Journal of Affective Disorders Reports 16 (2024) 100771

Contents lists available at ScienceDirect

Journal of Affective Disorders Reports

journal homepage: www.sciencedirect.com/journal/journal-of-affective-disorders-reports

Exploring the complex relationship between depression and risky decision-making: A meta-analysis

Tao Wang, Jianmin Zeng *, Yujie Yuan, Ying He, Jiayi Zhu, Beitong Lin, Qiao Yin, Peiru Peng

Sino-Britain Center for Cognition and Ageing Research, Faculty of Psychology, Southwest University, Beibei District, Chonqing, China

ARTICLE INFO

Keywords:
Risky decision-making
Depression
The Iowa Gambling Task
The Balloon Analog Risk Task
Age

ABSTRACT

Numerous studies have examined the association between depression and risky decision-making, but the results are mixed. To address this issue, we conducted a meta-analysis of risky decision-making in individuals with current Major depressive disorder (MDD). Patients with MDD exhibit divergent performances in risky decision-making across various tasks. Specifically, MDD patients tend to select the disadvantageous decks in the Iowa Gambling Task ($SMD = 0.40$; 95%$CI = 0.09$ to 0.70; $p = 0.011$), make fewer pumps on the balloon in the Balloon Analog Risk Task ($SMD = -0.29$; 95%$CI = -0.47$ to -0.12; $p < 0.01$), and demonstrate similar performance in the Cambridge Gambling Task and the Game of Dice Task when compared to healthy controls. The meta-regression analysis revealed that age exhibits a significant correlation with the effect size in the Balloon Analog Risk Task ($z = 2.375$, $p = 0.018$, 95%$CI = [0.004,0.043]$). The subgroup analysis showed a significant difference in effect sizes among age groups within both the Iowa Gambling Task ($Q = 9.34$, $df = 3$, $p = 0.025$) and the Balloon Analog Risk Task ($Q = 6.48$, $df = 1$, $p = 0.011$). These findings indicate that MDD might impair the distinct process of risky decision-making, and age may paly vital role in the performance of MDD patients in risky decision-making. Understanding this could potentially facilitate more effective clinical interventions, thus reducing the burden on society.

1. Introduction

Depression, known as the leading cause of disability globally (Ferrari et al., 2013), significantly burdens society (Greenberg and Birnbaum, 2005; Konig et al., 2020; Zhdanava et al., 2021). Characterized by a pervasive low mood and an aversion to activity, Depression includes a spectrum of depressive disorders, notably Major Depressive Disorder (MDD). MDD, also known as clinical depression, represents the classic condition of depression. It is characterized by discrete episodes of at least 2 weeks' duration (although most episodes last considerably longer) involving clear-cut changes in affect, cognition, and neuro-vegetative functions and inter-episode remissions (American Psychiatric Association & Association, 2013). MDD has been found to be related to a broad range of impairments across cognitive domains, such as decision-making (Ahern and Semkovska, 2017; Rock et al., 2014; Snyder, 2013). Compared to healthy controls, MDD patients exhibited a higher propensity for engaging in risk-taking behaviors, such as binge drinking, cannabis use, and delinquency (Bannink et al., 2015; Langille et al., 2012; Testa and Steinberg, 2010). With greater attention to the association between risky behaviors and MDD, increasing studies have explored the effect of MDD on risky decision-making through experimental games, such as the Iowa Gambling Task (IGT) and the Balloon Analogue Risk Task (BART), but the results are mixed.

Previous meta-analysis of risky decision-making in mood disorders have most concentrated on bipolar disorder (Edge et al., 2013; Ramirez-Martin et al., 2020; Richard-Devantoy et al., 2016), with limited research focusing on Major depressive disorder. So far, only one meta-analysis employing IGT paradigm was found that has partially addressed the risky propensity of unipolar patient (Richard-Devantoy et al., 2016). but its results blended the risk propensity of current MDD and remitted MDD patients, and its conclusion were drawn from just five articles. Therefore, its findings may not fully reflect the risk decision-making of patients with depression. To address this issue, this meta-analysis includes various paradigms to comprehensively capture the relationship between MDD and risky decision-making. Considering the differences between remitted MDD and current MDD (Wang et al., 2023), this meta-analysis focuses on examining the impact of current MDD on risky decision-making.

* Corresponding author.
E-mail address: james_psych@yeah.net (J. Zeng).

https://doi.org/10.1016/j.jadr.2024.100771
Received 27 December 2023; Received in revised form 2 March 2024; Accepted 22 March 2024
Available online 27 March 2024

In many real-world decisions, probabilities are uncertain, and individuals often make judgments based on their past experiences. To better reflect real-world risk decision-making, we opted for four well-known and widely used decision-making paradigms, namely the Iowa Gambling Task (IGT), the Balloon Analogue Risk Task (BART), the Cambridge Task (CGT), and the Game of Dice Task (DGT), because the payoff distributions in these paradigms are unknown, thus aligning more closely with real-world decision-making. While all of these tasks claim to measure risk-taking, there are significant differences in the task structure, task focus, and outcome measurement. Studies have shown that there is no significant correlation in the performance of individuals in different task, i.e., IGT and BART (Aklin et al., 2005; Bishara et al., 2009; Lejuez et al., 2003). Some researchers believe that IGT and BART measure unique and non-overlapping decision processes (Buelow and Blaine, 2015). Therefore, Separate meta-analyses were conducted for each paradigm to ensure homogeneity among the studies.

