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Review

Gender differences in suicidal deaths among cancer patients. A systematic review and meta-analysis of observational studies

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SUMMARY

Objective

This review and meta-analysis aims to assess suicide rates among cancer patients by sex, race/ethnicity, and marital status. Cancer impacts psychological, emotional, and financial aspects of daily life, increasing stress and suicide risk. Some sociodemographic determinants appear to be influential in determining the risk of suicide.

Methods

This systematic review and meta-analysis was carried out following PRISMA and MOOSE guidelines, using Embase, PubMed, Scopus, and Web of Science databases.

Results

Nine studies were included. Between-study heterogeneity among the selected studies was substantial (I^2=98.1%), thereby warranting caution in the interpretation of the pooled estimates. No significant difference in suicide rates was found between male and female patients. Significant differences in suicide incidences were found across race/ethnicity, except between unknown and white race/ethnicity. Black patients had the highest suicide rates. Unmarried patients had the highest suicide probabilities.

Conclusions

Focusing on sociodemographic features is crucial for effective suicide prevention among cancer patients. Sex, race/ethnicity, and marital status are sociodemographic variables that may contribute to the overall risk; thus, these characteristics should be interpreted as markers of broader psychosocial and contextual vulnerability rather than as direct causal determinants of suicide.

Key words: sex factors, neoplasms, risk assessment, suicide, marital status, ethnicity and health

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Introduction

Cancer represents a relevant public health issue also negatively impacting on psychological, emotional, and financial domains of daily life. All these difficulties in the patient's cancer journey expose the individual to a high risk of psychological and emotional stress which leads to suicidal ideation and even suicide attempts[2]. In this regard, cancer patients have reported higher levels suicide rates than the general population preceded by anxiety and depression conditions[3,4].

The enhanced risk of suicide among cancer patients depends on challenges in the patient's life due to the cancer-related treatment, including physical abilities and obstacles met in their daily lives, social relations, financial status, and family relationships, which together negatively impact

cancer patients in their psychological conditions[5,6]. For example, literature reports that cancer patients age over 65 years, unemployed, unmarried, white, and males report a higher risk of suicide[7,8].

However, from a psychopathological and public health perspective, sociodemographic variables such as sex, race/ethnicity, and marital status should not be interpreted as direct causal determinants of suicidal behaviour. Rather, they should be understood as indicators embedded within a broader framework of psychosocial vulnerability, shaped by cultural, normative, and social contexts, access to healthcare, stigma and prejudice and cumulative exposure to stressors.

Considering cancer site, gynecological and central nervous system cancers report higher suicidal risk rate thanother sites[2,9]. Thus, suicide in cancer patients represents a worldwide obstacle, and the risk of suicide death is approximately three times higher than the general population[10,11]. However, the suicide rate varies from various European countries, from England with a suicide rate of 11.3% to Estonia with a rate of 102.56%[9]. These cross-national differences highlight the sociocultural and structural complexity of the phenomenon suicide risk in the cancer population.

The present systematic review and meta-analysis aimed to assess how many cancer patients committed suicide according to sex, race/ethnicity and marital status.

Materials and methods

Search approach

The present systematic review and meta-analysis was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement[12]. To ensure methodological rigor, the Meta-analysis Of Observational Studies in Epidemiology (MOOSE)[13] guidelines were also followed. The literature search was performed using the Embase, PubMed, Scopus, and Web of Science databases. The search protocol was registered in the PROSPERO portal with id no. CRD42024628223.

MeSH terms used as keywords and combined with Boolean operators were: “Assessment”, “Gender Difference”, “Neoplasms”, “Risk” and “Suicide”. The PICO approach was applied, however, given the observational nature of the included studies, the PIO approach was performed to build our research question (Tab. I).

Table I outlines the PICO approach for a systematic review and meta-analysis, focusing on cancer patients differentiated by sex, race/ethnicity, and marital status. It compares the incidence of suicidal deaths with non-suicidal deaths, analyzing suicide death frequencies among cancer patients.

TABLE I. *The PICO approach for the present systematic review and meta-analysis.*

Population	Cancer Patients differentiated to sex, race, marital status
Intervention	Incidence of suicidal deaths compared with no suicidal deaths among cancer patients
Outcome	Suicide death frequencies among cancer patients

Criteria of Eligibility

In the present study we included all observational studies focusing on adult patients encountering differences in suicidal deaths according to sex, race/ethnicity and marital status among cancer patients and published in the English language. Thus, only frequencies were collected among cancer patients according to sex, race/ethnicity and marital status.

Manuscripts selection

Initially, manuscripts were identified thanks to a systematic database search and uploaded to reference management software where duplicate studies were removed. Two reviewers (E.V. & L.M.) read the title and the abstract and unsuitable reports were excluded from further reading. Then, records considered appropriate were uploaded and their full text versions were evaluated for final eligibility. Any disagreements were discussed and if the disagreement persisted, another reviewer was consulted (C.A.C.). For each record included in the present review, we extracted the same features, specifically: study characteristics, such as: author, year of publication, cancer typology, sample size, sex, race/ethnicity and marital status conditions.

Selection process

A total of 66 records were found, specifically 46 records belonged to the Embase database, 9 records to PubMed, 10 records to Scopus and 1 to Web of Science. Among these, 30 records were excluded, as 2 were duplicates and 28 were excluded for further reasons. Particularly, 27 records did not present data as frequencies of suicidal deaths and thus were excluded for further analysis. Finally, 9 records were included, specifically 5 records belonged to Embase, 2 to PubMed and 2 to Scopus. The article selection process was displayed in Figure 1.

