

BMJ Open Models of suicide in elderly: a protocol for a systematic review

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ABSTRACT

Introduction The rates of suicide in the elderly population are generally higher than other age groups. Models of suicide that explain the phenomenon of suicide in later life may have research, clinical and educational implications for the field of ageing. The primary purpose of this systematic review is to identify and review existing models of suicide that have a particular focus on the elderly.

Methods and analysis The authors intend reviewing the findings of observational studies including cohort studies, cross-sectional studies, case-control studies, and qualitative studies such as grounded theory designs which are published in Google Scholar, Scopus, PsycINFO, PubMed, Web of Science, Cochrane Database of Systematic Reviews and research-related journals. Models of suicide which specifically describe, explain and predict late life suicides will be included. Therapeutic, interventional and rehabilitation models, as well as models related to assisted suicide, will be excluded. The EndNote software will be employed for data management. Two independent reviewers will extract data. Methodological quality and the risk of bias of quantitative studies will be assessed using the Newcastle-Ottawa Scale and the Newcastle-Ottawa Scale adapted for cross-sectional studies, while that of qualitative studies will be assessed using the Critical Appraisal Skills Programme and the evaluative criteria of credibility, transferability, dependability and confirmability. The final report will present a range of models of suicide with a list of different subgroups.

Ethics and publication There are no predictable ethical issues related to this study. The findings will be published in prestigious journals and presented at international and national conferences.

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INTRODUCTION

Population ageing has been one of the major challenges the health arena has dealt with during the recent decades. Globally, the population of over 60 years of age is projected to increase from 10% in 2000 to 21% in 2050.¹ Although later life is defined as a period of life accompanied by higher levels of well-being, a more encompassing meaning of life and better emotion regulation, getting older is also associated with physical illnesses, cognitive deficits and socioeconomic changes, which individuals may perceive to be a threat,

Strengths and limitations of this study

- The present systematic review is the first to examine suicide-specific models for the elderly by searching various databases.
- To minimise potential bias, each process of initial screening, data extraction and quality evaluation will be performed by two independent reviewers.
- The study is limited in that only studies in English are to be reviewed, and this limitation may cause language bias.

and accordingly the risk of depression and suicide may increase.² The suicide rate has been reported to be higher among older people in comparison with other age groups in many countries.³

Suicide has become an important public health issue which recently has attracted global attention. Suicide is a deliberate and intentional act to terminate one's own life.⁴ Suicide rates among the older population have been estimated in a number of studies.^{5 6} Given the increasing population of older people, it is likely that the number of elderly who commit suicide will increase in the forthcoming decades.⁷

Most authors have agreed that no single risk factor alone can predict suicide ideation and behaviour among the older population. Although psychiatric illnesses, especially depression, have been noted as the strongest risk factors for suicide in older people,⁸ various studies have found that many older people with a history of suicide have not previously experienced symptoms of depression.^{9 10} Furthermore, clinical trials based on the identified risk factors of suicide have not clearly shown how preventive interventions work.³ Therefore, it is important to conduct an indepth examination of current knowledge to determine the risk factors that contribute to suicide as well as how they interact with each other.¹¹ Only models and theories can explain the suicide phenomenon comprehensively, reveal present

knowledge gaps, provide guidance for future research and propose practical considerations.¹¹ Accordingly, various researchers in the field of ageing have questioned whether a specific model for late life suicide is beneficial, and if so how it can help us arrive at an enhanced understanding of the ageing experience.³ Such models assume that in relation to aetiology and possibly epidemiology, suicide during later life is a different phenomenon from suicide in other periods of life.

An examination of current knowledge reveals that suicide and suicidal behaviour have been studied using different and often contradictory theoretical and experimental models. These include epidemiological,¹² philosophical,¹³ social and sociocultural,^{14 15} psychiatric,¹⁶ psychoanalytical,¹⁷ and neurobiological¹⁸ models. In addition, cognitive theories of suicide,¹⁹ family system theory,²⁰ interpersonal theory²¹ and the Motivational-Volitional Model of Suicidal Behavior²² have been employed to examine the phenomenon. Although these theories were not designed for a particular age group, they can be adapted to the positive and negative events that older people face during their ageing process.^{3 23} Furthermore, they may have implications for explaining and understanding the aetiology of suicide in old age.¹¹ In addition, various theories have been specifically designed to explain suicide in the elderly; these focus primarily on the following aspects of suicide: psychological, especially emotion and cognition,²⁴ developmental and longevity,²⁵ demographic and epidemiological,²⁶ and neurobiological.²⁷ The neurobiological models of suicide in later life, for example, propose a biological pathway that includes responsible genes, vascular diseases and/or degenerative processes, which lead to vulnerabilities, and in conjunction with late life events may increase the risk of suicide attempts.²⁷

