

SUICIDAL BEHAVIOURS DURING COVID-19 PANDEMIC: A REVIEW

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Abstract

Objective: Novel COVID-19 disease has become a major concern worldwide, and a recent line of research warned that the context of the COVID-19 pandemic may be a major risk factor for developing severe suicidal behaviors. A broad systematic review is needed to cover the studies that have already assessed the potential underlying factors for suicidal behaviors in the context of the COVID-19 outbreak.

Method: A total of 52 studies met the inclusion criteria, and data were then described according to the subsequent categories: (1) countries where the studies were carried out; (2) factors impacting suicidal behaviors during the COVID-19 outbreak; and (3) examination of the observed populations.

Results: Findings of the current systematic review suggest that there is a certain amount of heterogeneity in factors impacting suicidal behaviors during the COVID-19 outbreak, with economic downturn, psychiatric vulnerability, isolation and quarantine, health concerns, and relational difficulties being the most prominent reasons for developing suicidal behaviors during the COVID-19 outbreak.

Conclusions: Timely interventions are needed to prevent suicidal behaviors in both the clinical and general populations, and in this regard, the creation of standard procedures may speed up the process.

Key words: COVID-19, suicidal behaviors, pandemic, coronavirus

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1. Introduction

Suicidal behaviors are increasing sharply as causes of mortality and relevant socioeconomic burden (Chen et al., 2012; Arensman et al., 2020)

Recently, more than one million people have attempted suicide in Western countries (Piscopo et al., 2016) and nearly 800 000 individuals perish each year because of it (WHO, 2019). Therefore, there is a widespread consensus regarding the public relevance of suicidal behaviors (Arensman et al., 2020; Chen et al., 2020; O'Connor et al., 2018). Suicidal behaviors encompass a broad range of behaviors that may potentially end a person's life (Hemming et al., 2019). They may include self-harming behaviors, suicide attempts, completed suicides, planning, and ideation (Silverman et al., 2007; Turecki & Brent, 2016).

It is thought that stressors may foster risk of suicidal behaviors (Bøe et al., 2021; Chu et al., 2017), and in this regard, changes caused by the newly appeared COVID-19 disease may be considered as stressors that can severely affect individuals' psychosocial functioning (Fardin, 2020; Kontoangelos et al., 2020) because of the relevant economic and interpersonal problems that occur during the pandemic (Abbiati et al., 2020; Casale & Flett, 2020; Sher, 2020). Studies of

previous pandemics have shown that the changes caused by them are significantly associated with increased odds of suicidal behaviors (Cheung et al., 2008; Hawryluck et al., 2004; Reynolds et al., 2007; Wasserman, 1992) due to a decrease in social encounters and difficulties adjusting to the context (Wasserman, 1992). For instance, findings stemming from observations of the 2003 severe acute respiratory syndrome (SARS) outbreak suggested fears of contagion, perceived burden, general anxiety, social isolation, and psychological distress as relevant predictors of suicide rates. In a similar vein, Cheung et al. (2008) found an increase in suicide rates following the SARS epidemic and suggested that perceived interpersonal burden during the epidemic was a motive for suicide in many individuals. Parallel to previous outbreaks, changes due to COVID-19 may have an impact on the physical and mental health of the public, and therefore increased suicide rates may be likely to occur (Zalsman et al., 2020).

In this regard, a line of studies emphasized the role of COVID-19 as a risk factor for higher levels of suicidal behaviors (Caballero-Domínguez et al., 2020; Que et al., 2020; Joiner et al., 2020; Zalsman et al., 2020). Specifically, Gratz et al. (2020) highlighted that both environmental and personal factors such as thwarted belongingness and perceived burdensomeness

are particularly predictive of increased odds of suicidal behaviors, whilst Winkler et al. (2020) suggested that higher levels of suicide risk during the COVID-19 outbreak occur when individuals experience strong health concerns. In addition, Zhou et al. (2020) emphasized that healthcare workers are likely to suffer from suicide risk in the presence of excessive outbreak-related workload pressure.

The pandemic not only impacts individuals' physical and mental health but also has a severe impact on the economic dimension because of financial strain, unemployment, and bankruptcies. Such adverse consequences, in turn, may elicit psychosocial stress which may increase the possibility of suicide (Que et al., 2020). Indeed, studies of past economic downturns have observed how they exacerbated suicidal behaviors (Reeves et al., 2014; Tapia Granados & Diez Roux, 2009; Värnik, 1991), and in this regard, previous findings suggest an increased risk of suicidal behaviors during the Great Depression (Tapia Granados & Diez Roux, 2009) and that suicidality peaked when unemployment was at its highest during the 2008–2010 recession in Europe (Reeves et al., 2014). In the context of economic strain induced by COVID-19, Inoue et al. (2020) argued that economic hardship like decreasing salary growth rates and increasing unemployment may lead to increased rates of suicidal behaviors, whilst Vuorio and Bor (2020) argued they may increase due to prolonged economic downturn occurring as a consequence of the social, economic, employment, and personal challenges of COVID-19. In addition, Mamun and Ullah (2020) highlighted that suicidal behavior occurs due to the economic recession taking place in response to containment measures.

COVID-19-related suicidal behaviors are increasing sharply worldwide (Aquila et al., 2020; Caballero-Domínguez et al., 2020; Mamun & Griffiths, 2020), and this phenomenon may become a major clinical concern in both Eastern and Western countries. Hence, it is extremely relevant to understand the factors that draw individuals toward suicidal behaviors in the context of the COVID-19 outbreak to prevent these kinds of attitudes and to provide a broad perspective regarding such symptoms to provide better interventions in clinical practice. In this regard, past research aimed to provide an overview regarding the interplay between suicidal behaviors and the COVID-19 outbreak.