The condition or domain being studied

The systematic review and meta-analysis covered all studies among cancer patients evaluating the incidence of cases in suicidal deaths according to sex (female and male), race/ethnicity (white, black, other, unknown)

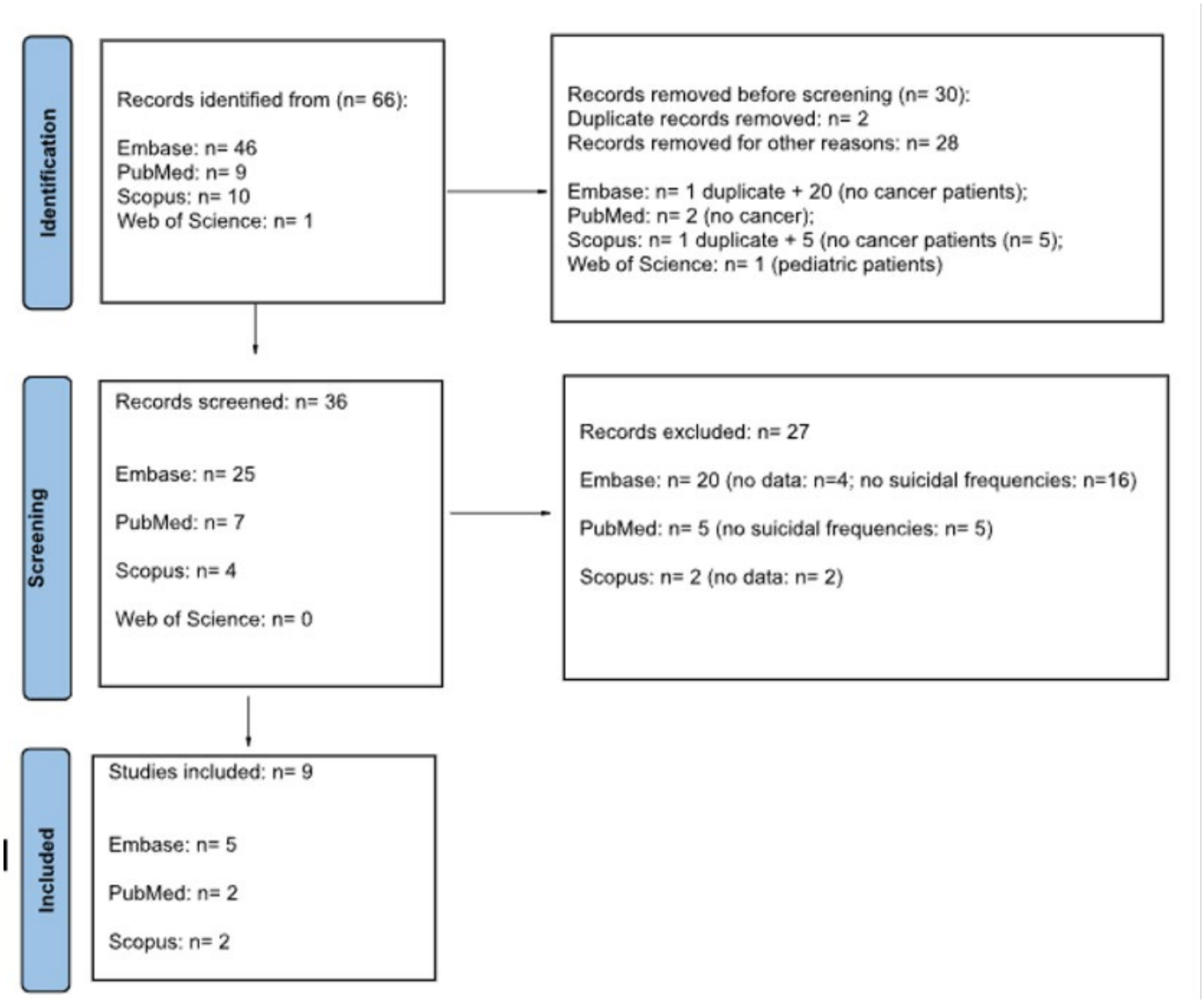


FIGURE 1. The selection process according to PRISMA checklist. *The PRISMA flow chart in this figure illustrates the selection process for the systematic review. It shows the identification, screening, and inclusion stages, detailing the number of records identified, screened, excluded, and included from various databases Embase, PubMed, Scopus, and Web of Science.*

and marital status (married, unmarried, unknown).

Risk of bias (quality) assessment

In this review, the risk of bias in the included observational studies was assessed using the Risk Of Bias In Non-randomized Studies of Exposures (ROBINS-E) tool[14]. This is a dedicated tool explicitly designed to evaluate bias in studies of exposures (or risk factors), aligning with our aim to assess sociodemographic factors as exposures for suicide mortality.

The tool consisted of seven domains through which the presence of bias in the results can be investigated. These domains were identified based on empirical evidence and theoretical considerations and cover all types of bias that could influence the results of observational studies of exposures (Fig. 2). The seven areas were:

(1) bias due to confounding;
(2) bias arising from measurement of the exposure;
(3) bias in selection of participants into the study (or into the analysis);
(4) bias due to post-exposure interventions;
(5) bias due to missing data;
(6) bias arising from measurement of the outcome;
(7) bias in selection of the reported result.

