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Anxiety or reflection? exploring profiles of death awareness among chinese nurses: a latent profile analysis

Zuming Qin¹, Yuting Huang¹, Xiaoke Zhang¹, Siyu Su¹, Huilin Zhang^{1*†} and Jun Peng^{2*†}

Abstract

Background Nurses frequently encounter death due to their professional roles, impacting their perceptions of mortality. Previous research has largely focused on the negative aspect of death awareness, known as death anxiety, while the other aspect, death reflection, has been less explored. This study aims to investigate the profiles of death awareness among Chinese nurses and identify factors influencing these profiles, such as socio-demographic characteristics, work-related characteristics, death education, and resilience.

Method A cross-sectional study was conducted using a convenience sample of 2882 nurses across China. Data were collected through an online survey from September to November 2023. Latent Profile Analysis was utilized to identify distinct profiles of death anxiety and death reflection among nurses. Multinomial logistic regression was used to analyze the predictive factors for different death awareness profiles.

Results Three distinct profiles were identified: Calm Reflectors (low death anxiety, high death reflection), The Anxious (high death anxiety, low death reflection), and Anxious Reflectors (high levels of both death anxiety and death reflection). Factors such as resilience, years of service, parental status, education level, and read death education-related information significantly predicted the classification into these profiles. Specifically, higher resilience and engagement in death education were associated with the Calm Reflectors profile.

Conclusions Our study suggests that nurses' death awareness can be categorized into three distinct profiles: Calm Reflectors, The Anxious, and Anxious Reflectors. Key predictors of these profiles include resilience, educational level, years of service, parental status, and read death education-related information. The findings suggest that enhancing resilience and targeted educational interventions are crucial for supporting nurses in managing death-related emotional and cognitive responses effectively.

Keywords Death awareness, Nurses, Death reflection, Death anxiety, Resilience

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Introduction

Due to their distinct professional role, nurses often face direct or indirect exposure to death or individuals at the end of their lives [1]. Such encounters profoundly impact their perceptions of mortality and life's fragility, a phenomenon that gained substantial validation during COVID-19 [2]. Variations in individual perceptions of death lead to two divergent attitudes: death anxiety and death reflection, and each one elicits a distinct reaction [3].

Current research primarily explores nurses' death anxiety but neglects the more positive concept of death awareness known as death reflection. Furthermore, studies conducted on employees during COVID-19 have reported some intrinsic connections between these two types of death awareness [4]. Thus, we set out to determine what kind of death awareness nurses experience at work, and what factors influence the nurses' death awareness?

Background

Events and experiences that remind individuals of their own mortality, known as mortality cues [5], collectively give rise to death awareness [5, 6]. Grant and Wade-Benzoni [5], building upon Terror Management Theory (TMT) and Generativity Theory, differentiated death awareness into two categories based on emotional and cognitive responses: death anxiety and death reflection. Death anxiety manifests as a negative emotional state characterized by fear and panic regarding death [7] and leads to increased external self-defense and self-protective retreat behaviors. In contrast, death reflection is a cognitive process in which individuals engage in self-examination, contemplate their life's meaning, and purpose, and consider how others will perceive them after death [8, 9]. Death reflection thus emphasizes the positive aspects of death and includes intentions to act on these positive perspectives [10].

Nurses who regularly interact with critically ill patients or handle sudden deaths face significant psychological pressures [11]. Current research on nurses' death consciousness primarily focuses on death anxiety and tends to explore its negative impacts [12–15], neglecting the role of death reflection and its potential positive effects [10]. Additionally, the exclusive focus on death anxiety does not fully account for observations made during COVID-19, where highly death-anxious employees sometimes exhibited prosocial and altruistic behaviors [2, 4]. Scholars suggest that repeated exposure to mortality cues can lead to a coexistence of both types of death awareness in that death anxiety may trigger death reflection as a sense-making and/or coping mechanism [16, 17]. Likewise, a focus on death due to reflection could in turn trigger death anxiety [18], indicating a complex

interplay and inherent connection between these two types of death awareness.

