

Why is perceived entrapment able to predict suicidal ideation?

¿Por qué la percepción de atrapamiento es capaz de predecir la ideación suicida?

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Abstract:

Suicidal behaviour represents a care challenge for frontline healthcare personnel, as it requires skills for its management—from early identification of risk factors that condition the appearance of suicidal ideation, to addressing a psychiatric emergency such as suicide attempt. The objective is to put into perspective the neurobiological background of suicidal ideation to understand the origin of this behaviour and to propose that the characteristics of entrapment make it susceptible to change, thus becoming a key point for preventing subsequent suicidal behaviours. A narrative literature review was conducted. Entrapment was identified as the neurocognitive process that precedes the generation of suicidal thoughts in many cases, but not all. An individual experiencing adverse events who perceives themselves as unable to escape these situations may conceive the idea of dying as a way out. However, these thoughts are not present throughout the day, as shown by self-monitoring questionnaires and real-time imaging studies. Entrapment is a behaviour susceptible to change and may help in preventing suicide risk, provided that a linear and sequential interpretation of the phases of suicidal behaviour is avoided.

Keywords:

Entrapment, suicidal ideation, suicidal behaviour, motivational moderators, Integrated Motivational-Volitional Model

Resumen:

La conducta suicida representa un reto asistencial para el personal de salud de primer contacto, ya que demanda habilidades para su manejo: desde la identificación temprana de factores de riesgo que condicionan la aparición de ideación suicida, hasta el abordaje de una emergencia psiquiátrica como el intento de suicidio. El objetivo de este trabajo es poner en perspectiva los antecedentes neurobiológicos de la ideación suicida para comprender el origen de esta conducta y proponer que las características del atrapamiento la hacen susceptible de cambio, constituyéndose en un punto clave para prevenir conductas suicidas posteriores. Se realizó una revisión narrativa de la literatura. Se identificó que el atrapamiento es el proceso neurocognitivo que precede a la generación de pensamientos suicidas en muchos casos, aunque no en todos. Un individuo que experimenta eventos adversos y se percibe incapaz de escapar de esas situaciones puede concebir la idea de morir como una salida. Sin embargo, estos pensamientos no están presentes durante todo el día, como lo muestran los cuestionarios de auto-monitoreo y los estudios de imagen en tiempo real. El atrapamiento puede ayudar en la prevención del riesgo de suicidio, siempre que se evite una interpretación lineal y secuencial de las fases del comportamiento suicida.

Palabras Clave:

Atrapamiento, ideación suicida, conducta suicida, moderadores motivacionales, Modelo Motivacional-Volitivo Integrado

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INTRODUCTION

The World Health Organization defines suicide as the deliberate act of taking one's own life (World Health Organization, 2025). Suicidal behaviour is a neuropsychiatric entity with effects on mood and cognitive function, consisting of a series of self-inflicted violent acts whose outcome can be fatal. Much of its study has focused on the final event, suicide; however, to achieve a better assessment, it has been proposed to conceptualize it as a process, in order to facilitate the identification of the elements involved.

Nevertheless, it is essential to avoid the idea that suicide occurs in linear and sequential phases (ideation, planning, attempt); current scientific evidence indicates that suicidal behaviour is a dynamic, complex, and non-linear process, as impulsive suicides have been demonstrated, as well as cases in which suicidal ideation does not directly precede the act (Malhi et al., 2020; Reeves et al., 2022).

Suicidal ideation refers to the presence of thoughts or wishes to die; suicidal planning is the organization of ideas without carrying out a suicidal action; suicide attempt is the implementation of a plan without a fatal outcome; and finally suicide (Reeves et al., 2022).

However, these categories should not be interpreted as mandatory or sequential stages.

According to the Pan American Health Organization (PAHO, 2023), approximately 98,000 deaths by suicide were recorded in the Region of the Americas in 2019. Globally, the World Health Organization (WHO, 2023) reported more than 700,000 deaths by suicide per year. In the United States, 2021 data indicated 12.3 million people with suicidal ideation, of whom 28.4% made suicide plans, 13.8% had at least one suicide attempt, and 0.39% died by suicide (Centers for Disease Control and Prevention [CDC], 2021). Ninety percent of suicidal acts were concomitantly associated with other mental disorders, and in the year prior to suicide, 80% of patients sought primary care, while only 25-30% had a psychiatric assessment (Harmer et al., 2024).

METHOD

A narrative review was conducted based on a search for information on entrapment in suicidal ideation using search engines such as PubMed, Google, Dialnet, and ScienceDirect. The descriptors used were: *suicidal ideation, entrapment, psychological theories of suicidal ideation, integrated motivational-volitional model, motivational moderators, pathophysiology of suicidal ideation, pathophysiology of suicide*.

