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Age differences in preference and memory for advertisements: the roles of advertisement type and product type

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Previous research has examined how motivational goals influence decision-making in advertising for both older and younger adults, and the findings support the proposal of socioemotional selective theory (SST), which suggests that older adults pursue emotionally-meaningful goals. However, such studies are limited in providing cross-cultural evidence, and the relevance of health-related goals in the contribution to age differences in preference and memory is underexplored. This study aimed to fill those research gaps, and investigated preference and memory, in Chinese younger and older adults, for emotionally-meaning and knowledge-related advertisements, for functional and general food products. Young adults (115 aged 18–26) and older adults (113 aged 60–86) were asked to indicate their purchase intentions for products, their liking of advertisements, and their recall of the advertisements they had viewed. For general food products, older adults showed more intention to purchase, and also better recall for emotionally-meaningful advertisements compared with young adults. However, both old and young adults showed an increased preference and memory for knowledge-related advertisements for functional food products, and this effect was greater for the older adults. The findings indicate that any default in older adults to focus on emotionally meaning information can be overridden when product information is directly related to individual health benefits. Thus, the SST may only apply when there is no personal investment in the decision to be made and hence these findings challenge the influential SST in its traditional form.

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Introduction

The aging group is forecast to strikingly increase its share in the world population by 2050 (Macedo 2017; Padeiro et al. 2023). Undeniably, older consumers have great purchasing power and they also retain a positive shopping attitude (Asebedo et al. 2019; Demos 2014; Eisend 2022; Hettich et al. 2018; Imtiaz and J 2021), which makes them an important group in the consumer market. Due to the growing size and economic importance of the older consumer group, interest in and research on the psychology of older consumers has been steadily on the rise.

Much research has focused on differences in information processing due to aging (Guido et al. 2020; John and Cole 1986; Salthouse 2012). Information processing for advertisements has been seen as a core element for consumer decision making (Samiee 1994; Yoon et al. 2009), and much evidence has shown that age differences in advertisement preference and memory may reflect the decline of available cognitive resources that comes with aging (Halfmann et al. 2015). That is, the information processing and memory capacity of older people are reduced compared to younger counterparts (Beard 2015; Guido et al. 2020). Thus, the conventional view holds that advertisements targeting older consumers should adopt structured, rational and easier-to-process information strategies (Cole and Houston 1987; Moschis, 1994). However, age-related motivational goals also significantly affect information processing (Carstensen 1992). In particular, socioemotional selective theory (SST) assumes that, aging is associated with an increase in the motivation of goals aimed at deriving emotional meaning from life, relative to the motivation of goals that increase future planning. Thus, and in direct opposition to the traditional view, the view of SST suggests that advertisements aimed at older consumers should focus on an emotional information executive strategy (Fung and Carstensen 2003; Williams and Drolet 2005). In short, these two opposing views suggest that the nature and content of advertisements might influence information processing and final purchase decisions in older people.

Socioemotional selective theory is a lifespan developmental theory related to motivational goals (SST; Carstensen 1992; Carstensen et al. 1999; Kennedy et al. 2001), and assumes that as people age, they realize that they have a limited remainder of life time. This results in a change in the way older people attend to and process information. Instead of pursuing the goals that are knowledge-related and developmental (defined as goals that optimize the future, often through acquisition of new information), they attach more importance to goals that are emotionally-meaning (defined as goals related to feelings, such as balancing emotional states or sensing that one is needed by others). Future time perspective (FTP) is more limited in older than younger adults(Williams and Drolet 2005), and within the FTP model, older adults are assumed to primarily process emotionally-meaningful information more deeply relative to knowledge-related and developmental information. In contrast, and in line with a perceived open time perspective, younger adults are assumed to pursue knowledge-related and developmental goals relative to emotionally meaning goals.

