



Published in final edited form as:

Aging Ment Health. 2021 March ; 25(3): 439–444. doi:10.1080/13607863.2019.1698514.

The relationship of frailty and disability with suicidal ideation in late life depression

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Abstract

OBJECTIVES: Frailty and disability are commonly found in Late Life Depression (LLD) and have been associated with increased depression severity, health comorbidities and mortality. Additionally, physical frailty has been associated with suicide in later life, independent of presence of a mood disorder. The objective of our study was to assess the associations of physical frailty and functional disability with suicidal ideation, controlling for depression severity and demographic factors, in an older depressed sample.

METHODS: This study used data from community-dwelling older adults with major depression. Eligible participants were 65 years old, completed measures of depression symptom severity (Hamilton Depression Rating Scale-24 item; HDRS-24), current suicidal ideation (Geriatric Suicide Ideation Scale; GSIS), and physical frailty/functional capacity measures.

RESULTS: Participants were 88 older adults with a mean age of 71.5 ($SD = 6.0$) and 66% of the sample was female. Poorer performance on frailty measures of gait speed ($B = .239, p = .003$) and muscle weakness ($B = -.218, p = .01$) were significantly associated with higher levels of suicidal ideation, independent of depression severity and demographic factors. Functional disability was also significantly related to suicide ideation, specifically impairment in financial capacity ($B = -.290, p = .008$), social interaction ($B = .408, p < .001$), and communication skills ($B = .373, p = .001$).

CONCLUSION: Our findings show that, in LLD, frailty and functional disability are significantly associated with higher levels of suicide ideation, independent of depression symptom severity.

Keywords

aging; frailty; disability; suicide; late life depression

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INTRODUCTION

Frailty and functional disability are immense public health issues in late life. In fact, the prevalence of frailty in community dwelling older adults ranges from approximately 11-31.5% [1–3] and has been found to increase with age [4]. Frailty has been shown to be associated with higher rates of adverse health outcomes including falls, hospitalizations, and increased mortality [5, 6]. Greater fatigability and frailty characteristics in older adults have also been linked to increased prevalence of depression [7], non-remission of depression [8, 9] and in some cases, increased risk for neurodegenerative disorders [3, 10].

The relationship between aspects of depression and frailty appear to be bidirectional [11]. Specifically, depression has been found to be a risk factor for poorer physical health, increased mortality, and functional disability in older adults [7, 12–14]. Unfortunately, most geriatric epidemiological studies of frailty exclude participants with significant psychiatric symptoms [15]. As a consequence, the relationship between frailty, depression severity and suicidal ideation have been understudied. Other symptoms of depression, including fatigue and somatic symptoms, may compound aspects of physical frailty and functional impairment in unique ways that impact both the severity of depression itself, and increase risk for other adverse outcomes [2, 11, 16].

Although depression is one of the leading causes of suicide in depressed older adults [17–19], the association of frailty and disability with suicidal ideation, independent of other depressive symptoms, has not received adequate attention. Along with current mood disorder diagnosis and past suicide attempts, poorer physical functioning has been shown to be a strong predictor of suicide in late life [18, 20–21]. Additionally, Preville et al, found that 8.1% of older adults who died by suicide had severe levels of functional impairment at the time of their death [22]. Evidence suggests frailty characteristics such as loss of muscle mass, fatigability, and decreased physical capacity in older adults may lead to withdrawal from social functions, hastening the spiral of depression severity [23] and suicidal ideation [12, 22].

To effectively prevent late life suicide, identification of potential risk factors is crucial. The objective of this study was to determine if frailty and functional disability were independently associated with suicidal ideation in patients with late life major depression after controlling for depression severity. Our hypotheses were (1) increased frailty on measures of gait speed, dexterity, and muscle weakness would be independently associated with increased self-reported suicidal ideation, even in the context of significant depression severity, and (2) poorer performance on functional measures of disability, as well as greater self-reported functional impairment across domains, would be associated with more suicidal ideation.

METHODS

Participants and Procedures

This study used data from community-dwelling older adults with current diagnosis of major depression. The research was conducted in line with the Declaration of Helsinki

for protection of human subjects, was approved by the institutional review board of the University of California San Francisco, and all participants provided informed consent. Inclusion criteria were age ≥ 65 years, current Major Depressive Disorder diagnosed using the Structured Clinical Interview (SCID-IV) for the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition [24], and depression severity ≥ 19 on the 24-item Hamilton Depression Rating Scale (HDRS-24) [25]. Diagnosis of Generalized Anxiety Disorder and simple phobias were allowed as comorbidities in the current study, however individuals with other comorbid psychiatric disorders were excluded. Other exclusion criteria included current involvement in psychotherapy, current antidepressant treatment, serious suicidal intent in need of immediate intervention, and significant current neurologic disease, such as epilepsy, Parkinson's disease, traumatic brain injury, or cortical stroke. Also excluded were patients with a diagnosis of dementia or with possible dementia as indicated by a score <25 on the Mini Mental State Exam [26].

