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Review Article

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Suicidality Research: A Narrative Review

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ABSTRACT

This narrative review is focused on brief summaries of 58 papers on suicidality published during 2024. The topics can be categorized as prevalence data, risk factors, comorbidities, potential underlying biological mechanisms, buffers and interventions. In this current literature, the prevalence of suicidality has ranged from 4% in a sample of older adults from China to 61% in a sample of adults with psychiatric problems and has varied by type of suicidality including ideation, planning, attempts and death. The risk factors include a history of attempts, fearlessness of death, impulsivity, and lack of self-regulation. Social risk factors have included "perceived burdensomeness", "thwarted belongingness", being bullied, and social withdrawal. Personality predictors included masculinity and narcissism. Cognitive risk factors include thought suppression, pain avoidance and being non-religious. Situational factors include adversity and climate change. Multiple comorbidities for suicidality were noted throughout this literature including depression, anxiety, substance use disorder, hoarding, subthreshold ADHD, subthreshold PTSD and Parkinson's disease. The few potential underlying biological mechanisms have included increased sympathetic activation, dysregulated biological rhythms, and involvement of the right amygdala and left caudate regions of the brain. Buffers include resilience, optimism/flourishing, sensation-seeking, social support, and exposure to greenness. The few interventions that have appeared include psychotherapy, cognitive behavioral therapy, telehealth, online therapy and virtual reality. Methodological limitations of this literature include the frequent sampling of psychiatric patients whose pathology itself could be the primary risk factor, the researchers' frequent use of mediation analyses involving pre-selected variables and the variability across studies on the level of suicidality studied including ideation, planning, attempts and death.

This narrative review is focused on brief summaries of 58 papers on suicidality published during 2024. Suicidality in this literature covers a wide range of suicidal behaviors from suicidal ideation to suicide planning, suicide attempts and suicide death, although most of the studies have been focused on suicidal ideation and only one sample of suicide deaths has been reported.

The prevalence of suicidality has been as high as 61%, highlighting the importance of research on risk factors to inform intervention protocols. The research found in the 2024 literature is focused predominantly on risk factors for suicidality. Fewer papers have appeared on comorbid psychiatric conditions, potential underlying biological mechanisms, buffers and interventions. These papers on empirical studies, systematic reviews and meta-analyses were found on PubMed and PsycINFO search engines by entering the terms suicidality and the year 2024. Exclusion criteria for this review included proposed protocols, case studies and non-English language papers.

The publications can be categorized as prevalence of suicidality, predictors/risk factors for suicidality, comorbidities, buffers and therapies. Accordingly, this review is divided into sections that correspond to those categories. Although some papers can be grouped in more than one category, 5 papers are focused on prevalence data, 26 papers on predictors/risk factors, 13 papers on comorbidities, 3 papers on potential underlying biological mechanisms, 9 papers on buffers/protective factors and 6 papers on therapies. A discussion on methodological limitations of this literature follows those sections.

Prevalence of Suicidality

The prevalence of suicidality has ranged from 4% for older adults in China to 61% for adults with mental health problems (see table 1). In the study from China on the relationship between cognitive functioning and suicidality (N=3896 adults greater than 60 years-old), lifetime suicidal ideation occurred in only 4% of the sample [1]. The relationship between cognitive functioning and suicidal

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ideation was mediated by depression. That depression explained this relationship is not surprising given that depression is often comorbid with suicidality, frequently precedes suicidal ideation and could be the underlying cause of suicidality.

Table 1: Prevalence of suicidality (and first authors).

Prevalence	First Authors
4% suicidal ideation in older adults in China	Qin
61% suicidal ideation in mental health patients in Pakistan	Hussain
20%-62% suicidal ideation, 52% attempts in substance use disorder patients	Leza
10% suicide attempts in 48 studies from Africa	Babajani
9% death wishes, 9% suicidal ideation, 3% suicide planning in PhD students	Poli

In the sample of adults with mental health problems (N=326, mean age =16-35 years-old from Pakistan), as many as 61% had suicidal thoughts and 91% were depressed [2]. Perceptual abnormalities were also noted in this sample. That two thirds of this depressed sample had suicidal thoughts is not surprising given that depression often leads to suicidality, as do perceptual abnormalities.