To date, a number of systematic and narrative reviews have been conducted in the area of late life suicide. These include a comprehensive review of psychological and social theories of elderly suicide¹¹; physical diseases, functional weaknesses and suicidal behaviour among the elderly²⁸; suicidal behaviours in old age from a gender perspective²⁹; suicide prevention in late life³⁰; self-harm in the elderly³¹; attempted suicide in older people³²; prevention of suicidal behaviours in older people³³; and the neurobiology of elderly suicide.²⁷ Most of the narrative reviews have focused on theories that do not deal specifically with later life. Rather, they have mainly described and discussed the implications and applications of general and known theories of suicide, such as the Durkheim's sociological theory,¹⁵ the helplessness theory³⁴ and the psychological pain theory,³⁵ in an attempt to understand and prevent suicide in late life. Most systematic reviews on suicide models have been age-non-specific and based on knowledge from known databases. Currently, no systematic review on age-specific models of suicide that have focused specifically on the elderly has been conducted. In many countries, older people have the highest suicide rates among all age groups,^{27 28} and suicidal behaviours of older people have a more deadly profile in comparison

with younger people, with a ratio of attempted/death by suicide of 4:1 vs 200:1.³⁶ Consequently, the importance of exploring the nature and process of suicidal ideation and suicidality in the aged is evident. In addition, the necessity of conducting studies in this field has become more imperative because of an increasing elderly population.²⁷ An enhanced understanding of this issue is dependent on theories that can explain old age suicide by providing a testable and parsimonious multifaceted framework or model.¹¹ Therefore, a systematic review of models of suicide in old age may clarify the underlying causal mechanisms, which can be used to determine priorities in the fields of research and prevention of late life suicide.

Objective

The objective is to identify and review existing models of suicide with a particular focus on late life suicide.

Review question(s)

1. Which models of suicide consider suicide in older people?
2. What are the implications of these models for the prevention of suicide in older people?
3. What areas need more research?

METHODS

The method employed for this study is in accordance with the guidelines detailed on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist (see online supplementary appendix 1). In addition, a PRISMA flow diagram will be employed to describe the flow of information at different stages of the study.³⁷ The protocol for this article has been registered in PROSPERO as CRD42017070982. Furthermore, the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols 2015 has been used for protocol preparation and reporting. Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) will also be used in the study. ENTREQ consists of 21 items grouped into 5 main domains: introduction, methods and methodology, literature search and selection, appraisal, and synthesis of findings.³⁸

Eligibility criteria (inclusion and exclusion criteria)

This systematic review will peruse published studies that focus on explaining the phenomenon of late life suicide in the form of models and theories. The criteria to be employed to include and exclude studies are thus presented.

Types of studies

It is the intention of this study to investigate findings of observational studies including cohort studies, cross-sectional studies, case-control studies, and qualitative studies such as grounded theory designs. Studies published in English and in full text from all countries will be included. The term model should be included in the title, abstract or keywords and form part of the primary or secondary objectives of the study. In the present study, a preliminary

search was first conducted; the objective thereof was to identify three types of studies: similar systematic studies, similar protocols and the identification of three to five related preliminary studies. However, similar systematic studies and protocols were not found. Based on the inclusion and exclusion criteria, experimental studies (whether randomised or not) that were based on therapeutic and interventional models are to be excluded. Only the models that describe how suicide ideation and behaviour are formed will be emphasised. Grounded theory studies will also be considered because they increase the chances of access to models and theories associated with the phenomenon of suicide in the elderly. Commentaries, opinion papers, discussion papers and editorials will also be excluded from the study.

Types of participants

Those studies that comprise research samples with the following characteristics will be selected:

- ▶ Elderly men or women.
- ▶ Elderly classified as aged 60 and older.
- ▶ Elderly who are residing in a community or nursing home such as a sanatorium.
- ▶ Elderly who are not affected by cognitive disorders or cognitive impairments, for example, a diagnosis of clinical dementia.
- ▶ Elderly classified from clinical reports that show one of the following: (1) the intense desire to die or reveal suicidal thoughts; (2) plans to attempt suicide and thoughts about how to do it; and (3) a history of intentional self-harm and suicidal behaviours. The latter also includes suicidal behaviours without prior planning. These individuals may have lost their lives as a result of the attempt, or remained in the hospital and be alive. In addition to clinical reports and hospital samples, studies using national mortality databases will also be included.

Types of models of suicide

- ▶ Those studies in which the models that explained suicide are to be included in the study; the models comprise theory-based models, explanatory models and process models.
- ▶ Studies that considered the models whose focus was on the causality and the emergence of suicide are to be included, whereas therapeutic and interventional models or rehabilitation models will be excluded.
- ▶ In the studies, only the discussion will be investigated, not the statistical analysis.
- ▶ The proposed models that are to be included cover various fields, for example, psychological, biological, medical, sociological, demographic and economic. However, the description, prediction and explanation of suicide in the elderly should be related to these fields.
- ▶ Suicide includes the desire to die, suicidal thoughts, intentional self-harm and death resulting from suicide.

