

## RESEARCH ARTICLE

# Does losing money truly hurt? The shared neural bases of monetary loss and pain

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**Abstract**

Both monetary loss and pain have been studied for decades, but evidence supporting the relationship between them is still lacking. We conducted a meta-analysis to explore the overlapping brain regions between monetary loss and pain, including physical pain and social pain. Regardless of the type of pain experienced, activation of the anterior insula was a shared neural representation of monetary loss and pain. The network representation pattern of monetary loss was more similar to that of social pain than that of physical pain. In conclusion, our research provided evidence of the common neural correlates of monetary loss and pain.

**KEYWORDS**

meta-analysis, monetary loss, physical pain, social pain

## 1 | INTRODUCTION

Money is considered to have multiple psychological meanings for its functions of exchanging goods and services, and motivating others (Lea & Webley, 2006). For example, money can elicit both positive and negative emotions (Tang, 1992), inspire individuals' internal motivations (Lea & Webley, 2006), reduce the harm caused by low self-esteem (Zhang, 2009), and transform the norms of interpersonal relationships (Vohs, Mead, & Goode, 2008; Zaleskiewicz & Gasiorowska, 2016). Monetary loss refers to the loss of money (Kamarajan et al., 2009), which can alter individuals' behavior and mental states. Individuals report more negative emotions after monetary loss relative to monetary gains (Jang, Lin, & Lustig, 2020). Monetary loss can also act as punishment to improve individuals' behavioral performance (Li, Cox, Or, & Blandford, 2016).

People often viewed the experience of monetary loss as undesirable and disgusting. For example, people usually described the

experience of monetary loss with words that described physically painful experiences such as using the word "headache" to depict the psychological state of receiving a costly bill (Xu, Zhou, Ye, & Zhou, 2015). Moreover, some researchers have found that monetary loss directly affects individuals' sensitivity to pain, since monetary loss might amplify the painful feelings of nociceptive stimuli or social exclusion (Zhou, Vohs, & Baumeister, 2009).

All these results suggested a psychological overlap between monetary loss and pain including physical pain and social pain, two typical types of pain, which have been widely investigated in pain-related research (Merskey, 1986). Physical pain refers to the displeasing sensory and affective experience caused by real or potential body injuries (Merskey, 1986), whereas social pain refers to the painful experience of social harm when social relationships are threatened, damaged or lost, such as social exclusion (Eisenberger & Lieberman, 2004; Rotge et al., 2015). Despite the linguistic overlap and mutual relationship between monetary loss and pain, one problem we remained unclear

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about was whether the processing of monetary loss and pain engaged overlapping neural bases.

Previous studies have detected neural activity related to monetary loss. The receipt of monetary loss activates a broad range of brain regions, including the anterior cingulate cortex (ACC), inferior frontal gyrus, medial frontal cortex, insula, cuneus, lingual gyrus, and parahippocampal gyrus (García, Filbey, Dunlop, & Myers, 2013; Kocsel et al., 2017, 2019; Lauwereyns, Bjork, Smith, Chen, & Hommer, 2010; Luo et al., 2019; Ubl et al., 2015; Yan et al., 2016; Yu, Duan, Wu, & Luo, 2021; Yu, Wu, Huang, & Luo, 2020). Moreover, a meta-analysis of monetary loss found that the outcome of monetary loss consistently activated the striatum and anterior cingulate gyri (Dugré, Dumais, Bitar, & Potvin, 2018).

The neurocognitive network underlying physical pain and social pain were similar to those underlying monetary loss. The processing of physical pain involves a specific brain network referred to as the “pain matrix,” including the sensory-discriminative system and cognitive-affective system (Wager et al., 2013; Wiech, 2016). The sensory-discriminative system is responsible for recognizing the intensity, location, and quality of nociceptive stimuli and this system includes the lateral thalamus, posterior insula, and primary and secondary somatosensory cortex. The cognitive-affective system is responsible for processing the psychological characteristics of physical pain, and this system includes the anterior insula (AI) and ACC. Regarding social pain, previous studies have found that social pain activates the insula, ACC, and ventrolateral prefrontal cortex (Cristofori, Harquel, Isnard, Mauguier, & Sirigu, 2015; Eisenberger & Lieberman, 2004; Luo et al., 2015; Luo et al., 2015; Luo, Shi, Yang, Wang, & Han, 2014). Moreover, the activity of the ACC and AI positively correlate with self-reported distress (DeWall et al., 2010; Eisenberger, Lieberman, & Williams, 2003; Luo et al., 2018; Luo, Yu, & Han, 2016; Luo & Zhang, 2018a, 2018b; Luo, Zhu, Kong, & Xu, 2017; Masten et al., 2009). Therefore, monetary loss and pain, including physical pain and social pain, may recruit a common neural substrate, such as insula and ACC.