Numerous studies have examined how motivational goals influence decision-making in advertising areas for both younger and older adults in Western cultures (e.g., Fung and Carstensen 2003; Teichert et al. 2018; Williams and Drolet 2005; van der Goot et al. 2021), and some have shown evidence to support the SST. For example, a ground-breaking study by Fung and Carstensen (2003), investigated preference and memory of young and older adults for three types of advertisements including emotionally-meaning (the advertisement is related to love and caring, e.g., "Captures some special moments"), knowledge-development (the advertisement is conducive to providing new knowledge, e.g. "Captures new unexplored world information") and control advertisements (the advertisement contains neither of the above). The findings supported the SST by demonstrating that older adults showed a greater preference and increased memory for emotionally-meaning advertisements (Fung and Carstensen 2003). Similarly, Williams and Drolet (2005) examined preference and memory of older and young adults for affective advertisements (that encouraged positive feelings toward the product) or rational advertisements (that encouraged thoughts on product attributes). The results suggested that older adults showed increased liking and recall for affective advertisements, but young adults favored and better remembered rational advertisements. In a later study, van der Goot et al. (2015) used TV advertisements that had higher ecological validity and they also found that older adults showed a preference for emotionally-meaning advertisements. Similar results have also been reported in other studies (Drolet et al. 2007; van der Goot et al. 2021).

However, some studies have reported the opposite pattern of results. For example, Sudbury-Riley and Edgar (2016) used real British brand products to investigate preference and memory, between differential age groups, in response to emotional and rational advertisements. In contrast to what would be predicted by SST, the results showed that older adults demonstrated a preference for rational advertisements, while young adults showed a preference for emotionally-meaning advertisements. Teichert et al. (2018) similarly found that younger groups are influenced by emotional advertisements while the mature groups were influenced more by rational advertisements. Clearly, the effects of different advertisement types on age differences in preference and memory are inconclusive, and, to some extent remain controversial. It should also be noted that most of this research has taken place in Western cultures, and whilst it is known that cultural differences may influence consumers' attitudes and behavior (Fung 2013), no work has directly investigated age differences in preference and memory for different types of advertisements in Eastern cultures.

The effects of product type on age differences in preference and memory for advertisements has also been explored. A study that adopted hedonic and utilitarian products as stimuli found that older people showed increased liking and recall of affective advertisements for both types of product while younger people showed a similar pattern only for hedonic products, implying that advertising preferences of older adults were not influenced by product type (Drolet et al. 2007). As seen in the literature reviewed above many prior studies have typically focused on general food products to explore the influence of product type on preference and memory. However, with the promotion of the importance of adopting a healthy lifestyle, functional food products (i.e. those claimed to have additional benefit beyond simple nutrition) are becoming a part of consumers' everyday lives and people's demand for functional foods around the world is increasing (Annunziata et al. 2015; Annunziata and Vecchio 2013; Santeramo et al. 2018). Functional foods are said to promote physical health (Annunziata et al. 2015), and advertisers often recommend these for older adults to purchase and use (Hettich et al. 2018). Thus, it is important to explore whether age differences in preference and memory are present across different types of advertisements, for different types of food products.

Interest in functional food is thought to be related to an individual's health focus, and older adults have a powerful demand for health-related products compared with younger groups (Puhakka et al. 2018). It is also known that when decision goals are personally-related (English and Carstensen 2015), older adults are more likely to emphasize health information related to product benefits (Plasek et al. 2020; Plasek and Temesi 2019) and

view such information as more effective (Hettich et al. 2018). Additionally, the consumption decisions of older adults are generally utility-orientated, employing rational strategies to evaluate functional food advertisements. Given the special properties of functional foods and the individual's pursuit of health goals, older adults may show a different pattern of advertising attitudes and behaviors for functional food products.