Original and review scientific articles, books on neuroanatomy and neurophysiology, as well as statistical reports from official organizations were included. The search strategy consisted of: 1) locating the origin of the concept of entrapment within the Integrated Motivational-Volitional Model, 2) identifying experimental studies on its application and performance, and 3)

searching for information on the neurobiological origin of suicidal ideation

RESULTS

Entrapment

The perception of entrapment is the desire to escape from a particular situation, feeling that all escape routes are blocked (Wang et al., 2023). It is also defined as a specific cognitive-affective state made up of two components: a cognitive part — the belief of being unable to change the life circumstances involving oneself and/or one's environment— and an emotional state of urgency to escape from these same circumstances (Cramer et al., 2019).

Integrated Motivational-Volitional Model (IMV)

One of the theories that is part of the explanatory framework of suicidal ideation is the Integrated Motivational-Volitional Model (IMV), which explains suicidal behaviour based on the study of the individual's biopsychosocial conditions and their response to adverse conditions. The model is schematized in three phases —pre-motivational, motivational, and volitional— and highlights factors called "moderators" that precede and precipitate these phases (O'Connor & Kirtley, 2018). It is important to note that these phases should not be interpreted as a mandatory linear sequence, but as a heuristic to understand the mechanisms involved. Evidence shows that not all people transition sequentially through these phases, and that there are impulsive suicides that are not preceded by ideation or planning (O'Connor & Kirtley, 2018; Malhi et al., 2020).

Pre-Motivational Phase: encompasses the coexistence of biological, genetic and/or cognitive vulnerability conditions and the individual's response to stressors, resulting in an adverse psychological reaction.

Motivational Phase: describes the individual who, when faced with an adverse condition, responds with cognitive processes that physiologically should allow them to fight or flee. However, when perceiving defeat, and with the concomitant existence of moderators such as ruminative thoughts, memory bias, or poor problem-solving skills, the transition to the perception of being trapped without escape occurs. At this point, the presence of moderators such as thoughts of frustrated belonging and a "catastrophic" future, the feeling of being a burden, attitude towards suicide, and social death are precipitating factors for the emergence of Suicidal Ideation.

Volitional Phase: is contextualized in an environment where psychological, environmental, and social moderators facilitate suicidal action. Some examples include having access to potentially lethal means or having first-degree relatives with a history of suicide. In this way, the transition from Ideation to Suicidal Attempt or Act occurs (O'Connor & Kirtley, 2018).

Is there a pathophysiological background to understanding suicidal ideation?

Neurophysiological studies in patients with mood disorders, mainly Major Depressive Disorder, have compared subjects with and without suicidal behaviour. Using magnetoencephalography, reduced hippocampal activity accompanied by asymmetry has been observed, with lower volume of the left hippocampus (Li et al., 2019). Evaluation of the medial frontoparietal network—involving self-reference, autobiographical memory, and thought—in patients with a previous suicide attempt at rest showed no conclusive changes to differentiate suicidal ideation from other suicidal behaviours (Thompson et al., 2023).

On magnetic resonance imaging, the frontal pole responsible for emotional regulation, decision-making, cognitive inhibition, and social cognition is smaller in patients with suicide attempts compared to those who have only had suicidal ideation and controls (van Velzen et al., 2022). Both in ideation and suicide attempts, there is decreased hippocampal activity; however, the reduction in anatomical volume is only evident in attempts, and a directly proportional relationship has been documented between the frequency and/or violence of the attempt and lower hippocampal volume (Zhang et al., 2022).

Neuroendocrine dysfunction of the hypothalamic-pituitary-adrenal (HPA) axis is characterized by a dysregulated stress response with abnormal cortisol release. The following associations have been established: acute exposure presents with elevated cortisol concentrations compared to chronic exposure, and there is greater cortisol sensitivity to stressful situations in people with personal and family histories of suicide (Harmer et al., 2024).

Regarding the glutamatergic system, various proinflammatory processes (nutritional alterations, diabetes mellitus, kidney injury) involve dysfunctions in the tryptophan-kynurenine pathway. Metabolites capable of crossing the blood-brain barrier promote increased density and activity of microglia and macrophages, which synthesize quinolinic acid at the level of the anterior, mid-anterior, and dorsolateral prefrontal cingulate cortices. This neurotoxic metabolite acts on N-methyl-D-aspartate (NMDA) receptors on the NR1+NR2A and NR1+NR2B subunits, predominantly in neurons of the hippocampus, striatum, and neocortex, causing release and subsequent extracellular accumulation of glutamate, as well as inhibition of astrocyte activity with activation of the hippocampal glutamatergic system (Bryleva & Brundin, 2017). Synergistically, deficiency of brain-derived neurotrophic factor (BDNF) and dysfunction of its precursors result in poor glutamate regulation and synaptic alterations in cortical and limbic regions. Furthermore, the Val66Met polymorphism constitutes a biological susceptibility factor that increases the risk of suicide (Can et al., 2023).