In this study, we first conducted a neuroimaging meta-analysis to investigate the overlapping neural bases of monetary loss and pain, including physical pain and social pain, with the activation likelihood estimation (ALE) technique (Eickhoff et al., 2009; Eickhoff, Bzdok, Laird, Kurth, & Fox, 2012). Furthermore, if the processing of monetary loss and pain, including social pain and physical pain, engaged overlapping brain regions, we wanted to further explore which type of pain exhibited a more similar neural representation to monetary loss by representational similarity analysis (RSA; Huang, Yu, Long, Huang, & Luo, 2022; Peng & Luo, 2021; Yuan, Long, Huang, Huang, & Luo, 2022).

## 2 | METHODS

### 2.1 | Literature search

For each domain, we searched relevant articles in Google Scholar on December 27, 2019, and supplemented the included literature by

searching articles in PubMed on November 16, 2021. For monetary loss, we used the terms fMRI AND (“monetary loss” OR “lose money” OR “lost money” OR “loses money” OR “money loss” OR “financial loss”) and identified 4012 studies. For physical pain, we used the terms fMRI AND pain AND (“electric stimuli” OR “thermal stimuli” OR “mechanical stimuli” OR “pressure stimuli”) AND participants and identified 4,514 studies. For social pain, we used the terms fMRI AND pain AND (“social pain” OR “social rejection” OR “social exclusion” OR “social ostracism”) and identified 8,103 studies.

### 2.2 | Sample selection

We screened all the studies according to the following criteria (Figure 1): (a) only fMRI studies; (b) only studies that contained whole-brain activation coordinates; (c) only studies whose activation coordinates were represented in Montreal Neurological Institute (MNI) space or Talairach (TAL) space; (d) only studies involving normal participants; (e) only original English studies published in a peer-reviewed journal; (f) only studies without priming or drug administration, since the drug or priming may affect the sensitivity of loss and pain (Bradley et al., 2020; Urtado Silva, Galhardoni, Ciampi de Andrade, & Brito, 2019); and (g) other special criteria. For monetary loss, only studies containing the outcome phase of monetary loss were included, since loss anticipation and outcome may activate distinct brain regions (Dugré et al., 2018). For physical pain, only studies including experimental pain rather than chronic pain were included. Additionally, we explored the brain areas consistently activated across different nociceptive stimuli, and we did not restrict the type of painful stimuli. For social pain, we only included studies involving a direct experience of social pain. Three researchers screened all relevant studies and reached a consensus on these inclusion criteria.

