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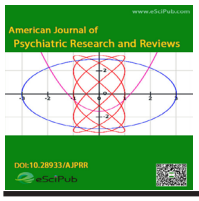

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Late Life Suicidality: A Narrative Review

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ABSTRACT

This review summarizes research on late life suicidality found in the recent literature (last five years). The prevalence has widely ranged from 5-56% for suicidality in late life. The research has focused primarily on predictors/risk factors for suicidality. Social factors have included bereavement, isolation and loneliness. Psychological problems have included anxiety, depression, cognitive impairment, sleep disturbances and prior suicide attempts. Physical conditions have included functional disability, inflammation, chronic illness and drug misuse. Interventions have focused primarily on exercise and increasing physical activity. The interpersonal theory of suicide (thwarted belongingness and perceived burdensomeness), inflammation and immune dysfunction have been considered potential underlying mechanisms for late life suicidality. This research is limited to self-report, cross-sectional studies that typically involve several variables, although the relative significance of the different variables is frequently not reported.

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This narrative review involved entering the terms suicidality and aging (ageing) into PubMed and PsycINFO. The search yielded 162 papers for the last five years. However, following exclusion criteria including case studies and non-English language papers, this review is a summary of the research reported in 39 papers. This recent literature on suicidality (usually defined as the risk for suicide indicated by suicidal ideation) is predominantly focused on predictors/risk factors for suicidality in aging adults along with studies on prevalence, interventions and potential underlying mechanisms. This narrative review is accordingly divided into sections on prevalence, predictors/risk factors, interventions and potential underlying mechanisms. These are followed by a section on methodological limitations of the research.

Prevalence

The prevalence of suicidality has varied widely from the “wish to die” at 5% to as many as 56% expressing suicidal thoughts when several studies are combined in a review (see table 1). In a paper entitled "Social interactions among older adults who “wish for death" (N =2787 French adults, mean age= 74), the sample from the Seniors Health Survey suggested that 5% expressed the “wish to die” (Bernier et al, 2020).

In a study on older adults in Brazil called the Global Burden of Disease Study, the mortality from suicide varied from 7% to 26% across 15 states (Pires et al, 2022). The mortality rate for men in this sample was 3 to 4 times greater than for women. The variation of mortality across the 15 states is difficult to interpret and highlights the need for more demographic data that might reveal a risk profile.

In an epidemiological study on suicide in older adults, the rate was 47% higher in older adults than in the general population (Santos et al, 2021). And the highest rates were in the adults who were older than 80 years.

In a review on older adults with major depression disorder, the prevalence of suicidality ranged from 5% to 56% (Donkor et al, 2021). The older women were more depressed and the older men more successfully suicided. In this review, hanging was the most common form of suicide, although the women preferred poisoning and the men preferred firearms. In another study, hanging was the most popular form of suicide by 68% of the participants (Santos et al, 2021). Firearms were used by under11%, self-intoxication by 9%, falling from a high place by 5% and “undetermined” by 6%.

In some countries, the prevalence of suicide has been decreasing. For example, starting in 1985, the prevalence of late life suicide in Italy started decreasing, especially in older adults and females (DeLeo et al, 2020). This was attributed to increased health care assistance and quality of life.

Clearly, the prevalence of suicidality in late life has varied across countries, within countries, by gender and by severity from suicidal thoughts to suicidal mortality. The suicidality rates may be underestimated due to “faking good” or reluctance to express suicidal thoughts even on anonymous surveys. However, the decreasing rate of death by suicide in Italy is a promising trend.

Predictors/Risk Factors

This recent literature on suicidality in aging adults is focused primarily on predictors/risk factors (see table 2). These include social factors, psychological problems, physical conditions, and drug misuse. Most of the studies have included several of these factors, which may be confounded, and which often are not assessed for the relative variance they explain in suicidality.

Social Factors

The social factors that have been problematic include bereavement, isolation, and loneliness.

Divorce and widowhood have been risk factors for suicidal thoughts in older adults. In a sample from the Swedish National Study on Aging and Care, being widowed or divorced were risk factors for suicidal thoughts (N=7,913 adults greater than 60 years-old) (Tuvesson et al,

2018). This may relate to bereavement over the loss of the relationships. Bereavement has been a specific risk factor in a systematic review on suicide behavior in older age adults (Beghi et al, 2021). In this review, related risk factors were living alone, depression, psychotropic drugs, being male, and being in poor medical condition.

