}(8, 148) = 7.44$, $p < .0001$, accounting for 26% ($R^2 = .260$) and 32% ($R^2 = .318$) of the variance, respectively. Model 2 added significantly to model 1, $\Delta R^2 = .058$, $F_{\text{chg}}(4, 141) = 2.99$, $p = .021$, but no moderation effects were found. Age ($\beta = .45$, $p < .0001$) and dysfunctional sexual beliefs predicted ($\beta = .16$, $p = .027$) increased subjective sexual arousal to this type of stimuli (see Table 4).

Table 4. Age, exposure time and dysfunctional sexual beliefs as predictors of the subjective sexual arousal to sexual stimuli.

	Romantic pictures		Sexually moderate pictures		Sexually explicit pictures	
	β	p	β	p	β	p
<i>Step 1</i>						
Age	.45	.000	.31	.000	.25	.003
Exposure time	.04	.559	.07	.366	.05	.576
Dysfunctional sexual beliefs	.16	.027	.01	.913	-.10	.230
<i>Step 2</i>						
Age	.28	.459	.93	.032	.99	.025
Exposure time	-.43	.534	.28	.725	.41	.604
Dysfunctional sexual beliefs	.34	.203	.45	.143	.38	.212
Age x Exposure time	.98	.151	-.37	.629	-.73	.350
Age x Dysfunctional sexual beliefs	-.09	.865	-.94	.102	-1.21	.037
Exposure time x dysfunctional sexual beliefs	.07	.929	-.20	.806	-.49	.554
Age x Exposure time x Dysfunctional sexual beliefs	-.55	.478	.49	.580	1.09	.224

Findings pertaining to the sexually moderate pictures showed that both Steps yielded significant models, $F_{Step\ 1} (3, 148) = 5.55, p = .001, F_{Step\ 2} (7, 148) = 2.91, p = .007$], accounting for 10% ($R^2 = .103$) and 13% ($R^2 = .126$) of the variance, respectively. In addition, model 2 did not add significantly to model 1, $\Delta R^2 = .023, F_{chg} (4, 141) = .94, p = .443$, showing no moderation effects. Accordingly, age was the only predictor of subjective sexual arousal ($\beta = .31, p < .0001$), with an older age predicting higher levels of subjective sexual arousal (see Table 4).

Finally, data regarding subjective sexual arousal to the sexually explicit pictures revealed that both models were significant $F_{Step\ 1} (3, 148) = 3.31, p = .022; F_{Step\ 2} (7, 148) = 2.43, p = .022$, accounting for 6% ($R^2 = .064$) and 11% ($R^2 = .108$) of the variance, respectively. While model 2 did not add significantly to model 1 $\Delta R^2 = .043, F_{chg} (4, 141) = 1.72, p = .149$, Step 2 revealed that the interaction term age x dysfunctional sexual beliefs predicted subjective sexual arousal. So, despite age predicted increased subjective sexual arousal ($\beta = .25, p = .003$), this relationship was moderated by sexual beliefs ($t = 2.21; p = .028$). Indeed, older women report increased sexual arousal to explicit pictures in the low dysfunctional sexual beliefs condition (see Figure 2 and Table 4).

Sexual content of images

Findings regarding the effects of age (Step 1) and the interaction terms age x exposure time and age x dysfunctional sexual beliefs (Step 2) in the level of sexual content attributed to the romantic pictures revealed significant models in both steps, $F_{Step\ 1} (3, 147) = 26.96, p < .0001$,

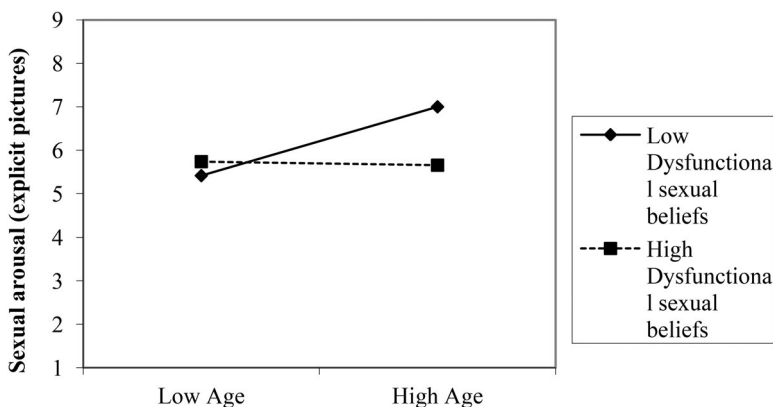


Figure 2. Subjective sexual arousal to sexually explicit pictures: moderation by dysfunctional sexual beliefs.