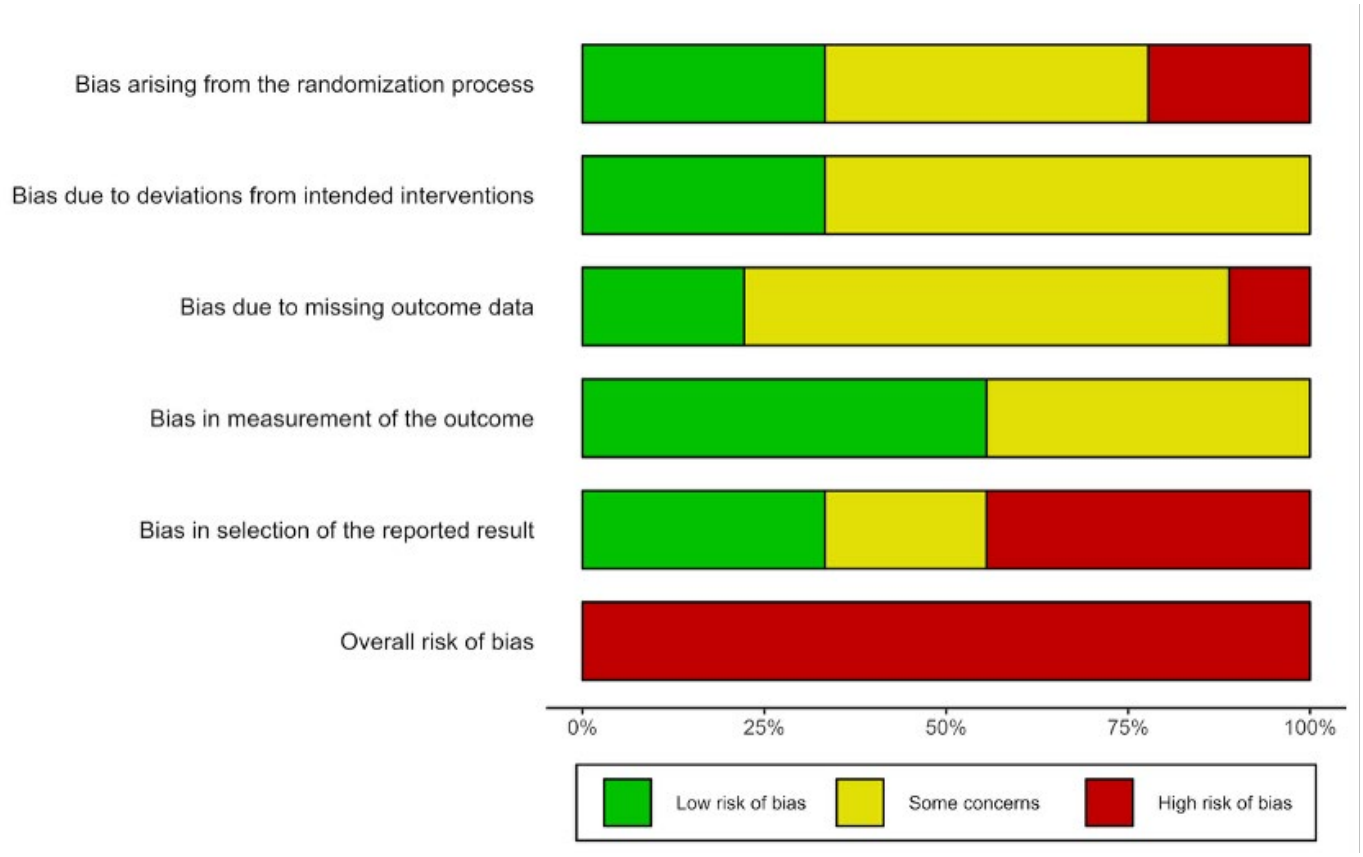


FIGURE 2. *Quality assessment and risk of bias of the selected records.*
Figure 2 presents a quality assessment and risk of bias analysis for the selected records. It evaluates various sources of bias, including randomization, deviations from intended interventions, missing outcome data, outcome measurement, and selection of reported results. The overall risk of bias is categorized into low risk, some concerns, and high risk.

Strategy for data synthesis

Studies were be assessed for quality as per protocol recommendations. The information retrieved from the final selected studies was exposed using both a narrative approach and tables. Statistical analysis is performed using the R environment (version 4.2.3) with a significance level considered to be $p < 0.05$.

For each study, the effect size was calculated by estimating Odds Ratios (OR) using the Mantel-Haenszel method (without continuity correction)[15,16].

For the aim of this investigation, a meta-analysis and two network meta-analyses (NMA) were performed. In particular, a meta-analysis was conducted to investigate the incidence of suicidal deaths compared with no suicidal deaths among cancer patients according to sex (female and male).

Network meta-analyses, on the other hand, examined the difference in the incidence of suicide deaths versus no suicide deaths among cancer patients, one by race/ethnicity (white, black, other, unknown) and the other by marital status (married, unmarried, unknown).

Heterogeneity between studies was assessed for all three analyses using the χ^2-based Q test, which assesses whether the variability between effect sizes is greater than expected. For the network meta-analyses, heterogeneity was calculated both within (Qw) and between (Qb) studies[17]. In all three analyses, a significant Q value ($p < 0.05$) indicates a significant inconsistency (heterogeneity)[18]. The inconsistency index (I^2) was used to assess the consistency across studies with 25%, 50%, and 75% suggesting low, moderate, and high heterogeneity degrees, respectively[19,20]. However, I^2 should be presented and interpreted cautiously in small meta-analyses. For this reason, 95% confidence intervals (95% CI) are presented in addition to the point estimate. Additionally, the Tau-squared coefficient (tau^2) was used to estimate the percentage of true variability in the observed effects. Forest Plots were generated for

each analysis[21]. Publication bias was assessed using funnel plots and performing Egger's t-tests [22].
Finally, comparisons of the incidences of suicide among different groups of patients according to race/ethnicity and marital status were analyzed by calculating p-score values that measure the degree of certainty that the likelihood of suicide one group is greater than another[23]. This interpretation is comparable to the area under the cumulative rating curve (SUCRA), which is an index with range of 0-1, where 1 indicates that one group has a definitely higher probability than the others and 0 that the group has the lowest probability of suicide.

Ethical considerations

Ethical approval was not required for this study as it is a systematic review and meta-analysis synthesizing data from previously published studies. All analyses were conducted on aggregated, anonymized data from these sources.

Results

Selected studies

Nine studies met the inclusion criteria[24-32]. The included studies, published between 2007 and 2024, were conducted across diverse geographical and healthcare settings and included heterogeneous cancer populations. Table II reports all the main characteristics of each study.

Features according to Sex

We pooled data from 9 studies[24-32]. Heterogeneity between the studies was high ($p < 0.001$; $tau^2 = 1.30$ and $I^2 = 98.1\%$; 95% CI = [97.4%; 98.6%]), so a random-effects model was used for the meta-analysis. As can be seen from the Forest Plot (Fig. 3), the results of the model tell us that there is no significant difference between suicides occurring among male patients compared to those occurring among female patients ($t = -1.71$; $P = 0.125$). The Funnel Plot was symmetrical (Fig. 4) and indicated the absence of publication bias, as confirmed by Egger's test result ($\beta = 1.63$; 95% CI = [-8.61; 11.88]; $p = 0.764$). However, due to the small number of studies ($n < 10$), Egger's test may not have the statistical power to detect the presence of bias.