Isolation and loneliness have often resulted from the loss of relationships by divorce and widowhood. The prevalence of loneliness in aging adults has varied from a low of 11% in Norway to a high of 76% in SanDiego (Field, 2023). In a study on social interactions among older adults who “wished to die” (N=2,787 French adults, mean age=74), three social variables predicted the “wish to die” including dissatisfaction with social life, being distant toward others and lack of participation in organizations. (Bernier et al, 2020). The authors interpreted their results as providing support for the Interpersonal Theory of Suicide that cites “thwarted belongingness” as a major risk factor.

Psychological Problems

The psychological problems that have been addressed in this literature include anxiety, depression, cognitive impairment, food insecurity, sleep disturbances and prior suicide attempts.

Anxiety has typically been comorbid with depression. For example, in a study, entitled "Anxiety symptoms in older adults with depression”, anxiety was associated with both depression and suicidality (N=218, mean age=76-years-old) (Bendixen et al, 2018). In that study, older adults experienced anxiety based on the Geriatric Anxiety Inventory. In another study on depressed adults (N=52), suicide ideation was associated with anxiety disorder, but also with being female, having pain and experiencing a number of lifetime events (Caceda et al, 2018).

Depression has rarely been the primary focus in these studies on suicidality in aging adults. This is surprising given the high incidence of late life depression ranging as high as 28% in Greece and the association between late life depression and late life suicidality (Field, 2023). Despite the lack of focus on depression, several samples in suicidality research have been exclusively older adults with depression. And depression often appears in a collection of variables, or as a mediator variable. For example, in a study on mental disorders as potential mediators of the association between chronic physical conditions and suicidal ideation (N=1,533 adults older than 65-years-old), the Quebec Health Survey on Services was sampled (Vasiliadis et al, 2022). In a path analysis, depression mediated the association between chronic physical conditions and suicidal ideation, although post-traumatic stress syndrome and functional disability were also mediators. In contrast, pain and anxiety were not mediators.

In another study entitled “Bridging late-life depression and chronic somatic diseases” (N=2,860 older than 60 years-old), the Swedish National Study on Aging and Care was sampled (Triolo et al, 2021). The diseases in the study included cardiovascular, neurological, gastrointestinal, metabolic, musculoskeletal, respiratory, sensory and unclassified. Depressive symptoms along with these disease clusters were associated with suicidal thoughts. But they were also associated with pessimism, anxiety, reduced appetite and cognitive difficulties.

In data from the CDC, depression and mood problems were the most common risk factors for suicide (Schwab-Reese et al, 2021). And, in a review on mental health conditions and suicidal thoughts, depression was a predictor of suicidal thoughts (Obuobi-Donker et al, 2021). Other variables that were risk factors in this review included physical illness, financial constraints, sexual dysfunction and living alone.

In a review of 23 papers on "rational suicide" in late life, which was defined as a well-thought-out decision by mentally competent adults, depression was a major risk factor. (Gramaglia et al, 2019). Ageism, and what was termed "the

Table 1. Prevalence of late life suicidality

Prevalence	First Author
France- 5% “wish to die”	Bernier
Brazil- 7-26% mortality	Pires
Major depressive disorder- 5-56%	Donker
47% greater in very old vs. general population	Santos
Decreasing in Italy	DeLeo

Table 2. Risk factors for late life suicidality

Risk Factor	First Author
Social Factors	
Widowhood/divorce	Tuvesson
Bereavement	Beghi
Isolation	Bernier
Loneliness	Bernier
Psychological Problems	
Anxiety	Bendixen, Caceda
Depression	Vasiliadis, Triolo, Schwab-Reese, Obuobi-Danker, Gramaglia
Cognitive impairment	Gumak
Food insecurity	Smith (22)
Sleep disturbances	Owusu, Smith (23)
Previous suicide attempts	Chatton, Shan
Physical Conditions	
Functional disability	Lutz
Frailty	Bickford
Pain	Conejero
Inflammation	Caceda
C-reactive protein	Wu
Chronic illness	Cabello
Drug Misuse	
25% misused	Schepis (19)
17% co-ingestion prescription drugs and alcohol	Schepis (21)
Overdose or suicide	Lundgren

Table 3. Interventions for late life suicidality

Interventions	First Author
Emotion regulation	Kiosses
Physical exercise	Shan, Laflamme

Table 4. Potential underlying mechanisms for late life suicide

Mechanisms	First Author
Interpersonal Theory of Suicide	Sheffler
Perceived burdensomeness	Odam, Troya
Thwarted belonginess	Bernier
Inflammation	Xiao
C-reactive protein	Caceda
Lower natural killer cell number	Schiweck
Higher natural killer cell number	Okazaki

slippery slope" (“the right to die leading to the social obligation to die”) were also significant predictors.