In a systematic review of 30 studies from Europe and the U.S. on individuals with substance disorder suicidality rates were high [3]. In this review, suicidal ideation occurred in 20% to 62% of adults being treated for substance use disorder, and suicide attempts occurred in as many as 52% of the participants.

Although most of the current literature has focused on suicidal ideation, another systematic review and meta-analysis on suicide attempts was found in this literature [4]. In this meta-analysis on 48 studies from across the African continent (N=244,701), a lower prevalence of 10% was noted for suicide attempts. Unfortunately, like most of the studies in this literature, the studies included in this meta-analysis were cross-sectional as opposed to longitudinal, making it impossible to know the trajectory of suicidality. That the European and U.S. studies revealed higher rates of suicide attempts than those on the African continent (52% versus 10%) likely relates to the European and U.S. samples having substance use disorder.

A wide range of different types of suicide was reported in a systematic review and meta- analysis on suicide risk among medical residents and PhD students [5]. The current prevalence of death wishes in this sample was 9%, suicidal ideation was 9%, suicide planning was 3%, and non-suicidal self-injury was .8%. The prevalence of lifetime suicidal ideation in this sample was greater than the current prevalence at 26% versus 9%, as well as for suicide planning at 10% versus 3% and suicide attempts at 3% versus. 8%. The greater lifetime prevalence versus current prevalence is not surprising as suicidal individuals have often made multiple attempts. Several risk factors for suicidality in this sample included depression, burnout, hopelessness, loneliness, and low-quality relationships with supervisors as well as workplace mistreatment. These risk factors were listed in this order, but, unfortunately, their relative contribution to the variance in suicidality was not statistically determined.

Predictors/Risk Factors for Suicidality

The most frequently studied predictors /risk factors for suicidality in this current literature include a history of attempts, fearlessness of death, impulsivity, and loss of control (see table 2). These risk factors are not surprising given that the samples included psychiatric patients, individuals with depression and suicide reattempts.

Table 2: Predictors/Risk Factors for suicidality (and first authors).

Predictors/Risk Factors	First Authors
History of attempts	Ernst, Pemar
Severity of helplessness	Riera-Serra
Fearlessness of death	Hart, Andrea-Jover
Impulsivity or loss of control	Rasmussen, Owsiany
Maladaptive emotion regulation	Roger, Russolillo
Perceived burdensomeness	Rimkevieien, Mulligan, Brooks
Thwarted belongingness	Brooks
Workplace bullying	Kim
Social withdrawal	Melzer
Masculinity	Scotti
Narcissism	Sprio
Thought suppression	Genuchi
Pain avoidance	Fang, Torino
Religiosity	Zhang
Cumulative adversity	Tate
Climate change	Chen
Multiple neurobehavioral symptoms	Coppersmith, Law

In a sample of psychiatric inpatients with a **history of suicide attempts** (N= 50), prompts were given for the "wish to live" and the "wish to die" [6]. Patients with a history of suicide attempts more often expressed a "wish to die" as well as greater suicidal desire. However, they also expressed greater ambivalence which could explain the negative correlation of only. 60 between the wish to live and the wish to die rather than a perfect correlation.

A systematic review and meta-analysis were focused on **suicide reattempts** [7]. In this review on 34 studies, the risk factors for suicide reattempts were previous history of suicide, active suicidal ideation, trauma, alcohol and drug misuse. Not surprisingly, these risk factors for reattempts are the same risk factors as those for initial suicide attempts.

In one of the few papers that included suicide deaths, several risk factors were noted [8]. In their systematic review and meta-analysis entitled "Clinical predictors of suicidal ideation, suicide attempts and suicide deaths in depressive disorder", 19 studies yielded 45 different predictors. Hopelessness led to suicidal ideation and suicide attempts. A history of suicide attempts, suicidal ideation, severe depression, and psychotic symptoms led to suicide attempts as well as suicide death. Time to full remission and sleep disturbances were also predictive. These findings highlight both the heterogeneity of risk factors for suicidality but also the greater number of risk factors

contributing to attempts and death than to ideation. Once again, these were findings from depressive disorder samples suggesting that depression could be the major risk factor for any phase of suicidality.