Can suicidal ideation be predicted?

In current medical practice, the use of paraclinical tests for the diagnosis of suicidal behaviour is not established.

Real-time neuroimaging studies in patients with major depressive disorder and suicidal behaviour have reported reduced hippocampal function (Thompson et al., 2023; Zhang et al., 2022) and amygdala asymmetry with lower volume in the left portion (Li et al., 2019). The volume of the frontal pole of the prefrontal cortex is smaller in patients with suicide attempts compared to those who have only presented ideation (van Velzen et al., 2022).

In laboratory studies, serum BDNF determination showed an increase at 8 weeks of cognitive-behavioural therapy (Zhang et al., 2022), as well as an increase associated with response to treatment with ketamine (Bryleva & Brundin, 2017; Can et al., 2023). On the other hand, serum serotonin concentrations are lower in patients with suicidal behaviours compared to controls (Sivaramakrishnan et al., 2023).

Predictive capacity of entrapment: when comparatively analysing feelings of entrapment and defeat, there is a greater predictive association of suicidal ideation for entrapment, since this behaviour presents variability in frequency and intensity throughout the day, which corresponds to the highly dynamic state of suicidal behaviour. However, it is important to consider that most patients in these studies had a history of suicide attempt (van Ballegooijen et al., 2022). First-time entrapment is a predictor of subsequent suicidal ideation, as evidenced by its first appearance in medical students without a history of neuropsychiatric disorders during two years of follow-up (Wang et al., 2023).

Moderators and measurement scales: the presence of moderators has been comparatively studied in control patients, ideators, and those with suicide attempts. The results indicate that those categorized within suicidal behaviour share pre-motivational and motivational moderators; however, when comparing between suicidal behaviours, it becomes evident that patients with suicide attempts have volitional moderators, unlike ideators (Branley-Bell et al., 2019).

The experience of entrapment is measured using a scale composed of two parts that evaluate: 1) a perception induced by external events (totally independent of the person) and 2) another conditioned by internal events (personal in nature). These variables can predict suicidal ideation, but association with risk factors such as social environment or belonging to a minority group is recommended (Gilbert & Allan, 1998). Finally, the perception of entrapment and the presence of suicidal ideas occur in a bidirectional manner with brief fluctuations (hours) throughout the day, which highlights that the feeling of entrapment is a dynamic state that can be modulated (van Ballegooijen et al., 2022).

Are there actions that can prevent suicidal ideation?

Coping skills and cognitive-behavioural therapy: evidence shows that poorer coping skills, such as cognitive rigidity, are associated with suicidal behaviour (Schotte & Clum, 1987). Therefore, cognitive-behavioural therapy (CBT) is the most recommended psychotherapeutic approach, as it develops acceptance, resilience, and mindfulness (Harmer et al., 2024). Its effectiveness can be evaluated both in clinical settings and through serum biomarkers (Can et al., 2023).

Relationship between coping and entrapment: coping skills can have a negative effect on entrapment when they are poor; conversely, good coping counteracts the perception of defeat. Therefore, it is proposed that therapy should foster positive perceptions of coping skills to counteract suicidal behaviour (Gooding et al., 2015).

Dynamic assessment of suicidal ideation: suicidal crises are transitory states, and suicidal behaviour intrinsically has a highly dynamic transition state. Therefore, the most objective way to assess suicidal ideation is through questionnaires over short periods (minutes to days), since increasing the assessment interval negatively influences mood and memory biases. Furthermore, recognition of moderators promotes cognitive and emotional control, which helps modulate behaviour by fostering resilience (Wang et al., 2023; van Ballegooijen et al., 2022; Ernst et al., 2022).

Social support and self-perception: self-perception presents a dichotomy depending on: 1) self-assessment of the degree of social participation (support network) and 2) level of self-esteem. Both factors can modulate the perception of being a burden to others, so having a solid support network is essential (Kleiman & Riskind, 2013).

Positive future visualization: a resource used in psychotherapy is positive future visualization. However, close follow-up is necessary to prevent the development of unattainable expectations and the consequent feeling of frustration (Pollak et al., 2021).