Features according to race/ethnicity

The studies included in the NMA were 5[25,29-32]. There was a level of total inconsistency between the studies considered ($p < 0.001$; $tau^2 = 3.34$ and $I^2 = 97.1\%$; 95% CI = [96%; 97.9%]), reflecting the presence of high inconsistency in both heterogeneities within designs ($Q_w = 110.22$; $p < 0.001$) and heterogeneity between designs ($Q_b = 229.39$; $p < 0.001$).
Considering the results of the analyses performed on the direct comparisons (Tab. III and Fig. 5), we can see that there are significant differences in the incidences of suicide in all comparisons except in the comparison between unknown and white race/ethnicity ($p = 0.334$).
Table IV shows the P-Score ranking of the subjects' probability of suicide according to race/ethnicity. We can see that the race/ethnicity with the lowest number of suicides is the White race/ethnicity, with a total probability of suicide cases of 6% ($p = 0.06$); while the group of patients most likely to commit suicide is that of patients belonging to the Black race/ethnicity ($p = 1$). No group has a P-score of zero, indicating that all modalities have a probability, albeit low, of suicide among patients.
Although the Funnel Plot is not symmetrical (Fig. 6), the Egger's test result indicates the absence of publication bias ($p = 0.633$).

Features according to Marital Status

NMA was performed considering studies[25,27,29,30,32]. The total inconsistency between studies was significant ($p < 0.001$; $tau^2 = 0.17$ and $I^2 = 77.5\%$; 95% CI = [55.5%; 88.6%]), reflecting the presence of inconsistency in heterogeneity within designs ($Q_w = 30.23$; $p < 0.001$). Heterogeneity between designs, on the other hand, was not significant ($Q_b = 0.87$; $P = 0.350$).
The results of the analyses performed on the direct comparisons (Tab. V and Fig. 7) lead us to state that there are no significant differences in the incidences of suicide in all comparisons (all $p > 0.05$).
Table VI shows the P-Score ranking of the subjects' probability of suicide according to marital status. We can see that the group with the highest probabilities of suicides is the Unmarried group, with a total probability of suicide cases of 84% ($p = 0.84$); while the group of patients less likely to commit suicide is that of patients belonging to the Married marital status ($p = 0.21$). No group has a P-score of zero, indicating that all modalities have a probability, albeit low, of suicide among patients. However, as the comparisons are not significant, these results should be interpreted with caution.
The symmetry present in the Funnel Plot (Fig. 8) indicates the absence of publication bias, as confirmed by the results of Egger's test ($P = 0.275$).

Discussions

The present systematic review and meta-analysis aimed to assess how many cancer patients committed suicide according to sex, race/ethnicity and marital status. The findings should be interpreted within the context of substantial methodological and clinical heterogeneity across the included studies ($p < 0.001$; $tau^2 = 1.30$ and $I^2 = 98.1\%$; 95% CI = [97.4%; 98.6%]). They should therefore be analysed as descriptive patterns that do not allow for the formulation of direct causal inferences.

Table II summarizes the main characteristics of nine selected studies, focusing on cancer patients' sex, race, and marital status. It highlights the association between these demographic factors and the incidence of suicidal deaths among cancer patients.

TABLE II. *The main characteristics of the selected studies (n=9).*

Author(s) Publication year Country	Study design	Cancer typology	Sample size	Sex	Race	Marital Status	Highlights
Akechi et al. 2010 Japan	Retrospective, single-center, cross-sectional analysis	Diagnosed cancer	728 cancer patients with major depression	Female: 157 Male: 136	Not revealed	Not revealed	Gender differences among cancer patients with major depression represented indicators of suicidal ideation.
Guo et al. 2019 USA	Retrospective population-based cohort study	Kidney cancer	207 suicides	Female: 28 Male: 179	White: 192 Black: 7 Other: 8 Unknown: 0	Married: 110 Unmarried: 92 Unknown: 5	Male sex, unmarried status, non-black race, were significantly associated with suicide deaths.
Kendal et al. 2007 USA	Retrospective population-based cohort study	Diagnosed cancer	1572 suicidal deaths	Female: 265 Male: 1307	Not revealed	Not revealed	Male, with head and neck cancer or myeloma, advanced disease, little social or cultural support were at risk of suicidal deaths.
Molla et al. 2022 Ethiopia	Single-center, cross-sectional study.	Diagnosed cancer	69 suicidal ideations	Female: 47 Male: 22	Not revealed	Married: 43 Unmarried: 17	The frequency of suicidal ideation and attempt was very high.
Park et al. 2024 Korea	Single-center, cross-sectional analytical study	Psycho-Oncology outpatients	252 suicidal ideations	Female: 190 Male: 62	Not revealed	Not revealed	Half of the psycho-oncology outpatients declared suicidal ideation.
Shen et al. 2019 USA	Retrospective population-based cohort study	KS	110 suicides	Female: 0 Male: 110	White: 99 Black: 8 Other: 2 Unknown: 1	Married: 5 Unmarried: 97 Unknown: 8	White KS patients reported high suicide risk.
Siracuse et al. 2017 USA	retrospective population-based cohort study	Bone and soft tissue cancer	52 suicides	Female: 7 Male: 45	White: 48 Black: 3 Other: 1	Married: 20 Unmarried: 25 Unknown: 7	Male and white patients increased incidence of suicide.
Yu et al. 2022 USA	Retrospective population-based cohort study.	SCC	1157 suicidal deaths	Female: 159 Male: 998	White: 1067 Black: 45 Other: 45 Unknown: 0	Not revealed	Male and white cancer patients were at higher risk factors for suicide attempts.
Zhou et al. 2024 USA	Retrospective prediction modeling study based on a population-based cohort.	Lung cancer	666 suicides	Female: 76 Male: 590	White: 620 Black: 25 Other: 21	Married: 380 Unmarried: 261 Unknown: 25	The predictive model suggested that sex, race and marital status significantly predicted suicide.

Abbreviations: KP: Kaposi's sarcoma; SCC: squamous cell carcinoma.