$F_{\text{Step } 2} (7, 147) = 13.28, p < .0001$, accounting for 36% ($R^2 = .360$) and 40% ($R^2 = .399$) of the variance, respectively. Still, model 2 did not add significantly to model 1, $\Delta R^2 = .039, F_{\text{chg}} (4, 140) = 2.29, p = .063$. Findings on the main predictors revealed that age ($\beta = .55, p < .0001$) and dysfunctional sexual beliefs ($\beta = .14, p = .050$) predicted the appraisal of romantic pictures as “more sexual” (see Table 5).

Findings pertaining the level of sexual content attributed to the sexually moderate pictures showed that all Steps yielded significant models, $F_{\text{Step } 1} (3, 147) = 6.21, p = .001, R^2 = .115, F_{\text{Step } 2} (7, 147) = 4.10, p < .0001, R^2 = .170$. Furthermore, model 2 marginally added to model 1, $\Delta R^2_{\text{age}} = .056; F_{\text{chg}} (4, 140) = 2.35, p = .057$ showing that the interaction term age x dysfunctional sexual beliefs significantly predicted the attribution of sexual content ($\beta = -1.31, p = .020$). Within this regard, younger women attribute more sexual content to the sexually moderate pictures in the high dysfunctional sexual beliefs condition ($t = 3.67; p < .0001$) (see Figure 3). Also, Step 1 showed that increased exposure time (40 seconds) predicted the appraisal of sexually moderate pictures as “more sexual” ($\beta = .23, p = .005$) (see Table 5).

Similarly, data on the level of sexual content attributed to the sexually explicit pictures revealed that all Steps yielded significant models, $F_{\text{Step } 1} (3, 147) = 5.79, p = .001, R^2 = .108, F_{\text{Step } 2} (7, 147) = 6.94, p < .0001, R^2 = .258$. In addition, model 2 significantly added to model 1, $\Delta R^2 = .150, F_{\text{chg}} (4, 140) = 7.07, p < .0001$ showing a 3-way interaction effect (age x exposure time

Table 5. Age, exposure time and dysfunctional sexual beliefs as predictors of the level of sexual content attributed to sexual stimuli.

	Romantic pictures		Sexually moderate pictures		Sexually explicit pictures	
	β	p	β	p	β	p
<i>Step 1</i>						
Age	.55	.000	.25	.002	-.11	.181
Exposure time	.13	.061	.23	.005	.15	.053
Dysfunctional sexual beliefs	.14	.050	-.02	.785	-.24	.004
<i>Step 2</i>						
Age	.34	.350	1.37	.001	1.86	.000
Exposure time	-.21	.750	1.63	.035	2.76	.000
Dysfunctional sexual beliefs	.24	.347	.71	.018	.90	.002
Age x Exposure time	.77	.227	-1.46	.054	-3.14	.000
Age x Dysfunctional sexual beliefs	.01	.984	-1.31	.020	-2.38	.000
Exposure time x dysfunctional sexual beliefs	-.05	.942	-1.06	.188	-2.12	.006
Age x Exposure time x Dysfunctional sexual beliefs	-.36	.621	1.21	.160	2.96	.000

