ARTÍCULO DE REVISIÓN

Psychosocial Autopsy-Based Predictive Models of Suicidal Behavior: Systematic Review of Approaches and Recent Evidence

Modelos Predictivos de la Conducta Suicida Basados en la Autopsia Psicosocial: Revisión Sistemática de Enfoques y Evidencia Reciente

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SUMMARY

The purpose of this study was to analyze the recent scientific literature on predictive models of suicidal behavior based on psychosocial autopsy. The methodology used was based on PRISMA guidelines, complemented with a quantitative approach typical of exploratory systematic reviews. For the collection of information, publications in English and Spanish corresponding to the period 2020 - 2025 were considered. Sixteen relevant studies were selected, located through the Scopus, PubMed, and Web of Science databases. The findings indicate that the integration of psychosocial autopsies with artificial intelligence models allows the development of more accurate and contextualized predictors of suicide risk, thus strengthening prevention and early intervention strategies.

Keywords: *Models, prediction, suicide, psychosocial autopsy.*

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RESUMEN

Este estudio tuvo como propósito analizar la literatura científica reciente sobre los modelos predictivos de la conducta suicida basados en la autopsia psicosocial. La metodología empleada se basó en los lineamientos de PRISMA, complementada con un enfoque cuantitativo propio de las revisiones sistemáticas de tipo exploratorio. Para la recolección de información, se consideraron publicaciones en inglés y español correspondientes al periodo 2020 – 2025. Se seleccionaron 16 estudios relevantes, localizados a través de las bases de datos Scopus, PubMed y Web of Science. Los hallazgos indican que, la integración de autopsias psicosociales con modelos de inteligencia artificial permite desarrollar predictores más precisos y contextualizados del riesgo suicida, fortaleciendo así las estrategias de prevención e intervención temprana.

Palabras clave: *Modelos, predicción, suicidio, autopsia psicosocial.*

INTRODUCTION

Suicide is a complex, multifactorial, and multicultural phenomenon worldwide, and its approach represents a major concern for many public health systems. According to the World Health Organization (WHO), it indicates that statistically, 700 000 people die by suicide each year, being the fourth leading cause of death among young people aged 15-29 years, and the leading cause of premature mortality in several high and middle-income countries (1). This results in irreparable loss and high social, emotional, and economic costs for individuals, families, and healthcare systems.

Despite significant advances in the identification of risk factors associated with this problem, suicide rates have not declined in a representative manner worldwide. In countries such as South Korea, suicide has remained the leading cause of death in adolescents and young adults for decades, reflecting persistent challenges in prevention and intervention strategies (2). Similarly, in China, despite an overall reduction in suicide rates, it remains a significant public health threat, especially in rural and vulnerable populations (3). This persistence highlights the urgent need for a deeper understanding of the contextual and longitudinal factors surrounding this phenomenon. To this end, several research methodologies have been developed. Among them, psychosocial autopsy emerges as a fundamental tool, allowing a detailed reconstruction of the circumstances before the suicide through structured interviews with relatives and the review of medical records and other relevant documents. This retrospective approach offers crucial insight into the interaction of risk and protective factors over time (4).

In coherence with this, different theoretical models have joined efforts to explain suicide from multiple perspectives at the psychological, historical, biological, and social levels. In this sense, one of the approaches with the greatest integration of variables is the biopsychosocial model proposed by Turecki at al. (5) which distinguishes between distal risk factors such as genetics, family history, and childhood trauma; developmental factors such as impulsivity and substance use; and proximal factors such as hopelessness, emotional dysregulation, and stressful life events.

Despite the reported studies on these factors, the integration of this knowledge into clinical and community resources for the timely identification and management of this problem remains limited. This is due, in part, to the fact that conventional predictive models have relied predominantly on traditional statistical approaches, such as logistic regression. These methodologies exhibit strong difficulties in recording nonlinear relationships, complex interactions, and temporal dynamics among the multiple variables associated with suicidal behavior (6). This situation has limited the ability to generate effective and generalizable predictive models, especially in populations with high psychosocial vulnerability, such as children, adolescents, and young adults (7). It is in this context that the psychosocial autopsy acquires particular relevance, given that the qualitative and contextual data of high granularity derived from it can significantly enrich the information used by predictive models, allowing a more holistic and personalized view of suicidal risk by capturing the life trajectory and precipitating events (8).