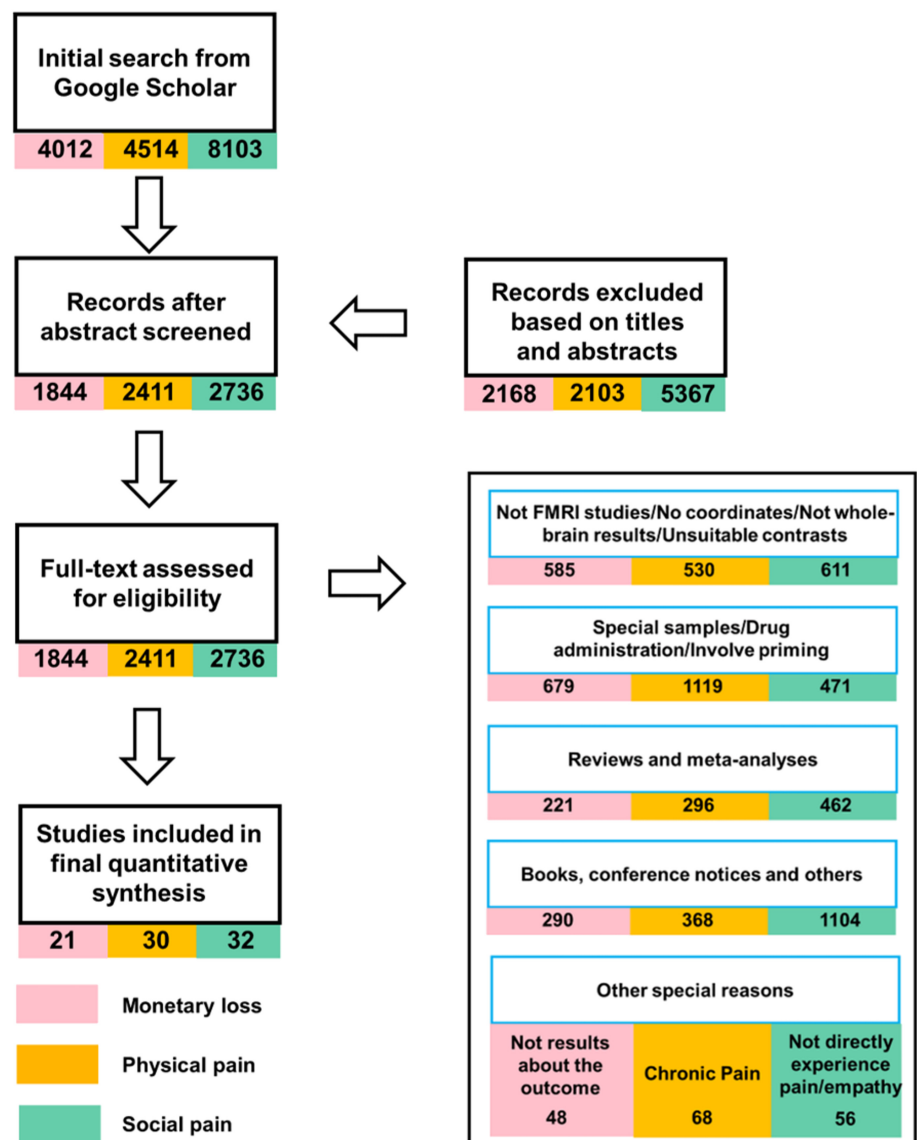
### 2.3 | ALE procedure

We conducted the meta-analysis with the ALE method using the GingerALE software package (Eickhoff et al., 2009, 2012; Eickhoff, Laird, Fox, Lancaster, & Fox, 2016).

#### 2.3.1 | Independent meta-analysis

We first performed an individual meta-analysis of each domain to examine the most concurrent brain regions in each domain. Only coordinates with positive activations were included in our analyses. Additionally, we excluded those activation coordinates detected by a more liberal threshold than the threshold used for the rest of the brain. We first used GingerALE software to convert all the TAL coordinates into MNI coordinates (Eickhoff et al., 2009). Then, we used a three-dimensional Gaussian probability distribution to represent the spatial uncertainty of each activation coordinate, in which the value of each voxel was the probability that the activation coordinate was

**FIGURE 1** The flowchart of the sample selection process



located in this voxel. In each study, for each voxel, we calculated the probability that at least one activation coordinate was located in this voxel, which was called the model activation (MA) value representing the probability of activation of this voxel in this study. Then, we obtained an MA map for each study. Through the integration of all the MA maps, we calculated the ALE value for each voxel, representing the probability that at least one activation coordinate was located in this voxel when considering all relevant papers. Finally, we conducted a permutation test to examine whether these MA maps overlapped. We randomly selected an activation coordinate and its corresponding MA value for each MA map and then calculated an ALE value based on these MA values. After repeating these steps several times, we constructed the null distribution based on the obtained ALE values and calculated the  $p$ -value for each voxel. We applied cluster-level family-wise error correction and used  $p < .001$  as the cluster-forming threshold and  $p < .05$  for cluster-level inference to identify the significantly activated brain regions and correct for false-positive inflation resulting from multiple comparisons (Eickhoff et al., 2009).

### 2.3.2 | Conjunction and contrast analysis

Before conducting the conjunction and contrast analysis, we first merged all the original activation coordinates for each domain pair (monetary loss–physical pain; monetary loss–social pain) and conducted an individual meta-analysis based on these pooled coordinates.

We conducted a conjunction analysis by taking the voxelwise minimum ALE value of those two thresholded individual meta-analysis-derived networks to determine the overlapping brain regions for each domain pair.

We also conducted a contrast analysis for each domain pair to determine the distinct brain regions. For each domain pair, we first pooled all the original activation coordinates of those two meta-analysis networks and randomly split them into two groups (Eickhoff et al., 2011). We calculated the voxelwise ALE values for each group and computed the difference in the ALE values between those two groups for each voxel. After iterating these steps 10,000 times, we produced a null distribution and calculated the  $p$ -value for each voxel

(Laird et al., 2005). Finally, we applied an uncorrected threshold of  $p < .01$  with a minimum cluster size of  $200 \text{ mm}^3$  to correct for false-positive inflation resulting from multiple comparisons. The results of contrast analyses are provided in the Supporting Information.

## 2.4 | Similarity analysis

To further analyze the similarity in neural representations between each domain pair (monetary loss–physical pain; monetary–social pain), according to Schurz et al. (2021), we conducted similarity analyses based on the meta-analytical results at a less conservative statistical threshold of  $p < .005$  uncorrected with a minimum cluster size of  $200 \text{ mm}^3$ .

For each meta-analysis-derived network, we categorized all the significantly activated voxels based on the 17-network parcellation template reported by Yeo et al. (2011). We calculated the percentage of the significant voxels located in each subnetwork among all the voxels significantly activated by that domain, which consisted of the distribution vector. For each network pair, the Spearman correlation coefficient and the Euclidean distance between their corresponding distribution vectors were calculated as indices of their similarity in neural representations.