Recent studies related to death awareness have mostly applied the variable-centered approach [19, 20], which assumes population homogeneity and focuses on explaining relationships between variables of interest in a population. By contrast, in the person-centered approach, the focus lies on the identification of latent subpopulations of individuals based on several observed characteristics (i.e., indicators), which gives this approach a higher level of specificity compared to the variable-centered one [21]. Instead of emphasizing individual variables, this view allows the researcher to identify different constellations of constructs and thus gain more knowledge about the relationships between various characteristics. To identify latent subgroups with distinct patterns of death awareness and their predictors, we employed latent profile analysis (LPA), a person-centered approach suitable for continuous variables. Zhong et al. [4] first applied latent profile analysis to consider death anxiety and death reflection together and found that during COVID-19, employees' two types of death awareness coexisted, meaning that some employees experienced high levels of both death anxiety and death reflection. These varying profiles of death awareness were linked to different psychological states and behaviors, highlighting the possibility of their coexistence amidst frequent exposure to death. Different death awareness profiles predicted different psychological states and behaviors, emphasizing that death anxiety and death reflection can coexist in situations of repeated exposure to death. However, most current research that considers both death anxiety and death reflection has been conducted during COVID-19 [2, 19, 20, 22] or in laboratory studies [23–25], with subjects mostly being ordinary professionals or students who have limited experience with repeated exposure to death, which naturally limits the generalizability of the results to special occupational groups such as nurses. Consequently, in this study we employ LPA to explore nurses' death awareness profiles during periods that do not include public health crises in order to understand their distinctive characteristics and to investigate variations in related traits.

Transactional stress theory posits that an individual's perception of stress is influenced by both environmental stimuli and cognitive factors [26]. Zheng [27] suggested that mortality cues in the workplace can be viewed as a source of stress that either impedes or facilitates the achievement of individual goals, with death anxiety and death reflection being influenced by different evaluations of these mortality cues. This implies that an individual's awareness of death induced by facing mortality cues is affected by their own ability to cope with stress. Within positive psychology, this coping capacity is often

linked to resilience, defined by Cochrane as the ability to cope with the negative effects of stress and thus avoid mental health problems and their wider effects [28]. The stronger the psychological resilience, the better one can mitigate adverse reactions from stressors at work [29]. Studies have found that employees with high resilience experience lower death anxiety during COVID-19 [30], but there has been no exploration between death reflection and resilience. Because it is a more positive form of death awareness, we hypothesize that death reflection has a distinctly different relationship with resilience and that nurses with higher resilience are more likely to lean towards death reflection rather than death anxiety.

Additionally, we explore the influence of nurses' demographics on their death awareness profiles. This includes sociodemographic characteristics, work-related characteristics, and death education experiences. Prior research has shown that female nurses report higher levels of death anxiety compared to male nurses [12]. Nurses with higher education levels and longer years of service tend to have lower death anxiety and fear [31]. Differences in death anxiety are also observed across nurses working in different departments [14]. Nurses with children generally report lower death anxiety, while those frequently

experiencing patient deaths are often led to reflect on their own mortality [14, 32]. Death education has been shown to reduce death anxiety among nurses [33]. Moreover, factors such as the number of night shifts worked per month and monthly income, which are closely tied to nursing work, are also investigated in this study. The theoretical framework of this study is shown in Fig. 1.

Present study

In the current research, nurses, as the main type of worker who frequently encounters critically ill patients or sudden deaths, face considerable psychological stress [11]. Such stress not only impacts nurses' physical and mental well-being but also influences the quality of their nursing care [34]. Given the existing gap in comprehensive understanding of nurses' death awareness, this study aims to examine both types of death awareness within this unique occupational group. We seek to identify the factors that can predict nurses' death awareness profiles and to assess specifically whether resilience serves as a key predictor. This exploration is pivotal for guiding psychological health and death education training among healthcare professionals. By employing latent profile analysis (LPA), our study focuses on: (1) identifying