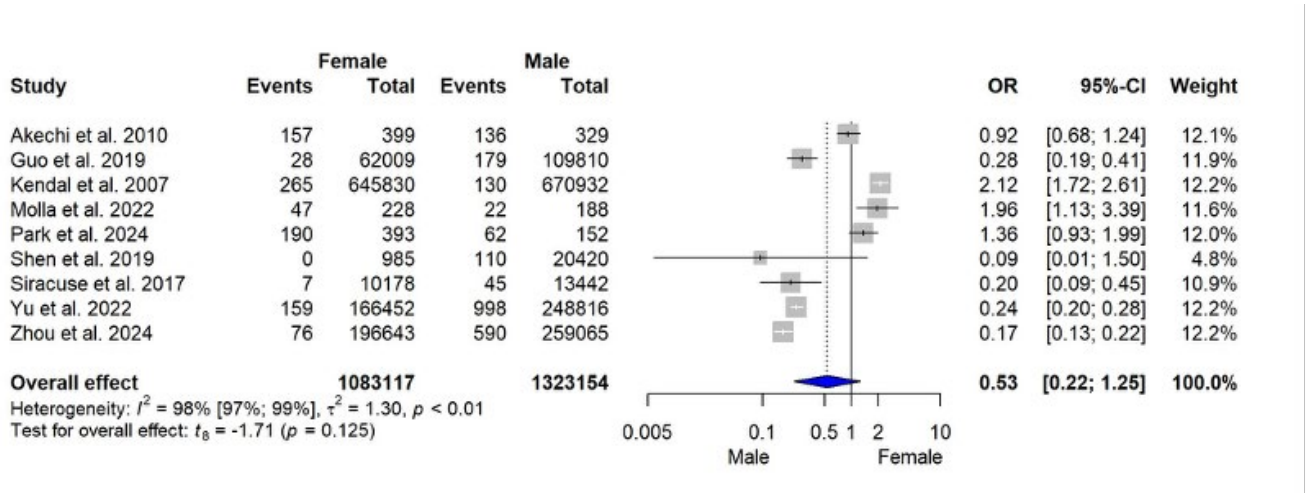


FIGURE 3. *Forest Plot in Sex differences. Figure 3 is a forest plot illustrating sex differences. The plot compares events among females and males across various studies. It includes data on the number of events, total events, and total participants for each study. The results are expressed as Odds Ratios (OR) with 95% confidence intervals (CI), and the weight of each study is indicated. The overall effect and heterogeneity statistics are also provided, helping to visualize the differences in outcomes between sexes.*

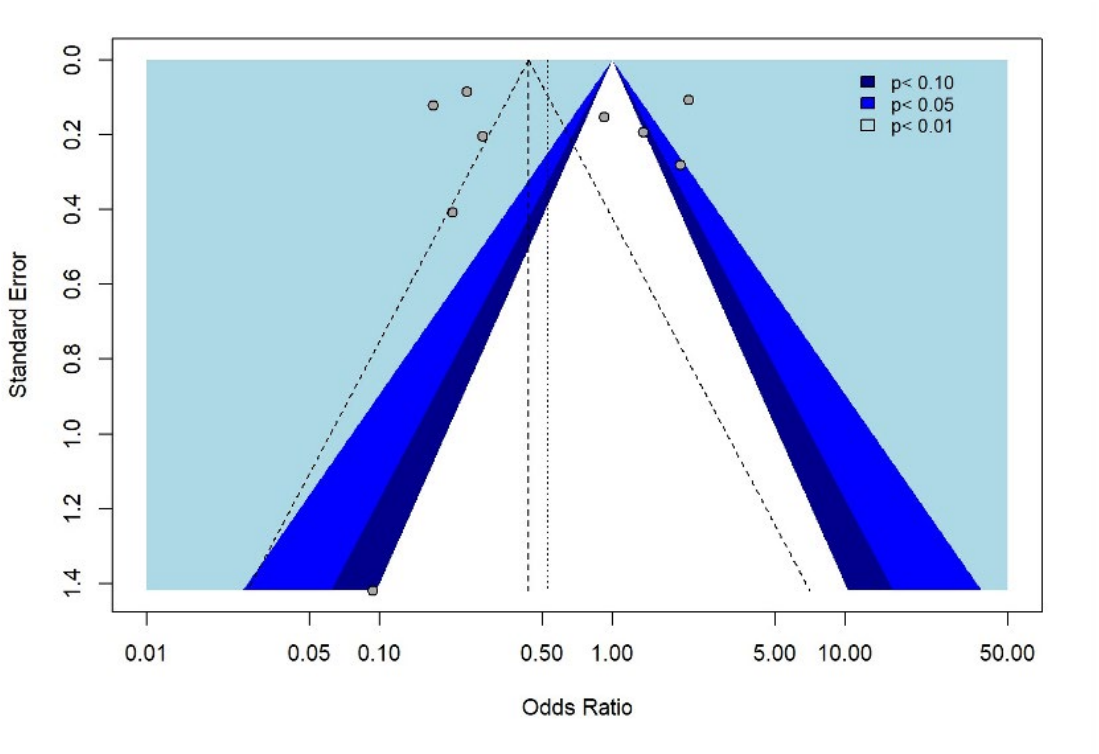


FIGURE 4. *Contour-enhanced Funnel Plot in Sex differences. Figure 4 is a contour-enhanced funnel plot illustrating sex differences. The plot shows the relationship between the standard error and the odds ratio (OR) for various studies. Significance levels are indicated by different p-values (p < 0.10, p < 0.10, p < 0.05, p < 0.05, p < 0.01, p < 0.01). The plot helps visualize the distribution of study results and assess potential publication bias.*

No significant difference between suicides occurring among male patients compared to those occurring among female patients was recorded (t = -1.71; p = 0.125). In this regard our data were in disagreement with the Park et al.[29] in which 8.6% of cancer patients declared suicidal ideation and females appeared to be

Table III presents the overall effects of intergroup comparisons based on race, using Odds Ratios (OR) and 95% confidence intervals (CI). It includes heterogeneity statistics and p-values, highlighting the significance of differences in suicide odds among racial groups.