Fearlessness of death is another significant risk factor for suicidality. In a study entitled "Fearlessness about death and suicidal ideation: religious identity matters", patients seeking treatment in a partial hospital program comprised the sample (N =155) [9]. Fearlessness about death was a risk factor for suicidal ideation, but only among the non-religious. Religious individuals often have positive views about life after death, e.g. a belief in reincarnation, so they would likely have low fearlessness about death but would also be opposed to suicide.

Fearlessness of death was reported in another study entitled "Suicidal behavior and social cognition: the role of hypomentalizing and fearlessness about death" [10]. Suicide attempters from seven Spanish hospitals were surveyed (N=1371, mean age =40 years). The results are given in the title. Not surprisingly, suicidal behavior was related to fearlessness about death.

Impulsivity or loss of control have also been significant predictors/risk factors for suicidality in a few studies. In one paper entitled "Multidimensional impulsivity and suicidal behavior", impulsivity was the most significant predictor for suicidality (N= 1027 adults from the UK) [11]. In contrast, sensation-seeking was a protective factor. Sensation-seeking may have satisfied the impulsivity of the participants, thereby protecting them from impulsive suicide.

In a systematic review and metanalysis entitled "Control in relationships, suicidal ideation and non-fatal suicidal behavior among older adults", 12 studies from eight countries were included (N= 1487 participants) [12]. **Perceived lack of control** and value placed on control were the reasons given for suicide attempts by those who survived suicide attempts. The perception of lack of control by older adults is common and all too often reflects real lack of control.

Maladaptive emotion regulation strategies have been associated with suicidality. In a study on emotion regulation, difficulties with emotion regulation were related to suicidality (N= 246) [13]. In a review of many studies (N= 226 studies), the multifaceted role of emotion regulation in suicidality was studied [14]. As might be expected given the large number of studies in this review, several maladaptive emotion regulation strategies were noted for suicidality. They included thought suppression, avoidance, rumination, brooding and negative, impulsive and avoidant problem-solving.

A few predictors that could be considered **social risk** factors include the interpersonal theory of suicide variables that have been labeled "perceived burdensomeness", and "thwarted belongingness". Other social risk factors include being bullied and social withdrawal. In a study entitled "Unraveling the complexity of suicidality", Lithuanian adults were surveyed (N=1873, mean age=44) [15]. **Perceived burdensomeness** was the most significant predictor of suicidality. Surprisingly, this was not accompanied by thwarted belongingness, which is typically highly correlated with perceived burdensomeness. The authors suggested that other "culturally relevant" risk variables were alcohol use, sexual abuse, emotional neglect, and restricted emotionality. How these other variables were related to perceived burdensomeness was not clear.

In a paper entitled "Integrating social determinants with the interpersonal theory of suicide in bipolar outpatients", outpatients attending a bipolar clinic in the U.S. were sampled (N= 171) [16]. Perceived burdensomeness, thwarted belongingness, and socioeconomic risk led to suicidal risk. Perceived burdensomeness mediated the relationship between socioeconomic risk and suicidal risk. Once again, thwarted belongingness was not a risk factor for suicidality.

Links between interpersonal and "psychache" theories of suicide were explored in research entitled "Thwarted belongingness and suicide risk in primary care: Perceived burdensomeness and psychache as mediators" (N= 224) [17]. The results suggested that **thwarted belongingness** led to perceived burdensomeness and "psychache" which led to suicidal risk. As in mediation/ moderation analyses, these mediators (which are considered causal variables) were pre-selected based on a theory (the interpersonal theory of suicide and the psychache theory of suicide). Given that the prevailing theories for suicide are the interpersonal theory of suicide and the psychache theory, it's surprising that these theories have received so little attention in this current literature.

Workplace bullying has also been a social risk factor for suicidality. In a study on Korean employees across 26 companies (N=12,541), as many as 19% of females and 11% of males reported being bullied in the workplace [18]. An association between being bullied and suicidal ideation was noted in those with and without depression which is not surprising given the distress caused by the abusive, bullying behavior independent of depression.