In sum, it is important to examine how motivational goals influence decision-making for both older and younger adults in Chinese culture, and whether there are age differences exhibited in the expected SST pattern for emotionally-meaning advertisements and knowledge-related advertisements for different types of products. It is not known how different product types influence preference and memory in Chinese young and older adults, and, it is not known how such product preferences might interact with the different types of advertisement. Accordingly, the current study investigated the roles of advertisement type (emotionally meaning versus knowledge based) on age differences in advertising preference and memory for both functional food and general food products in Chinese adults.

We anticipated that older adults would have greater purchase intentions for the functional foods compared with young adults due to a greater demand and a personal-related goal for health-related products (Puhakka et al. 2018). In line with SST, we would also expect older adults to show a preference and increased memory for emotionally-meaning advertisements, whereas young adults should show a preference and memory for knowledge-related advertisements. More importantly, the SST pattern would be moderated by product type. Specifically, in line with Drolet et al. (2007), we expected older adults would increase liking, purchase intentions and recall of emotionally-meaning advertisements regardless of product type, while younger adults might be expected to show this pattern only for the general food products. Alternatively, if older adults prioritize their personal health goals with a focus on health information related to product benefits, older adults should show an increased preference and recall for knowledge-related advertisements for functional (but not for general) food products.

Method

Participants. The sample consisted of 115 younger adults from the authors' University and 113 older adults from the surrounding community. No participants reported having any physical disabilities or cognitive disorders and no participants had taken part in similar experiments. Participants were selected to have at least 10 years of formal education (equivalent to senior high schooling). Before taking part in the current experiment demographic data and scores on the Mini-Mental State Examination (MMSE) were recorded. A summary of sample characteristics is shown in Table 1.

No previous studies reported a power analysis, so we conservatively estimated the required sample size for our study to be 132 to detect a $2 \times 2 \times 2$ within and between interaction for a small to medium effect size f of 0.25 in a repeated-measures analysis of variance (ANOVA; an alpha of 0.05, power at 0.95) calculated using G*Power 3.1.9.7 software (Faul et al. 2007). All participants were compensated following the experiment. Younger participants received 10 yuan, and older participants were given a gift following the experiment.

Materials and Pretest

In line with previous research we aimed to select popular health foods and functional foods (Annunziata et al. 2015; Küster and Vila 2017), and our products were also selected in line with the results from a prior survey ("Do you think this type of food is a functional/general product?", "What type of functional/ general foods do you frequently use in daily life?") for younger and older adults. A total of 14 frequently used products in daily life (half of these functional foods) were selected. This approach ensured that the selected products were both scientifically relevant and representative of real-world consumption patterns. All selected products aligned with the study's focus on health and functional foods. It is noted that all of the food products were health-related foods. Detailed pretest information and results are available from the authors. For the selected products, 14 emotionally-meaning advertisements ("This advertisement made me feel positive, share happiness in life, and think about the love or caring from relatives and friends", e.g. Fish Oil Capsules-one capsule each day, sending you care, and love and giving yourself and your family better nutritional protection) and 14 knowledge-related advertisements ("This advertisement increased my knowledge for new topics", e.g. Fish Oil Capsules-Derived from Alaskan sea fish, regulating blood lipids, protecting your vision and enhancing your immunity effectively) were compiled based on SST (see Fung and Carstensen 2003; van der Goot et al. 2021). Printed advertisements were presented on a computer monitor in the form of colorful product images with accompanying text, and the brightness of the images and length of the text were carefully balanced. Brand names of products were removed to avoid participants' preference being based on specific brands.

Advertisement type ("This advertisement made me think it was primarily emotionally-meaning or knowledge-related", -3 ~ 3 point scale, anchors = "emotionally-meaning" and "knowledge-related"), advertisement credibility ("This advertisement is credible", 1 ~ 7 point scale; anchors = "disagree" and "agree") and product relevance ("This product is relevant to me", 1–7 point scale, as above) were rated by 20 young and 20 older adults (who did not participate in the experiment). Analysis confirmed that the knowledge-related advertisements of four functional food products (vitamin C, fish oil capsules, eye care capsules and calcium tablets) and four general food products (milk, blueberry, green tea and cherry) were intended to be perceived as more knowledge-related relative to the emotionally-meaning advertisements ($p < 0.001$). There were no age differences in the rating of advertisement type, advertisement credibility and product relevance ($ps > 0.05$). Finally, 8 products (half of which were general foods) were selected as stimuli, see Fig. 1 for a sample advertisement.