TABLE III. *Estimation of Overall Effects related to intergroup comparisons according to Race.*

Comparison	OR	OR 95%-CI	I2	tau2	P-value
Black vs Other	0.51	[0.37; 0.69]	0.00%	0	P < 0.001*
Black vs Unknow	0.34	[0.19; 0.58]	7.30%	0.09	P < 0.001*
Black vs White	0.17	[0.14; 0.21]	98.40%	4.62	P < 0.001*
Other vs Unknow	0.71	[0.41; 1.25]	8.00%	0.10	P = 0.022*
Other vs White	0.49	[0.39; 0.62]	95.00%	1.80	P < 0.001*
Unknow vs White	0.92	[0.63; 1.37]	16.80%	0.21	P = 0.334

*P-value of the test for significance of the Overall Effects Estimate. *P<0.05. OR <1 suggests that the group listed on the left has less odds of suicide; OR >1 suggests that the group listed on the left is has higher odds of suicide.*

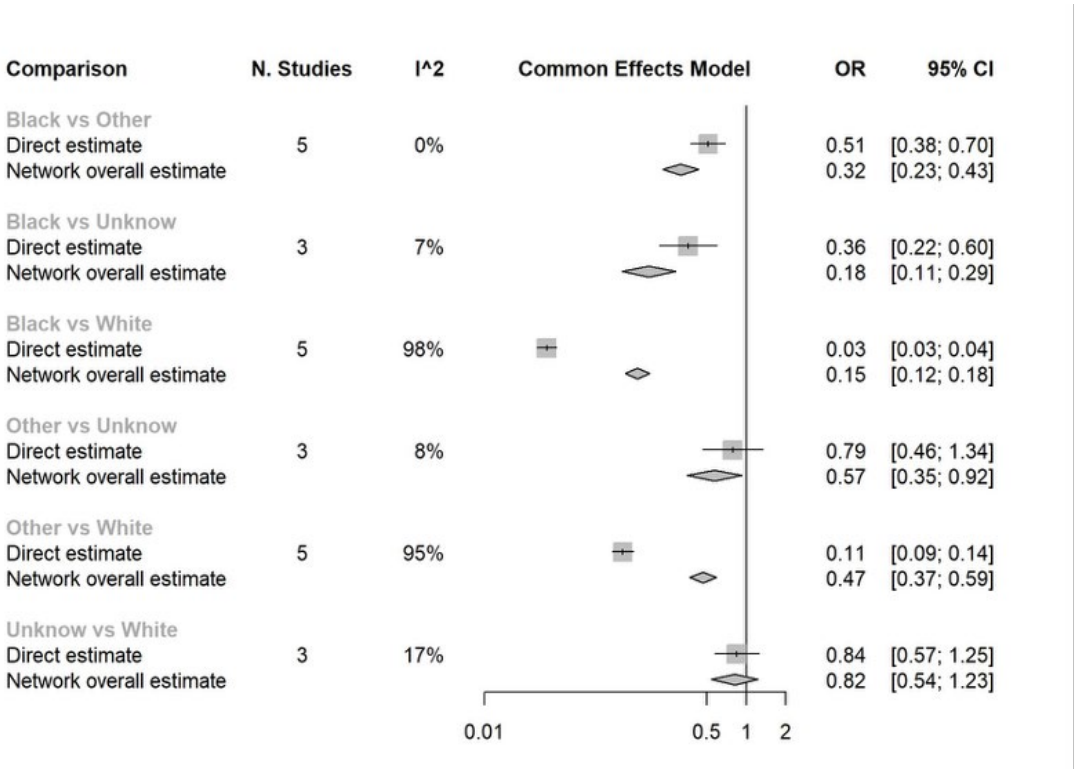


FIGURE 5. *Forest Plot in Race differences. Figure 5 is a forest plot illustrating race differences. The plot compares various racial groups (Black, Other, Unknown, and White) using direct and network overall estimates. The results are expressed as Odds Ratios (OR) with 95% confidence intervals (CI). The number of studies and the heterogeneity statistics for each comparison are also provided, helping to visualize the differences in outcomes across racial groups.*

more vulnerable to suicidal ideation than males, despite male cancer patients justifying their suicidal ideations with worse financial conditions, lower education, unemployment, and marital status, especially unmarried. Particularly, suicidal ideation was higher among younger female cancer patients, with a higher body mass index (BMI), and higher social responsibilities, as employed and married. All these elements were related to suicidal ideation in both sexes[29,33], thus suggesting that sex, when considered alone, may be insufficient to account

TABLE IV. *P-Score ranking according to Race/ethnicity. This table classifies race/ethnicity based on their P-scores, which indicate the relative ranking of each race/ethnicity in the context of the study. The P-scores are as follows: Black (1), Other (0.66), Unknown (0.28), and White (0.06). This ranking helps to understand the relative differences among racial groups in the study.*

P-score	
Black	1
Other	0.66
Unknow	0.28
White	0.06

Classification of race/ethnicity by P-Score.

for suicide risk in oncological populations and should be situated within a wider set of contextual and psychosocial determinants. On the other hand, male sex and unmarried status seemed to be risk variables for suicides. Marital status appeared to negatively impact on the quality of life in cancer patients increasing risk of suicide[34]. Taken together, these observations should not be considered contradictory, but instead suggest that sex-related vulnerability to suicide in cancer patients may be largely mediated by contextual and psychosocial factors, including social support and relational circumstances. The present findings are consistent with the psycho-oncological literature indicating that social connectedness, rather than marital status per se, may