Assisted suicide may be relevant for those who experience rational suicide. In a study entitled “Social, cultural and experiential patterning of attitudes and behavior toward assisted suicide in Switzerland” (N=2,015 55+ year-old adults), the Survey of Health, Aging and Retirement in Europe was examined for attitudes about assisted suicide (Vilpert et al, 2020). Positive attitudes toward assisted suicide were held by 82% and 28% were already involved and 61% considered asking for it. More negative attitudes were expressed among the religious and among those in the 75 and older group.

Cognitive impairment is another psychological variable that has an extensive literature of its own regarding aging problems. However, it rarely appears as a single variable contributing to suicide. An exception is a study entitled “Risk of suicide attempts and patients with a recent diagnosis of mild cognitive impairment or dementia” (N=147,595, mean age=75) (Gunak et al, 2021). In this study, those with recent mild cognitive impairment or dementia were at greater risk for suicide. However, this sample was drawn from VA medical centers resulting in 97% of the sample being men and 86% being non-Hispanic white which limits the generalizability of these findings.

Food insecurity was assessed in a study entitled "Association of food insecurity with suicidal ideation and suicide attempts" by two questions including "the frequency of eating less" and "hunger due to lack of food" (N=34,129, mean age=62) (Smith et al, 2022). Severe food insecurity led to five times greater odds for suicide attempts. The self-reported "wish to die" was the measure of suicide ideation, but was only assessed for those who were depressed.

Sleep disturbances have also rarely been the focus of studies on late life suicidality. This is surprising given the high prevalence of sleep disturbances in aging adults ranging from 18% in the UK to greater than 50% in China (Field, 2023). Two studies on the relationship between sleep disturbances and suicidal ideation and attempts have appeared in the recent literature on late life suicidality. In one study, entitled "Association of sleep characteristics and suicidal ideation and suicide attempts among adults greater than 50 with depressive symptoms”, the sample was drawn from the WHO study (N= 2040) (Owusu et al, 2020). Sleep quality, which was defined as less than seven hours per night or greater than nine hours per night, was associated with suicidal ideation and suicidal attempts.

In a study entitled “Physical multi-morbidity, suicidal ideation and suicide attempts among adults”, the Study on Global Aging and Adult Health was sampled (N =34,129, mean age=62 and maximum age was 114) (Smith et al, 2023). In this study, physical multi-morbidity was associated with increased odds of suicidal ideation (odds ratio =2.99) and attempts (odds ratio = 2.79). These were mediated by sleep/energy limitations (28–34%) but also by mobility limitations (26–35%) and pain/discomfort (33–44%).

Previous attempts at suicide, surprisingly, have only appeared among a series of risk factors in a couple review papers. In one review, previous attempts were listed along with depression, physical illness, substance use, loneliness, marital status and low social support (Chatton et al, 2022). In another review, previous suicidal attempts were listed as a risk factor for future suicides along with mood disorders, physical health and social isolation (Shan et al, 2022).

Physical Conditions

Physical conditions have included functional disabilities, pain, inflammation, and disease. These problems have typically been studied along with other risk factors, and it is often unclear which of the risk factors is most related to suicidality.

Functional disability has been related to suicidal behavior in older adults (Lutz et al, 2018).

In this sample, depression was a mediator for the relationship between functional disability and suicide attempts, although depression has rarely been treated as a mediator in the studies of this literature. In a study entitled "The relationship of frailty and disability with suicidal ideation in late life depression", poor performance was noted on frailty measures of gait speed and muscle weakness (N=72 adults with depression) (Bickford et al, 2021). These frailty measures were associated with greater suicidal ideation, independent of depression severity and demographics. Functional disability in this study was uniquely defined as impairment in financial capacity, social interaction, and communication skills all of which were associated with suicidal ideation.