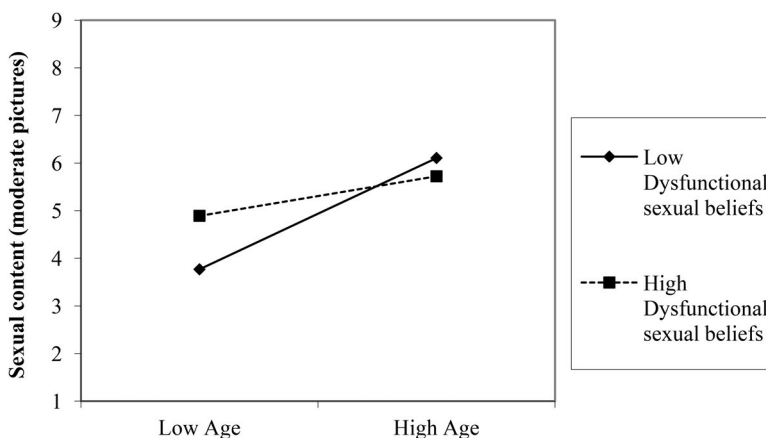
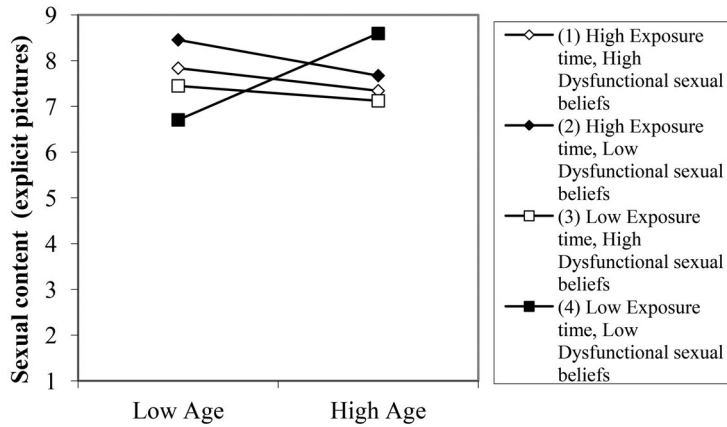


Figure 3. Sexual content to sexually moderate pictures: moderation by dysfunctional sexual beliefs.



* Pair of slopes	<i>t</i>	<i>p</i>
(1) and (2)	0,285	0,776
(1) and (3)	-0,155	0,877
(1) and (4)	-1,607	0,110
(2) and (3)	-0,308	0,759
(2) and (4)	-2,474	0,015
(3) and (4)	-2,182	0,031

Figure 4. Sexual content to sexually explicit pictures: 3-way interaction.*

x dysfunctional sexual beliefs $\beta = 2.96, p < .0001$; see Table 5). Accordingly, findings showed that while younger women attribute more sexual content to the sexually explicit pictures in the high exposure time condition, older women attribute more sexual content in the low dysfunctional sexual beliefs condition (see Figure 4 for comparisons of the slopes).

Discussion

The aim of the present study was to test the predictive role of age in the cognitive and emotional appraisal of sex pictures, including attributed emotional valence, subjective sexual arousal, and level of sexual content to distinct classes of pictures (romantic, sexually moderate, and sexually explicit), in women. We further tested the moderating role of dysfunctional sexual beliefs and exposure time within the relationship between age and the appraisal of pictures.

Findings regarding the predictive role of age in the emotional valence attributed to the erotic pictures revealed that dysfunctional sexual beliefs moderate the relationship between age and the level of pleasantness attributed to the romantic pictures. Indeed, while the endorsement of dysfunctional sexual beliefs would be expected to negatively predict the appraisal of pictures, it actually predicted young women’s positive valence toward romantic contents. This possibly happened because such contents align with these women’s views of sexuality, favoring their emotional appraisal of romantic pictures. Moreover, while age predicted increased pleasantness attributed to the sexually moderate and explicit pictures, dysfunctional sexual beliefs predicted more unpleasantness to these kind of stimuli. Indeed, sexual beliefs, independently of age, seemed to have a role on women’s emotional appraisal of explicit/pornographic pictures. Such finding suggests that older women may feel emotionally comfortable with explicit sexual contents (i.e., contents displaying genital interaction), being sexual beliefs, rather than age, the potential source of discomfort when facing explicit sexual contents. Therefore, contrary to our predictions, women may actually enjoy sexually explicit contents in older ages. Eventually, this result may mirror greater comfort with bodily issues, as women get more sexually experienced with age. Alternatively,

this finding may translate the need for more explicit contents in order to induce a positive emotional state, counterbalancing habituation (sexual) responses resulting from years of exposure to diverse sexual experiences.