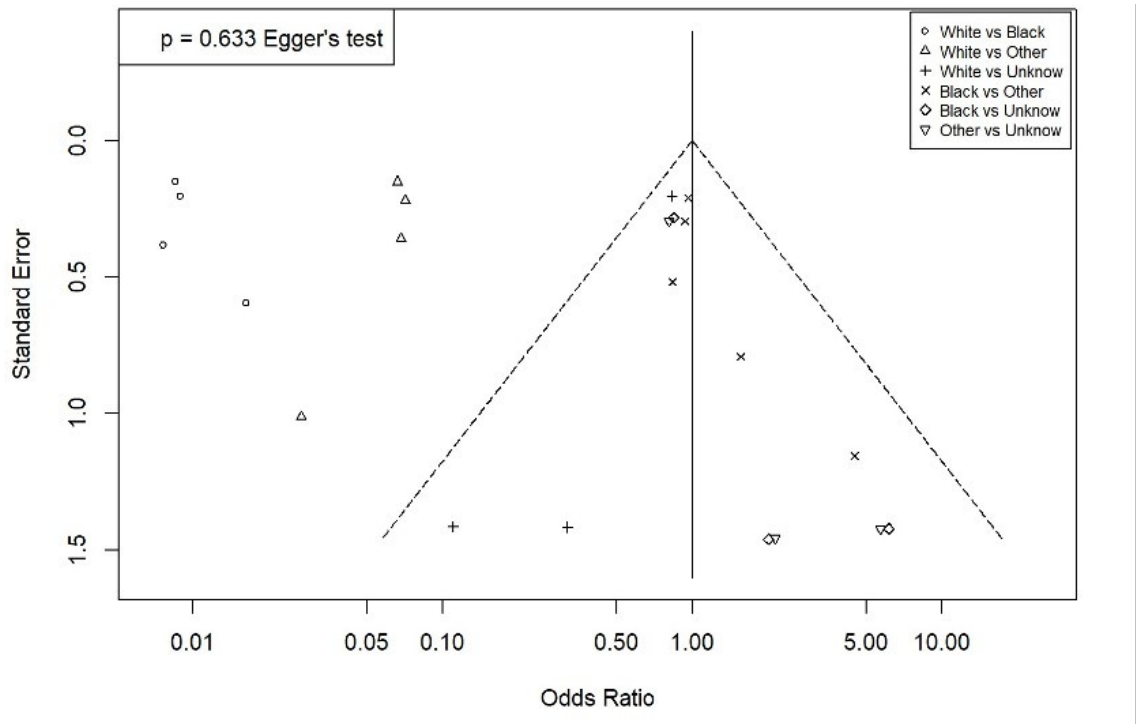


FIGURE 6. *Funnel Plot in Race/ethnicity differences*
Figure 6 is a funnel plot illustrating race/ethnicity differences. It shows the relationship between the standard error and the odds ratio (OR) for various racial comparisons, including White vs. Black, White vs. Other, White vs. Unknown, Black vs. Other, Black vs. Unknown, and Other vs. Unknown. Egger's test result is also included.

Table V presents the overall effects of intergroup comparisons based on marital status, using Odds Ratios (OR) and 95% confidence intervals (CI). It includes heterogeneity statistics and p-values, highlighting the significance of differences in suicide odds among marital status groups.

TABLE V. *Estimation of Overall Effects related to intergroup comparisons according to Marital Status.*

Comparison	OR	OR 95%-CI	I2	tau2	P-value
Unknow vs Married	1.24	[0.89; 1.71]	72.70%	0.40	P = 0.779
Unmarried vs Married	1.09	[0.96; 1.25]	72.50%	0.09	P = 0.069
Unknow vs Unmarried	1.07	[0.78; 1.45]	83.30%	0.60	P = 0.569

P-value for overall estimate effect. *P < 0.05. OR < 1 suggests that the group listed on the left has less odds of suicide; OR > 1 suggests that the group listed on the left is has higner odds of suicide.

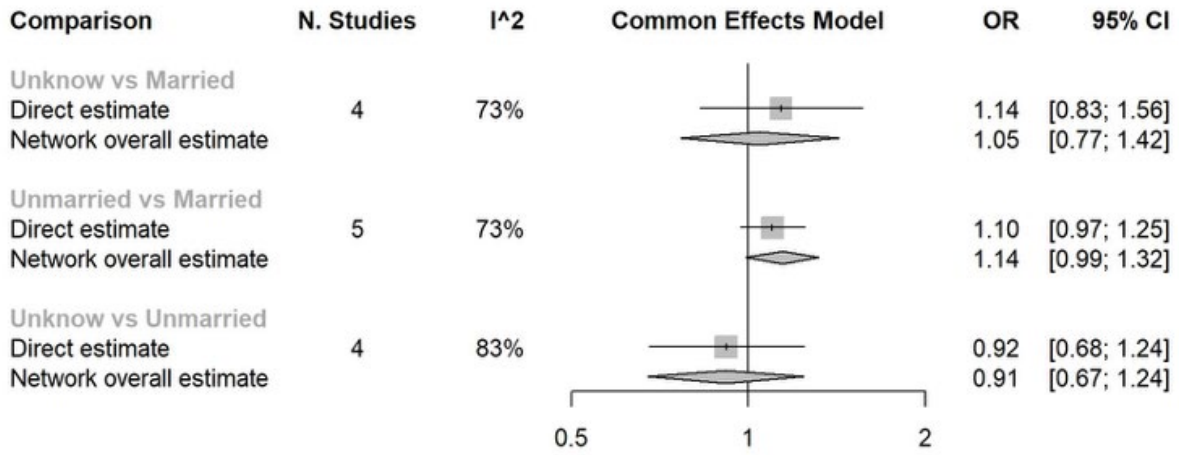


FIGURE 7. *Forest Plot in Marital Status differences*

Figure 7 is a forest plot illustrating differences in marital status. The plot compares various marital statuses (Unknown, Unmarried, and Married) using direct and network overall estimates. The results are expressed as Odds Ratios (OR) with 95% confidence intervals (CI). The number of studies and the heterogeneity statistics for each comparison are also provided, helping to visualize the differences in outcomes across marital statuses.

Table VI presents the P-score ranking according to marital status, with Married at 0.21, Unknown at 0.45, and Unmarried at 0.84. This ranking helps to understand the relative differences in suicide odds among marital status groups.

TABLE VI. *P-Score ranking according to Marital Status*

P-score	
Married	0.21
Unknow	0.45
Unmarried	0.84

Classification of race/ethnicity by P-Score

buffer suicide risk.

Accordingly, marital status appears to emerge as a particularly informative sociodemographic marker of vulnerability: among the variables examined, marital status shows the most consistent association with suicide risk, indeed the P-Score ranking of the subjects' probability of suicide according to marital status. There were the highest probabilities of suicides is the Unmarried group, with a total probability of suicide cases of 84% (P-score = 0.84); while the group of patients less likely to commit suicide was that of patients belonging to the Married marital status (P-score = 0.21). This trend was similar in the current literature, since divorced or widowed cancer patients recorded the highest risk of suicidal deaths than singles and marrieds [40]

Considering the race/ethnicity condition, there were significant differences in the incidences of suicide in all comparisons except in the comparison between unknown and white race/ethnicity (p = 0.334). The p ranking of the subjects' probability of suicide according to race/ethnicity showed that the group of patients belonging to the Black race/ethnicity (P-score = 1) most likely committed suicides. By contrast, Elshanbary et al. [35] indicated that patients suffering from gastric adenocarcinoma reported a higher risk of suicide, lower among Black and female patients. On the other hand, the literature suggested that White race/ethnicity was correlated with a raised risk of suicide among gastric cancer patients[36] associated with an unmarried status[37].

