



## Research article

# My friends have a word for it: Event-related potentials evidence of how social risk inhibits purchase intention

Qian Shang<sup>a</sup>, Guanxiong Pei<sup>b,c</sup>, Jia Jin<sup>d,e,\*</sup><sup>a</sup> Management School, Hangzhou Dianzi University, Hangzhou, China<sup>b</sup> School of Management, Zhejiang University, Hangzhou, China<sup>c</sup> Neuromanagement Lab, Zhejiang University, Hangzhou, China<sup>d</sup> Business School, Ningbo University, Ningbo, China<sup>e</sup> Academy of Neuroeconomics and Neuromanagement at Ningbo University, Ningbo, China

## HIGHLIGHTS

- The neural basis of social risk perception regarding purchase intention was examined.
- Social risk factors could inhibit people's purchase intention.
- Larger anterior N2 amplitude was induced by the social risk condition.
- Participants involved more cognitive conflicts in the social risk condition.

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## ABSTRACT

Social risk refers to the potential disapproval from significant others (especially family or friends), and it is crucial in dissuading consumers from making decisions to purchase. The current study explored the neural process underlying how social risk influenced people's purchase intention. Event-related potentials (ERPs) were employed to investigate the electrophysiological process when subjects evaluated their purchase intention for products with social risk factors. The behavioral data showed that the social risk condition inhibited people's purchase intention compared to the control condition. Neurophysiologically, larger anterior N2 amplitude was induced by the social risk condition in contrast with the control condition. We suggest that this anterior N2 may reflect the cognitive control or conflict monitoring. It may be that the participant has to regulate the conflict between an internal desire to purchase the item and the discordant information obtained from the social risk sentence, which would pressure the participant to not purchase the item in accord with social norms. These findings will be helpful in understanding the neural basis of social risk perception during purchase decisions.

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## 1. Introduction

The purchase decision is the most fundamental economic decision in our daily life [23]. Traditional theories assert that consumers' purchase decisions are driven by personal preferences and product prices [23,40,41]. For example, Kuntson et al. investigated how people weigh these two factors in the process of purchase decision-making. They revealed that preference activated neural circuits (nucleus accumbens, NAcc) associated with anticipated gain, while

excessive prices activated circuits (mesial prefrontal cortex, MPFC) associated with anticipated loss prior to the purchase decision [23].

However, in addition to personal preference and product price, consumers' purchase decisions can also be affected by social norms, i.e., perceptions of what other people approve of [2,7,27,35]. For example, consumers might stop buying a preferred product when fearing disapproval or criticism from family or friends [44,54]. The process of purchase decision making was influenced by other people's opinions [27,51], particularly products which might bring into controversy [54]. It was also found that friends or relatives' environmental concern (social norm) could be a social determinant of green buying [3]. This kind of social norm is defined as social risk, which refers to the anticipated or potential lack of acceptance from significant others (especially family or friends) [4,22,46]. Marketing

\* Corresponding author at: Business School, Ningbo University, 818# Fenghua Road, Ningbo, NB 315211, China.

E-mail address: [jinjia@nbu.edu.cn](mailto:jinjia@nbu.edu.cn) (J. Jin).

researchers have proposed that perceived social risk greatly affects purchasing behavior [6,31,38]. When perceived risk was relatively high, consumers would have a preference for the social norm [6]. What's more, participants whose interdependent selves were activated to maintain connectedness and harmony with others were less likely to seek risk in their social choices [34].

In recent years, there has been increasing interest in adopting neural methods to investigate consumers' purchase decisions, which make it possible for us to directly understand the role of social risk in the processing of purchase decision. For example, Yokoyama et al. investigated how social risk influenced people's purchase decision using functional magnetic resonance imaging (fMRI) [56]. In their experiment, volunteers reported their purchase intentions for various products as well as their anticipation of others' disapproval of possessing a product. The results demonstrated a strong positive correlation between ratings of social risk and activity in the anterior insula, an area of the brain that is known as part of the social-emotion related network. This finding suggested that the anterior insula processes consumers' social risk implicitly to prompt consumers not to buy socially unacceptable products. One possible limitation of this study is that perception of social risk and the purchase decision did not appear at the same stage of the experiment, which makes it difficult to directly examine the influence of social risk on purchase decision.