In addition, findings on the subjective sexual arousal to the sex pictures were somehow surprising. Age positively predicted the subjective sexual arousal to the romantic, sexually moderate, and sexually explicit pictures. More specifically, the relationship between age and sexual arousal to the sexually explicit pictures was moderated by sexual beliefs. Age predicted increased sexual arousal under low dysfunctional sexual beliefs. Such finding provides preliminary evidence on the positive role of age on subjective sexual arousal, as measured by self-report, in the context of women's exposure to visual/static sexual stimuli. In face of the limited scientific background, which could eventually provide us with a context to better interpret these findings, we may speculate that despite the natural impairment of women's sexual response with age (e.g., Basson, 2007, Hayes & Dennerstein, 2005), there are some components – such as subjective sexual arousal – that remain intact for a longer period of time. Indeed, some studies have revealed increments in women's sexual functioning and activity with age, albeit in small percentage rates (Hayes & Dennerstein, 2005). In addition, part of the decline in women's interest in sex as they get older, may be explained by the loss of their partners rather than a decline *per se* (DeLamater, 2012). This leaves us with some context to consider the possibility that subjective sexual arousal to erotica may be one of the sexual components that remain *active* for a longer time. This is of course speculative, and deserves further testing. In addition, it must be considered that older women were raised in a social background where people were much less exposed to sexual contents (e.g., in the media, etc.). Therefore, there is a chance that the sexual pictures have resulted in some kind of novelty to older women, who had less chances of having been exposed to sexual related contents and hence, less familiarized with sex stimuli². This process may have been translated into higher levels of subjective sexual arousal. Finally, it is worth looking at the concept of sexual wisdom, raised by Forbes et al. (2017). This concept translates the buffering effects of age within the context of sexuality, as people find their own strategies and skills to deal with their sexuality related issues, as they get older (Forbes, Eaton, & Krueger, 2017). Therefore, the current findings on women's subjective sexual arousal to sexual contents may reflect a more harmonious positioning toward their sexuality, with the increment of age.

Still on the role of age and sexual beliefs on the subjective sexual arousal, findings revealed that while dysfunctional sexual beliefs predicted higher levels of subjective sexual arousal to the romantic pictures, they were also involved on how older women respond to sexually explicit pictures. Such findings suggest a differentiating role of sexual beliefs as a function of the sexual content and age. Accordingly, dysfunctional sexual beliefs may positively relate to subjective sexual arousal to romantic stimuli because the content of such stimuli (e.g., affect, emotional bonds) aligns with the assumptions underpinning a sexually conservative style. However, in the case of sexually explicit pictures, dysfunctional sexual beliefs seem to have more of an interplay role, moderating the relationship between age and subjective sexual arousal. Indeed, age positively predicted subjective sexual arousal under low dysfunctional sexual beliefs, supporting the buffering effect of an adaptive cognitive style in women's sexual response. This is not to say that changing older women's sexual beliefs system is mandatory. Sexually explicit pictures are prototypical of genitally-centered activity, and most of the times regarded as lacking an *emotional* component. Therefore, it may be inferred that romantic/affectional contents, rather than genital-focused contents, may be used in therapeutic contexts as means to achieve/increase subjective sexual arousal in sexually conservative women, rather than trying to fit their sexual beliefs with less conservative approaches.

Finally, findings on the level of sexual content attributed to the erotic pictures showed that age positively predicted the appraisal of romantic pictures as “more sexual”. Indeed, there is evidence supporting that older adults endorse a broader concept of sexual activity, covering behaviors such as the display of intimacy or genitally-centered activity (c.f., Hinchliff, Tetley, Lee, & Nazroo, 2018). Accordingly, it may have happened that older women appraised the

intimate content of romantic pictures as “sexual”. Dysfunctional sexual beliefs also predicted the appraisal of romantic pictures as “sexual”. Conservative views on sexuality may similarly trigger the interpretation of non-genitally centered details as sexual aspects of a stimulus.