Additionally, we conducted a RSA based on the representational similarity between those 17 subnetworks within each meta-analysis-derived network. For each domain, we used the following formula to calculate the similarity of each pairwise subnetwork:

$$S_{mn} = 1 - |P_m - P_n| \quad (1)$$

where  $S_{mn}$  represents the similarity of subnetworks  $m$  and  $n$ , and  $P_m$  and  $P_n$  represent the percentages of the significant voxels located in subnetworks  $m$  and  $n$  among all the voxels significantly activated by that domain, respectively. Then, we acquired a similarity matrix for each meta-analysis-derived network, in which the value of each cell was defined as the similarity of each corresponding pairwise subnetwork. For each domain pair, we calculated the Spearman correlation coefficient between their corresponding similarity matrices and tested it using the Mantel permutation test (Mantel, 1967), which was a one-tailed test. The null hypothesis was that the Spearman correlation coefficient between two similarity matrices was  $\leq 0$ . We randomly shuffled the rows and columns of one similarity matrix to construct a new similarity matrix and then calculated the Spearman correlation coefficient between this new similarity matrix and the remaining similarity matrix. After repeating these steps many times, we constructed a null distribution and calculated a  $p$ -value for the observed Spearman correlation coefficient.

## 2.5 | Meta-analytical functional decoding

We decoded the functional characteristics of the meta-analysis network of each domain using the Neurosynth Image Decoder. This platform

calculates the similarity between any meta-analysis network and other meta-analytical maps related to certain terms by computing Pearson's correlation coefficients across all voxels (Bellucci, Molter, & Park, 2019). For each domain, we selected four relevant meta-analytical activation maps (monetary loss domain: stop signal, choices, reward, and error; physical pain domain: somatosensory, sensation, nociceptive, and stimulation; and social pain domain: affective, social, emotional, and mood).

## 3 | RESULTS

### 3.1 | Individual meta-analysis

For monetary loss, one study was excluded from the final ALE meta-analysis because it reported no significant activation coordinates. The monetary loss dataset (Table S1) consisted of 469 participants and 20 studies containing 20 experiments and 151 foci. The ALE meta-analysis of all foci (Figure 2a and Table 1) revealed four significant clusters, involving the right AI (extending to the inferior frontal gyrus and superior temporal gyrus), left AI (extending to the inferior frontal gyrus), anterior cingulate, and lingual gyrus (extending to the inferior occipital gyrus).

The physical pain dataset (Table S2) included 615 participants and 30 studies containing 32 experiments and 568 foci. ALE meta-analyses of all foci revealed eight significant clusters (Figure 2b and Table 1), involving the right AI (extending to the precentral gyrus and lentiform nucleus), left posterior insula (extending to the inferior parietal lobule and postcentral gyrus), anterior cingulate, thalamus (extending to the caudate), postcentral gyrus (extending to the supramarginal gyrus and inferior parietal lobule), right posterior insula, and claustrum.

The social pain dataset (Table S3) comprised 1,201 participants and 32 studies including 34 experiments and 376 foci. ALE meta-analyses of all foci revealed four significant clusters (Figure 2c and Table 1), involving the left AI (extending to the inferior frontal gyrus), anterior cingulate gyrus, and lingual gyrus.