Therefore, the current research sought to carry out a comprehensive investigation of suicide risk factors during the current COVID-19 pandemic. Specifically, the goals of the current systematic review are to (i) understand and summarize the major causes of and factors related to the risk of suicidal behaviors due to the COVID-19 pandemic, examining the studies present, to date, in the literature, and (ii) provide a systematic synthesis of the studies present in the literature.

2. Method

2.1 Protocol, Registration, and Eligibility Criteria

The present systematic review focuses on qualitative and quantitative studies that describe suicidal behaviors in the context of the COVID-19 outbreak. For the purpose of this study, the PRISMA statement for reporting systematic reviews was used (Liberati et al., 2009), and no registration was previously undertaken. Inclusion criteria were coded by all the authors by reaching an agreement regarding the coding process

and were as follows: Studies had to (a) include data regarding the relationship between suicidal behaviors and the COVID-19 outbreak; (b) contain quantitative and/or qualitative data; (c) be published in a peer-reviewed journal; (d) be available as full text in English; (e) be original research articles. Exclusion criteria were being commentaries, letters to editors, case reports, reviews, and brief reports.

2.2 Information Sources and Search Strategy

The academic databases Scopus, Web of Science, and PubMed were searched to identify existing papers from January 2020. The following English keywords were defined by the authors of the current study and were used to perform the literature search: ("suicide" OR "suicidal ideation") AND ("COVID-19" OR "coronavirus 2019" OR "pandemic"). Articles were selected when they met the aforementioned inclusion criteria.

2.3 Study Selection and Data Collection Process

The first search, on Scopus, revealed 71 papers. The second, on Web of Science, found 36 papers, and the third, on PubMed, revealed 143 papers. Furthermore, six more papers were provided by experts in the field. The research was carried out on May 30, 2021.

Subsequently, duplicated papers (48) were excluded. The systematic review was carried out in accordance with the inclusion and exclusion criteria previously described and following the search strategy presented in the flow diagram (**figure 1**).

3. Results

The screening procedure is described in **figure 1**. A first group of 254 papers was identified by using the aforementioned keywords and then a total of 52 studies were finally included for the purposes of the current review. Specifically, the search first identified 254 publications, of which 48 were excluded because were duplicates. In addition, titles and abstracts of the remaining articles were screened for eligibility, and two more publications were excluded, one because it had no full text in English and one because it was a retracted article, while 70 were excluded because they were commentaries, letter to editors, case reports, brief reports, or reviews. A further 47 were excluded after full-text assessment because they were not in accordance with the inclusion criteria previously described.

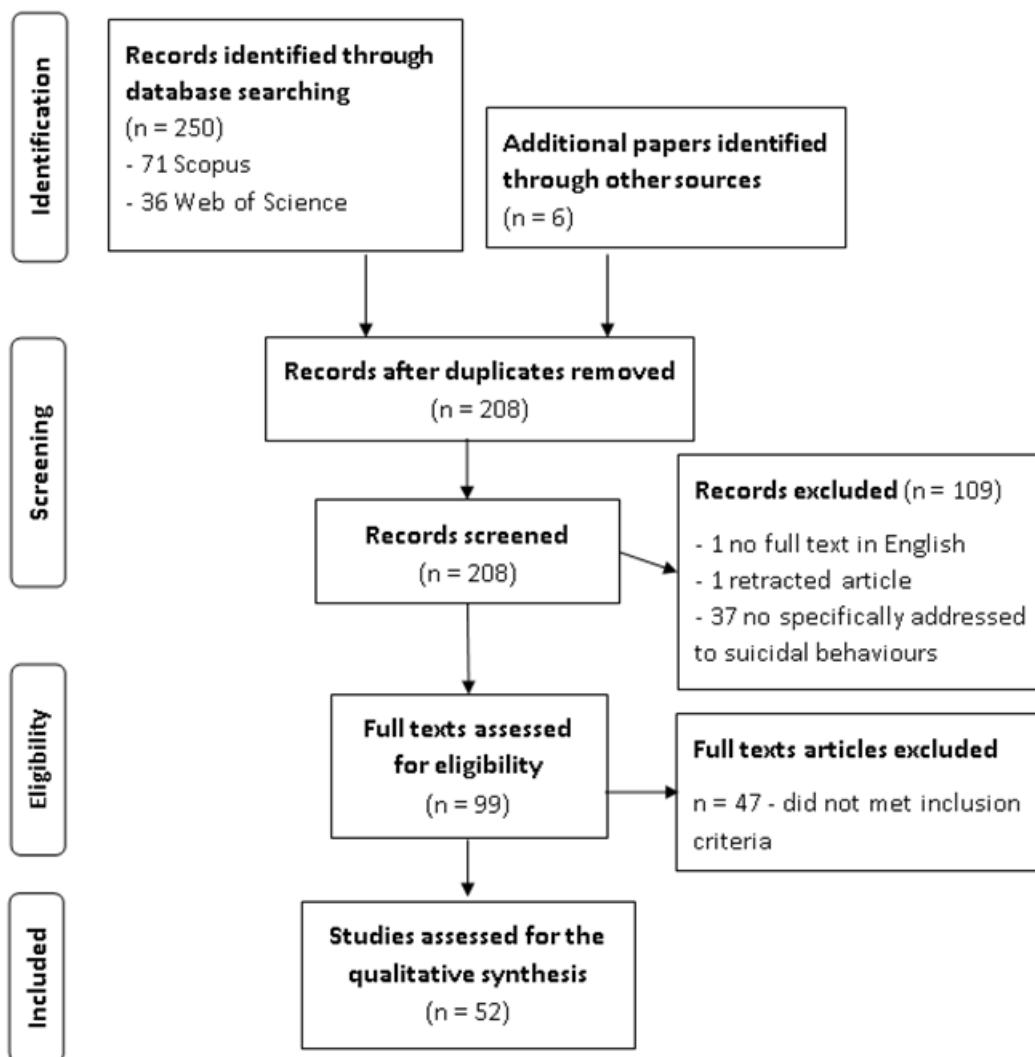
3.1. Synthesis of Results

This review focuses on: (1) countries where the studies were carried out; (2) factors impacting suicidal behaviors during the COVID-19 outbreak; and (3) examination of the observed populations.