Currently, advances in artificial intelligence (AI) and machine learning (ML) have expanded the possibilities for developing more accurate predictive models, enabling the identification

of complex patterns that are not readily apparent to the naked eye. In particular, the integration of data obtained from psychosocial autopsies, including detailed narratives, contextual factors, psychopathological history and critical life events of the deceased individual, can enhance the ability of these algorithms to build more robust risk models. Models such as artificial neural networks, multilayer perceptrons, and backpropagation algorithms have demonstrated greater predictive capacity compared to traditional approaches when processing high-dimensional and heterogeneous information, achieving accuracy levels above 90 % in some studies that combine clinical and sociodemographic data (6,9).

Given this scenario and recognizing the potential of psychosocial autopsy to generate valuable data on the etiology of suicide, it is imperative to review how these elements can be integrated in the development of predictive models that allow early identification of at-risk populations and the design of early intervention strategies. Artificial intelligence and machine learning have proven to be effective tools for the prediction of suicidal behaviors in adolescents and young adults (9,10). It is crucial to understand how these models can be informed and refined by detailed information obtained from psychosocial autopsies, enabling the identification of behavioral, psychological, and social biomarkers with greater specificity (11).

Considering the above elements, the purpose of this study was to synthesize the current knowledge on predictive models of suicidal behavior based on psychosocial autopsy, analyzing their methodological approaches, diagnostic accuracy, variables used and potential for clinical and preventive application.

Predictive models of suicide based on psychosocial autopsy.

In the last two decades, the prediction of suicidal behavior has gained prominence as a crucial strategy for prevention and care in mental health. One of the most promising approaches has been the development of predictive models based on psychosocial autopsies. Although traditionally used for epidemiological research and etiological understanding of suicide, this technique allows the identification of risk factors from retrospective analysis of completed suicide cases. This methodology, originally designed to explore psychological and social circumstances before death, has evolved into a valuable resource for feeding artificial intelligence (AI) and machine learning (ML) systems, given its ability to generate rich, detailed, and contextualized data on the life course and precipitants of suicidal risk (5,12).

Psychosocial autopsy, also known as psychological autopsy, involves the systematic collection of information about the deceased's life, mental health, social relationships, life events, and behavior through structured interviews with close people, as well as the analysis of medical, school, and social records (13). This methodology has been fundamental for the identification of proximal factors and triggers of suicide, such as depressive symptoms, hopelessness, social isolation, family dysfunction, and exposure to traumatic events (7,12). The richness of retrospective data and the contextualization it provides are crucial for capturing the complexity of suicidal patterns that are not evident with cross-sectional data alone, allowing a deeper understanding of the dynamics of suicidal risk (4).

Recent studies in South Korea have shown that up to 97 % of adolescents who died by suicide had at least one diagnosable mental disorder, and more than 80 % had manifested warning signs in the year before their death. However, many of these signs were not recognized by their families or educational institutions, evidencing the need for more sensitive predictive models that integrate this qualitative and contextual information provided by psychosocial autopsy (12). The ability of psychosocial autopsy to uncover subtle or previously uninterpreted signals, when combined with the capacity of machine learning algorithms to identify complex patterns, represents a promising avenue for overcoming current limitations in risk detection by enabling the identification of behavioral, psychological, and social biomarkers with greater specificity (14).

From this empirical basis, several researchers have begun to build predictive models of suicide using artificial intelligence algorithms that incorporate psychosocial autopsy data. For example, Lyu et al. (3) utilized data collected

in rural China through psychological autopsies to train artificial neural networks (including backpropagation and multilayer perceptrons). Their results showed accuracy rates above 90 %, significantly exceeding those of traditional logistic regression models. This research highlights that the richness of qualitative data, when processed by nonlinear algorithms, can substantially improve predictive ability. In addition, other research has explored the use of longitudinal and clinical data, sometimes resembling the granularity obtained in psychosocial autopsies, to feed machine learning models in the prediction of suicide in young populations, achieving high accuracy and area under the curve (AUC) values above 0.90 (11).