To sum up, we aim to produce a quantitative summary of this literature by conducting a meta-analysis of risky decision-making in individuals with current MDD. This could potentially facilitate more effective clinical interventions, thus reducing the burden on society.

2. Methods

2.1. Inclusion and exclusion criteria

The inclusion criteria for this meta-analysis were as follows: 1) Participants included individuals diagnosed with current MDD (including first episode and recurrent MDD) according to the Diagnostic and Statistical Manual of Mental Disorders (DSM) or the International Classification of Diseases (ICD); 2) The intervention methods incorporate at least one of the tasks, including IGT, BART, CGT, and GDT; 3) The comparators were healthy controls; 4) The eligible studies included case-control or cross-sectional designs; 5) Peer-reviewed empirical papers; 6) Studies presented in English

Studies were excluded if, 1) Patients with bipolar disorders, schizophrenia, major psychosis, dementia, neurologic diseases (including head injury); 2) samples overlapping with other included data sets; 3) insufficient statistical information for calculating effect size.

2.2. Literature search

A comprehensive literature search without date restrictions was conducted on the Web of Science, PubMed, PsycInfo, and Medline databases. The following keywords were used to search for participants: depress* or dysthymi* or affect disorder* or affective symptom* or mood disorder*. The keywords used to search for interventions included: Iowa Gambling task, the Balloon Analog Risk Task, the Cambridge Gambling Task, the Game of Dice Task, as well as their corresponding abbreviations (i.e., BART) and variations (i.e., the Balloon Analogue Risk Task), Gamb* task, decision-making task, decision making task, and risk* task. Furthermore, the bibliographies of previous reviews or meta-analyses on relevant topics were manually reviewed. The final literature search was conducted in August 2023.

2.3. Coding and calculation of effect sizes

For all of included studies, the following data were coded: the first author's name, publication date, average age, gender, average years of education, medication status of the MDD group, depressive severity, behavioral tasks, sample size (*N*), mean effect measures (*M*), and their standard deviation (*SD*). Two independent reviewers conducted the data extraction and cross-checked the results for any discrepancies. Any deviations were resolved through discussion.

As for effect size, Cohen's *d* was calculated for group comparison, by computing the difference in risk-taking levels between the current MDD patients and the healthy controls, and then dividing this difference by the pooled standard deviation. The effect sizes were coded in such a way that positive values represented higher risk-taking levels by MDD patients, whereas negative values represented higher risk-taking levels by the healthy controls. To correct for overestimation of the effect size related to small sample sizes, we transformed Cohen's *d* to Hedges's *g* (Hedges and Olkin, 1985). Effect sizes were calculated in line with the general systematic approach via website (https://www.campbellcollaboration.org/research-resources/effect-size-calculator.html). In interpreting the standardized mean differences (SMD), we follow Cohen's guidelines (Cohen, 1992), with values of 0.2 indicating small, values of 0.5 indicating medium, and values of 0.8 indicating large effect sizes.

The effect sizes were calculated based on means and standard deviations or standard errors when possible; occasionally, *F, t*, or *p* values were used with sample size to estimate the effect size. When these types of statistics were not reported, we contacted the author requesting the raw data of the risky decision-making tasks. However, if the request was not successful or sufficient information could not be extracted from the corresponding graphs, we had to exclude those studies from the meta-analysis.

2.4. Handling of multiple effect sizes

Ten studies contained multiple effect sizes because multiple groups were investigated. For these studies, we merged the mean and standard deviation (SD) of the different subgroups via a website (https://www.statstodo.com/CombineMeansSDs.php). Two studies contained multiple effect sizes because multiple tasks were administered, we extracted the decision-making scores on each task separately.

2.5. Statistical analysis

The random-effects model was used to calculate the overall effect size for different decision-making tasks separately. After an overall effect size was calculated, Hedges' *g* was calculated as the effect size.

Heterogeneity was tested using the *Q* test and I^2 statistic. Cochran's Q test serves to detect the presence of heterogeneity in meta-analyses, whereas the I^2 statistic quantifies its extent. A significant result in Cochran's Q test indicates heterogeneity. An I^2 value of 0% suggests no observed heterogeneity, with higher values indicating greater heterogeneity. Typically, I^2 values of 25%, 50%, and 75% represent low, moderate, and high heterogeneity, respectively. Publication bias was assessed using the funnel plots, trim and fill method, and Egger's tests. Sensitivity analysis was conducted to investigated the robustness of the overall results by removing one study at a time to evaluate the weights of individual studies on the pooled SMDs.