Participants were recruited through direct mailings in the San Francisco Bay Area. Direct mailing letters included a description of the study, general inclusion criteria (age ≥ 65 , English speaking), and provided a brief pamphlet on the signs and symptoms of depression. Individuals interested in the project were provided more information over the phone before arriving to the clinic. Eligible participants completed measures of current suicidal ideation, depression symptom severity, physical frailty, functional disability, and financial capacity. Frailty and functional disability were assessed through a variety of in-clinic assessment measures and self-report measures, including gait velocity, dexterity, muscle weakness, perceived disability, and financial capacity. Not all participants completed all measures.

Measures

Depression Measures

Depression Symptom Severity: Current severity of depression symptoms was assessed using the 24-item Hamilton Depression Rating Scale (HDRS-24) [25], administered by trained research coordinators.

Geriatric Suicide Ideation Scale: Suicide ideation was measured through self-report utilizing the Geriatric Suicide Ideation Scale (GSIS). The GSIS is a multidimensional 31-item Likert-type scale developed specifically for measuring suicidal ideation in older adults. The GSIS contains a total score and subscale scores; including suicide ideation, perceived meaning of life, loss of personal self-worth, and death ideation. The GSIS has demonstrated strong internal consistency ratings for the total score and subscales as well as strong concurrent validity with other measures of suicide ideation [27]. The GSIS total score ranges from 31-155 with higher scores reflecting greater total suicidality. The GSIS suicide ideation subscale ranges from 5-50 with higher scores reflecting greater active suicide ideation. Clinical categories for high/low suicidal ideation on the GSIS have not been established. Participants were included in analysis only if they completed the suicide ideation measure.

Frailty Measures

Timed Walk Test: Gait velocity or slowness was measured by a 10-meter timed walking test. Participants were asked to walk along 10 meters of rope placed on the floor at a comfortable pace, without overexerting themselves, for two consecutive trials. The time in seconds to walk the entire distance was recorded for each trial and averaged. A maximum pace was also measured twice, with participants walking at their fastest safe pace for 10-meters. The time in seconds was recorded for each of the maximum trails and averaged as well. This measure is used frequently in older adults as a measure of physical frailty [28].

Grooved Pegboard: Dexterity, motor speed and hand-eye coordination were assessed using the grooved pegboard test. Participants were asked to complete the task with each hand twice, and the time to complete (in seconds) for each hand was collected and averaged [28].

Grip Strength Test: A handgrip dynamometer was used to assess muscle weakness in both the dominant and non-dominant hands. Their performance was recorded as strength in pounds and averaged for each hand across two trials. Participants unable to complete the test due to arthritis or hand injuries were not included in the analysis [29].

Functional Disability Measures—*The World Health Organization Disability Assessment Schedule 2nd Edition (WHODAS II)* is a multidimensional measure for assessing self-reported disability and functional capacity. The questionnaire contains 36 items about different types of functioning and disability during the last month. WHODAS II is comprised of questions on a Likert-type scale of 1-5 assessing the following domains: Understanding and Communicating (subscale total score range, 6–30), Moving and Getting Around (subscale total score range, 5-25), Self-Care (subscale total score range, 4-20), Getting Along With Others (subscale total score range, 5-25), Life Activities (subscale total score range, 8-40) and Participation in Society (subscale total score range, 8-40). Total WHODAS II score ranges from 36–180. Higher scores are associated with greater levels of self-reported disability and functional impairment [30].

Independent Living Scale (ILS), Managing Money Scale: The ILS managing money subscale assesses participants' ability to answer questions relevant to financial capacity, complete common financial calculations, and answer questions related to recommended precautions with financial decision-making. This scale consists of 17 items, with scores for each item rated on a scale of 0-2 for a total score of 34. The ILS managing money subscale has been validated in subjects with a range of psychiatric disorders and symptoms, including LLD [31, 32].