Likewise, the use of structural models, such as the one proposed by Lievano-Ruiz et al. (7), in Mexican university students, has allowed the identification of proximal risk factors such as hopelessness, emotional dysregulation, social isolation and family dysfunction, all extracted from self-reported information and interviews that simulate the structure of a psychosocial autopsy. Although these structural models do not employ machine learning algorithms directly for prediction, their value lies in the empirical validation of the interrelationship of these risk factors. Such validation is critical for variable selection and conceptualization of more complex AI/ML-based predictive models, ensuring that the features used are theoretically sound and clinically relevant (15).

Despite these advances, important methodological challenges remain. These include the standardization of psychosocial autopsy protocols, the inherent subjectivity of interviews with family members and close associates, and the difficulty in accessing sensitive data in sociocultural contexts where suicide remains a stigmatized topic (5). Additionally, the scarcity of large psychosocial autopsy datasets that can be systematically integrated into machine learning models limits their generalization, and efforts are required to develop methodologies that enable interoperability and analysis of large-scale qualitative information (14). Nevertheless, the heuristic value of this tool remains indisputable, especially when articulated with emerging technologies for suicide detection and prevention (5).

METHODOLOGY

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. It had an exploratory quantitative approach. For the structuring and delimitation of the research, Boolean operators were used to ensure the consolidation of a robust and coherent search, taking into account the study's purposes.

A systematic literature search was conducted in high-impact databases, including Springer Open, Web of Science, and Scopus, which were selected for their comprehensive coverage of the social sciences, psychology, and applied informatics. The search strategy incorporated a combination of keywords, linked by Boolean operators AND, OR, NOT, in order to maximize the relevance of the results (Table 1).

Table 1. Controlled terms and Boolean operators

("psychological autopsy" and "prediction" or = "suicide" not = "disability" "psychosocial" and "behavior" or "Suicidal" or "predictive" not = = "elderly" ("psychological autopsy" and "prediction" or = "suicide" not = "disability" "psychosocial" and "behavior" or "suicidal" or "predictive" not = "elderly")

Inclusion and exclusion criteria

In this study, clear criteria were defined that responded to the nature of the research, the period of publication, and the variables involved. These guidelines helped to minimize possible biases and strengthen the validity of the results obtained.

The search focused on articles published between 2020 and 2025, in English, Spanish, and Portuguese, selected from journals indexed in specialized databases. Duplicate papers, abstracts, and brief notes were discarded, always prioritizing those that offered the full text. Key information was extracted from each study chosen, such as the title, objective, authors, country, year of publication, sample, methodology, instruments used, main findings and theoretical gaps, which allowed the construction of a solid background matrix, facilitating a deeper, more current and contextualized understanding of the variables analyzed.

Table 2. Cross-referencing of search terms in databases

Search	Data base	Final Results Algorithms			
"psychological autopsy" and "prediction" or = "suicide" not = "disability", "psychosocial" and "behavior" or "suicidal" or "predictive" not = "elderly" ("psychological autopsy" and "prediction" or = "suicide" not = "disability" "psychosocial" and "behavior" or "suicidal" or "predictive" not = "elderly").	Scopus	90	75	35	200
	PubMed	78	52	45	175
	Web of Science	120	58	62	240
	Total	288	185	142	615

Table 3. Final research results by database

Database	Final Results
Scopus	200
PubMed	175
Web of Science	240
Total	615

Choice of studies

For the selection of documents for the review, the time window of the last five years was taken into account, without considering articles linked to scientific platforms or journals that were in closed access, in addition to duplicate texts, which fell outside the categories established for the search, in addition to abstracts and research notes.