To account for expected between-study variance, we performed a random effects meta-regression. Moderator variables were as follows: depression severity, average age, gender, medication status, average years of education, publication year and article quality. depression severity was coded as mild, moderate, or severe based on the specific criteria provided by the relevant measurement scales. Average age refers to the mean age of the depression group and the healthy group within the study, which was represented in continuous form. Gender indicates the proportion of females. medication status was categorized as either entirely unmedicated or at least partially medicated. Like average age, average years of education, publication year and article quality were represented in continuous form. In the moderator analyses, each potential moderator was included individually. Furthermore, subgroup analysis was conducted on the following variables: depression severity, medication status, and average age (represented categorically with age groups defined as adolescent (< 18), youth ($18 \leq$ age < 24), adult ($24 \leq$ age < 60), and older (≥ 60)).

All statistical analysis were conducted with the meta-analysis package Metafor (version 4.4–0) and meta (version 6.5–0) in the statistic software R (version 4.3.1).

3. Results

3.1. Characteristics of included studies

A total of 37 studies which met the inclusion criteria were enrolled, of which 23 studies used IGT, 9 studies used BART, 4 studies used CGT, and one studies used GDT. Most of the articles were obtained through database searches, with only one article (i.e., Moniz et al. (2017)) identified through reference lists of eligible literature. After removing duplicates, we obtained 1901 articles. After screening by titles and abstracts, 97 articles entered the full-text screening process. Among them, 59 articles were excluded for not meeting the inclusion criteria. One article (i.e., Hevey et al. (2017)) was classified as "other reasons" and excluded, as the experimental paradigm structure did not meet our standards. In this article, the authors informed participants of the best strategy in the instructions, allowing them to adjust only on the anchor (i.e., the best strategy) without the need for learning through experience.A summary of the screening process is presented in Fig. 1. The methodological quality of the studies, as assessed by Newcastle-Ottawa Scale (NOS), is presented in the Supplementary materials. most included studies were scored with seven or more stars, classifying them as high-quality research. All information regarding the included articles can be found in the supplementary material.

3.2. The Iowa Gambling Task

Within IGT, a total of 23 studies were included, involving 1895 participants, of which 1047 were individuals with current MDD. The overall effect size analysis revealed that individuals with MDD select more disadvantageous decks than the healthy controls ($SMD = 0.40$; 95%$CI = 0.09$ to 0.70; $p = 0.011$; $I^2 = 89.81\%$; $P_{\text{heterogeneity}} < 0.001$) (see Fig. 2).

Egger's test showed that funnel plot is symmetrical ($z = -0.50$, $p = 0.62$), and trim and fill method indicated that 0 studies are missing on the right side (see Fig. 3). these results therefore do not suggest publication bias. Next, it was examined whether the overall effect size was overly influenced by any single effect size by using the "leave one out" method. The minimum of estimates was 0.33, with a p-value of 0.046 and a 95% confidence interval of [0.05,0.61], and the maximum of estimates was 0.47, with a p-value less than 0.01 and a 95% confidence interval of [0.20,0.74]. Results shows that sensitivity analysis was quite robust for the meta-analysis.

The results of meta-regression indicated that there was no significant association between effect size and any of the considered factors. In the subgroup analysis, a significant difference in effect sizes was found only between the age subgroup based on Q statistics ($Q = 9.34$, $df = 3$, $p = 0.025$). Details are presented in Table 1.

3.3. The Balloon Analogue Risk Task

Within BART, 9 studies were included, encompassing 1036 participants, with 589 of them diagnosed with current MDD. The overall effect size analysis revealed that individuals with MDD make fewer pumps on the balloon compared to the healthy controls ($SMD = -0.29$; 95%$CI = -0.47$ to -0.12; $p < 0.01$; $I^2 = 46.69\%$; $P_{\text{heterogeneity}} > 0.05$). For more details, refer to Fig. 4.

Fig. 5 displays the funnel plot after trim-and-fill, indicating that no studies are missing on the left side. The results of Egger's test demonstrated the symmetry of the funnel plot too ($z = 0.086$, $p = 0.931$). All of these findings collectively indicate the absence of publication bias. Sensitivity analysis indicated that influences of single effect size have a small impact, insufficient to reverse the outcome. Mete-regression revealed that only age exhibits a significant correlation with the effect size, explaining 71.43% of the heterogeneity ($z = 2.375$, $p = 0.018$, 95% CI = [0.004,0.043]). The subgroup analysis showed a significant difference in effect sizes among age groups ($Q = 6.48$, $df = 1$, $p = 0.011$). But no significant differences were observed between depression severity or medication status. Table 2 displayed the detailed results for the age subgroups.