The desire to die may be defined as a wish to expedite death and act in a way that ends one's life earlier than it would have.³⁹

Suicide thoughts may be defined as individuals' thoughts and ideas about ending their own life, which may appear in various ways, including suicidal thoughts without a specific method; suicidal thoughts with several non-specific methods; suicidal thoughts with a specific method in mind but without a plan; suicidal thoughts with a specific method; and a well-conceived plan, often referred to as a suicide plan.⁴⁰

Death resulting from suicide is the final stage in the suicide process in which individuals lose their life after one or several suicide attempts.⁴⁰

Suicidal behaviour is any action that could cause a person to die, such as hanging, suffocation, drowning, and medicaments and biological substances. Deliberate self-harm in the elderly, which is different from non-suicidal self-injury, will be included in the study.

Deliberate self-harm involves any self-directed direct or indirect harmful behaviours, regardless of their suicidal intent. In contrast, non-suicidal self-injury only comprises direct harmful behaviours without any suicidal intent.^{41 42}

- ▶ Models of suicide related to non-suicidal self-injury and assisted suicide with the help of a physician will be excluded.

Information sources

Electronic databases including Google Scholar, Scopus, PsycINFO, PubMed, Web of Science, Embase and Cochrane Database of Systematic Reviews, as well as grey literature and targeted journals, for example, *Aging & Mental Health*, *Suicide and Life-Threatening Behavior*, *Archives of Suicide Research* and *Suicidology Online*, from the inception of the database until 30 December 2017 will be searched.

Search strategies

A comprehensive search strategy will be developed to search the databases; the vocabulary unique to each database is to be used. The search strategy will be conducted by having discussions with experts in the fields of psychology, psychiatry and systematic review methodology. Furthermore, related areas will be reviewed and relevant keywords identified. The authors will also hand-search reference lists of review articles and sites such as *Aging & Mental Health*, *Suicide and Life-Threatening Behavior*, *Archives of Suicide Research* and *Suicidology Online* to ensure that all relevant articles are considered. An outline of the master search strategy for Scopus and PubMed has been developed (see online supplementary appendix 2).

STUDY RECORDS

Data management

The EndNote software will be employed to manage the data. Once all databases have been searched, the searches will be exported to a single EndNote software library in order to identify and delete similar studies, and thus aid

in the search process. In addition, hand searches will be used to identify similar studies with this software.

Selection process

Two independent reviewers will extract data, screen titles and abstracts of the identified studies, and assess the quality of full papers to minimise bias in all stages of the review. Studies which initially may have been considered to be relevant but ultimately are excluded will be listed in a table titled *Characteristics of excluded studies*. The reason for removing each one is to be noted.

Disagreement at any stage will be resolved through a discussion and referred to a third reviewer. Furthermore, the PRISMA diagram⁴³ will be completed to illustrate the screening process and the number of studies at each stage (see online supplementary appendix 3).

Data collection process

At this stage, two reviewers will extract and manage the data of included studies independently using a data extraction form. At first, the data extraction form will be executed as a pilot and subsequently corrected in accordance with the feedback received from colleagues who are specialists. At this stage, any disagreement between the reviewers will be resolved by discussion. If the disagreements cannot be resolved through negotiation, a third review author will act as an arbiter. Furthermore, data will be collected electronically by employing the CSPro (Census and Survey Processing System) software.

Data items

- ▶ Release details: title, journal, author, year, city and country of study.
- ▶ Design: type of study design, the purpose of study, data collection methods, and inclusion and exclusion criteria.
- ▶ Profile of participants: number, gender, age, race, diagnosis and other demographic information.
- ▶ Study outcomes: proposed models, key findings, discussion, limitations, practical/clinical implications and recommendations for future research.

Risk of bias in individual studies

When primary studies are analysed and interpreted in a systematic review, quality assessment and evaluation of susceptibility to biases are essential.⁴⁴ Quality assessment of research involves the appraisal of a study's internal validity, in other words the degree to which its design, conduct and analysis have minimised biases or errors. For practical reasons, study quality assessment in reviews often covers both internal and external validity. Initially, quality assessment can be used to determine a minimum quality threshold for the selection of primary studies that are to be included in a review. Subsequently, detailed quality assessment is employed to scrutinise the quality of studies included so as to explore quality differences as an explanation for heterogeneity in study results. This aids in the interpretation of the results and allows the generation of inferences to inform practice and research.⁴⁵

There are many sources of bias in methodology. Bias begins with the research question and includes selection bias, information bias, confounding variables and the overall quality of the study.