Pain has surprisingly been rarely mentioned in this literature. In a review on suicide in older adults, it was one among many predictor variables (Conejero et al, 2018). Other risk factors included psychological and neurological disorders, social exclusion, bereavement, cognitive impairment, difficult decision-making, cognitive inhibition, physical illness, and psychological problems.

Inflammation was the focus of a study entitled "A probe in the connection between inflammation, cognition and suicide" (Caceda et al, 2018). C-reactive protein, as an inflammation marker, was associated with suicide attempts, but, surprisingly, not with ideation (N=52 depressed adults). Suicide attempts were also associated with age, BMI, interleukin–6 (another inflammation biomarker) and pain. And, suicidal ideation was associated with pain and lifetime events as well as being female and having an anxiety disorder.

C-reactive protein was also related to depression and risk for suicide in a study that compared aging adults who were depressed, non-depressed, and those with treatment–resistant depression (Wu et al, 2022). The pro-inflammatory markers including CRP, TNF-alpha and IL–6 levels were greater in depressed versus non-depressed individuals, as might be expected. However, surprisingly, they were also greater in depressed adults who responded to anti-depressants. Those with treatment-resistant depression were at greater risk for suicide. These results are limited by the small sample (N=30 each group) and its cross-sectional design. And, the sampling for inflammation markers was conducted at only one time point.

Chronic illness is another variable that has been listed among many others as being risk conditions for suicidal ideation and attempts in older people. For example, in a large sample study (N= 52,150), chronic health conditions were considered a risk factor for suicidal ideation and attempts (Cabello et al, 2020). In that study, other risk factors included being greater than 65-years-old, being from a high-income country, having more negative affect, disability and food insecurity, and being isolated.

Drug Misuse

Drug misuse has been highlighted in a few studies. In a paper entitled "Prescription opioid and benzodiazepine misuse is associated with suicidal ideation in older adults" (N =17,608 adults greater than 50 years), a sample was taken from the U.S. National Survey of Drug Use and Health (Schepis et al, 2019). Drug use in the past year but without misuse was associated with suicidal ideation. Only 2% of adults not engaged in misuse had suicidal ideation, while as many as 25% of those who misused drugs endorsed suicidality.

In a study on co-ingestion of prescription drugs and alcohol in U.S. adults greater than 50-years-old, the U.S. National Survey on Drug Use and Health was again used (N=35,190) by the same author on twice the sample size (Schepis et al, 2021). In this sample, prescription opioid, tranquilizer/sedative and stimulant misuse occurred while "drinking or within a couple hours of drinking". As many as 27% of the sample engaged in past month co-ingestion. The risk for suicidal ideation was 506% greater in those with co-ingestion than those with past year prescription drug misuse.

The Cause of Death Registry from the Swedish National Board of Health and Welfare has been studied for opioid use and death due to an overdose or suicide (N=1500 with N=136 adults who committed suicide and N=405 who experienced death due to suicide from an overdose) (Lundgren et al, 2022). The risk factors for death due to suicide included elevated mental health scores, previous suicide attempts, non-medical opioids one to two times per week for a year, history of drug use and early onset drug use. The risk factors for deaths due to accidental overdose included again elevated mental health scores, recency of non-medical opioids as well as frequency of that use.

Interventions

Surprisingly, only a few intervention studies have appeared in this literature (see table 3). These include an application for emotion regulation, physical activity programs and exercise interventions.

In a study entitled "An emotion regulation app for middle age and older adults at high suicide risk", a tablet app that helps suicide risk patients regulate their emotions outside of therapy sessions was developed (Kiosses et al, 2022). The intervention was called wellPATH.

In a mini-review and synthesis of literature, several different interventions were reviewed including diet, psychosocial programs, and depression medication (Shan et al, 2022). In this review, physical exercise was the most effective intervention. In a systematic review of reviews, physical activity was again the most effective intervention in contrast to antidepressant data that were inconclusive (Laflamme et al,2022). Surprisingly, these two reviews suggested that activity/exercise was the most effective intervention, although no studies appeared in this literature suggesting that inactivity was a risk factor for suicidality. There is, however, an extensive separate literature on inactivity in aging adults suggesting a prevalence ranging from 21% in Malaysia to as high as 79% in European countries (Field, 2023). These data highlight the need for activity interventions.