3.4. The Cambridge Gambling Task

Within CGT, 4 studies were incorporated, involving 345 participants, among whom 136 were patients with MDD. Fig. 6 showed that there were no significant differences in risky decision-making performance between the depressive group and the healthy group. Due to the limited number of included studies, we refrained from conducting further analyses on the CGT.

3.5. The Game of Dice Task

Only one study was included in the GDT, comprising 23 healthy controls and 48 patients with current MDD. The results did not reveal significant difference in the risky decision-making performance between MDD patients and healthy controls ($SMD = 0.23$; 95%CI = −0.27 to 0.73).

4. Discussion

The main objective of this meta-analysis was to systematically

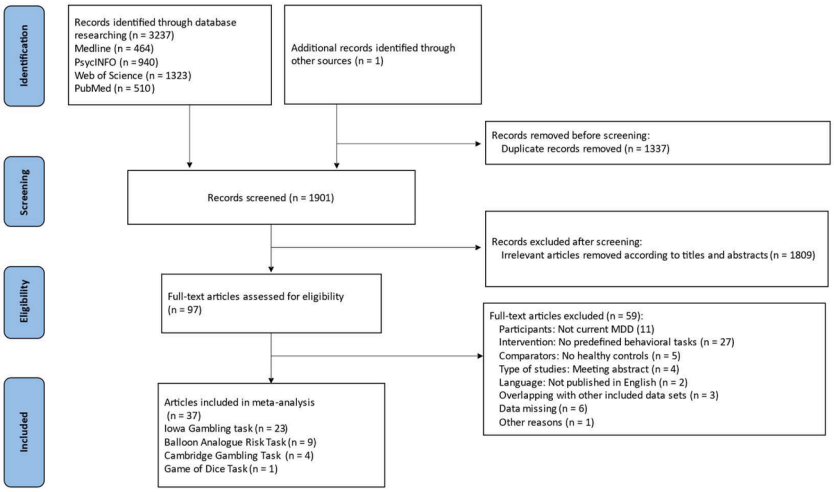

Fig. 1. The flow diagram of included studies. "n" represents the number of articles.

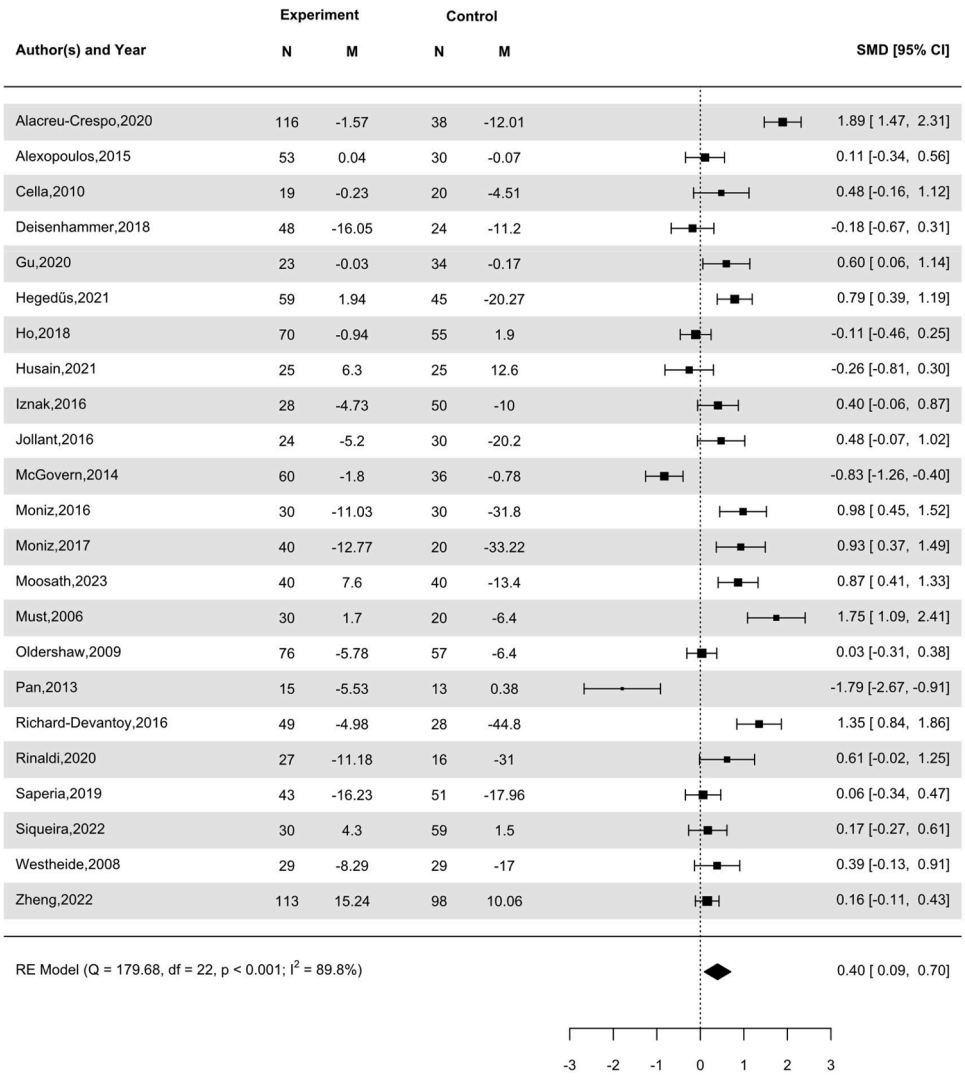

Fig. 2. Forest plot of pooled effect size on IGT.