Table 1 Demographic information, physical health and MMSE of age group.

	Young adults ($N = 115$) *M (SD)*	Older adults ($N = 113$) *M (SD)*
Age	21.94 (1.63)	69.75 (6.45)
Gender		
Male	46	32
Years of education	15.93 (1.61)	12.76 (3.25)
Physical health	4.47 (0.69)	3.88 (0.96)
MMSE	—	29.73(0.74)

Measurement of the physical health is a 5-point scale and measure one's physical health condition ("1" = "very poor", "5" = "very good"). MMSE = Mini-Mental State Examination. MMSE is a commonly used test for screening cognitive impairment and dementia. The questions assess different cognitive areas such as orientation, attention, memory, language, and visuoconstruction.

Design and procedure. The study was a mixed design with age group (young adults vs. older adults) as the between-participants factor, advertisement type (emotionally-meaning advertisements

Fig. 1 Examples of emotionally-meaningful advertisement (left) and knowledge-related advertisement (right) for the functional food product. The advertisement for the left picture means “Take one each day, passing on the care, fighting for love and providing better nutritional protection for yourself and your family ”. The advertisement for the right picture means “Derived from deep-sea fish in Alaska, it effectively regulates blood lipids, protects vision, and enhances immunity”.

Table 2 Descriptive statistics of liking, purchase intention and recall results of age group.

	Functional food *M* (*SD*)		General food *M* (*SD*)	
	Emotion	**Knowledge**	**Emotion**	**Knowledge**
Liking				
YA	5.03 (1.18)	4.89 (1.23)	5.67 (0.91)	5.28 (1.06)
OA	4.81 (1.11)	5.31 (1.01)	5.70 (0.86)	5.33 (0.69)
Purchase intention				
YA	4.75 (1.24)	5.13 (1.19)	5.52 (0.97)	5.59 (0.97)
OA	4.50 (0.91)	5.30 (0.78)	4.99 (0.79)	4.83 (0.68)
Recall (%)				
YA	0.12 (0.17)	0.23 (0.23)	0.18 (0.23)	0.34 (0.26)
OA	0.03 (0.08)	0.21 (0.20)	0.21 (0.20)	0.14 (0.17)

Recall is a proportional score. *OA* older adults, *YA* younger adults, *Emotion* emotionally-meaning advertisements, *Knowledge* knowledge-related advertisements.

vs. knowledge-related advertisements) and product type (functional food products vs. general food products) as the within-participants factors.

The research was carried out between March and June 2023. Due to the limited conditions imposed by COVID, young adults completed the experiment in the laboratory whereas older adults completed the experiment in a quiet room in the senior community. The experiment took place in as quiet an environment as possible. During the experiment, participants were presented with 16 advertisements containing emotionally-meaning and knowledge-related advertisements for 8 products (half of which were functional foods). Participants then rated their purchase intentions for the products and their liking of the advertisements using a Likert 7-point scale (“1” = “not at all”, “7” = “very much”), and were subsequently tested for recall memory about the advertisements they had viewed.

Analysis. Statistical analyses were performed using IBM SPSS Statistics v.22.0 software. To investigate our hypothesis, we conducted a three-way ANOVA (age group × advertisement type × product type). For the measurement of liking, purchase intention and recall for each participant. We mainly focus the results of three-way, age group × advertisement type and age group × product type interaction to interpret our findings.