Potential Underlying Mechanisms

Potential underlying mechanisms for late life suicidality have appeared in this literature (see table 4). They include the Interpersonal Theory of Suicide, inflammation and immune variables.

The interpersonal theory of suicide includes three main components. These are thwarted belongingness, perceived burdensomeness, and capability for suicide (Sheffler et al, 2021). Some research groups have interpreted their findings as support for thwarted belongingness, and others for perceived burdensomeness. In a study entitled "Validating the interpersonal theory of suicide among older adults, pre and peri– Covid–19 Pandemic", 208 older Australians were surveyed face-to-face pre-pandemic or online peri- pandemic (Okan et al, 2022). Perceived burdensomeness was a greater predictor than depression or thwarted belongingness of suicidal ideation. Suicidal ideation and perceived burdensomeness were greater in men and the interaction of perceived burdensomeness and thwarted belongingness added to the variance.

Perceived burdensomeness was also highlighted in another review on 40 articles (62,755) (Troya et al, 2019). I% this review, perceived burdensomeness was the most frequent predictor variable of late life suicidality along with comorbid, physical problems, loss of control and increased loneliness. Self- poisoning was the most common method.

In contrast, in the French study on the Seniors Health Survey, the authors found that suicidality was more prevalent in those who are distant toward others (Bernier et al, 2020). They interpreted these findings as support for the thwarted belongingness component of the Interpersonal Theory of Suicide.

Inflammation and immune dysfunction have also been noted as potential underlying mechanisms for late life suicidality. In a paper, entitled "Association of dietary inflammatory index with depression and suicidal ideation in older adults", the high dietary, inflammatory index group had

more prevalent depression (9% versus 7%) and suicidal ideation (9% versus 3%) (Xiao et al, 2022). In a small-sample study on inflammation and suicide, the inflammatory marker C- reactive protein was surprisingly associated with the number of lifetime suicide attempts, but not with suicidal ideation (Caceda et al, 2018).

Mixed findings have been reported for natural killer cell number. In one study (N=306 older adults with major depressive disorder and control participants), natural killer cell number was lower in those with depression and suicidality suggesting immune dysfunction (Schiweck et al, 2020). In contrast, in a study, in which suicide completers as compared to non-psychiatric patients (N=56 per group), a higher natural killer number was noted in the completers group, suggesting that natural killer cells may be a biomarker for suicide completion (Okazaki et al, 2020). The authors of this study referred to their results as "accelerated extrinsic epigenetic aging" which they say involved “immunosenescence in blood cell composition”.

Methodological Limitations

Several methodological limitations can be noted about these recent studies on late life suicidality. Significant variability has been reported on the prevalence data which likely relates to variability on sampling methods and on the sample sizes. And, the variable prevalence may relate even more to some of the studies being based on suicidal thoughts while others are on suicidal attempts and still others on suicide completers.

Self-report surveys have been the most frequently used method for data collection for suicidal ideation which has its limitations especially for as sensitive a topic as suicidal thoughts unless participants are assured of anonymity of their report. Death records have been used for completed suicides which make those studies cross-sectional by nature as they cannot retrospectively determine risk factors.

Most of the studies have focused on multiple risk factors but regression analyses have rarely been conducted to determine the relative variance explained by the different risk factors. Profile analyses would be very useful for identifying those who might have a risk profile for late life suicidal thoughts to inform intervention efforts. Surprisingly, very few studies in this recent literature have reported medical problems, frailty and/or cognitive deficits as being risk factors for suicidality. Additional risk factors that have been rarely considered include socioeconomic status and education that might be risk factors or mediating/ moderating variables if they had been analyzed by mediation/ moderation or structural equations analysis.

Late life suicidality has rarely been compared to suicidality by younger adults. Surprisingly, sex differences have been rare, although several studies were exclusively male or female, limiting generalizability. The prevalence of late life suicidality and its risk factors are so variable that systematic reviews are inconclusive and meta-analyses have not been conducted. Biomarkers and potential underlying mechanisms for late life suicidality have been suggested in reviews on the topic, although mechanism studies have rarely appeared in the recent literature. And, several of the recent intervention studies have not randomly assigned participants to comparison groups. Despite these methodological limitations, the recent literature on late life suicidality highlights the significant problem of identifying a risk profile that informs prevention programs.

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