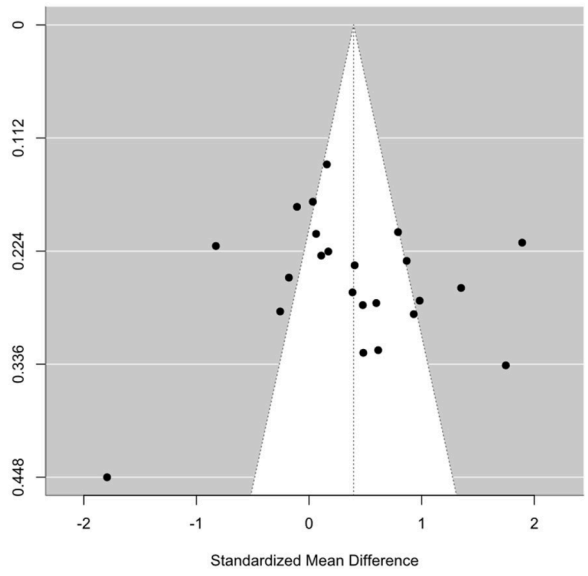

Fig. 3. Funnel plot with pseudo 95% confidence limits on IGT.

identify risky decision-making of patients with current MDD, as well as the impact of depression-related factors and demographic factors on risky decision-making. Results on IGT indicate that MDD patients are characterized by more risky decision making than healthy controls, with a small to medium effect size. However, the results on BART were contrary to those of IGT, indicating that the MDD patients exhibited a lower propensity for risky decision-making, with a small effect. No significant differences were found between MDD patients and the healthy controls on CGT and GDT. Meta-regression analyses of IGT indicate no significant association between effect size and any of the considered factors. In the case of BART, only age exhibits a significant correlation with the effect size. The subgroup analysis showed a significant difference in effect sizes among age groups within both IGT and BART.

We found that MDD patients exhibited contrasting risky preferences on the IGT and the BART. One possible reason is that the IGT emphasizes long-term risk assessment, while the BART places greater emphasis on short-term risk assessment. MDD patients exhibit a higher discount rate for large rewards (Pulcu et al., 2014), and make choices that minimize current pain and maximize current reward, despite severe later consequences or lost opportunities (Engelmann et al., 2013). Alterations in the experience of reward might make individuals with depression more sensitive to short-term rewards and punishments. Therefore, MDD patients focus on short-term gains while neglecting long-term losses,

Table 1
Results for age subgroups on IGT.

Group	k	SMD	95% CI	tau^2	tau	Q	I^2
Adolescent	2	−0.8307	[−2.6182; 0.9567]	1.5480	1.2442	13.87	92.8%
Youth	1	0.8669	[0.4075; 1.3263]	–	–	0.00	–
Adult	17	0.5956	[0.2970; 0.8943]	0.3281	0.5728	109.47	85.4%
Older	3	−0.1847	[−0.8196; 0.4502]	0.2645	0.5143	12.71	84.3%

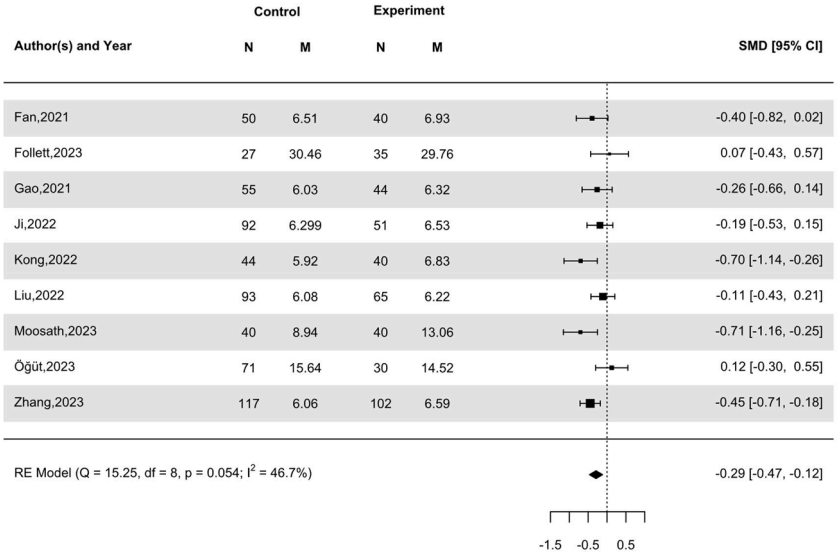

Fig. 4. Forest plot of pooled effect size on BART.