Results

Effect of liking. A significant two-way interaction between age group and advertisement type was found (F (1,226) = 4.02, $p < 0.05$, $\eta_p^2 = 0.02$). Further analysis showed young adults preferred emotionally-meaning advertisements over knowledge-related advertisements ($M_{\text{Emotionally-meaning}} = 5.35$, $M_{\text{Knowledge-related}} = 5.09$, $p < 0.05$), while older adults rated liking the two different advertisements types equally ($M_{\text{Emotionally-meaning}} = 5.25$, $M_{\text{Knowledge-related}} = 5.32$, $p > 0.05$). More importantly, a significant three-way interaction among age group, advertisement type and product type was also observed, F (1,226) = 27.93, $p < 0.001$, $\eta_p^2 = 0.11$. Further analysis showed that older adults preferred knowledge-related advertisements over emotionally-meaning advertisements ($p < 0.001$) for the functional food products and this effect was absent in the young adults ($p > 0.05$). For the general food products, both young and older adults showed a numerical increased liking for emotionally-meaning advertisements, although this was not statistically significant ($ps > 0.05$), see Table 2 and Fig. 2.

Effect of purchase intention. The interaction effect between age group and advertisement type was absent ($p > 0.05$), but a significant interaction of age group × product type (F (1,226) = 31.15, $p < 0.001$, $\eta_p^2 = 0.12$) was observed. Further analysis showed that young adults were more likely to buy the

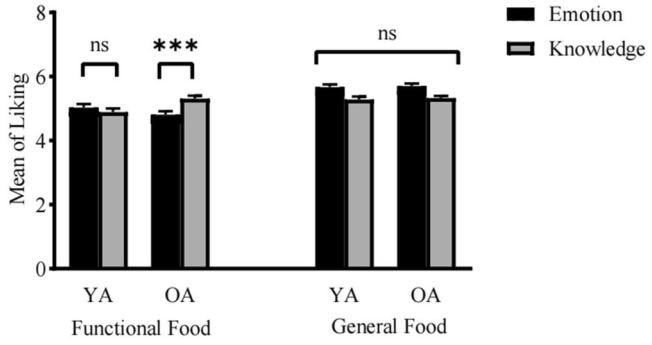

Fig. 2 Mean liking of different types of advertisement for each age group to two products. YA young adults, OA older adults, Emotions emotionally-meaning advertisements. Knowledge knowledge-related advertisements, Functional Food functional food products. General food general food products.

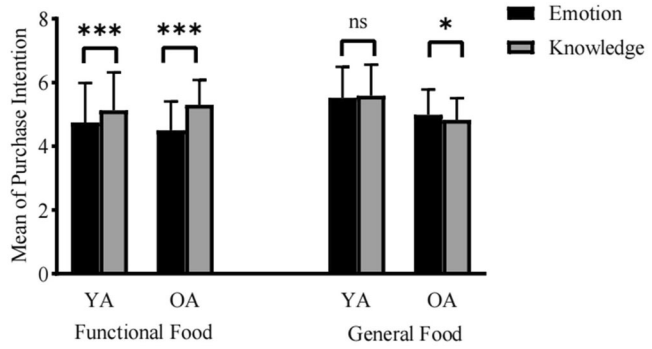

Fig. 3 Mean purchase intention of different types of advertisement for each age group to two products. YA young adults, OA older adults, Emotions emotionally-meaning advertisements. Knowledge knowledge-related advertisements, Functional Food functional food products, General food general food products.

general food products ($M_{\text{General food}} = 5.56$, $M_{\text{Functional food}} = 4.94$, $p < 0.01$), while older adults had equal purchase intentions for both types of products ($M_{\text{General food}} = 4.91$, $M_{\text{Functional food}} = 4.90$, $p > 0.05$). Furthermore, a significant three-way interaction was found, $F\ (1,226) = 24.14$, $p < 0.001$, $\eta_p^2 = 0.10$. Both young and older participants showed a preference to buy products that were presented as knowledge-related advertisements rather than emotionally-meaning advertisements for the functional food products ($ps < 0.001$). For the general food products, older adults were more likely to buy products that were presented as emotionally-meaning advertisements than knowledge-related advertisements ($p < 0.05$), and this effect was absent in the young adults ($p > 0.05$), see Tables 2 and Fig. 3.