3.1.1. Cultural background

Analysis of the studies analyzed for the purposes of this review showed that the American continent was the most represented, with 15 studies being conducted in the United States of America, one in Canada, one in Colombia, and one in Argentina. A robust line of research was developed on the Asian continent, with China being the most represented country with five studies, while three were carried out in Japan and three in India. In

Figure 1. Flow diagram in line with PRISMA guidelines (Liberati et al., 2009)



addition, four studies were conducted in Bangladesh, one in South Korea, and one in Iran. Furthermore, the results showed that four studies were conducted in countries on the Oceania continent, specifically three in Australia and one in New Zealand. In addition, 13 studies were carried out on the European continent, with two being conducted in Switzerland, two in Spain, one in the United Kingdom, one in the Czech Republic, one in Greece, one in France, one in England, one in Wales, one in North Ireland, one in Italy, and one in Germany (table 1).

3.2. Factors impacting suicidal behaviors during the COVID-19 outbreak

With regard to potential factors impacting suicidal behaviors during the COVID-19 pandemic, the results of the current review showed that a combination of several risk factors for more severe suicidal attitudes are present.

Although this review comprises 52 studies, a paucity of studies used a theory-driven approach to deepen the construct of suicidal behaviors in the context of the COVID-19 pandemic. For instance, Gratz et al. (2020) used the well-established theoretical framework of

Interpersonal Psychological Theory of Suicide (ITS; Van Orden et al., 2010). These theoretical differences preclude analysis and comparison across different studies.

It is worth noticing that different studies observed different dimensions of suicidal behaviors. Specifically, suicide ideation, that is, a persistent intention to commit suicide (Tasnim et al., 2020), was the most represented suicide-related dimension, with 25 studies addressing this dimension (Anestis et al., 2021; Caballero-Domínguez et al., 2020; Elbogen et al., 2021; Every-Palmer et al., 2020; Fountoulakis et al., 2021; Halford et al., 2020; Han et al., 2021; Hao et al., 2020; Hill et al., 2021; Jiang et al., 2020; Khosravani et al., 2021; López Steinmetz et al., 2020; Louie et al., 2021; Mamun et al., 2020; Monteleone et al., 2021; Murata et al., 2020; Na et al., 2021; Nomura et al., 2021; O'Connor et al., 2020; Shi et al., 2021; Tasnim et al., 2020; Tsai et al., 2021; Winkler et al., 2020; Zhou et al., 2020; Zwickl et al., 2021). In addition, suicidal thoughts and planning, namely, considering taking one's life and working out a plan to do it (Mortier et al., 2021; Posner et al., 2011), were reported by a robust line of study (Ambrosetti et al., 2021; Ammerman et al., 2021; Anestis & Brian, 2021; Caballero-Domínguez et al., 2020; Crasta et al., 2020; Evans et al., 2020; Fayaz & Albarracín, 2021;

Table 1. Summary of included studies (listed in alphabetical order)

Study	Design	Participants	Country	Main findings
Ambrosetti et al., 2021	Observational	Emergency Department Inpatients	Switzerland	A significant increase of admissions to the psychiatric emergency department during the COVID-19 pandemic was observed in individuals without strong social bonds. An increased suicide risk was also observed
Ammerman et al., 2021	Cross-Sectional	General Population	United States of America	Results support an association between several COVID-19 related experiences (i.e., general distress, fear of physical harm, effects of social distancing policies). Exploratory analyses highlighted a potential additional link between COVID-19 and suicidal behavior, suggesting that a portion of individuals may use exposure to COVID-19 virus as means to kill themselves
Anestis et al., 2021	Cross-Sectional	General Population	United States of America	Individuals who purchased a firearm during COVID-19 more frequently reported lifetime, past-year, and past-month suicidal ideation than non-firearm owners and firearm owners who did not make a purchase during COVID-19
Anestis & Brian, 2021	Cross-Sectional	General Population	United States of America	Individuals intending to purchase firearms were also more likely to have experienced suicidal ideation in the past year and to experience greater intolerance to uncertainty
Appleby et al., 2021	Real Time Surveillance	General Population	England	No rise in suicide rates in England in the months after the first national lockdown began in 2020 was observed, despite evidence of greater distress
Caballero-Domínguez et al. 2020	Cross-Sectional	General Population	Colombia	High suicide risk was associated with high perceived stress related to COVID-19, risk of depressive episode, and poorer quality of sleep
Crasta et al., 2020	Cross-Sectional	General Population	United States of America	Suicide risk during the pandemic was related to perceived burdensomeness to others and psychological inflexibility
Elbogen et al., 2021	Cross-Sectional	General Population	United States of America	Multivariable logistic regression showed that loneliness and financial strain due to COVID-19 outbreak were associated with suicidal behaviours in a nationally representative sample
Evans et al., 2020	Qualitative	General Population	Australia	Families reported divergent themes regarding the pandemic, namely “Boredom, depression and suicide: A spectrum of emotion” “Families are missing the things that keep them healthy” “Changing family relationships: The push pull of intimacy,” “The unprecedented demands of parenthood”
Every-Palmer et al., 2020	Cross-Sectional	General Population	New Zealand	the number of people who reported having suicidal thoughts increased from previous assessments during the COVID-19 pandemic, in addition to higher levels of psychological distress, anxiety and poorer wellbeing
Fayaz & Albarracín, 2021	Cross-Sectional	General Population	United States of America	Containment measures limited searches for suicide
Fitzpatrick et al. 2020	Cross-Sectional	General Population	United States of America	Risk factors such as economic insecurity, physical symptoms, and internalizing symptomatology are significantly related to suicidal behaviours
Fountoulakis et al., 2021	Cross-Sectional	General Population	Greece	Suicidal thoughts increased during lockdown in Greece
Gil-Jardiné et al., 2021	Neural Network Approach	General Population	France	No noticeable trends was found for calls to emergency medical communication centers in relation to suicide and self-harm during lockdown
Gratz et al., 2020	Cross-Sectional	General Population	United States of America	Thwarted belongingness and perceived burdensomeness are risk factors for more severe suicidal behaviours during COVID-19 outbreak
Halford et al., 2020	Google Trends Analysis	General Population	United States of America	Queries in Google searches representative of financial difficulty sharply increased during the COVID-19 outbreak
Han et al., 2021	Cross-Sectional	General Population	South Korea	Individuals with higher levels of maladaptive personality traits were more likely to show higher levels of suicidal behaviours
Hao et al., 2020	Cross-Sectional	Psychiatric Population	China	Psychiatric population showed more severe suicidal behaviours compared to normal controls and higher levels of concerns for physical health, anger and impulsivity
Hill et al., 2021	Cross-Sectional	Emergency Department Inpatients	United States of America	Rates of suicide behaviours were higher times when COVID-19 related stressors and community responses were heightened as compared with 2019 in youths aged 11 to 21 in a pediatric emergency department
Holland et al., 2021	Cross-Sectional	Emergency Department Inpatients	United States of America	Rates for suicidal behaviours were higher during the COVID-19 pandemic in individuals assisted in emergency departments