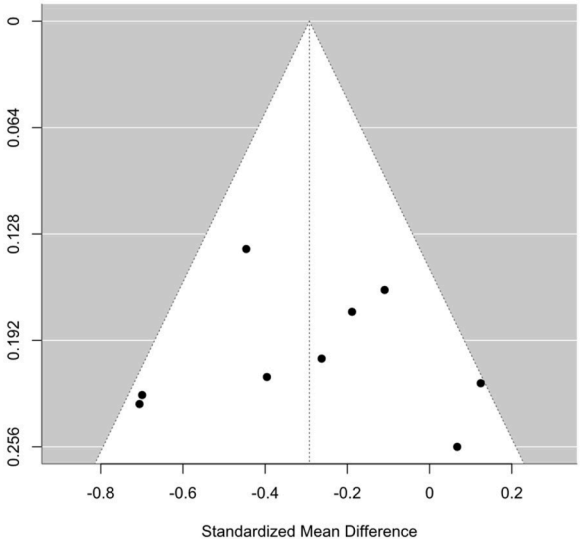

Fig. 5. Funnel plot with pseudo 95% confidence limits on BART.

Table 2
Results for age subgroups on BART.

Group	k	SMD	95% CI	tau^2	tau	Q	I^2
Youth	7	−0.3719	[−0.5343; −0.2095]	0.0131	0.1145	8.52	29.6%
Adult	2	0.1004	[−0.2250; 0.4258]	0	0	0.03	0.0%

leading to their increased selection of disadvantageous decks in the IGT, and they make fewer balloon pumps in the BART to avoid pain caused by immediate loss. Another possible reason is the distinction between one-shot and sequential decision-making associated with IGT and BART. Within a single trial, the IGT requires participants to select one card from four (Bechara et al., 1994), while the BART task demands participants to inflate a balloon (Lejuez et al., 2002). In the IGT task, patients with MDD demonstrated heightened risk-taking, potentially driven by the pursuit of immediate rewards to counteract negative emotions. Conversely, BART confronts patients with MDD with a series of continuous decisions within one trial. Participants must evaluate the risk that further inflation could cause the balloon to burst, leading to considerable loss. The conservatism of MDD patients may stem from an oversensitivity to potential losses or a fear of negative outcomes.

In the context of IGT, age subgroup analysis has revealed significant results, suggesting potential significant differences in effect size among different age groups. However, when age is considered as a continuous variable in meta-regression analysis, we did not find a significant overall impact on effect size. This indicates that, although a significant correlation exists between age and effect size within specific age ranges, this correlation does not manifest statistically when treating all age ranges as a continuous spectrum. One potential explanation for this difference is that subgroup analysis can unveil effects under specific conditions, while meta-regression analysis, due to its continuous nature, broader age range, and higher variability, may not detect significant effect size variations statistically. Another possibility is that a limited number of studies included within specific age ranges may introduce bias. Multiple studies have identified gender differences in the performance of the IGT (Bolla et al., 2004; Byrne and Worthy, 2016; d'Acremont and Van der Linden, 2006), wherein males prioritize long-term outcomes, whereas females are more attentive to the frequency of losses. However, this meta-analysis did not reveal that gender impacts the risk decision-making of MDD patients. One possible reason is that most studies neutralized potential biases by balancing the gender ratio. On

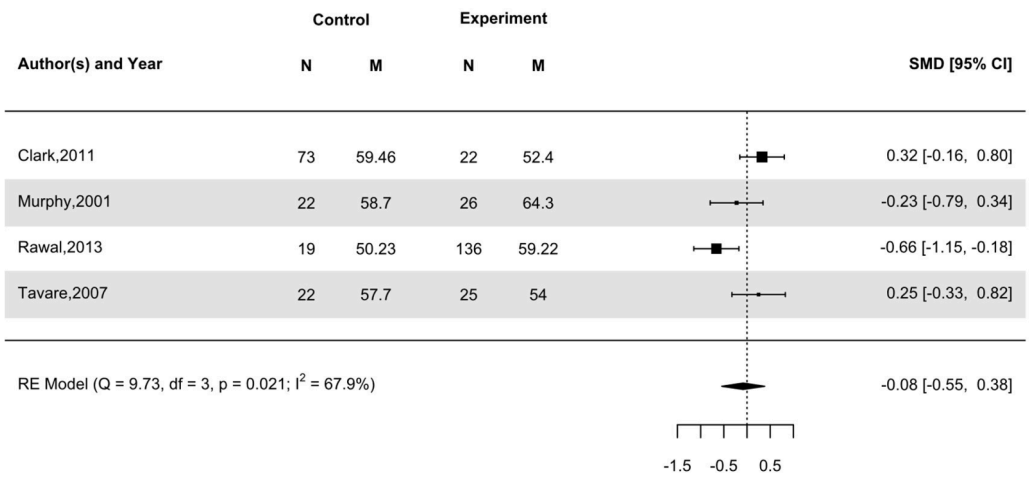

Fig. 6. Forest plot of pooled effect size on CGT.

the other hand, MDD may diminish the effect of gender differences, but this hypothesis requires further validation. In the context of BART, we observed that age is not only significant in subgroup analysis but also emerges as a crucial effect modifier in meta-regression analysis. Furthermore, in the healthy population, previous meta-analyses have confirmed age differences in risk decision-making (Defoe et al., 2015). Considering the findings of this study, age might play a crucial role in the risk decision-making of individuals with depression.