Data Analysis

Descriptive statistics, including demographic and clinical characteristics of the participants, were obtained. Pearson correlation coefficients between frailty measures, functional disability and the suicide ideation subscale scores were analyzed. Linear regression analyses were then conducted, assessing the relationship of physical frailty, perceived functional disability, and financial capacity with suicidal ideation, controlling for the effects of age, education, sex, and depression severity. An alpha level of .05 was utilized as a cutoff for

statistical significance for all analyses. R^2 values were then calculated based on standardized beta values in the final model. Statistical analyses were conducted using SPSS version 25.

RESULTS

Participants were 88 adults with a mean age of 71.5 ($SD = 6.0$). The sample was 62.5% female. Mean HDRS-24 depression severity was 25.7 ($SD = 4.5$) and the mean MMSE score was 29.1 ($SD = 1.2$). Additionally, 17.0% of the sample endorsed a previous suicide attempt. Other descriptive characteristics of the sample are presented in Table 1.

In order to determine the linear relationships among the variables of interest, Pearson correlation coefficients were obtained for the relationships among suicidal ideation (GSIS total score) and the primary measures of interest – depression severity, frailty, functional disability, and financial capacity (see Table 2). In this analysis, dominant hand grip strength ($r = .27, p < .01$), minimum gait speed ($r = .29, p < .01$), total functional disability ($r = -.23, p < .01$), and financial capacity ($r = -.27, p < .01$) were all significantly correlated with suicidal ideation. In order to identify which aspect of self-reported functional disability was most related to suicidal ideation in this sample, GSIS total scores were also analyzed for correlations with the various subscales of the WHODAS II (see Table 3). In this analysis, the most highly correlated subscale of functioning with suicidal ideation was the Getting Along with Others subscale ($r = .43, p < .01$), which was subsequently used in the linear regression analysis.

To determine the independent associations of frailty and objective as well as subjective functional disability with suicidal ideation, accounting for depression severity and demographic variables, a hierarchical linear regression analysis was conducted (see Table 4). In the first step, control variables were assessed, with only depression severity significantly associated with GSIS total score ($B = .29, p < .05$). The first step of the model explained 7% of the variance in GSIS score. In the second step, frailty, financial capacity, and functional disability were added into the model, which then explained 34% of the variance in suicidal ideation. In this second step, depression severity was no longer significantly related to suicidal ideation, however frailty, defined by slower timed walk speed ($B = .44, p < .01$), worse financial capacity ($B = -.23, p < .05$), and more functional disability in Getting Along With Others ($B = .32, p < .01$) were all significantly associated with more severe suicidal ideation, independent of depression severity.

DISCUSSION

This study sought to investigate the associations of frailty and functional disability on suicidal ideation and in dwelling older adults with major depression. Our results suggest that frailty and both subjective and objective measures of functional impairment are significantly related to suicidal ideation, independent of depression severity. Our finding that decreased gait speed, as measured by the Timed Walk Test, provide evidence of the impact physical limitations may have on mood perception and suicidal thought. Indeed, the connection between frailty, physical symptoms and depression has been widely studied [11–14]. These findings lend support to the association between physical impairments and suicidal ideation,

independent of the presence of mood disorders, as previously reported in the literature on late life suicide [20].

Our finding on the association between worse social functioning and suicidal ideation fits with the previous literature. Specifically, we found that late life depressed patients with higher suicidal ideation had increased reports of deficits on the Getting Along with Others and Understanding and Communicating subscales of the WHODAS II. These scales assess the impact of concurrent health conditions on difficulties in interpersonal interactions, as well as difficulties in concentration, remembering, problem solving, and communicating with others due to physical health limitations. These results echo a literature where limited social connectedness and limited involvement with family, friends, and social groups has been found to relate to suicidal ideation, behavior and attempts in later life [33]. Thus, the link between disability burden due to social, interpersonal, and physical limitations and suicidal ideation may be a mutually reinforcing process of decline in late life, especially among those already suffering from depression [34] and may put these individuals at higher risk for both adverse medical and adverse psychiatric outcomes. Additionally, our sample excluded individuals who were in active treatment which may relate to the lower perceived social and interpersonal connectedness reported.

Compounding concerns for functional impairment among older depressed adults, we found that increased suicidal ideation was associated with impairment on a measure of financial capacity, a vital independent activity of daily living [31, 32]. Financial strain and financial impairments have been strongly linked to suicidal ideation in younger depressed adults [35] but the research conducted in older adults with depression has been limited [31, 32]. Older adults are already considered an at-risk population for financial abuse [36], and the link between financial impairment and higher suicidal ideation adds increased concern for an already high-risk and vulnerable population.