Social withdrawal has been a predictor/risk factor for suicidality. In a review of 21 studies entitled "Suicide crisis syndrome", a pre-suicide state was said to include not only social withdrawal but also entrapment, affective disturbance, loss of cognitive control, and hyperarousal [20]. Again, these risk factors appear to be related, but it would have been informative to know the relative contribution of these risk factors to suicidality based on a regression analysis or structural equation modeling.

A couple **personality variables** have been identified as risk factors for suicidality. They include **masculinity** and narcissism. In a review on a significant number of papers (N= 452) on masculinity and suicidality, the authors concluded that in most countries men complete suicide at twice the rate as women [21]. They categorized the literature they reviewed as covering three epochs. The first epoch was focused on gender differences in suicide. Epoch two was focused on work effects on males leading to mental health issues. Epoch three involved help-seeking by suicidal males. If 452 papers on suicidality in males could be found in an earlier literature, it is not surprising that the prevalence of suicidality in males and masculinity have rarely appeared as risk factors in the current literature.

Narcissism was the second personality risk factor for suicidality found in this literature. In a review paper entitled "Can clinical and subclinical forms of narcissism be considered risk factors for suicide-related outcomes?", 47 studies were included [22]. In this review, narcissism was categorized as vulnerable or grandiose narcissism. Vulnerable narcissism was associated with suicidal ideation, less impulsive non-suicidal injury and deliberate self-harm. Grandiose narcissism was considered a more severe form of suicidality by virtue of its association with severe non-suicidal injury and multiple suicide attempts with "high intent to die". Interestingly, these severe forms of suicidality were protective against suicidal ideation and suicide planning.

A few **cognitive factors** contributing to suicidality have been the focus of research in this literature, including thought suppression, pain avoidance, and non-religiosity. In a study on **thought suppression** entitled "Broadening the perspective on the dynamics of men's suicide: Thought suppression as a mediator between men's self-reliance and suicidality", the results are given in the subtitle [23]. In this sample on U.S. men who had recently experienced a stressful event (N= 785), thought suppression was a mediator between men's self-reliance and suicidality. Also, men's toughness directly led to suicide but was also mediated by thought suppression. Thought suppression has appeared to be a significant risk factor in this sample.

Two studies have been focused on **pain and suicidality**. In the first of these, psychological pain avoidance was considered a "direct driver" of suicidality (N= 501) but, not surprisingly, in a sample with major depression disorder [24]. In a systematic review and meta-analysis on 88 studies entitled "Physical pain and suicide – related outcomes across the lifespan", physical pain led to suicide- related outcomes [25]. The strongest associations were noted between pain and lifetime death wish, current suicidal ideation, and lifetime suicide attempts. Females engaged in more suicidal ideation. The specific painful conditions were fibromyalgia, abdominal pain, and migraine headaches. The association between these conditions and female gender is not surprising given that these conditions occur more frequently in females than males. And the greater engagement in suicidal ideation by females is consistent with other studies suggesting that suicidal ideation occurs more often in females and suicidal attempts are more prevalent in males.

Religiosity was the focus of a paper called "Religion, psychological strain and suicidality in China" (N= 1012) [26]. In this sample, only 4% were religious and as many as 41% were fence – sitters. Those who were religious had a greater risk for suicidality and depression than both the atheists and the fence-sitters, but the fence-sitters had greater psychological strain. That the religious were at greater risk for suicidality in this sample is inconsistent with the previously mentioned finding that the non-religious were at greater risk for suicidality [9]. This inconsistency is difficult to interpret but could be related to cross-cultural or other factors that were not measured in both studies.

Cumulative adversity and climate change have been risk factors for suicidality. In a paper entitled "Cumulative adversity and emotion regulation effects on suicidal ideation and attempts" (N=757 community adults), the results are given in the title [27]. In this rare sampling of community adults, **cumulative adversity**, not surprisingly, led to suicidal ideation and attempts.