### 3.2 | Conjunction analysis

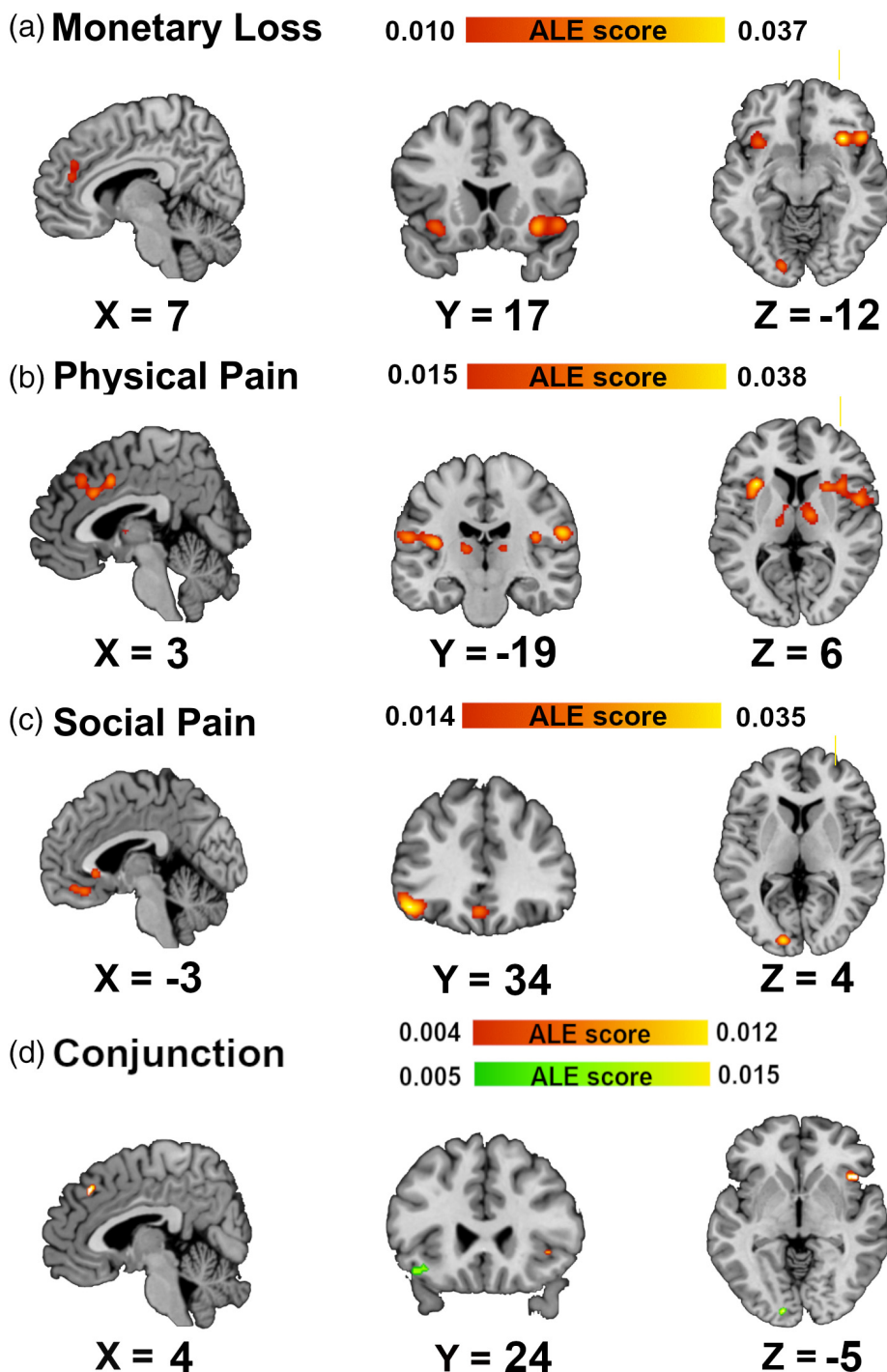
The conjunction analysis between physical pain and monetary loss (Figure 2d and Table 2) revealed two significant clusters, which were located in the right AI and dorsal anterior cingulate. The conjunction analysis between social pain and monetary loss (Figure 2d and Table 2) revealed three significant clusters involving the left AI (extending to the inferior frontal gyrus), inferior occipital gyrus, and lingual gyrus.

### 3.3 | Similarity analysis

For each meta-analysis-derived network, we calculated the percentage of the significant voxels located in each subnetwork among all the

**FIGURE 2** Overview of significant clusters identified in the individual meta-analyses and conjunction analysis.

(a) Meta-analysis of monetary loss.  
 (b) Meta-analysis of physical pain.  
 (c) Meta-analysis of social pain.  
 (d) Conjunction analysis. ALE, activation likelihood estimation; ML-SP, the conjunction analysis between monetary loss and social pain (shown in green); ML-PP, the conjunction analysis between monetary loss and physical pain (shown in red)



voxels significantly activated by that domain (Figure 3). The monetary loss meta-analysis-derived network was mainly located within the visual peripheral, limbic, and default A network; the physical pain meta-analysis-derived network was mainly located within the control A, default C, and default A networks; and the social pain meta-analysis-derived network was mainly located within the limbic and visual peripheral networks. The Spearman correlation coefficient between the distribution vectors of monetary loss and social pain was marginally significant (Spearman's  $\rho = .44$ ,  $p = .079$ ), while the Spearman correlation coefficient between the distribution vectors of monetary loss and physical

pain was insignificant (Spearman's  $\rho = -.01$ ,  $p = .959$ ). Consistently, the distribution vector of monetary loss was closer to the distribution vector of social pain than to physical pain (the Euclidean distance between monetary loss and social pain: .19; the Euclidean distance between monetary loss and physical pain: .46).