Despite findings in line with previous research on suicide ideation, frailty and disability, it was unexpected that depression severity was not additively associated with suicidal ideation, independent of these others more functionally-mediated factors. This is a novel finding as most of the literature on late life depression and disability focuses on symptom severity as a primary driver of these impairments [2, 15, 23]. One major contribution of the current study is the use of the Geriatric Suicide Ideation Scale, a lengthy and comprehensive self-report questionnaire which assesses several subdomains of suicide particular to older adults [27]. This allowed for a more nuanced and comprehensive assessment of suicide ideation than other studies which typically a single suicide questions from depression symptom questionnaires that do not parse the many facets of suicide ideation or allow for a greater assessment of range of ideation across multiple domains. These more complex and varied aspects of suicide ideation are particularly important to understand and assess further in late life depression, especially given the high lethality rates of first attempts in late life relative to younger depressed adults [19], and the potential for preventive interventions by both medical and mental health providers.

Suicidal older adults have been found to communicate with family and friends about their intentions and close to 45% visit their primary care physician within a month of their suicide

attempt [37]. Unfortunately, there is still a taboo in terms of discussing suicidal ideation in healthcare settings, and older adults tend to prefer talking with their primary care providers over mental health providers [38]. In fact, only one-third of older adults with common psychiatric conditions, such as depression, actually seek a mental health professional in a time of distress [39]. Understanding the association between suicidal ideation and frailty provides a unique opportunity for clinicians and primary care providers to screen for suicidal thinking, since issues related to concurrent health comorbidities are often more easily reported, less stigmatized and more frequently identified [40]. General practitioners can inquire about physical symptoms of frailty, such as gait, muscle weakness, trouble with IADLS (specifically managing money), and social interaction/getting along with others as one part of an assessment which not only impinges on physical health and morbidity factors but may also aid in high-risk identification for older patients with depression. Potential intervention in these domains or providing referrals to appropriate services, could not only improve depression and physical health, but as our findings suggest, may ameliorate suicidal ideation as well.

This study is limited by the nature of our sample. The participants in our study were primarily white females, with a relatively high level of education for a depression sample. Given that suicide rates are generally increased for male older adults our large female sample size (66%) limits generalizability. Additionally, exclusion criteria for this study excluded participant in active treatment which does not represent currently treated patients. For our assessment measures, a limitation included use of both the WHODAS-II and GSIS, which although well-validated and frequently used, are self-report instruments, and thus may differ from clinician-administered measures. The mean age of the sample was 71.5 with a majority of study participants falling between ages 65-72 years old. Due to the narrow age range, generalizability of these findings may be limited. The study is additionally limited by sample size and the cross-sectional design, making us unable to determine the longitudinal effects of frailty and functional impairments on suicidal ideation, as well as whether treatment of depression improves outcomes in these physical and functional domains. Further research should be conducted on the long-term effects of treatment and time on frailty and functional impairment, with a larger, more diverse sample of LLD adults.

CONCLUSION

Many studies have found that frailty, disability and depression share symptoms in late life. Our results suggest that frailty and functional disability, independent of depression severity, are uniquely associated with suicidal ideation in LLD. Further, frailty, physical weakness and other medical comorbidities may be a valuable avenue for clinicians to uncover potential suicidal ideation that may not normally be discussed, or a pathway by which to intervene in those with treatment-resistant depression. If increased physical limitations, multiple medical comorbidities, and struggles with social interactions are reported, a conversation about possible suicidal ideation, low mood, or psychiatric symptoms may be a valuable and protective tool to help older adults in this crucial moment of mental anguish and stress.

Educating both medical and psychiatric providers about the complex interplay of functional, physical and emotional concerns is also an important consideration in treating

patients holistically and improving outcomes across all areas. Additionally, the need for interdisciplinary collaboration between geriatric and psychiatric research, as well as the education of patients and families can help form a link between older depressed adults contemplating suicide and those who care about them.

Future research should be conducted to determine whether improvement of physical and functional outcomes, separate from or in combination with depression treatment more broadly, ameliorate suicidal ideation in late life major depression.

Funding:

This work was supported by R01 MH098062: (PI:Mackin), R01 MH101472 (PI:Mackin); UCSF Epstein Endowment Fund. This research is also supported by the Department of Veterans Affairs Office of Academic Affiliations Advanced Fellowship Program in Mental Illness Research and Treatment, Sierra Pacific Mental Illness Research Education and Clinic Centers, San Francisco VA Medical Center.