In a review and meta-analysis of studies on **climate change** and suicide epidemiology, high temperatures and air pollution were linked to more suicide attempts and deaths, especially among males [28]. Females had greater suicidal ideation but also greater anxiety and non-suicidal self – harm. Again, greater suicidal ideation by females and more frequent attempts by males has been consistently reported in this current literature.

As some have highlighted, risk factors for suicidality are heterogeneous [29]. Multiple **neurobehavioral symptoms** have been noted including affective symptoms, somatosensory symptoms, and vestibular symptoms (N= 309 community participants, mean age = 37) [30]. These symptoms have been noted to predict future suicidal ideation.

An attempt has been made to identify unique sub-groups based on different types of suicidal risks among psychiatric outpatients [31]. In this study from South Korea (N= 1849), those with suicidality were compared to those without suicidality and clusters were formed. Cluster one was characterized by low suicide risk, less frequent suicidal ideation and suicidal planning, but more suicidal attempts. Cluster two was characterized by high-risk, externalizing and bipolar disorder. Cluster three was characterized by internalizing and hopelessness as well as depressive disorders. That cluster one individuals made more suicide attempts but engaged in less suicidal ideation and suicide planning suggests that suicidal ideation and planning aren't necessarily risk factors that predict or precede suicide attempts. This highlights the importance of identifying risk factors for those who attempt suicide without ideation or planning (the cluster one individuals).

Even **songs on suicide** are suggestive of risk factors for suicide. In a paper entitled "Suicide and songs: A thematic analysis of 674 suicide songs", five themes emerged [32]. The themes were: 1) support and empathy for people struggling with suicide; 2) personal experience with suicide; 3) endorsement of suicide; 4) suicide as rebellion or revenge; and 5) suicide as self – medication. The last three risk factors that appeared in these songs have surprisingly not been addressed in current research on suicidality.

Comorbidities of Suicidality

Several comorbidities have been reported for suicidality. They include depression, anxiety, substance use disorders, hoarding disorder subthreshold ADHD, subthreshold PTSD and Parkinson's Disease (see table 3). In addition to the depressive symptoms reported in the 4 samples already described in the section on prevalence data, a fifth study suggested that **depressive symptoms and neuroticism** mediated the association between traumatic events and suicidality [33]. Traumatic events have rarely been mentioned as risk factors in this literature.

Table 3: Comorbidities of suicidality (and first authors).

Comorbidities	First Authors
Depression	
Anxiety	Doering
Substance use disorder	Leza
Alcohol use disorder	Thompson, Gilmore, Lupi
Hoarding disorder	Gil-Hernandez
Sub-threshold ADHD	Oh
Sub-threshold PTSD	Kim
Parkinson's disease	Mai

Anxiety symptoms preceded suicide in a sample from Sweden [34]. Based on physicians' notes, anxiety symptoms were reported within one week before suicide death in as many as 50% of the sample (N=956). Other comorbidities were depression, substance use disorder, and sleep disorders. Multiple comorbidities would be expected to contribute to suicide death.

Substance use disorder was a comorbidity of lifetime suicidal behaviors in a systematic review of 30 studies from Europe and the U.S. [3]. In this review, suicidal ideation occurred in 20% to 62% of adults being treated for substance use disorder, and suicide attempts occurred in as many as 52% of the participants.

Alcohol use disorders have been inconsistently called an effect or a risk factor for suicidality. In the study on excessive alcohol as an effect, stress and alcohol-related coping mechanisms were said to result from suicidality in a sample of mixed types of suicidality (N= 1055) [35]. These included no history of suicidality (79%), suicidal ideation only (15%), or a history of suicide attempts (6%). The authors' results suggested, not surprisingly, that suicidality led to stress and drinking, which led to a lower quality of life.

Suicide as a risk factor for excessive alcohol use has also been studied with actively suicidal adults (N = 13) who engaged in heavy episodic drinking [36]. In this study, current suicidal ideation was based on unusually frequent daily assessments. Suicidal ideation and urges were, not surprisingly, greater on heavy drinking days. These results suggest that the association could be both unidirectional and bidirectional.