Table 1. Continues

Isumi et al., 2020	Cross-Sectional	Child and Adolescent Population	Japan	No significant change in suicide rates during the school closure
Jahan et al., 2021	Retrospective press media suicide reports	Healthcare workers	Bangladesh	Fear of having COVID-19 was the most common cause for suicide, in addition to work-related stress, and fear related to COVID-19 infection/transmission.
Jiang et al., 2020	Cross-Sectional	General Population	China	PTSD-related symptomatology are key components for severe suicidal attitudes during COVID-19 outbreak
Kar et al., 2021	Cross-Sectional	General Population	India	Containment measures impacted suicide behaviours in several regions of India and Bangladesh
Khosravani et al., 2021	Cross-Sectional	Psychiatric Population	Iran	Individuals suffering from obsessive compulsive disorders were more likely to show more severe suicidal behaviors during COVID-19 outbreak
Knowles et al., 2021	Cross-Sectional	General Population	Wales	Domestic abuse, relationship problems, social isolation and financial problems were related to more severe suicidal behaviours
Leske et al., 2021	Interrupted Time-Series Analysis	General Population	Australia	No significant change in suicide rates
López Steinmetz et al., 2020	Cross-Sectional	General Population	Argentina	A worsening pattern for suicidal behaviours was observed as quarantine sub-periods went by
Louie et al., 2021	Cross-Sectional	Elderly Population	China	Older adults with late life depression are at increased suicidal risk
Mamun et al., 2020	Cross-Sectional	Healthcare workers and general population	Bangladesh	Being female, being divorced, and having no child emerged as predictors for suicidal behaviours
Manzar et al., 2021	Google Trends Analysis	Youth Population	Bangladesh	Suicide rates were higher in youths during COVID-19 outbreak and most common suicide causalities were related to mental sufferings such as depression, loneliness, psychological distress, followed by academic distress and being tested for COVID-19
McIntyre & Lee, 2020	Cross-Sectional	General Population	Canada	Unemployment is a major risk factor for higher rates of suicidal behaviours
McIntyre et al., 2020	Retrospective	Psychiatric Population	North Ireland	COVID-19 outbreak showed less self-harm behaviours initially, followed by a sharp increase in May 2020
Monteleone et al., 2021	Cross-Sectional	Psychiatric Population	Italy	Severity of psychiatric psychopathology worsened during the lockdown and the rise of general symptoms persisted in the following re-opening phase, except for suicide behaviors
Mortier et al., 2021	Longitudinal	Healthcare Professionals	Spain	Suicidal behaviors increased among healthcare providers during the first COVID-19 wave
Moser et al., 2020	Prospective	General Population	Switzerland	Suicide risk was expressed in years of life lost and the average person would suffer of 0.21 years due to psychosocial consequence of COVID-19 mitigation measures
Murata et al., 2020	Cross-Sectional	Adolescents, Adults, and Health Care Workers	United States Of America	The COVID-19 outbreak is related with increased rates of clinically significant psychiatric symptoms and loneliness was a major risk factor for more severe suicidal behaviours across populations
Na et al., 2021	Longitudinal	Army Veterans	United States of America	Army veterans with greater pre-pandemic psychiatric, symptom severity, history of suicide attempt, psychosocial difficulties, COVID-19 infection and past-year increase in psychiatric symptom severity were likely to suffer more of suicidal behaviours
Nomura et al., 2021	Cross-Sectional	College Students	Japan	Suicide rates increased in college students
O'Connor et al., 2020	Longitudinal	General Population	United Kingdom	Mental health and well-being were of particular concern during the early phase of the COVID-19 pandemic. Suicidal thoughts increase as the pandemic continues
Panigrahi et al., 2021	Cross-Sectional	General Population	India	Reports in the media and scientific literature emphasized the role of containment measures and fear of COVID-19
Pirkis et al., 2021	Interrupted Time-Series Analysis	General Population	United States of America	No increases in suicides rates during COVID-19 's early months
Prados-Ojeda et al., 2021	Cross-Sectional	Emergency Department Inpatients	Spain	Number of suicide-related presentations stayed the same in comparison to the pre-COVID period and represented a significantly larger proportion of cases compared to the period before the COVID-19 outbreak
Radeloff et al., 2021	Interrupted Time Series Analysis.	General Population	Germany	Suicidal behaviours during COVID-19 outbreak are in line with the trend in previous years