4.1. Limitations

This study has several limitations. Firstly, we could not establish causal relationships between risky decision-making and MDD, due to the fact that the analyzed studies were cross-sectional. Secondly, we failed to differentiate between decisions made under ambiguity and those made under risk in the Iowa Gambling Task, as individual deck selection data were unavailable in most eligible articles.

5. Conclusion

Risky decision-making is complex, not a unitary construct (Bishara et al., 2009; Blankenstein et al., 2021; Reynolds et al., 2006; Weber et al., 2002). Different task structures may lead to measurement of different combinations of psychological processes. This meta-analysis reveals that patients with MDD exhibit divergent performances in risky decision-making across various tasks, suggesting that depression may impair distinct processes of risky decision-making. Understanding this could potentially facilitate more effective clinical interventions, thus reducing the burden on society.

Funding source

There is no financial support in this article.

CRediT authorship contribution statement

Tao Wang: Writing – original draft, Software, Methodology, Conceptualization, Investigation, Formal analysis, Data curation. **Jianmin Zeng:** Writing – review & editing, Supervision. **Yujie Yuan:** Formal analysis, Data curation, Investigation. **Ying He:** Data curation, Methodology. **Jiayi Zhu:** Data curation, Investigation. **Beitong Lin:** Data curation, Investigation. **Qiao Yin:** Data curation, Investigation. **Peiru Peng:** Data curation, Investigation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

Gratitude is extended to all collaborators for their sincere support and contributions.

References

Ahern, E., Semkovska, M., 2017. Cognitive functioning in the first-episode of major depressive disorder: a systematic review and meta-analysis [Review] Neuropsychology 31 (1), 52–72. https://doi.org/10.1037/neu0000319.

Aklin, W.M., et al., 2005. Evaluation of behavioral measures of risk taking propensity with inner city adolescents. Behav. Res. Ther. 43 (2), 215–228. https://doi.org/10.1016/j.brat.2003.12.007.

American Psychiatric Association, D., & Association, A. P., 2013. Diagnostic and Statistical Manual of Mental Disorders: DSM-5 (Vol. 5). American Psychiatric Association, Washington, DC.

Bannink, R., et al., 2015. Depressive symptoms and clustering of risk behaviours among adolescents and young adults attending vocational education: a cross-sectional study [Article] BMC Public Health 15. https://doi.org/10.1186/s12889-015-1692-7. Article 396.

Bechara, A., et al., 1994. Insensitivity to future consequences following damage to human prefrontal cortex. Cognition 50 (1–3), 7–15. https://doi.org/10.1016/0010-0277(94)90018-3.

Bishara, A.J., et al., 2009. Similar processes despite divergent behavior in two commonly used measures of risky decision making. J. Behav. Decis. Mak. 22 (4), 435–454. https://doi.org/10.1002/bdm.641.

Blankenstein, N.E., et al., 2021. Resolving ambiguity: broadening the consideration of risky decision making over adolescent development. Dev. Rev. 62 https://doi.org/10.1016/j.dr.2021.100987. Article 100987.

Bolla, K.I., et al., 2004. Sex-related differences in a gambling task and its neurological correlates. Cereb. Cortex 14 (11), 1226–1232. https://doi.org/10.1093/cercor/bhh083.

Buelow, M.T., Blaine, A.L., 2015. The assessment of risky decision making: a factor analysis of performance on the Iowa Gambling Task, Balloon Analogue Risk Task, and Columbia Card Task. Psychol. Assess. 27 (3), 777–785. https://doi.org/10.1037/a0038622.

Byrne, K.A., Worthy, D.A., 2016. Toward a mechanistic account of gender differences in reward-based decision-making. J. Neurosci. Psychol. Econ. 9 (3–4), 157–168. https://doi.org/10.1037/npe0000059.

Cohen, J., 1992. A power primer. Psychol. Bull. 112 (1), 155.

d'Acremont, M., Van der Linden, M., 2006. Gender differences in two decision-making tasks in a community sample of adolescents. Int. J. Behav. Dev. 30 (4), 352–358. https://doi.org/10.1177/0165025406066740.