In a systematic review on 41 studies, **alcohol use disorders** were comorbid with suicidal behaviors [37]. Not surprisingly, alcohol use disorders were both predisposing and precipitating factors in the studies reviewed.

Hoarding disorder has also been comorbid with suicidal thoughts and behaviors in a sample that were classified as having active or passive suicidal ideation (N=99) [38]. In this study, as many as 50% were noted to have passive suicidal ideation and 26% had active ideation. In a study entitled "Heightened suicidal risk in **ADHD and sub-threshold ADHD**" (N=5005), 4% were noted to have ADHD and 14% sub-threshold ADHD [39]. Surprisingly, suicidal ideation and plans were more prevalent in the sub-threshold ADHD sample. Other comorbidities were depression and substance use disorder.

In a sample of adults with **sub-threshold PTSD** from Korea, the prevalence of sub-threshold PTSD was 2.5% and the prevalence of PTSD was 1.5% [19]. Other comorbidities included major depression disorder, obsessive compulsive disorder, generalized anxiety disorder, and specific phobia. The sample with subthreshold PTSD versus the PTSD sample had greater suicidal ideation, plans, and attempts. Subthreshold conditions like these for ADHD and PTSD may have greater suicidality because their conditions are not recognized, are often overlooked and undertreated despite the high prevalence and significant impact of suicidality in these groups.

In a review and meta-analysis entitled "Risk of suicidal ideation behavior in individuals with Parkinson's disease", 14 studies were included (N=505,950) [40]. In this meta-analysis, 22% of those with **Parkinson's disease** had suicidal ideation and 1% showed suicidal behavior. That individuals with this chronic disease are suicidal is not surprising since it is accompanied by several painful psychological and physical symptoms.

Potential Underlying Biological Mechanisms for Suicidality

Only a few potential underlying biological mechanisms have been the focus of current research on suicidality. They include increased sympathetic activation, dysregulated biological rhythms, and involvement of the right amygdala and left caudate regions of the brain (see table 4).

Table 4: Potential underlying biological mechanisms for suicidality (and first authors).

Mechanisms	First Authors
Increased sympathetic activitation	Ortiz
Dysregulation biological rhythms	Liu
Dysregulation in right amygdala and left caudate regions of the brain	Lin

Having a history of suicide attempts has been associated with **increased sympathetic activation**, but in bipolar disorder [41]. Wearable devices were used in this sample (N=53). Increased respiratory rate and decreased parasympathetic activation (vagal activity) were noted. Suicide risk was 20 times higher in those adults with bipolar disorder, which is characterized by an imbalance of parasympathetic/sympathetic activation and elevated arousal levels that might mediate or explain that relationship.

In a study entitled "Relationships between **biological rhythm dysregulation** and suicidal ideation in patients with major depression disorder", the Beck Scale for Suicide Ideation and the Biological Rhythm Interview of Assessments in Neuropsychiatry were given (N=50 with MDD and 50 without) [42]. The latter scale assesses five areas related to biological rhythms including sleep, activity, social aspects, diet and predominant rhythm (chronotype). Disturbances in these rhythms have been associated with suicidality, so it is not surprising that these two assessments were positively correlated. An actual measure of biological rhythms as in heart rate or EEG monitoring or sleep actigraphy would have been more valid and reliable measures than the interview in this study.

Dysregulation in the right amygdala and left caudate regions of the brain were the most reliable predictors of suicidality in

a study on late-life depression [43]. In this sample (N= 83), 35 were non – suicidal, 26 had suicidal ideation and 22 had made suicide attempts. That the attempters comprised as many as 27% of the sample is not surprising given their late-life depression. The involvement of the right amygdala is also not surprising as it plays a critical role in processing negative emotions, particularly fear and threat, and the left caudate has been activated in romantic interactions. The absence of distressed romantic interactions like breakup distress and loss of significant others as suicidality risk factors is a notable limitation of this current literature [44].

Buffers/ Protective Factors for Negative Effects of Suicidality

Several buffers or protective factors for suicidality have appeared in this current literature. They include resilience, optimism/ flourishing, social support, education and exposure to greenness (see table 5).