Table 1. *Continues*

Shi et al., 2021	Cross-Sectional	General Population	China	Containment measures, loss of employment and increased psychological stress during the pandemic were related with an increased risk of suicidal ideation and its severity
Sripad et al., 2021	Cross-Sectional	General Population	India	Higher levels of suicidal behaviors were observed among males and those with positive/suspected COVID infection within the first week, while receiving treatment in COVID care centres.
Tanaka & Okamoto, 2021	Time Series Analysis	General Population	Japan	Increase in suicidal behaviours followed an initial decline during the COVID-19 pandemic in Japan because of disease recurrence, social distancing, and economic downturns
Tasnim et al., 2020	Cross-Sectional	College Students	Bangladesh	Sleep disturbance, tobacco overuse, past suicidal thoughts and attempts, family history of suicidality, mood disorders and stress are related to higher levels of suicidal behaviours
Tsai et al., 2021	Cross-Sectional	General Population	United States of America	Pre-existing psychiatric symptomatology are stronger predictors of distress than personal infection or exposure during COVID-19 outbreak
Winkler et al., 2020	Cross-Sectional	General Population	Czech Republic	Health concerns and economic consequences of COVID-19 were associated with suicide risk. In add, having been tested for COVID-19, irrespective of result, was associated with a higher levels of suicidal behaviours
Zhou et al., 2020	Cross-Sectional	Healthcare Providers	China	Healthcare providers are more likely to suffer from psychological disturbances compared to general population
Zwickl et al., 2021	Cross-Sectional	Transgender Individuals	Australia	Transgender individuals were more likely to suffer from suicidal behaviours during COVID-19 outbreak because of financial strain and the onset of psychiatric vulnerabilities and cancellation or postponement of gender-affirming surgery

Fitzpatrick et al., 2020; Gratz et al., 2020; Knowles et al., 2021; López Steinmetz et al., 2020; Mamun et al., 2020; Mortier et al., 2021; Winkler et al., 2020; Zhou et al., 2020; Zwickl et al., 2021).

Another interesting suicide-related dimension observed from the included studies was that of suicide rates. Although suicide rates were generally found to peak during the COVID-19 outbreak (Isumi et al., 2020; Jahan et al., 2021; McIntyre & Lee, 2020; Prados-Ojeda et al., 2021; Radeloff et al., 2021; Sripad et al., 2021; Tanaka & Okamoto, 2021), two studies found no significant change in suicide rates during the COVID-19 outbreak (Appleby et al., 2021; Leske et al., 2021).

Furthermore, suicide attempts were observed as well (Ambrosetti et al., 2021; Every-Palmer et al., 2020; Fitzpatrick et al., 2020; Gil-Jardiné et al., 2021; Holland et al., 2021; Manzar et al., 2021; McIntyre et al., 2020; Moser et al., 2020; Murata et al., 2020; Panigrahi et al., 2021). In addition, being unmarried/single or separated/divorced was identified as increasing the risk of more suicidal behaviors during the COVID-19 outbreak as per Ambrosetti et al. (2021).

3.2.1. Economic downturn

A total of 16 studies (Elbogen et al., 2021; Evans et al., 2020; Fitzpatrick et al., 2020; Halford et al., 2020; Holland et al., 2021; Kar et al., 2021; Knowles et al., 2021; Manzar et al., 2021; Na et al., 2021; Nomura et al., 2021; Radeloff et al., 2021; Shi et al., 2021; Tanaka & Okamoto, 2021; Winkler et al., 2020; Zwickl et al., 2021; O'Connor et al., 2020) emphasized the role of economic distress in fostering higher levels of suicidal behaviors. The financial impact of COVID-19 has been significant: a noticeable number of individuals are facing financial strain and experiencing housing insecurity (US Census Bureau, 2020). Taken together, the results show the role of financial strain, loss of employment, and fear of losing housing in determining different levels of suicidal behaviors.

In addition, the observation of the aforementioned studies has highlighted how other types of economic distress such as food insecurity are currently a major

concern which is very difficult to handle (Elbogen et al., 2021; Evans et al., 2020; Fitzpatrick et al., 2020; Knowles et al., 2021). This suggests that financial, housing, and food insecurity may trigger a crisis of increased suicide/self harm behaviors related to COVID-19 (Ettman et al., 2020).

3.2.2. Psychiatric vulnerabilities

A robust line consisting of 16 studies highlighted that changes due to the COVID-19 outbreak may lead to the onset of psychiatric symptomatology, exacerbating stress and vulnerability to suicidal behaviors (Caballero-Dominguez et al., 2020; Every-Palmer et al., 2020; Fitzpatrick et al., 2020; Fountoulakis et al., 2021; Han et al., 2021; Hill et al., 2021; Manzar et al., 2021; López Steinmetz et al., 2020; Murata et al., 2020; Na et al., 2021; Nomura et al., 2021; Radeloff et al., 2021; Shi et al., 2021; Zwickl et al., 2021; Jiang et al., 2020; O'Connor et al., 2020). The studies in this review showed that a wide range of symptoms appeared during the COVID-19 pandemic. Most of the studies reported the onset of stress, depression, and anxiety symptomatology (Caballero-Dominguez et al., 2020; Every-Palmer et al., 2020; Fitzpatrick et al., 2020; Fountoulakis et al., 2021; Han et al., 2021; Murata et al., 2020; Na et al., 2021; Nomura et al., 2021; O'Connor et al., 2020; Shi et al., 2021). Some studies also reported higher levels of the onset of PTSD symptomatology (Jiang et al., 2020; Murata et al., 2020; Na et al., 2021).