The results of the RSA showed a similar pattern (Figure 3). Monetary loss shared more similar neural representations with social pain than physical pain (the Spearman correlation coefficient between the similarity matrices of monetary loss and social pain: Spearman's  $\rho = .51$ ,  $p = .002$ ; the Spearman correlation coefficient between the

**TABLE 1** Significant clusters revealed by the individual meta-analyses

Cluster	Volume (mm <sup>3</sup> )	x	y	z	Region
<i>Monetary loss</i>					
1	4528	32	20	-12	Insula
		48	22	-10	Inferior frontal gyrus/insula
		50	18	-24	Superior temporal gyrus
2	1640	-34	16	-12	Insula
		-48	22	-16	Inferior frontal gyrus/insula
3	1480	6	42	18	Anterior cingulate
		2	36	40	Anterior cingulate
		6	40	28	Anterior cingulate
4	1296	-16	-88	-12	Lingual gyrus
		-12	-94	-2	Inferior occipital gyrus
<i>Physical pain</i>					
1	7408	52	2	4	Precentral gyrus
		36	8	12	Insula
		24	14	4	Lentiform nucleus
		40	18	2	Insula
2	4696	-38	-16	14	Insula
		-64	-28	28	Inferior parietal lobule
		-58	-18	18	Postcentral gyrus
3	4000	2	8	40	Anterior cingulate
		4	20	30	Anterior cingulate
		-2	32	36	Anterior cingulate
		-4	12	50	Anterior cingulate
4	3896	14	-10	8	Thalamus
		14	6	14	Caudate
		-14	-18	10	Thalamus
		-8	-4	4	Thalamus
5	3640	58	-20	22	Postcentral gyrus
		60	-34	38	Supramarginal gyrus
		64	-28	26	Inferior parietal lobule
6	2328	-32	16	6	Clastrum
7	1024	-42	-4	-2	Insula
8	1024	38	-20	18	Insula
		44	-12	14	Insula
<i>Social pain</i>					
1	2784	-46	34	-14	Inferior frontal gyrus
		-36	24	-4	Insula
2	2048	-2	34	-16	Anterior cingulate
		-12	46	-2	Anterior cingulate
3	1560	-14	-92	4	Lingual gyrus
4	1216	0	26	-4	Anterior cingulate

Note: The MNI coordinates (x, y, z) are provided.

similarity matrices of monetary loss and physical pain: Spearman's  $\rho = .02, p = .378$ ).

All these results suggested that the neural representation of monetary loss was more similar to social pain than to physical pain.

### 3.4 | Meta-analytical functional decoding

As shown in Figure 4, the meta-analysis network of each domain was more closely related to the functional roles in the corresponding

**TABLE 2** Significant clusters revealed by the conjunction analysis

Cluster	Volume (mm <sup>3</sup> )	x	y	z	Region
<i>Monetary loss</i> ∩ <i>Physical pain</i>					
1	296	44	20	-6	Insula
		40	20	-6	Insula
2	160	4	34	40	Dorsal anterior cingulate
<i>Monetary loss</i> ∩ <i>Social pain</i>					
1	376	-12	-94	-2	Inferior occipital gyrus
2	120	-36	24	-14	Insula/inferior frontal gyrus
		-44	24	-16	Insula/inferior frontal gyrus
		-40	22	-14	Insula/inferior frontal gyrus
3	32	-14	-90	-8	Lingual gyrus

Note: The MNI coordinates (x, y, z) are provided.

domain relative to the other domains. Moreover, the monetary loss meta-analysis network was more closely related to the functional roles in the social pain domain than the physical pain domain, confirming the hypothesis that the monetary loss meta-analysis-derived network was more similar to the social pain meta-analysis network than to the physical pain meta-analysis-derived network.