Table 5: Buffers/Protective Factors for suicidality (and first authors).

Buffers/Protective Factors	First Authors
Resilience	Lee, Ki
Flourishing and optimism	Chang
Social support	Garvishi
Listening and expressing care	Metat
Meaning/purpose in life	Maynard
Education	Ludwig
Green space exposure	Bolanis

In a study on psychological resilience and suicidality in the general population of Korea, **less resilience** was noted in those who reported lifetime, one-year, and one-month suicidal ideation, suicide planning or suicide attempts [45]. In those who had high resilience, no suicidal ideation, planning or attempts were noted. In a systematic review on psychosocial protective factors against suicide and suicidality (N=70 studies) a few factors were notable buffers. Not surprisingly, they included resilience, purpose in life and positive relationships [46].

In a study entitled "Examining optimism and flourishing as protective factors of suicidality across the adult lifespan", three different age groups from Spain were studied including young adults (18 to 35 years-old), middle age (36 to 55 years-old) and old adults (greater than 55 years- old) [47]. **Flourishing** was protective in the young and middle-age groups and **optimism** was protective for the old-age group.

In a systematic review and meta-analysis on the role of **social support** in preventing suicidal ideation and behaviors (N=118 studies, 692,226 participants), inverse relationships were noted between social support and suicidal ideation, plans, attempts, and death [48].

Listening and expressing care have been reported to be the most helpful responses to disclosure of suicidality. In a study on perceptions of helpful responses to suicidality, the sample comprised international users of YOUPER, a mental health app (N= 2952) [49]. In this sample, 56% shared their suicidal thoughts and 56% perceived the responses they received as being helpful. Listening and expressing care were considered the most helpful responses. Those who were severely depressed and those who had a generalized anxiety disorder diagnosis gave more disclosures, and those with borderline personality disorder and social anxiety made fewer disclosures.

In a review of 5441 records on psychological factors protecting against suicidality in older adults, eight factors emerged [50]. These included 1) meaning/purpose in life, 2) reasons for living, 3) coping styles, 4) psychological well-being, 5) life satisfaction, 6) personality factors, 7) cognitive functioning and 8) sense of belonging. These variables would seemingly be highly correlated with each other.

In a review and meta-analysis of 41 studies on **education** and suicidal ideation in Europe, education was a buffer [51]. A trend was reported for education having a protective effect on the emergence of suicidal ideation. Surprisingly, education has rarely been mentioned in this literature, not unlike other demographic factors like socioeconomic status, race and ethnicity.

Green space exposure was noted to be a protective factor across the lifespan in a review on 23 studies [52]. The various measures included duration and frequency of being exposed to greenness, tree canopy, and green space. This protection was noted for suicide mortality, self-harm and suicidal ideation. Greenness protection was greater for females. These results are consistent with a review on nature therapy research suggesting greater effects of green space exposure for women [53,54]. These consistent data could relate to women spending more time in nature.

Therapies for Suicidality

Several therapies have appeared in this current literature on suicidality. They include psychotherapy, cognitive behavioral therapy, Telehealth, online therapy, and virtual reality therapy (see table 6).

Table 6: Interventions for suicidality (and first authors).

Interventions	First Authors
Psychotherapy	vanBallegooijen, Xu
Brief cognitive behavioral therapy	Diefenbach
Telehealth brief cognitive behavioral therapy	Baker
Online prevention campaign	Stas
Virtual reality therapy	Ronaghi

In a systematic review and meta- analysis on 193 studies (N= 11,001), suicidal ideation and suicide attempts were decreased by both direct and indirect **psychotherapy** [55]. In another systematic review and meta- analysis of 34 trials on psychotherapy for individuals who had attempted suicide (N=6600), psychotherapy reduced the levels of suicidal ideation, depression, anxiety and hopelessness [56]. Psychotherapy also reduced suicidal tendencies of those who had attempted suicide and decreased repeated suicide attempts.

Psychotherapy is typically referred to as a psychodynamic therapy protocol that differs across therapists based on their

different types of training. In contrast, cognitive behavioral therapy appears to be based on a standardized protocol that is typically similar across therapists.