RESULTS

For the consolidation of the review, the criteria described in the PRISMA methodology were followed. Boolean operators AND, OR and NOT were used to perform the searches: "psychological autopsy" AND "prediction" OR = "suicide" NOT = "disability" "psychosocial " AND "behavior" OR "Suicidal" OR "predictive"

Table 4. Process of identification, elimination and selection of items

Equations	AND, OR and NOT operators			
No Articles in the Language	Spanish		English	
		295	320	
Databases	Scopus	PubMed	Web of Science	Total
No Filter	200	175	240	615
No Access	100	90	140	330
R/ Incomplete/ Duplicates	50	40	73	163
Do Not Meet Criteria	45	40	21	106
Election	5	5	6	16

NOT = "elderly" ("psychological autopsy" AND "prediction" OR = "suicide" NOT = "disability" "psychosocial" AND "behavior" OR "suicidal" OR "predictive" NOT = "elderly" (Table 1). Reference lists of the most relevant systematic reviews to be considered in this study were also reviewed. Eligible publications were those that were limited to reporting predictive models of suicidal behavior and psychosocial autopsies in cases of completed suicides.

Relevant documents were selected from scientific databases, such as Scopus, PubMed, and Web of Science. The search included publications in English and Spanish, focusing on the last five years (2020 - 2025) to compile the most recent research in this thematic line (Table 2 and 3).

Similarly, all the articles taken from the indexed journals were downloaded and those that were duplicates or did not meet the criteria were eliminated. Priority was given to publications with full text, and the abstracts and research notes were excluded; the key information of the articles was extracted. As an initial result of this search, 615 files were obtained, comprising 32.5 % from Scopus, 28.4 % from PubMed, and 39 % from Web of Science. Of these, 47 % are in Spanish and 52 % in English (Table 4).

The following is a summary of the most important findings of the studies reviewed through the search in different scientific databases, which allow the foundation and support for the approaches of this research related to predictive models of suicide based on artificial intelligence and machine learning and psychological autopsy, thus allowing the knowledge of the problem in a current manner in the last five years, in addition to the relationship that is found with the objectives set out in this project.

Accordingly, López-Villalobos et al. (17) examined the prevalence and prediction of suicidal behavior in Spanish adolescents through the Millon Clinical Inventory. For this purpose, they designed statistical models to predict suicidal tendency, ideation, planning and attempts. In this study, child abuse was found to be a variable present in all models. At the same time, family conflicts, pessimism, oppositional or impulsive personality were associated with an increased risk of suicide in the population.

In a study conducted by Barajas-Aranda et al. (13), Machine Learning models were compared and explained to predict suicide. Within this research, they evaluated artificial neural networks, logistic regressions, and decision trees, noting that the neural network technique yielded the best performance in predicting 82 %. However, the study places special emphasis on its practical use in clinical and healthcare scenarios. Therefore, SHAP (SHapley Additive exPlanations) and LIME (Local Interpretable Model-agnostic Explanations) techniques were also employed to achieve a more precise definition of the model. This study is situated at the exact crossroads between artificial intelligence and mental health in clinical contexts.

In line with this, Patel et al. (18) developed a machine learning-based approach to predict weekly state suicide rates in individual states, incorporating real-world data from social media, emergency room visits, specialized search engines, and mental health self-assessments. Within the state, the model achieved high accuracy in four different states, outperforming conventional models, demonstrating its value in integrating digital signals for monitoring suicide trends in the population. Arunpongpaisal et al. (19) conducted a predictive model for the risk of death in the first suicide attempt, considering records from the national suicide surveillance system in Thailand. The design was based on the multivariable logistic regression method, identifying variables such as advanced age, male sex, presence of mental disorders, unemployment and warning signs of suicidal behavior as one of the main predictors, obtaining a high level of accuracy. This model has been applied within the clinical field to enhance suicide risk assessment and prevention in hospital and healthcare settings.