To date, however, no studies have explored the temporal dynamics of how social risk affects people's purchase decisions. To investigate how this cognitive process is implemented in the brain, we adopted event-related potentials (ERPs). ERPs are an important measure of the perceptual and cognitive processing of stimuli and have high temporal resolution [33,45]. In ERPs studies concerning risk evaluation and the processing of social signals, N2 is the most widely reported and examined ERPs components, including the anterior, posterior, and novelty N2 [5,14,26,29,30,42,50,52,57]. The anterior N2 is a negative wave peaking between 200 and 350 ms after stimulus onset, which is closely related with cognitive control or conflict monitoring [14]. In go/no-go studies, no-go gave rise to larger N2s, which were driven by response conflict [5,39]. In stop signal paradigm, participants responded under time pressure to an initial stimulus (S1) which was sometimes followed by a "stop" stimulus that signaled the need to withhold the response. Frontocentral N2s were elicited by stop signals, which were closely related to inhibition or control [10,32]. The Eriksen flanker task is another task designed to investigate the influence of cognitive control, in which a choice reaction time task on the central letter of a letter string was carried out [13]. Incongruent flankers elicited delayed reaction times and an enhanced frontocentral N2, which reflected the process of conflict monitoring [1,9,25,55]. In our study, the participant has to regulate the conflict between an internal desire to purchase the item and the discordant information obtained from the social risk sentence, which would pressure the participant to not purchase the item in accord with social norms. Controlling this conflict or regulating the differences between these processes may be eliciting an anterior N2.

In the present experiment, we applied ERPs to investigate how the social risk influenced consumers' purchase intention in the human brain. The purchase-intention evaluation tasks were revised from the above-mentioned work of Yokoyama et al. [56]. Participants were asked to evaluate purchase intention for products with the social risk as background information. This paradigm design aimed to have the perception of social risk appear at the same stage as purchase decision in order to allow the direct examination of the influence of social risk on purchase decision, which is different from the previous fMRI experimental design. This study tested the following two hypotheses: (1) Social risk factors would inhibit people's purchase intention. (2) The N2 component would provide corresponding evidence for this inhibitory effect on pur-

**Table 1**  
Social risk and control sentences used in our study.

Condition	Sentence
Social risk	Friends will say I should not wear this T-shirt
	Family will say I should not wear this T-shirt
	I feel that what I buy might not be in fashion
	I worry that my friends might think I look funny in this T-shirt
	Wearing this T-shirt might make others have an unfavorable impression of me
	Wearing this T-shirt might cause me to lose my reputation
	Other people will get bad vibes from the T-shirt
	I will be thought of as strange if I wear this T-shirt
	Friends might say this T-shirt is not suitable for me
	Friends might think this T-shirt is not good on me
Control	# @ % * # @ % * # @ % * # @ % * # @ % *

chase intention. The amplitudes of the N2 would be larger in the social risk condition than in the non-social risk condition.

## 2. Methods

### 2.1. Subjects

Sixteen right-handed subjects (8 females) aged 20–25 years ( $M = 21.06$ ,  $S.D. = 1.30$ ) from Ningbo University participated in this experiment as paid volunteers. They were all native Chinese speakers and had normal or corrected-to-normal vision with no history of neurological or psychiatric abnormalities. All the participants provided written informed consent before the experiment started. The study was approved by the Internal Review Board of the Center for Management Decision and Neuroscience at Ningbo University.

### 2.2. Stimuli

Yokoyama et al. investigated how social risk influenced people's purchase decision using functional magnetic resonance imaging (fMRI), in which subjects viewed the images of T-shirts and rated each of them on purchase intention [56]. As this previous study [56], a total of 100 photos of T-shirts selected from one online vendor (<http://www.graniph.com/>) were used in this study to control for price, style, brand, and quality. Before the evaluation task of purchase intention, the participants were instructed that all T-shirts were of identical price, brand, and quality to exclude these confounding factors. Ten sentences of social risk used in the experiment were chosen from previous studies [16,22,24,56]. In the control group, the social risk sentences were replaced with a series of basic symbols (see Table 1). The stimuli were presented on a black ( $R = 0$ ,  $G = 0$ ,  $B = 0$ ) computer screen 90 cm away from the participants, using E-prime 2.0 (Psychology Software Tools, Pittsburgh, PA, USA).

### 2.3. Procedure

Participants sat comfortably in a sound-attenuated room. As shown in Fig. 1, each trial began with a fixation cross that appeared in the center for 500 ms. The visual angle of the fixation cross was  $0.32^\circ \times 0.32^\circ$ . After fixation cross offset, there was an interval of 400–600 ms. Subsequently, target stimuli composed of a T-shirt ( $4.58^\circ \times 4.58^\circ$  of visual angle), a social risk/control sentence ( $5.28^\circ \times 0.32^\circ$  of mean visual angle) and a progress bar ( $9.5^\circ \times 0.95^\circ$ ) were presented in the center of the computer screen. Participants were required to evaluate their purchase intention (using ratings of 1–8) for the product by modulating the progress bar using a com-

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