DISCUSSION

The bibliographic search revealed that English-speaking countries, Spain, and China have research focused on suicidal ideation and have shown interest in real-time evaluation of the perception of entrapment. Through ecological momentary assessment, using self-questionnaires administered via mobile devices, it is possible to know the perception at very specific time points. Based on these findings, it is proposed that the perception of entrapment presents fluctuations in its intensity and frequency throughout the day. However, these studies have biases due to the small number of participants, and adherence is questioned (100% response from participants) (van Ballegooijen et al., 2022; Ernst et al., 2022). Nevertheless, it is considered that the implementation of technological resources

to keep a digital logbook can serve as a behavioural action for the patient and, at the same time, function as a database for the therapist.

In primary care, it is important to develop a clinical history with a specific approach to the type of suicidal behaviour crisis, since entrapment can predict suicidal ideation (Wang et al., 2023), and ideation in turn is the main risk factor for recurrence of the same behaviour or progression towards suicide attempts (Ernst et al., 2022). It is proposed that the cognitive process has the capacity to modify neuroplasticity (Malhi et al., 2020) and brain architecture, therefore modifications in patients' future behaviour can be expected.

By proposing the implementation of the Integrated Motivational-Volitional Model in primary care, the objective is to assess immediate risk and guide therapeutic interventions to identify risk factors and work on moderators. Below are some approaches to the clinical history (Harmer et al., 2024) that are important to investigate:

Suicide risk factors: these can be predisposing factors such as the presence of neuropsychiatric disorders, family history of suicide, previous suicide attempts, adverse childhood experiences, and economic difficulties; and precipitating factors such as substance use disorders, access to lethal means, stressful life events, and recent diagnoses of chronic degenerative or terminal diseases.

Psychiatric assessment in suicide risk evaluation: it is important to inquire whether the patient has a history of previous suicidal ideation or has made suicide attempts.

Assessment of suicidal ideation: the objective is to investigate the characteristics and nature of the ideation, determine whether a suicide plan exists, know whether the patient has access to means, whether they present or have presented suicidal intent, and finally, know the protective factors the patient has.

On the other hand, imaging studies were not consistent when evaluating brain activity as a function of the number of participants. With smaller samples, findings showed a reduction in mesolimbic system activity in patients with suicidal ideation (Li et al., 2019; Zhang et al., 2022). However, studies that evaluated a larger number of patients found that brain activity level was homogeneous between controls or first-time suicidal ideation patients compared to patients with a history of suicide attempts (Thompson et al., 2023; van Velzen et al., 2022).

It is important to consider that imaging studies may be inaccessible for the majority of the population due to their high cost and operator dependence. Nevertheless, their contribution to the suicidal behaviour database allows some inferences to be made by associating functions that should occur physiologically, such as the following:

The cingulate gyrus is one of the three association cortices in the limbic system and presents four functional regions: a) the subungual portion, associated with emotional regulation; b) the

rostral portion, which interconnects the amygdala and the orbitofrontal and insular cortices, integrating the perception of physical pain and its emotional perception; c) the middle portion, which presents motor efference to emotions and is involved in the reward system; and d) the posterior portion, associated with memory.

Other affected functions are those carried out by the orbitofrontal cortex, involved in decision-making, evaluation of these decisions, and hedonic value in response to stimulation. The temporal pole (Brodmann area 38), being interconnected with the orbitofrontal cortex, amygdala, and hypothalamus, integrates the conceptualization of personality and the socialization process, such as the negative interaction of social isolation (Martin, 2025).

CONCLUSION

Suicidal behaviour represents a clinical entity with high morbidity and mortality that profoundly impacts quality of life, making it imperative to implement strategies aimed at restoring well-being and preventing self-harming behaviours. Available evidence shows that suicidal behaviour does not necessarily follow a linear or stepwise progression, but can manifest unpredictably, even in the absence of prior ideation or planning. In this context, the perception of entrapment emerges as a relevant neurocognitive process. Although in many cases it precedes the appearance of suicidal thoughts, its expression is neither homogeneous nor universal. Its dynamic and fluctuating nature with significant variations in intensity and frequency throughout the day, positions it as a promising therapeutic target for the prevention of suicidal ideation, especially when intervention is timely and contextualized.

Likewise, it is essential to avoid rigid or sequential interpretations of available theoretical models. Suicidal ideation is not always linked to an explicit desire to die, but rather sometimes responds to an experience of entrapment with no apparent escape, and not all people go through the phases described in these models.

Finally, any clinical or preventive approach must consider biopsychosocial risk factors and understand the individual within their environment. The limitations inherent to this work, derived from its narrative design, invite caution in generalizing the findings, but do not diminish the clinical relevance of entrapment as a vulnerability marker and as a starting point for early interventions in suicide prevention.

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