Conflicts of Interest:

David Bickford has nothing to disclose; Dr. Morin has nothing to disclose; Cara Woodworth has nothing to disclose; Elizabeth Verdusco has nothing to disclose; Maryam Khan has nothing to disclose; Emily Burns has nothing to disclose; Dr. Nelson reports personal fees from Assurex, personal fees from Eisia, personal fees from Janssen, personal fees from Lundbeck, personal fees from Otsuka, personal fees from Sunovion, personal fees from Biohaven, personal fees from FVS-7, and personal fees from UpToDate, outside the submitted work; Dr. Mackin reports grants from National Institute of Mental Health, personal fees from Johnson and Johnson, outside the submitted work.

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Table 1:

Sample Demographics (n = 88)

Variable	Range	Mean	SD
Age	65-91	71.5	6.0
Education	12-20	16.4	1.9
HDRS-24	19-39	25.7	4.5
MMSE	26-30	49.1	1.2
GSIS SI	10-49	20.6	8.3

HDRS-24= Hamilton Depression Rating Scale 24 Item; MMSE = Mini Mental State Exam; GSIS SI = Geriatric Suicide Ideation Scale, Suicide Ideation Subscale; SD = Standard Deviation.

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Correlations between suicide ideation, depression severity, physical frailty, functional disability and financial capacity (n = 88)

Table 2:

	GSIS SI	HDRS-24	GP Dom	GS Dom	TWT Min	WHODAS Tot	ILS
GSIS SI	1	.186	.120	-.274**	.293**	.329**	-.232**
HDRS-24		1	.090	.041	-.081	.137	-.029
GP Dom			1	-.099	.294**	.130	-.335**
GS Dom				1	-.319**	-.244*	.125
TWT Min					1	.470**	-.324**
WHODAS Tot						1	-.337*
ILS							1

GSIS SI = Geriatric Suicide Ideation Scale, Suicide Ideation Subscale, HDRS-24 = Hamilton Depression Rating Scale 24 item, GS Dom = Grip Strength Dominant Hand Average, GP Dom = Grooved Pegboard Dominant Hand Average, TWT Min = Timed Walk Test Comfortable Pace Average, WHODAS Tot = World Health Organization Disability Assessment Schedule 2 Total Score, ILS = Independent Living Scale, Money Management subscale total score.

* p < .05

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p < .01

p < .001

Table 3: Correlations between suicide ideation, depression severity and WHODAS subscales (n = 88)

	GSIS SI	HDRS-24	Getting Around	Self-Care	Getting Along	Life Activities	Work	Participation	Understanding
GSIS SI	1	.186	.173	.189	.426**	.076	.064	.239*	.347**
HDRS-24		1	.074	.101	.170	.033	.149	.199	-.054
Getting Around			1	.618**	.277**	.469**	.443**	.666**	.280**
Self-Care				1	.376**	.360**	.430**	.522**	.277**
Getting Along					1	.149	.282**	.426**	.432**
Life Activities						1	.593**	.385**	.203
Work							1	.460**	.308**
Participation								1	.322**
Understanding									1

GSIS SI = Geriatric Suicide Ideation Scale, Suicide Ideation Subscale, HDRS-24 = Hamilton Depression Rating Scale 24 item.

* p < .05

** p < .01

*** p < .001

Table 4:

Gait speed, functional disability and financial capacity as predictors of suicide ideation on the GSIS SI (n = 80)

Variable	Std Beta	t	p-value	R ²	R ²
Step 2.					
Age	.17	1.35	.18		
Gender	-.06	-.53	.60	.083	.070
Education	-.04	-.33	.74		
HDRS-24	.29	2.39	.02*		
Step 3.					
Age	-.15	-1.25	.22		
Gender	-.12	-1.29	.20		
Education	.20	1.93	.06		
HDRS-24	.14	1.42	.16	.420	.337
TWT Min	.44	3.63	.001**		
WHODAS Getting Along	.32	3.19	.002**		
ILS Financial Capacity	-.23	-2.32	.02*		

std beta = standardized beta, HDRS-24 = Hamilton Depression Rating Scale 24 item, GSIS SI = Geriatric Suicide Ideation Scale, Suicide Ideation Subscale, TWT Min = Timed Walk Test Comfortable Pace Average, WHODAS = . World Health Organization Disability Assessment Schedule 2 Total Score, ILS = Independent Living Scale, Money Management subscale total score.

* p <.05

** p <.01

*** p <.001