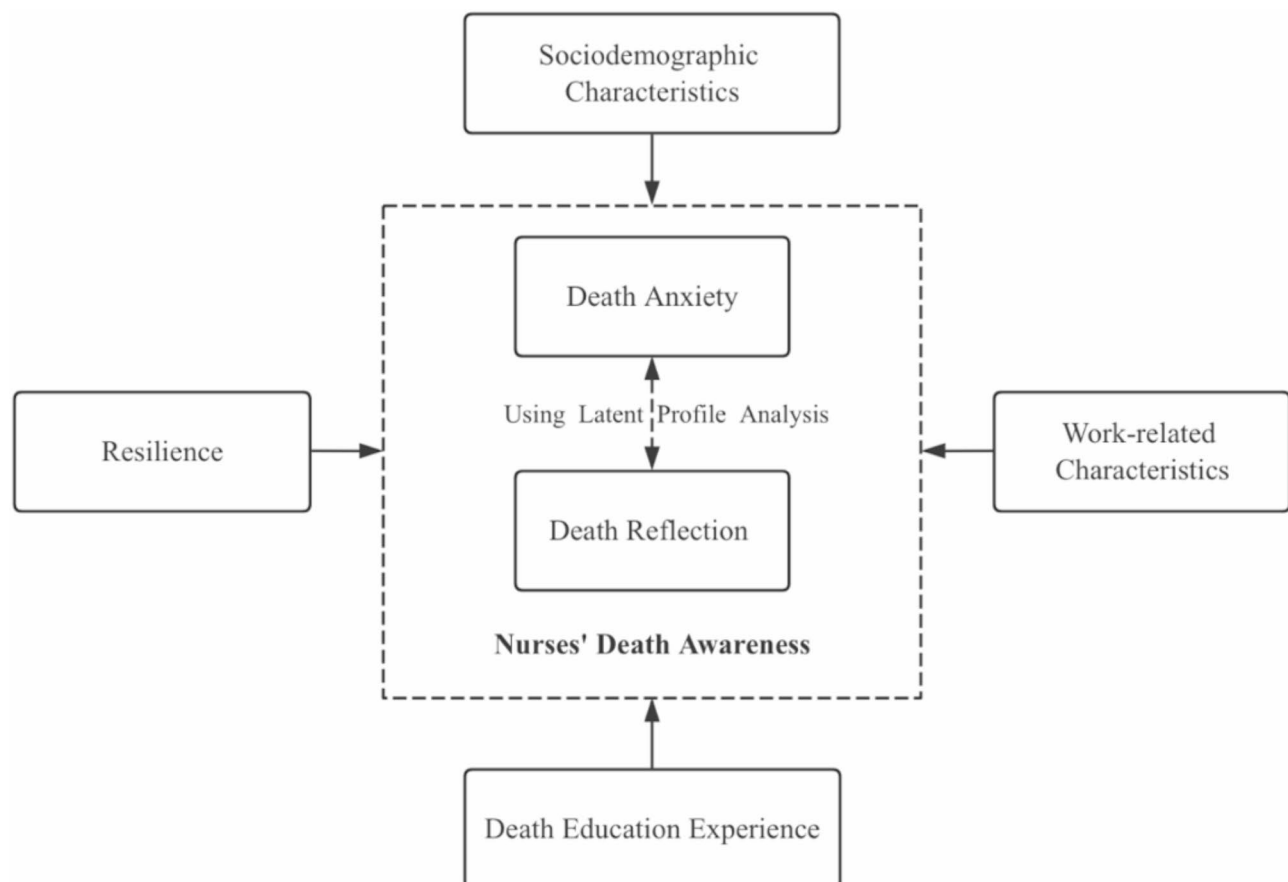


Fig. 1 The conceptual framework of this study

distinct profiles of death awareness among nurses and (2) evaluating the predictive value of nurses' sociodemographic characteristics, work-related characteristics, death education experiences, and resilience in predicting their death awareness profiles.

Methods

We employed LPA to explore whether distinct profiles of the two forms of death awareness among nurses exist and how each nurse's two different forms of death awareness are composed, as well as to determine the demographic and resilience differences of each subgroup. The STROBE statement was used to report the results of this study.

Participants and procedures

The data were collected through anonymous and self-reported questionnaires. Before the main survey, a pre-survey was carried out in August 2023 with 30 nurses to make sure the questions were easy to understand and to check for any technical issues with the online questionnaire (these data are not included in this study). The inclusion criteria were: (1) possession of a nursing practice certificate; (2) no cognitive or mental disorders; and (3) provision of informed consent and voluntary participation. The exclusion criteria were: (1) student nurses; (2) nurses who are unable to participate in the survey due to leave, external training, or study. We collected this data through an online Chinese questionnaire platform (<https://www.wjx.cn/>) from September to November, 2023.

Prior to distributing the questionnaire, we contacted hospitals listed in the Chinese Hospital Directory and asked if they were interested in participating. Hospitals willing to participate were selected for inclusion in the study. We contacted nearly 120 hospitals and received positive responses from 89 of them. The questionnaire link was subsequently sent to the designated contact person at each participating hospital, who distributed it to nurses within their departments through WeChat working groups. Nurses completed the questionnaire voluntarily using the provided link.

In order to ensure the completeness and validity of each questionnaire, the same IP address or account could only respond to a given questionnaire once, and questionnaires could not be submitted if they were incomplete. After the questionnaires were collected, two researchers checked and cleaned the data and manually eliminated invalid questionnaires. Our pilot test showed that at least 5 min would be needed to read through the questionnaire. Therefore, questionnaires with the exclusion of response duration < 5 min, the number of the same options > 80%, and self-contradictory answers. After excluding 205 invalid questionnaires, 2,882 valid

questionnaires were collected, for a valid response rate of 95.84%.