One noteworthy finding is that 11 studies suggested that the pandemic scenario worsened pre-existing psychiatric conditions (Fountoulakis et al., 2021; Hao et al., 2020; Khosravani et al., 2021; Louie et al., 2021; López Steinmetz et al., 2020; McIntyre et al., 2020; Monteleone et al., 2021; Mortier et al., 2021; Na et al., 2021; Tasnim et al., 2020; Tsai et al., 2021). In particular, the studies observed in the current review reported more severe levels of mood disorders and anxious symptomatology (Hao et al., 2020; McIntyre et al., 2020; Mortier et al., 2021; Na et al., 2021; Tasnim et al., 2020; Tsai et al., 2021), obsessive-compulsive disorder (Khosravani et al., 2021), eating disorders

(Monteleone et al., 2021), and alcohol overuse (Tsai et al., 2021). Interestingly, some of the insights observed in the studies addressed the potential intervening role of trauma (Tasnim et al., 2020) and the onset of different levels of burnout symptomatology (Mortier et al., 2021; Zhou et al., 2020).

3.2.3. Isolation and quarantine

Ten studies emphasized the role of mitigation policies and social isolation in determining different levels of suicidal behaviors (Ambrosetti et al., 2021; Ammerman et al., 2021; Elbogen et al., 2021; Fountoulakis et al., 2021; Holland et al., 2021; Knowles et al., 2021; Murata et al., 2020; Panigrahi et al., 2021; Shi et al., 2021; Tanaka & Okamoto, 2021).

Specifically, Gratz et al. (2020) argued that longstanding experience of being alienated from meaningful relationships with others increased suicide risk during the current pandemic, whilst Elbogen et al. (2021) emphasized how social isolation was associated with suicidal behaviors during the early months of the pandemic because of social alienation and a lack of connection with others. The observation of the studies mentioned above supports concerns that social distancing measures and isolation stemming from mitigation policies aimed at hindering the spread of the virus may diminish important social connections, which may potentially foster higher levels of suicidal ideation and thoughts of self-harm (Hagerty & Williams, 2020; Reger et al., 2020; Torales et al., 2020).

3.2.4. Health concerns

Ten studies (Ammerman et al., 2021; Anestis & Brian, 2021; Holland et al., 2021; Kar et al., 2021; Manzar et al., 2021; Na et al., 2021; Panigrahi et al., 2021; Shi et al., 2021; Sripad et al., 2021; Tanaka & Okamoto, 2021) reported that suicidal behaviors were higher when health concerns were higher, for instance, the fear of being infected with COVID-19 (Sripad et al., 2021). As highlighted by Tanaka and Okamoto (2021), fear caused by the threat of the disease may cause restricted access to healthcare services, thereby inducing higher levels of psychiatric symptomatology and increased suicidal behaviors. Sripad et al. (2021) also reported that the majority of suicides occurred in the first week of COVID-19-positive status and individuals had expressed either a fear of death or stigma related to COVID-19 infection. In addition, Kar et al. (2021) suggested that feelings of shame and frustration in response to testing positive for COVID-19 test were a major risk factor. Moreover, further insights highlighted a potential additional link between COVID-19 and suicidal behavior, suggesting that a portion of individuals may use exposure to COVID-19 virus as means to kill themselves (Ammerman et al., 2021).

3.2.5. Relational difficulties

Five studies highlighted the role of relational difficulties in determining individual differences in suicidal behaviors (Crasta et al., 2020; Evans et al., 2020; Gratz et al., 2020; Han et al., 2021; Knowles et al., 2021).

Specifically, the observed studies highlighted that the presence of maltreatment and violence (Knowles et al., 2021), perceptions of being a burden to others, feelings of social detachment, and lack of relevant social bonds (Crasta et al., 2020; Gratz et al., 2020), and strained relationships (Evans et al., 2020; Han et al., 2021) were closely related to higher levels of suicidal behaviors during the COVID-19 outbreak.

3.3. Observed populations

Indeed, many studies have suggested that the psychological impact of COVID-19 may be different across cohorts. In the studies included in this review, suicidal behaviors were observed in different populations. Most of the studies ($n = 32$) addressed the impact of suicidal behaviors in the general population (Ambrosetti et al., 2021; Ammerman et al., 2021; Anestis et al., 2021; Anestis & Brian, 2021; Appleby et al., 2021; Caballero-Domínguez et al., 2020; Crasta et al., 2020; Elbogen et al., 2021; Evans et al., 2020; Every-Palmer et al., 2020; Fayaz & Albarracín, 2021; Fountoulakis et al., 2021; Gil-Jardiné et al., 2021; Gratz et al., 2020; Halford et al., 2020; Han et al., 2021; Jiang et al., 2020; Sher, 2020; Kar et al., 2021; Knowles et al., 2021; Leske et al., 2021; López Steinmetz et al., 2020; McIntyre & Lee, 2020; Mortier et al., 2021; Moser et al., 2020; O'Connor et al., 2020; Panigrahi et al., 2021; Pirkis et al., 2021; Radeloff et al., 2021; Shi et al., 2021; Sripad et al., 2021; Tanaka & Okamoto, 2021; Tsai et al., 2021; Winkler et al., 2020).

Concerning the general population, financial problems were the most frequently described risk factor (Elbogen et al., 2021; Fitzpatrick et al., 2020; Gratz et al., 2020; Knowles et al., 2021; McIntyre et al., 2020; O'Connor et al., 2020; Shi et al., 2021; Tanaka & Okamoto, 2021; Winkler et al., 2020). Physical symptoms and fear of physical harm were also reported as risk factors (Ammerman et al., 2021; Anestis & Brian, 2021; Fitzpatrick et al., 2020; Sripad et al., 2021; Winkler et al., 2020). Connected to the previous point, fear of testing positive for COVID-19 was reported as closely linked to suicidal behaviors (Sripad et al., 2021).