In contrast, Núñez et al. (20) conducted a scientometric analysis of research trends using a meta-investigative approach to examine the suicide risk variable in children and adolescents, employing a graph theoretical model and citation networks. The study identified trends related to non-suicidal self-injury, psychiatric factors, antidepressant use and child abuse. The research made a map of specific knowledge from the area, highlighting theoretical gaps, authors and patterns of scientific articulation where they establish the need to use models that allow the prediction of suicide in vulnerable populations. Similarly, Cifuentes et al. (21) developed a module for forecasting suicide predictions using time series data in the city of Medellín, Colombia. They evaluated Holt-Winters, Box-Jenkins, and a seasonal parametric model with ARMA 0.5 errors, which incorporates both autoregressive (AR) and moving average (MA) components, where the latter proved to be the most effective.

Lievano-Ruiz et al. (7) carried out research focused on the validation of Turecki's biopsychosocial model of suicidal ideation in Mexican university students. The study took into account the structural equations in a sample of 165 young students, where they found very good levels of adjustment in the proposed model, identifying emotional dysregulation, depressive symptoms, feelings of hopelessness, social isolation and family dysfunction as risk factors. Lee et al. (2) developed an investigation considering the psychological autopsy in South Korean adolescents in cases of completed suicides, to explore psychiatric diagnoses, personality traits, risk factors, life histories and warning signs in 36 adolescents who died between 2015 and 2021, using interviews with their parents and the application of standardized analyses. In the main results, they found that 97.2 % presented a psychiatric disorder, with the most prevalent being depression. In addition, most had manifested warning signs that were complex to identify, due to personality characteristics of submission or avoidance.

Núñez et al. (20) designed and validated a model to predict suicide in young people in Colombia, where they identified that variables such as anxiety, depression, and hopelessness explain more than 50 % of the risk of suicide. In addition, substance use, especially alcohol, acts as a mediator of affective variables related to suicide, suggesting the importance of interventions for emotional regulation and substance use in the youth population. Underwood et al. (22) studied the relationship between stress, early adversity, and suicidal behavior, also reviewing the levels of HPA axis-associated proteins cortisol and BDNF in postmortem samples of prefrontal and anterior cingulate cortex in 52 people distributed between suicidal patients and a sex- and age-matched control group. The results of the study indicate that high levels of recent stress, rather than early stress, biologically influence the risk of suicide.

In the same vein, Lyu et al. (6) conducted a study in which they developed a model to predict suicide through the implementation of neural networks, using psychosocial autopsies in rural areas of China as a database. For this, two artificial intelligence models were considered: the backpropagation neural network and the multilayer perceptron, which were compared using traditional logistic regression. The main findings showed that the model achieved an accuracy of over 90 %. In comparison, the other method attained a rate of 82 %, demonstrating the effectiveness of models based on machine learning in predicting risk and suicidal behavior, and highlighting the relevance of implementing

them in clinical scenarios to support automated diagnoses.

On the other hand, Pérez-Martínez and Rodríguez-Fernández (10) analyzed the psychosocial autopsy as a technique to explore the causes of violent deaths, with special emphasis on cases of completed suicides, reconstructing a psychological profile of the deceased, positioning this tool as a key resource for the investigation of self-inflicted deaths.

Bae et al. (23) performed psychosocial autopsies in 48 suicide cases in South Korea to identify psychosocial and psychiatric factors in the deceased and their family members, using the Korea Psychological Autopsy Checklist (K-PAC) to collect information on mental health status, stressful life events, and warning signs. The findings indicate that in 87 % of cases, a previous psychiatric diagnosis was present. Still, in only 15 % of the cases, the current treatment was ongoing, and some instances exhibited warning signs that family members did not detect. Valdés-García et al. (24) implemented psychological autopsies to analyze the factors associated with suicide in two members of the same family. In the investigation, precipitating factors such as love breakups, suicidal ideation, and the method of hanging were found. In this study, the authors conclude that couple conflicts and a history of suicidal behavior in the family are factors that increase the vulnerability to suicide within the family nucleus.

Pérez-Martínez and Rodríguez-Fernández (10) explored the application of psychological autopsies to clarify doubts about suicide. From this study, the autopsy was explored as a fundamental resource to perform retrospective analysis in the psychological state of people who have died. The research highlights its employability to establish risk factors and distinguish the difference between suicidal acts, accidental death, and homicide.