Defoe, I.N., et al., 2015. A meta-analysis on age differences in risky decision making: adolescents versus children and adults. Psychol. Bull. 141 (1), 48–84. https://doi.org/10.1037/a0038088.

Edge, M.D., et al., 2013. Iowa gambling task performance in euthymic bipolar I disorder: a meta-analysis and empirical study. J. Affect. Disord. 150 (1), 115–122. https://doi.org/10.1016/j.jad.2012.11.027.

Engelmann, J.B., et al., 2013. Posttraumatic stress disorder increases sensitivity to long term losses among patients with major depressive disorder. PLoS ONE 8 (10). https://doi.org/10.1371/journal.pone.0078292. Article e78292.
Ferrari, A.J., et al., 2013. Burden of depressive disorders by country, sex, age, and year: findings from the global burden of disease study 2010. PLoS Med. 10 (11) https://doi.org/10.1371/journal.pmed.1001547. Article e1001547.
Greenberg, P.E., Birnbaum, H.G., 2005. The economic burden of depression in the US: societal and patient perspectives. Expert Opin. Pharmacother. 6 (3), 369–376. https://doi.org/10.1517/14656566.6.3.369.
Hedges, L.V., & Olkin, I. (1985). Statistical methods for meta-analysis.
Hevey, D., et al., 2017. Clinical depression and punishment sensitivity on the BART. Front. Psychol. 8, 7. https://doi.org/10.3389/fpsyg.2017.00670.
Konig, H., et al., 2020. The excess costs of depression: a systematic review and meta-analysis. Epidemiol. Psychiatr. Sci. 29 https://doi.org/10.1017/s2045796019000180. Article e30.
Langille, D., et al., 2012. Risk of depression and multiple sexual risk-taking behaviours in adolescents in Nova Scotia, Canada [Article] Sex. Health 9 (3), 254–260. https://doi.org/10.1071/sh11029.
Lejuez, C.W., et al., 2003. The Balloon Analogue Risk Task (BART) differentiates smokers and nonsmokers. Exp. Clin. Psychopharmacol. 11 (1), 26–33. https://doi.org/10.1037/1064-1297.11.1.26.
Lejuez, C.W., et al., 2002. Evaluation of a behavioral measure of risk taking: the Balloon Analogue Risk Task (BART). J. Exp. Psychol. Appl. 8 (2), 75–84. https://doi.org/10.1037/1076-898x.8.2.75.
Moniz, M., et al., 2017. The influence of planning and response inhibition on cognitive functioning of non-psychotic unipolar depressed suicide attempters. Eur. J. Psychol. 13 (4), 717–732. https://doi.org/10.5964/ejop.v13i4.1385.
Pulcu, E., et al., 2014. Temporal discounting in major depressive disorder. Psychol. Med. 44 (9), 1825–1834. https://doi.org/10.1017/s0033291713002584.
Ramirez-Martin, A., et al., 2020. Impulsivity, decision-making and risk-taking behaviour in bipolar disorder: a systematic review and meta-analysis. Psychol. Med. 50 (13), 2141–2153. https://doi.org/10.1017/s0033291720003086. Article Pii s0033291720003086.
Reynolds, B., et al., 2006. Dimensions of impulsive behavior: personality and behavioral measures. Personal. Individ. Differ. 40 (2), 305–315. https://doi.org/10.1016/j.paid.2005.03.024.
Richard-Devantoy, S., et al., 2016. Decision-making in unipolar or bipolar suicide attempters. J. Affect. Disord. 190, 128–136. https://doi.org/10.1016/j.jad.2015.10.001.
Rock, P.L., et al., 2014. Cognitive impairment in depression: a systematic review and meta-analysis. Psychol. Med. 44 (10), 2029–2040. https://doi.org/10.1017/s0033291713002535.
Snyder, H.R., 2013. Major depressive disorder is associated with broad impairments on neuropsychological measures of executive function: a meta-analysis and review. Psychol. Bull. 139 (1), 81–132. https://doi.org/10.1037/a0028727.
Testa, C.R., Steinberg, L., 2010. Depressive symptoms and health-related risk-taking in adolescence [Article] Suicide Life-Threat. Behav. 40 (3), 298–305. https://doi.org/10.1521/suli.2010.40.3.298.
Wang, Z., et al., 2023. Common and distinct patterns of task-related neural activation abnormalities in patients with remitted and current major depressive disorder: a systematic review and coordinate-based meta-analysis [Review] Neurosci. Biobehav. Rev. 152. https://doi.org/10.1016/j.neubiorev.2023.105284. Article 105284.
Weber, E.U., et al., 2002. A domain-specific risk-attitude scale: measuring risk perceptions and risk behaviors. J. Behav. Decis. Mak. 15 (4), 263–290. https://doi.org/10.1002/bdm.414.
Zhdanava, M., et al., 2021. The prevalence and national burden of treatment-resistant depression and major depressive disorder in the United States. J. Clin. Psychiatry 82 (2). https://doi.org/10.4088/JCP.20m13699.