Another noteworthy dimension related to suicidal behaviors in the general population was general distress (Ammerman et al., 2021; Caballero-Domínguez et al., 2020; Evans et al., 2020; Every-Palmer et al., 2020; Fountoulakis et al., 2021; Tsai et al., 2021). In addition, depressive and anxious symptomatology (Caballero-Domínguez et al., 2020; Fitzpatrick et al., 2020; Murata et al., 2020; Shi et al., 2021; Tsai et al., 2021) and PTSD (Jiang et al., 2020) were identified as increasing the risk of suicidal behaviors. In one study, insomnia was linked with higher risk of suicidal behaviors as well (Caballero-Domínguez et al., 2020).

Furthermore, the contributing role of social distancing in levels of suicidal behaviors reported by general populations was assessed in many studies (Ammerman et al., 2021; Gratz et al., 2020; López Steinmetz et al., 2020; Shi et al., 2021; Tanaka & Okamoto, 2021). Similarly, higher levels of suicidal behaviors were linked to loneliness (Elbogen et al., 2021; Gratz et al., 2020; Mamun et al., 2020; Murata et al., 2020), whilst one study emphasized the role of domestic abuse and relational difficulties (Knowles et al., 2021). In addition, having maladapted thinking patterns, such as exaggerated threat expectancies and low tolerance of uncertainty (Anestis & Brian, 2021), psychological inflexibility (Crasta et al., 2020), and perceived burdensomeness (Crasta et al., 2020; Gratz et al., 2020) were identified as increasing the risk of suicidal behaviors during the COVID-19 outbreak.

From the analyses of the included studies, the observation of different vulnerable populations emerged, with emergency department inpatients ($n = 4$) and psychiatric populations ($n = 4$) and individuals undergoing surgical treatment ($n = 1$) being the most frequently represented subjects (Ambrosetti et al., 2021; Hao et al., 2020; Hill et al., 2021; Holland et al., 2021; Khosravani et al., 2021; McIntyre et al., 2020; Monteleone et al., 2021; Prados-Ojeda et al., 2021;

Zwickl et al., 2021).

With regard to emergency department inpatients, studies included in the current review identified a number of factors that may foster suicidal behaviors. Specifically, having a pre-existing history of suicide attempts (Prados-Ojeda et al., 2021), substance abuse (Holland et al., 2021; Prados-Ojeda et al., 2021), social distancing (Hill et al., 2021), and higher levels of loneliness (Ambrosetti et al., 2021) were identified as increasing the risk of suicidal behaviors during the COVID-19 outbreak. Concerning the psychiatric population, it was generally found that more severe psychiatric symptomatology may worsen suicidal behaviors (Hao et al., 2020; Khosravani et al., 2021; McIntyre et al., 2020), although one study suggested that the severity of both specific and general psychopathology increased during lockdown and the rise in general symptoms was maintained during the reopening phase, except for suicide ideation (Monteleone et al., 2021).

Other interesting factors related to suicidal behavior during the COVID-19 outbreak were clinically significant rates of depression and thoughts of self-harm in individuals undergoing gender-affirming surgery as per Zwickl et al. (2021).

In addition, two lines of research have been developed that address the impact of suicidal behaviors in the context of COVID-19 outbreak in specific populations. Specifically, a line of studies observed suicidal behaviors in certain age groups, such as children and adolescents (Isumi et al., 2020; Manzar et al., 2021; Murata et al., 2020) and the elderly population (Louie et al., 2021), whilst the other line addressed specific working populations, such as healthcare professionals (Jahan et al., 2021; Mamun et al., 2020; Mortier et al., 2021; Murata et al., 2020; Zhou et al., 2020), college students (Nomura et al., 2021; Tasnim et al., 2020), and former military personnel (Na et al., 2021).

With regard to children and adolescents, mental health problems such as depression, loneliness, psychological distress (Manzar et al., 2021; Murata et al., 2020; Tasnim et al., 2020), and even greater exposure to COVID-19-related news (Murata et al., 2020) were identified as increasing suicidal behaviors. Concerning the elderly population, one of the included studies identified that individuals with pre-existing psychiatric histories were at a higher risk of suicidal behaviors (Louie et al., 2021). Regarding college students, several risk factors were emphasized, namely substance abuse, impaired quality of sleep, personal and family history of suicidal behaviors, and internalizing symptoms (Nomura et al., 2021; Tasnim et al., 2020).

With regard to healthcare providers, the included studies identified several factors contributing to higher levels of suicidal behaviors in the context of the COVID-19 pandemic scenario. Specifically, perceived lack of coordination, communication, personnel, or supervision at work, financial stress, and work-related stress were reported (Jahan et al., 2021; Mortier et al., 2021). Fear of infection and fear related to COVID-19 infection/transmission were also reported as being closely linked to suicidal behaviors in healthcare workers. In one study, a significant part of healthcare providers and the general population showed COVID-19-related suicidal behaviors (Mamun et al., 2020), whilst another suggested that healthcare providers were significantly less likely to show suicidal behaviors (Murata et al., 2020).

Overall, observation of the results of the current review suggests that several populations are affected by the COVID-19 pandemic scenario, which may indicate that changes due to the pandemic are widespread.

4. Discussion

4.1. Summary of Evidence

The goal of the current study was to systematically review the studies addressing major causes of and factors related to the risk of suicidal behaviors or suicidal ideation due to the COVID-19 pandemic. Identification of factors that are associated with a higher risk of suicidal behaviors is valuable for prevention purposes. The current results are parallel to previous findings (Wasserman, 1992; Yip et al., 2010) which concluded that past epidemics such as the Spanish flu and SARS created major risk factors for increased suicidal behaviors.