Kim at al. (11) analyzed 23 000 cases of suicide in South Korea, where they found that hanging was the most frequent method of suicide in this population, and that certain variables such as age, the presence of psychopathology such as schizophrenia, substance use, especially alcohol, and psychopathological history in the family are closely related to the selection of the method.

This research allows for the establishment of a risk profile associated with different forms of suicide, which provides inputs for the design and implementation of contextualized interventions.

Finally, the studies analyzed show that suicide is the product of an interaction between multiple psychosocial risk factors at the psychiatric, biological, social, and personality levels. They also highlight the need to design and implement predictive models of suicide that integrate the resources derived from psychosocial autopsies,

Based on these findings, the need arises to design a predictive model of suicide that integrates the inputs obtained through psychosocial autopsies, taking advantage of the capabilities of artificial intelligence to analyze complex patterns, detect risk factors, predict suicidal behaviors, and generate diagnostic support tools. It is essential to recognize the strategic value of psychosocial autopsies as a critical resource in this process, since they allow the construction of more accurate predictive models, contextualized and based on real information, contributing to improving the response capacity of the health system to risk cases detected early and strengthening suicide prevention strategies.

DISCUSSION

The results obtained in the present study highlight the remarkable progress in the study of suicidal behavior from a predictive approach supported by psychosocial autopsies and AI artificial intelligence models. The affinity between classical methodologies such as psychological autopsy and contemporary computational approaches such as machine learning enhances an epistemological transition in the approach to suicide as a global public health problem. This discussion presents the results obtained in light of the theoretical background, the empirical literature, and the clinical and preventive implications that emerge from this synthesis.

First, the analysis reveals a growing trend towards the use of algorithmic models for predicting suicidal behavior, as highlighted in studies such as those of Barajas-Aranda et

al. (13), where artificial neural networks achieved predictive accuracy above 80 %, even reaching 90 % in rural contexts. These findings reinforce the effectiveness of deep learning for processing large volumes of clinical and psychosocial data, outperforming traditional statistical models in many cases. Similar results have been reported by Kessler et al. (25), who, by applying predictive models, found accuracies of 85 % in predicting suicidal risk based on longitudinal data. However, these models present limitations in their real-world applicability if they are not accompanied by interpretative tools such as SHAP or LIME7(13), which enable the translation of algorithmic findings into understandable variables for clinical staff, a necessity in the healthcare context.

Regarding the population variable, there is a marked concern for suicide in vulnerable populations such as children, adolescents, and young people, especially in Latin American and Asian contexts (12,17,20). Childhood abuse, family conflict, impulsivity, and hopelessness emerge as highly predictive variables of suicidal risk, being constant in several models. Parallel studies, such as Walsh et al. (27), focused on North American adolescents, also identified depressive symptomatology and family problems as key predictors, validating the international consistency of these factors.

However, the study by Lievano-Ruiz et al. (7) validates Turecki's biopsychosocial model, providing empirical evidence on the interaction between emotional, family, and social variables. This comprehensive approach reaffirms that a single dimension cannot explain suicidal behavior, but rather a complex web of factors. Similarly, Franklin et al. (27) in their literature review on predictors of suicide, concluded that the most robust models are those that combine multiple dimensions (clinical, social, and cognitive), which converges with the findings of the present review.

The contributions of studies such as that of Underwood et al. (22) show a relevant biological component by identifying neurochemical alterations linked to the HPA axis and BDNF in people who have died by suicide. This line of research opens the possibility of integrating objective biomarkers into predictive models, thereby enriching diagnostic precision and

depth. Research such as Neupane et al. (28) has also explored this approach, identifying several biomarkers in suicides, which reinforces the role of the biological component in prediction.

From the methodological point of view, the review confirms the richness of psychological autopsy as a retrospective technique for in-depth exploration of risk factors. Studies (2,23,24) highlight its usefulness in reconstructing the emotional and behavioral profiles of deceased people. Similarly, recent reviews such as Favril et al. (29) also highlight the usefulness of psychological autopsy to understand the underlying causes of suicide, which remains valid and of practical value.