Effect of recall. Recall of the advertisements was coded by three independent coders (inter-rater reliability = 0.89). Consistent with methodology in Williams and Drolet (2005), coders jointly identified and agreed upon keywords or elements in each advertisement (e.g., in the emotionally-meaning advertisements, "Blueberry-share with relatives/sweet and yummy/have good life"; in the knowledge-related advertisements, "fish oil capsules-come from the deep sea of Alaska/regulating blood lipids/protecting vision/enhancing immunity). Recalled items were deemed correct even if they were not exactly identical to the copy in the advertisements, so long as they retained the basic meaning. Items included in the protocol that did not appear in the advertisements or were unrelated (e.g., "the strawberry is sour" and "the milk

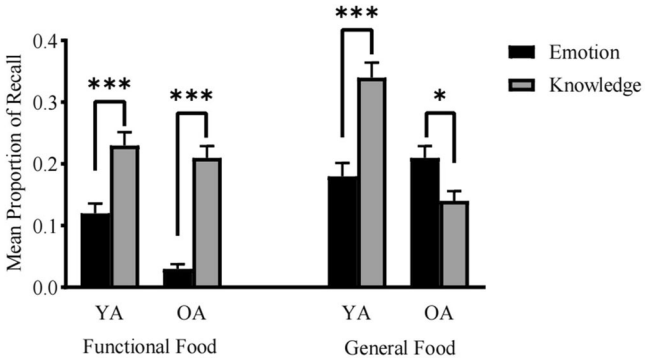

Fig. 4 Mean proportion of recall of different types of advertisement for each age group to two products. YA young adults, OA older adults, Emotions emotionally-meaning advertisements, Knowledge knowledge-related advertisements, Functional Food functional food products, General food general food products.

come from the Finland") were considered intrusions and counted separately. Disagreements between coders were resolved via discussion. For each participant, we calculated the proportion of items correctly recalled from each advertisement.

A significant two-way interaction between age group × advertisement type was found ($F\ (1,226) = 5.05$, $p < 0.01$, $\eta_p^2 = 0.02$). Further analysis showed that both younger and older participants were more likely to recall knowledge-related advertisements than emotionally-meaning advertisements (young adults: $M_{\text{Emotionally-meaning}} = 0.15$, $M_{\text{Knowledge-related}} = 0.28$; older adults: $M_{\text{Emotionally-meaning}} = 0.12$, $M_{\text{Knowledge-related}} = 0.18$, $ps < 0.01$). Moreover, a significant three-way interaction was also found, $F\ (1,226) = 34.77$, $p < 0.001$, $\eta_p^2 = 0.13$. Further analysis revealed that both young and older adults had higher recall for knowledge-related advertisements than emotionally-meaning advertisements for the functional food products ($ps < 0.001$). For the general food products, older adults better remembered emotionally-meaning advertisements ($p < 0.05$) whereas young adults had increased recall for knowledge-related advertisements ($p < 0.001$), see Table 2 and Fig. 4.

Discussion

The current study examined whether there were age differences in preference and memory of emotionally-meaning and knowledge-related advertisements for both functional and general food products in Eastern culture. Overall, the findings provide evidence to show that older adults differed from the young adults in their preferences and memories for different types of advertisements and products. Specifically, results showed that both older and young adults had an increased preference and memory for knowledge-related advertisements for functional food products, and this effect was greater for older adults. This finding is inconsistent with what would be predicted for a traditional SST pattern that older adults pursue emotionally-meaningful goals. For general food products, older adults showed the expected SST pattern of an increased preference and better memory for emotionally-meaning advertisements.