Brief cognitive behavioral therapy (CBT) for suicidal inpatients was assessed via a randomized controlled trial (N= 200, Mean age = 33) [57]. The participants were randomly assigned to a group receiving treatment as usual or a group that received treatment as usual and CBT. The participants were given four individual sessions. The CBT group experienced a reduction in suicide attempts by 60% and a decrease of readmissions by 71%. These data on CBT for suicidal inpatients are consistent with CBT results for individuals with depression [53].

In a telehealth brief CBT for suicide prevention study, randomized controlled trials were conducted (N= 98, mean age= 32) [58]. The suicide-focused treatment that involved emotion regulation and self-appraisal skills was more effective than the trial focused on identifying adaptive responses to stress. The CBT group experienced fewer suicide attempts (30% versus 36%).

In an evaluation of an **online suicide prevention campaign** targeting men (N= 250 men from Belgium), access was given to an online suicide prevention campaign for three days [59]. The results suggested an increase in help-seeking intention when experiencing suicidal thoughts and an openness to communicating and expressing emotions following the prevention campaign experience. The generalizability of these data is limited by the exclusive focus on men. The researchers likely elected this exclusivity because of the greater prevalence of suicide attempts in men.

In a study entitled "How does virtual reality technology affect suicidal ideation in society?", adults with a history of suicide (N=189) were randomly assigned to three different groups including a control group, a traditional therapy group and a **virtual reality – based training** group [60]. The therapy was conducted for 90 days. A greater reduction in suicidal thoughts occurred in the virtual reality group based on the Beck Scale for Suicide Ideation. The results of this study demonstrated positive use of three-dimensional simulation and visualization tools, but it's not clear what type of therapy was effective. Other research has suggested that online therapy may be more effective than in person therapy.

Methodological Limitations of this Literature

Several methodological limitations can be noted for this literature. Most of the studies were cross-sectional as opposed to longitudinal so that the trajectory of suicidality from suicidal ideation to planning suicide to suicide attempts could not be traced. Presumably these occur in a sequential process with the earlier stages preceding the later stages, although at least one study showed that suicide attempts were not preceded by ideation or planning. Typically, researchers have addressed only one stage based on convenience samples. Comparisons across these different stages regarding symptoms and emotional states would help inform intervention protocols

Most of the samples were individuals with suicidal ideation or psychiatric conditions as opposed to samples from the general population. This suggests that these were self-selected samples that were predisposed to suicidality. The typical psychiatric condition was depression disorder which has been noted as a high-risk comorbidity of suicidality. This sampling of psychiatric patients or those who are already experiencing suicidality raises a question of generalizability to the general population.

Another problem with sampling was some studies exclusively sampled men or women, suggesting that the results would not be generalizable to the opposite gender. This concern would also be applied to samples of single ethnicity, race, age group or socioeconomic status.

Variables from the interpersonal theory of suicide including perceived burdensomeness and thwarted belongingness were studied but sometimes separately and at other times as preselected mediation variables, suggesting researcher bias. The relative significance of these variables and the sequence of their occurrence has not been determined. Other variables that would seemingly be significant risk factors have not appeared in this literature, for example romantic breakup distress or bereavement over the loss of a significant other [53]. These may have been anecdotally noted, but they were not studied as risk factors for suicidality.

The frequency of mediation analyses based on weak theoretical rationales for the selection of mediation variables is another limitation of this literature. The selection of mediating/moderating variables requires a priori theoretical rationales for their selection. Also, that form of analysis does not determine the relative contribution of predictor or risk variables to negative effects or outcomes. The use of regression analysis or structural equation modeling would have been more informative for determining the relative contributions of the various risk factors to suicidality.

The relative absence of potential underlying biological mechanism studies is problematic. Despite the severity of suicidality, the significant prevalence and the growing prevalence, the mechanism research has been limited, likely because of its costliness and limited available funding.

Despite these methodological limitations, the current research on suicidality has been informative, especially the results of the large numbers of risk factor studies. These can hopefully inform the more expensive intervention studies that are needed to prevent suicidality and its risk factors.

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