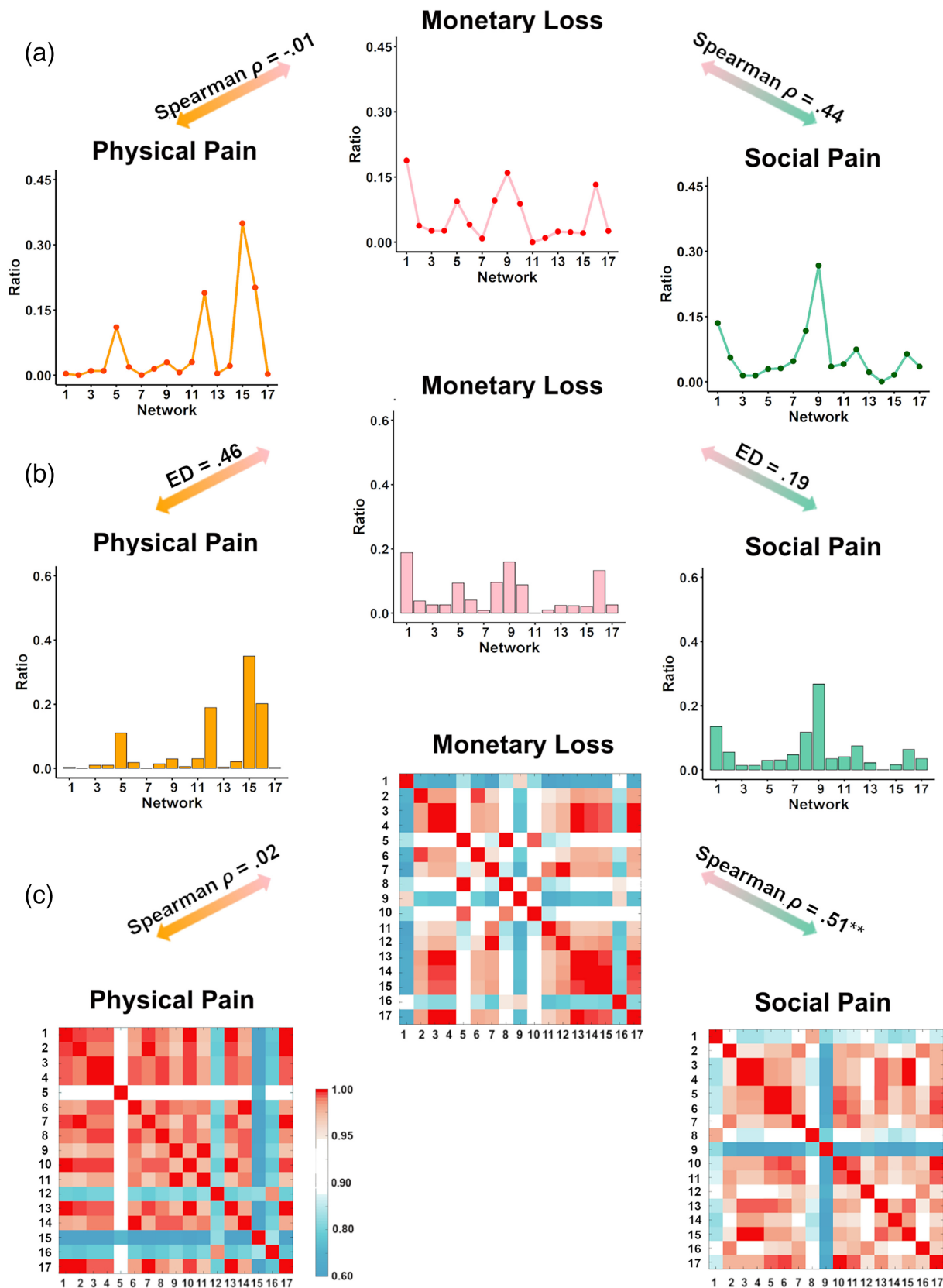
## 4 | DISCUSSION

Current research has shown that monetary loss shares common neural bases with pain. We found that monetary loss and pain, whether physical pain or social pain, engaged overlapping neural regions. Although monetary loss and physical pain coactivated the right AI and dorsal anterior cingulate, monetary loss and social pain coactivated the left AI, inferior occipital gyrus, and lingual gyrus. Furthermore, the neural representation of monetary loss was more similar to social pain than to physical pain. All these results provided persuasive evidence of common neural correlates of monetary loss and pain.

Regardless of the type of pain experienced, activation of the AI was a shared neural representation of monetary loss and pain. The AI is a multifunctional brain region that is involved in various cognitive, perceptual, and socio-affective processes (Clos, Rottschy, Laird, Fox, & Eickhoff, 2014; Kurth, Zilles, Fox, Laird, & Eickhoff, 2010). In particular, activation of the insula plays an important role in affective processing (Koelsch, Cheung, Jentschke, & Haynes, 2021). Therefore, coactivation of the AI might reflect that monetary loss and pain engaged an overlapping neural module of affective processing. Moreover, monetary loss and physical pain coactivated the right AI, whereas monetary loss and social pain coactivated the left AI. This result was consistent with previous findings that the AI was right-lateralized in connectivity with the postcentral gyrus and superior parietal lobule, which were part of the physical pain network (Kann, Zhang, Manza, Leung, & Li, 2016), whereas the left AI was part of memory and socioemotional networks (Clos et al., 2014), and the activation of the left AI was associated with maintaining the feelings of others in working memory (Smith et al., 2017).