Evidence from the general food products in the current study supported the expected SST pattern whereby older adults showed a preference and memory of emotionally-meaning advertisements, and this is consistent with previous research (Drolet et al. 2007; Fung and Carstensen 2003; Williams and Drolet 2005). According to SST, older adults acquire goals that are emotionally-meaning rather than goals that are knowledge-related. This serves to strive for emotional gratification in the present moment, and is underpinned by devoting greater attention to social

connectedness, an overall positive state, and general happiness, all of which can be experienced and enjoyed in the here and now.

For the functional food products in the present study, however, the SST pattern was not observed. Potential explanations for older adults showing increased preference and memory for knowledge-related advertisements for functional foods could be related to individual goals to improve one's health, and thus one's quality of life (English and Carstensen 2015). Firstly, functional food products may have a stronger personal-relevance for the older adults compared to the younger counterparts (Puhakka et al. 2018), which may lead older adults to pay more attention to such products and thus devote more cognitive resources to the processing of these, including the accompanying text, and the overall messages in the advertisements for those products (Van Der Zanden et al. 2014). Moreover, older consumers, particularly those in worse health conditions or those wishing to avoid adverse health problems, may place more emphasis on the functions of functional food products. As a result, they may actively take health statements (e.g., boosting immune system) related to these products more seriously (Annunziata et al. 2015; Plasek et al. 2020; Plasek and Temesi 2019). Secondly, older adults tend to recall better the beneficial information for the products that interest them (Guido et al. 2020). We also note that the knowledge-related advertisements for functional food products in our study promote more product benefits (e.g., high qualitative protein and nutritional value), and this in itself may have enhanced older adults' attention and memory, leading to increased positive preference and greater memory for those products. Alternatively, it has also been suggested that SST does not manifest in exactly the same way across different cultures (Fung 2013). Therefore, if Asian older adults believe that giving more attention to knowledge-related advertisements contributes to better selection of beneficial functional food products, they may process such information more seriously in order to try to avoid any possible deception by the product owners which could incur financial losses.

Interestingly, and in line with Sudbury-Riley and Edgar (2016), we found younger adults overall favored emotionally-meaning advertisements while older adults showed no significant preference of advertisement type. This finding could be attributed to the product stimuli adopted by the current study, which clearly induced higher involvement than stimuli used in previous research (Chowdhury and Micu 2010; McKay-Nesbitt 2011), and, it is established that involvement (i.e., has been operationalized as "the level of perceived personal importance and/or interest evoked by a stimulus within a specific situation", Antil 1984) with the product affects consumers' attitudes toward different type of advertisements (Akbari 2015). Additionally, both age groups recalled more knowledge-related advertisements than emotionally-meaning advertisements. The literature on memory has reliably found that people are more likely to remember information that is more relevant to their goals (Blaney 1986). Accordingly, if older adults perceive knowledge information as having greater personal relevance and significance (Fung et al. 2019; Gong and Fung 2020), they may adjust their limited cognitive resources to process this information. Inconsistent with our expectation, both age groups had equal purchase intentions for the functional food products. Studies have shown that the authenticity of the product brand, the loyalty or familiarity of the consumer to the products and the price of the products will all affect consumer's purchase intentions (Annunziata et al. 2015; Annunziata and Vecchio 2013; Guido et al. 2020; Hettich et al. 2018; Plasek and Temesi 2019; Puhakka et al. 2018). It was noted that the real brand name of products was removed in the current study, therefore older adults may have doubted the authenticity and price of the products and maintained a cautious attitude, leading to a decline in the purchase intentions of functional food products.