The pandemic and related societal and economic changes created a cascade of modifications in daily life that are mainly characterized by the presence of changes in interpersonal and contextual dimensions (Cannavò et al., in press; Mucci et al., 2020; Presti et al., 2020; Sher, 2020). A variety of factors were thus associated with a higher risk of suicidal behaviors. Among the most commonly described causes of increased suicidal behaviors in the setting of the COVID-19 pandemic, both individual and contextual factors have been described, with financial difficulties and psychiatric vulnerabilities being the most frequently represented. This is in line with theoretical explanations of suicide positing that the etiology of such behaviors may be explained by the interplay of proximal, medial, and distal factors (Turecki & Brent, 2016). As far as individual factors are concerned, our results extend those of previous studies suggesting that psychiatric vulnerability and perceived social isolation have a strong effect on the general population (Que et al., 2020; Sher, 2020; Zalsman et al., 2020) and also on healthcare workers (Zhou et al., 2020).

These results confirm previous studies from SARS outbreaks (Liu et al., 2012) in which authors found that individuals seemed to be more prone to suicidal behaviors because of psychiatric vulnerability. For instance, Que et al. (2020) argued that the increased presence of symptomatology in psychiatric patients during the pandemic could be due to difficulty accessing mental health care providers and healthcare resources, which during the pandemic are used to contain the spread of COVID-19 and for the management of infected patients. As Hawryluck et al. (2004) argued, exposure to a life-threatening illness increases the prevalence of severe psychological and emotional problems, and therefore an increased mental health burden may be likely to follow (Secor et al., 2020).

It is noteworthy that the number of studies on the impact of factors related to the COVID-19 outbreak and suicidal behaviors is rather well distributed between Western and Eastern countries, but it appears that developing countries have not produced a sufficient number of papers on the subject, thus highlighting the need for this topic to be further deepened to verify whether the same characteristics are maintained in more countries and cultures. In this regard, suicidal behaviors related to the consequences of the COVID-19 pandemic should be further deepened from a cross-cultural perspective, as cultural factors may have a role in offsetting or alternatively enhancing suicide risk.

Moreover, the results of this study showed that suicidal behaviors are particularly prevalent in both the general and psychiatric populations during the COVID-19 outbreak. Overall, a diverse range of psychiatric disorders (e.g., mood disorders, eating disorders) are affected by changes due to the COVID-19

outbreak and anti-pandemic measures, which in turn may have triggered increased suicide risk (Que et al., 2020). Therefore, within the diagnostic process usually provided in the context of the pandemic, additional assessment of the psychological dimensions, particularly of suicidal behaviors, may also be desirable.

In addition, the findings of the current systematic review provide evidence that the psychological impact of COVID-19 on the general population and vulnerable groups is severe. Hence, the implementation of targeted interventions aimed at improving mental health during pandemics is essential. National and international boards should therefore create a large-scale safety plan aimed at preventing suicidal behaviors in the general population. In this regard, the implementation of tailored interventions aimed at fostering emotional intelligence and emotional regulation may have a favorable role, as robust lines of research highlighted that such constructs may hinder suicidal dynamics (Barberis et al., 2020; Domínguez-García & Fernández-Berrocal, 2018; Neacsiu et al., 2017).

It is of note that a paucity of studies addressed the role of the current outbreak in specific application contexts, such as working environments. This is of particular interest, as some specific occupational contexts may be particularly prone to fostering poor wellbeing in relation to COVID-19 (Zhou et al., 2020). In this regard, past research has already warned that certain professions are at greater risk of developing maladjustment during the outbreak (Conversano et al., 2020; Ruiz & Gibson, 2020; Vuorio & Bor, 2020). Specifically, Zhou et al. (2020) observed healthcare providers during the pandemic, highlighting how the observation of specific populations may be a relevant component for deepening the understanding of the harmful impact of COVID-19 on individuals' everyday life. It is important to note that there have been cases of suicides among healthcare workers globally during the COVID-19 outbreak (Goyal et al., 2020; Jahan et al., 2021; Mamun et al., 2020; Montemurro, 2020; Mukhtar, 2020) and therefore organizations may want to provide physicians, nurses, and allied professionals with screening services for suicidal behaviors as much as possible. In addition, future studies should replicate these findings in different working populations to obtain a broader perspective regarding COVID-19 in working environments.

Interestingly, a small number of studies suggested that COVID-19 had little or no effect on the observed participants (Fayaz & Albarracín, 2021; Gil-Jardiné et al., 2021; Isumi et al., 2020; Leske et al., 2021; Prados-Ojeda et al., 2021; Pirkis et al., 2021; Appleby et al., 2021). For instance, one study addressing children and adolescents (Isumi et al., 2020) and one assessing the general population (Leske et al., 2021) suggested that the first wave of the pandemic had no harmful effects on the participants, in contrast to other researches that showed a significant increase in social and psychological distress even during the first wave (Job et al., 2020; Singh, 2020). On the other hand, other findings suggested that after a decline during the first wave of the pandemic, suicides increased during the second (Tanaka & Okamoto, 2021), thus revealing a need for the dynamics and the effects of the current COVID-19 outbreak to be further investigated in several application contexts and social environments (e.g. family, romantic relationships, friendships).

Despite the robust contribution provided to the understanding of the interplay between psychological variables and the current pandemic, it should be noted that the studies included in the current review were

carried out in the very early phases of the pandemic and therefore replication studies are needed to substantiate the findings.

Limitations

The findings of the current systematic review should be considered in the light of the limitations of each included study. In addition, no unpublished material was included, and this could be particularly relevant as the COVID-19 pandemic is still ongoing and several researches that may potentially be investigating its potential impact on the psychological dimension may still be ongoing. Therefore, a publication bias is likely to occur. Furthermore, this systematic review is only descriptive and explorative in nature and therefore did not assess the quality of any of the studies.

Implications and Conclusions

The findings of this systematic review provide evidence that the COVID-19 pandemic is significantly associated with more severe suicidal behaviors. Therefore, it is crucial to create targeted interventions aimed at fostering good mental health in the general population, maintaining active healthcare services for psychiatric populations, and preserving at-risk professions. The validation of international procedures, standard protocols, and guidelines for the management of suicidal behaviors may help in the creation of specific interventions and an effective diagnostic process.

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