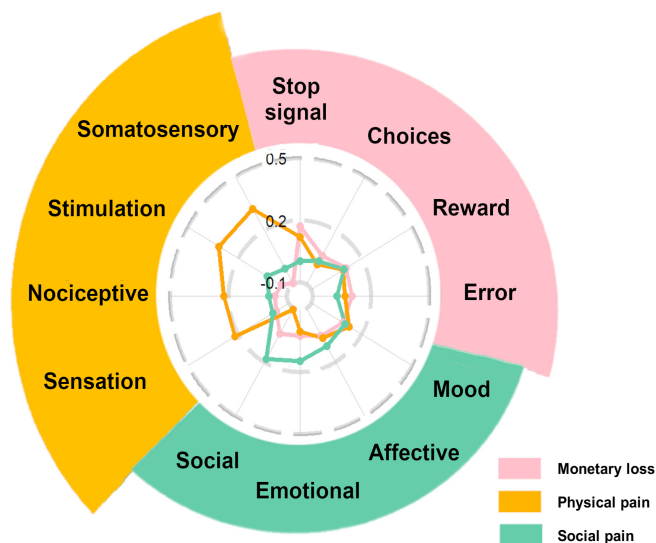
The comparison of activation patterns used three algorithms and consistently showed that the monetary loss network was more similar to the social pain network than to the physical pain network. For individuals, money is not only a physical stimulus but also has rich emotional and social meanings to people, since money can arouse positive or negative emotions (Tang, 1992; Yu, Huang, Mao, & Luo, 2022), elicit individuals' internal motivation (Lea & Webley, 2006), reduce the harm caused by low self-esteem (Zhang, 2009) and change the norms of interpersonal relationships (Vohs et al., 2008; Zaleskiewicz & Gasiorowska, 2016). Moreover, this result provided neural evidence of the social resource theory of money, in which money was regarded as a type of social resource, similar to social relationships, which might elicit pain and a sense of security (Zhou et al., 2009; Zhou & Gao, 2008).

We admitted that our research had several limitations. For one thing, results of similar analyses may be due to higher similarities in sensory system between monetary loss and social pain compared to physical pain. The reason was that the sensory system of physical pain was the somatomotor system while the sensory system of both monetary loss and social pain was the visual system. However, we excluded this possibility by replicating the similarity analyses without including the somatomotor and visual networks. We got similar results to the previous ones (Figures S3 and S4), suggesting that the neural representation of monetary loss shared more similarities with that of social pain beyond the level of sensory system. For another thing, our research investigated the shared neural bases underlying monetary loss and pain by exploring whether processing these two events involved overlapping neural regions while ignoring the possibility of the involvement of overlapping functional connectivities. Previous studies have reported that the processing of social stimuli and monetary stimuli recruits overlapping functional connectivities by investigating the relationship between social reward and monetary reward (Gu et al., 2019). However, we remained unclear whether the processing of monetary loss and social pain also involved overlapping functional connectivities. Future studies could use meta-analytic connectivity modeling to investigate the neural correlates of monetary loss and social pain from the perspective of functional connectivity.



**FIGURE 3** Results of the similarity analysis. (a, b) Line and bar charts of the percentage of the significant voxels located in each subnetwork among all the voxels significantly activated by that domain. ED, Euclidean distance. (c) Representational similarity matrices of three domains. The value of each cell represents the similarity of each pairwise subnetwork. The name of 17 subnetworks: 1—visual peripheral network, 2—visual central network, 3—somatomotor A network, 4—somatomotor B network, 5—dorsal attention A network, 6—dorsal attention B network, 7—ventral attention network, 8—salience network, 9—limbic network, 10—limbic network, 11—control C network, 12—control A network, 13—control B network, 14—default D network, 15—default C network, 16—default A network, and 17—default B network. \* $p < .05$  and \*\* $p < .01$





**FIGURE 4** Results of meta-analytical functional decoding

## 5 | CONCLUSIONS

In conclusion, our research revealed the shared neural bases underlying monetary loss and pain. We showed that the processing of monetary loss and pain engaged overlapping neural regions by conducting an ALE neuroimaging meta-analysis. Regardless of the type of pain experienced, activation of the AI was a shared neural representation of monetary loss and pain. Moreover, the neural representation of monetary loss was more similar to that of social pain than to that of physical pain. Therefore, our research provided persuasive neural evidence for the shared neural bases between monetary loss and pain.

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### CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

### AUTHOR CONTRIBUTIONS

*Designed the research:* Huixin Tan, Yihan Liu, Xinyu Qiao, and Siyang Luo. *Conducted the experiments:* Huixin Tan, Yihan Liu, and Xinyu Qiao. *Analyzed the data:* Huixin Tan, Qin Duan, Yihan Liu, and Xinyu Qiao. *Wrote the manuscript:* Huixin Tan, Qin Duan, and Siyang Luo. *Commented on the manuscript:* Huixin Tan, Qin Duan, Yihan Liu, Xinyu Qiao, and, Siyang Luo.

### ETHICS STATEMENT

All procedures in studies involving human participants were performed in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. All

participants provided written informed consent, and the study was approved by the Department of Psychology of Sun Yat-sen University Ethics Committee.

### DATA AVAILABILITY STATEMENT

All data are available in Tables S1–S3. The thresholded and unthresholded meta-analysis map can be downloaded from <https://neurovault.org/collections/11982/>. The software used in our research is publicly accessible: GingerALE 2.3.6 (<http://www.brainmap.org/ale/>), and R 4.0.4 (<https://www.r-project.org/>).

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