This study has significant theoretical and practical implications. Theoretically, the current research has replicated other findings that support the proposal of traditional socioemotional selective theory, that older adults pursue the emotionally-meaningful goals. It highlights the importance of understanding motivational differences that underlie the effects of aging on decision making. However, and importantly, our findings also extend the traditional view of how SST might operate, or be overridden, for older adults in the Eastern-context advertising domain. Our study suggests that Chinese older adults show overall increased preference and memory for knowledge-related advertisements rather than emotionally-meaning advertisements, and, the role of product type plays a significant role too. Older adults also showed increased preference and memory for emotionally-meaning advertisements for general food products, and also increased preference and memory for knowledge-related advertisements for functional food products. These findings imply that SST does not manifest in exactly the same way in older adults who are viewing and processing information for advertisements, at least in the Chinese culture (Fung 2013). Practically, the current study provides valuable insights for advertisers. Older adults tend to be attracted by emotionally meaningful advertisements, whereas younger adults are more influenced by knowledge-related advertisements. However, and of significance for future focus in the advertising domain, for health-related products, knowledge-related advertisements are more effective for older adults. Thus, our research suggests that advertisers should consider the importance of different types of advertisements and the role of different product types when designing specific products for Chinese older adults. These findings are likely to be particularly useful for marketing professionals when creating advertisements of products tailored to the expanding older population. The businesses who target the older population may want to focus on both emotional appeal and time perspective. Additionally, our findings also hold significant relevance for public health messages targeting older adults.

Limitations of the current study include the use of convenience samples who came from the same central retirement community near author's university, and the level of education, economic conditions, sample size, and other resources may be more advantageous in that sample than those of older people in other areas, and as such may not be representative of the common elderly. It is important to note, however, that the primary objective of this research is to generate hypotheses and lay the groundwork for future studies with larger and more diverse samples. Product stimuli used in this study have higher consumer involvement and this may impact on consumer attitude and decisions (Akbari 2015). More importantly, a limitation of this research concerns the lack of any direct evidence as to the mental processes underlying older consumers' preference and memory for different advertisements. Future time perspective (FTP) is an important consideration of SST (Carstensen et al. 1999) and it is possible that older adults in the current study may have paid more attention to knowledge-related advertisements in order to increase their FTP (Fung and Carstensen 2003). At the outset of this study, however, we assumed that older adults maintain a short FTP and we did not manipulate FTP (Fung and Carstensen 2003; Williams and Drolet 2005) or measure self-perceived age (i.e., a proxy for FTP within one's own life, see Sudbury-Riley and Edgar 2016). A fruitful avenue for future research could consider the psychological mechanisms of FTP and how these might impact on age differences for different types of advertisements and products.

In conclusion, this study is among the first to examine the influence of functional food products on age differences in preference and memory for emotionally-meaning and knowledge-related advertisements, in the Eastern population. A central finding showed that older adults have an emotionally-meaningful preference and memory for general food products, but a knowledge-related preference and memory for functional food products. These findings challenge the traditional view of how SST might operate in older adults when selecting products to buy for themselves, and, they clearly highlight which specific elements (e.g., product type) to focus on when targeting this population in the advertising domain.

Data availability

All the data and materials are available at https://osf.io/xftsd/. This experiment was not preregistered.

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Author contributions
WC and FX contributed to the study conception and design. WC, LZ, SY, ZS, and FX performed material preparation, data collection and analysis. WC wrote the first draft of the manuscript. FX and V.B. commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Competing interests
The authors declare no competing interests.

Ethical approval
The research was approved on August 22nd, 2022 by the research ethics committee of the Zhejiang Normal University. The approval number associated with this confirmation is ZSRT2022066. All research activities were performed in accordance with the principles of the Declaration of Helsinki.

Informed consent
Written informed consent was obtained from all subjects involved in the study prior to their participation. Consent was secured by the researcher between March 28, 2023, and June 1, 2023. All participants were thoroughly informed about the purpose of the study, the voluntary nature of participation, the right to withdraw at any stage without any penalty or negative consequences, the use of data for academic research and publication purposes, and the anonymity of reporting results.

Additional information
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