As for the sexually moderate pictures, findings revealed that age and exposure time (40 seconds) positively predicted the attribution of sexual content. However, the interplay between age and sexual beliefs superseded these effects. Indeed, younger women appraised sexually moderate pictures as being “sexual” under the high dysfunctional sexual beliefs condition, which further aligns with the rationale that a conservative cognitive style may favor women’s appraisal of non-genital contents as “sexual”. Additionally, findings on the sexually explicit pictures revealed a 3-way significant interaction effect. While in younger women, the attribution of sexual content seemed to be mostly linked with higher exposure time, in older women, the attribution of content seemed to depend on the sexual beliefs system. One possible interpretation is that, in younger women, higher exposure time allows more extraction of sexual information or increased awareness and interpretation of sexual details, shaping the attribution of sexual content. In older women, the attribution of sexual content to the sexually explicit pictures seems instead related to sexual beliefs. Accordingly, findings revealed that the less sexually conservative women appraised these pictures as more “sexual”. One likely explanation is that the less sexually conservative women were capturing more of the sexual information of the stimuli, while the most conservative were avoiding such details, and hence appraised the pictures as less “sexual”. This is of course speculative, as we did not measure attentional processes in this study. Still, addressing the effects of exposure time in future research may be worthwhile, as experimental sex research strongly relies on exposure procedures.

The current study presents some limitations that must be outlined. In light of the sparse research conducted in the field of the aging process and sexual stimuli processing, this study represents a preliminary approach to the topic, rather than a conclusive study on the role of age on the processing of sexual contents in women. It is worthy to highlight that most women were under the age of 45; the distribution was as follows: 41.9% aged between 18 and 29, 27.1% aged between 30 and 45, and 31% aged over 45 (among women older than 45, 21 were aged over 60 years old). A larger sample of women over 60 years old would be recommended. Although the recruitment may be particularly difficult in older women, a sample that is not equally distributed lacks representativeness and the findings may be tied to this gap. Also, it is worth noting that the predictive role of age on sexual behavior and functioning must be differentiated from the effects of birth cohort (being the first related with individuals’ chronological age, and the second with the social/historical context where individuals were born), being difficult to disentangle. Notwithstanding this fact, in the present study we tested for the predictive role of age and sexual beliefs (being sexual beliefs a result of a socialization process, capturing a woman’s learning process within a given cultural context), assessing both the individual and adding effects of these variables. Another limitation relates to the heterosexual-centered approach. Future studies are expected to capture longitudinal data in order to unveil age versus cohort effects, as well as to target participants with other sexual preferences; the current findings should not be generalized to non-heterosexual women. Also, replication in other countries is recommended; as a study measuring subjective ratings, and capturing sexual beliefs that are shaped after one’s socialization process, the current findings may depart from other countries’ findings – *in fact, part of the current participants (born before 1974) were raised and (partially) educated under a dictatorship (Salazar’s regime) where sexual contents were not disseminated.* It is also worth noting that studies showing sexually explicit materials may be especially prone to sample bias (see Dawson et al., 2019 for a description of the topic), although we are not aware if such differences impact the processes underpinning sexual response (Janssen, 2002).

In all, the current study adds to the literature preliminary evidence on how age predicts the appraisal of sex stimuli in women. More specifically, it has showed that age may predict higher levels of subjective sexual arousal to different types of sex stimuli (romantic, sexually moderate, and sexually explicit stimuli), and not be followed by negative emotions (i.e., unpleasantness).

Accordingly, the present findings support the use of sexual contents not only in clinical contexts (as a means to induce subjective sexual arousal), but also in contexts related to the promotion of sexual well-being in older women. In addition, and notwithstanding its preliminary nature, the current results contribute to the deconstruction of age-related myths associated with women's sexuality and the aging process.

Notes

1. While this is an expected assumption in the Portuguese context, it may depart from other cultural contexts.
2. Even though, is worth noting that the majority of women (89.5%) reported low frequency of visualization of sexual contents (see Table 1), and there is no relationship between age and visualization of sexual contents ($r_s = -.14$, $p = .07$).

Disclosure statement

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