Another notable finding is the exploration of alternative data sources in predictive models, as evidenced by the study by Patel et al. (18), which integrates information from social networks, search engines, and emergency records. This approach, which can be termed "applied psychoinformatics," allows for more proactive surveillance of suicidal tendencies. Similar findings were reported by Soron and Pagliari (30), who demonstrated that the analysis of social network data allows the detection of early signs of suicidal risk.

From the perspective of population prediction, research such as that of Cifuentes et al. (21) explores time series models. In this regard, previous studies such as Yan et al. (31) have already noted the importance of monitoring temporal patterns of suicide to adjust public health strategies. This distinction between individual and ecological prediction reinforces the need for a multilevel approach. It also highlights the potential of predictive models to profile specific suicide patterns, as seen in the study by Kim et al. (32). Park et al. (33) have also explored the choice of suicidal method as an indicator of risk, highlighting the importance of considering these variables to improve preventive intervention. Despite these advances, gaps in the literature have also been identified, as noted by the scientometric analysis of Núñez et al. (34). This issue could be addressed through transdisciplinary research that integrates mental health, data science, and social sciences.

In summary, the results of this review allow us to conclude that suicide prediction has moved

from purely clinical approaches to hybrid models, where psychological autopsies provide contextual depth, while AI algorithms provide analytical power. This pairing offers a glimpse of a future where healthcare systems can anticipate suicide attempts, acting in a preventive and personalized manner. To this end, it is essential to move towards predictive models that integrate clinical, social, digital, and biological data, always under principles of ethics, confidentiality, and equity. In addition, the training of mental health professionals should include competencies in the interpretation of algorithmic models and the responsible use of technology in clinical contexts. Finally, it is recommended that suicide epidemiological surveillance systems be strengthened to incorporate these findings and become effective tools for the design of sensitive, evidence-based public policies aimed at early prevention.

CONCLUSIONS

Integrating psychosocial autopsy as an input for the design of predictive models of suicide represents a key epistemological advance in suicide prevention, by articulating qualitative dimensions with quantitative data processing through artificial intelligence and machine learning. This methodological convergence enables the overcoming of the limitations of traditional approaches, providing a more contextualized, personalized, and dynamic understanding of suicide risk factors (2,3).

One of the main conclusions derived from the study is that AI-based models, particularly artificial neural networks and multilayer perceptrons, significantly outperform classical statistical models, such as logistic regressions, in accuracy, especially when fed with data derived from psychosocial autopsies (3). This finding not only highlights the technical efficacy of these algorithms but also underscores the relevance of contextual, narrative, and longitudinal data that only psychosocial autopsy can provide.

Another relevant contribution of the study lies in the validation of the biopsychosocial model of suicide (5), which recognizes the interaction of factors such as genetic and historical factors,

impulsivity, life events and hopelessness as a complex explanatory network of suicidal behavior. The literature reviewed confirms the repeated presence of variables such as depressive symptomatology, social isolation, family dysfunction and child abuse, especially in adolescents and young adults, as strong predictors of suicidal risk (17,20). These variables not only have international empirical support (26) but also confirm the need for multi-systemic and interdisciplinary approaches.

In addition, progress has been made in utilizing alternative data sources to inform predictive models, such as digital records, social networks, and web searches, which expands the possibilities for proactive monitoring of suicide risk (35). This could complement classical techniques and generate real-time early warning systems, with high value in public health contexts.

Likewise, the study confirms the clinical and forensic value of psychosocial autopsy, not only as a tool for reconstructing the mental state before suicide, but also as a method for generating predictive profiles applicable in clinical and community settings (4,10). Its rigorous and systematic implementation, however, is hampered by ethical, cultural, and methodological barriers, such as the standardization of protocols, access to sensitive information, and the specialized training of professionals (5).

Finally, from an applied perspective, the inclusion of alternative data sources, such as social networks, digital medical records, and search engines, in predictive models is also noteworthy (30,35). These emerging sources constitute an expanding frontier in the field of psychoinformatics and open unprecedented opportunities for proactive detection of suicide risk at the population level, especially among young digital natives.

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