Further studies suggested that White cancer patients recorded four-fold increase in the risk of suicide risk among Americans[31,37,38]compared with the general population[37]. The same trend was also confirmed by Yu. et al.[31] (2022) who associated a significantly increased risk of suicide in leukemia patients compared with black patients (HR = 6.80, 95% CI = 1.69–27.40, p = 0.007). Ma et al.[39] (2021) reported that 92.4% of patients who attempted suicide were White. The same trend was highlighted by Klaassen, et al.[38] (2015), in which Black patients significantly recorded lower risk of suicide than White ones (OR range 0.26–0.46). Consistent with the interpretation of other sociodemographic variables, race/ethnicity itself does not seem to constitute a direct

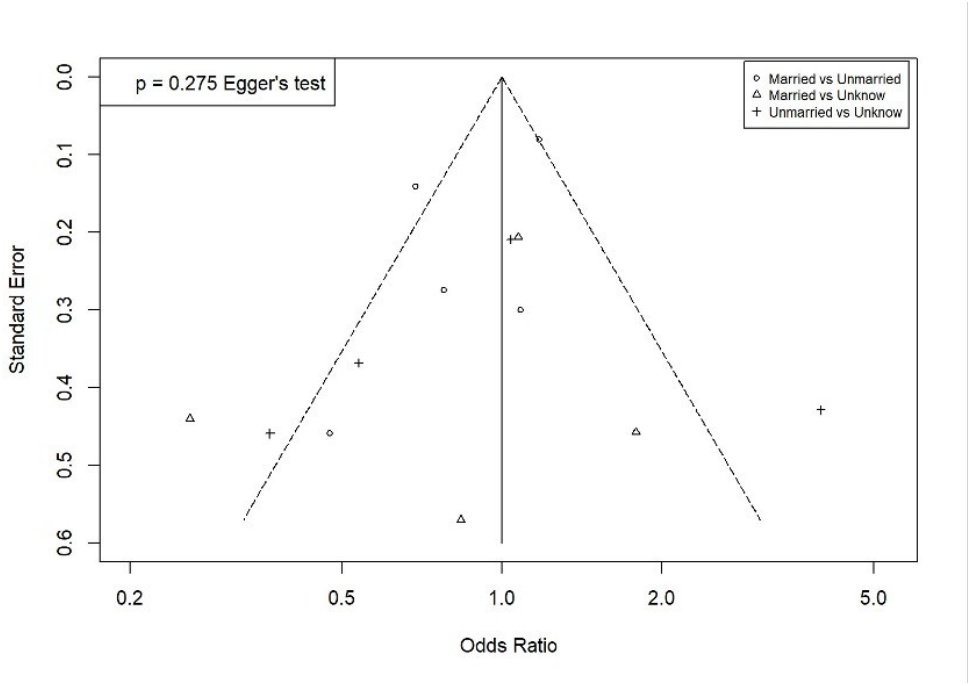


FIGURE 8. Funnel Plot in Marital Status differences.
Figure 8 is a funnel plot illustrating differences in marital status. It shows the relationship between the standard error and the odds ratio (OR) for various marital status comparisons, including Married vs. Unmarried, Married vs. Unknown, and Unmarried vs. Unknown. Egger's test result is also included, indicating the presence of publication bias.

risk factor for suicide; instead, it likely operates as a proxy for broader sociocultural determinants, including socioeconomic inequalities, access to healthcare, and exposure to stressors, which contribute to suicide vulnerability among cancer patients. Based on the preceding considerations, suicide risk among cancer patients can be understood as a phenomenon that does not occur in isolation, but is embedded within broader psychosocial, societal, and environmental contexts. To these contexts, large-scale stressors, such as pandemics, wars, and economic crises, should be added, as they may influence and often amplify pre-existing clinical and psychosocial vulnerabilities that shape suicide risk in oncological populations. In this regard, evidence from the COVID-19 pandemic has shown that systemic stressors can exacerbate mental health disparities and suicide risk, particularly among vulnerable groups as shown by Barlattani et al. (2023) [41]. Integrating these broader public-health considerations into predictive patterns of suicide risk appears essential for a more comprehensive understanding of the phenomenon and for the development of effective prevention strategies.
Several limitations must be acknowledged. Some limitations depend on the available literature itself: several key determinants of suicide risk, such as pain burden, psychiatric comorbidity, and functional impairment, are not systematically reported, thus preventing their analysis in the present review. Moreover the high heterogeneity and the limited number of studies (n = 9) constrain the robustness of the findings and the exploration of more specific interactions. Furthermore, the observational nature of all included studies precludes causal inference.

Conclusions

From a psycho-oncological and psychopathological perspective, this review supports the view that sociodemographic variables act as important proxies for broader psychosocial and contextual vulnerability rather than direct as causal agents of suicide among cancer patients

In light of the high incidence of suicide and the interplay of sociodemographic, psychosocial, and contextual factors shaping this risk, the need for timely and targeted public-health preventive interventions is evident. Future studies are necessary to identify risk factors exploring more specific dynamics and the underlying social and psychological mechanisms linking risk factors and suicide deaths in cancer patients.
The present systematic review and meta-analysis may have important clinical implications, due to the high cancer prevalence and its related morbidity and mor-

tality. Exploring suicide risk across different cancer trajectories and sociodemographic contexts may support early psychopathological screening and the provision of tailored psychosocial support.

Conflicts of interest statement

The authors report there are no competing interests to declare.

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Author Contributions

Elsa Vitale: Conceptualization, Methodology, Investigation, Data Curation, Writing Original Draft, Supervision; Carlo Alberto Camuccio: Methodology, Validation, Formal Analysis, Writing Review & Editing, Supervision; Orejeta Diamanti: Investigation, Writing Review & Editing; Federica Dellafiore: Investigation, Writing Review & Editing; Lorenza Maistrello: Software, Formal Analysis, Data Curation, Visualization

Ethical approval

Not relevant.

Additional declaration

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