Various studies have been conducted on non-interventional quality assessment tools. All the studies have concluded that currently there is no agreed gold standard appraisal tool.^{45–48} Although the Strengthening the Reporting of Observational Studies in Epidemiology seems to be the only tool available for this type of study, this tool is used for the reporting of observational studies rather than for assessing the quality of primary studies.⁴⁹ Because both quantitative and qualitative studies are considered in this study, appropriate tools will be used for each one.

The Newcastle-Ottawa Scale (NOS) and the Newcastle-Ottawa which has been adapted for cross-sectional studies will be used for observational studies.

The NOS was the product of the continuous collaboration between the universities of Newcastle, Australia and Ottawa. This tool was developed by employing a Delphi process and subsequently tested on systematic reviews. The NOS is divided into two separate scales that include cohort and case-control studies. Eight items and a set of response options have been considered for both scales. A 'star system' has been developed in which a study is judged on three broad perspectives: the selection of the study groups; the comparability of the groups; and the ascertainment of either the exposure or outcome of interest for case-control or cohort studies, respectively. The star system allows for a semiquantitative assessment of the quality of the study so that a maximum of one star for each item is allocated to the highest quality of studies, except for comparability which can be assigned up to two stars. The range of stars in the NOS comprises zero to nine stars.⁵⁰ The Newcastle-Ottawa Scale which was adapted for cross-sectional studies uses the same star system in the main scale only. The difference is that on this scale there are five stars for the selection dimension, two stars for the comparability dimension and three stars for the outcomes dimension, which indicates the quality of the study.^{51 52}

Since there is no agreement on how to assess qualitative evidence, a limited set of criteria may not be applied to all types of qualitative studies.⁵³ Consequently, in this study two different methods are to be used to evaluate the quality of qualitative studies: the Critical Appraisal Skills Programme (CASP)⁵⁴ and the evaluative criteria of credibility, transferability, dependability and confirmability.⁵⁵ The CASP tool is generally appropriate for a variety of qualitative study designs. The tool consists of 10 questions and prompts. Studies will be rated as high quality if they meet 8 of the 10 criteria, medium quality if they meet 5–7 criteria and low quality if they meet 4 or less.⁵³ Although CASP assesses the quality of reporting and methodology, it does not address any aspects of research validity. Thus, the four evaluative criteria of credibility, transferability, dependability and confirmability provided by Cochrane will be applied.⁵⁶

Two independent reviewers will complete the quality assessment tools for the included studies. Any conflict in evaluations will be discussed between the reviewers, and agreement will be reached through consensus or a third reviewer may be consulted. It should be noted that appropriate and special tools will be used for the included studies. If their methodological quality cannot be assessed by the tools noted previously, tools will be developed.

Data synthesis

The final report will be divided into three sections. First, a range of models of suicide will be presented with a list of subgroups. The list of subgroups may include the type of suicide model such as theory-based explanatory, and process models; various fields of models that include demographic, psychological, social and biological; characteristics of samples that include patient and non-patient, community resident, settled in hospice, gender and age; and suicide steps that comprise death wishes, ideation, attempted suicide and death resulting from suicide. Second, the type of implications, for example, implications for families, governments and non-governmental organisations, and for clinicians, will be discussed. The third section will focus on future research. Subsequently, different models will be compared with each other, and their differences and similarities will be discussed. One of the preliminary strategies in this regard is to provide a narrative synthesis of the findings, including a qualitative analysis of the models. The implications and recommendations for future research will be based on the included models. In other words, the implications and recommendations for future research can be directly extracted from the discussions of the studies. However, in each case, practical/clinical and research recommendations may vary according to the type of model or theory, and may be indirectly derived from the authors' conclusion and interpretation. The latter is based on the comparison of the implications and recommendations for research, which are derived from each of the models in terms of the most important and most frequent recommendations.

Patient and public involvement

Patients and the public were not involved with the development of this protocol. The results will be published in open-access, peer-reviewed publications.

DISCUSSION

This systematic review will provide a detailed account of the existing evidence in relation to late life suicide. The synthesis of review findings in the present study will assess the limitations of identified studies as well as any limitations in our own review methodology. Once a large volume of studies have been identified as a result of the first search, we will use a multiple reviewer team to minimise the risk of bias. A team of multiplayers is beneficial in reducing the time needed to complete the study. It is expected that the findings of this review will be of interest

to physicians, psychiatrists, mental health professionals and those who are in contact with older people who are suicidal. Models of suicide in late life can assist in the evaluation, diagnosis and design of interventions that will lead to the effective prevention of late life suicide. The findings of this review study may also be compared with findings from other studies on this issue. Finally, in the discussion, key findings, study limitations, implications and recommendations for future research, and practical/clinical considerations for specialists will be presented.

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