Sample size

A minimum sample size of 500 cases is recommended for LPA given that a smaller sample size can introduce problems related to aggregation and identifying small profiles [35]. A total of 2882 participants were included, which met the aforementioned sample size requirements.

Ethical considerations

Sampling and data collection procedures were in accordance with the Declaration of Helsinki and were approved by the the Second Xiangya Hospital of Central South University Ethics Committee (Approval number: LYF20230107). All participants participated voluntarily. An online informed consent form was presented on the homepage of the online questionnaire, and all participants were informed that their participation was voluntary and confidential and that they could withdraw from the study at any time for any reason and without facing negative or disciplinary consequences of any kind.

Measurement

Demographic information

We collected demographic information, including sociodemographic characteristics (gender, age, education level, parental status), work-related characteristics (whether a nurse worked in an emergency room or intensive care unit, years of service, number of night shifts per month, monthly income, whether a nurse experienced patient death in the past year), and death education experiences (participation in death education training or learning, whether a nurse had read death education-related books, films, or online information, etc.).

Death anxiety

The Chinese version of Templer's Death Anxiety Scale (CT-DAS) was originally developed by Templer et al. in 1974 and translated into Chinese by Yang et al. [36] with cultural adaptations in 2010. The scale consists of 15 death-related questions (6 of which are scored in reverse), using a 1 to 5 Likert scale, where 1 represents "completely disagree" and 5 represents "completely agree." A higher score indicates a higher level of death anxiety. The internal consistency coefficient of this scale is 0.854, with a Cronbach's α of 0.762 [36]. In this study, Cronbach's α for this scale was 0.781.

Death reflection

The Death Reflection Scale (DRS) was developed by Yuan et al. [10] in 2018 and revised for Chinese applications by Fang et al. [37] in 2022, with college students as subjects. The scale comprises 15 questions about death, such as

“When I think of death, I feel I should do more for this world” and “When I think of death, I consider what I can leave behind.” The scoring method is identical to the original scale, with 15 items scored on a Likert scale from 1 (completely disagree) to 5 (completely agree), where a higher total score indicates a higher level of death reflection and the Cronbach’s α of this scale is 0.83 [37]. In this study, Cronbach’s α for this scale was 0.94.

Resilience

We used the 10-item Connor-Davidson Resilience Scale (CD-RISC-10) to measure nurses’ psychological resilience. This scale was developed by Laura Campbell-Sills et al. [38] in 2007 and translated into Chinese by Ye et al. [39] in 2016. It includes 10 items, scored on a 5-point Likert scale from 0 “never” to 4 “always,” with higher scores indicating higher levels of psychological resilience and the Cronbach’s α of this scale is 0.851 [39]. In this study, Cronbach’s α for this scale was 0.931.

Statistical analysis

All data analysis was performed using IBM SPSS 25.0, Mplus 8.3 and R (version 4.4.2; R Core Team). Frequencies and percentages were applied for categorical data. Given that normality testing revealed all continuous variables were non-normally distributed (see Appendix 1), medians and interquartile ranges (25th and 75th percentiles) were used for continuous data. Spearman correlation analysis was used to explore the relationship between death anxiety, death reflection, and resilience. The following two-tailed tests were conducted, with $P < 0.05$ indicating statistically significant results. Exploratory LPA using Mplus 8.3 was employed to examine the latent profiles of death anxiety and death reflection among nurses. Models ranging from initial (2 latent profiles) to final (6 latent profiles) were estimated by gradually increasing the number of latent profiles until the fit indices reached an optimal level. To determine the best number of profiles, the Bayesian Information Criterion (BIC), Akaike Information Criterion (AIC), and sample-size-adjusted BIC (aBIC) were used, with smaller values indicating a better model fit [40]. Entropy values were also calculated, with values close to 1.0 indicating high classification accuracy [40]. P -values of the Lo-Mendell-Rubin adjusted likelihood ratio test (LMR-A) and the bootstrapped likelihood ratio test (BLRT) falling below 0.05 indicate that a model with k profiles is superior to a model with $k-1$ profiles [41]. After selecting the optimal model, chi-squared tests were conducted to analyze categorical variables. For continuous variables, the Kruskal-Wallis test was applied for group comparisons, followed by Bonferroni-Dunn post-hoc tests for multiple comparisons. Finally, multinomial logistic regression analysis was conducted with profiles as the dependent variable and

demographic data and resilience as independent variables in order to explore the predictive factors for nurses’ death awareness profiles.

Results

Table 1 presents the mean and standard deviation of demographic information and resilience across three subgroups of nurses. The majority of participants were female (95.4%), 33.15 ± 7.085 years old, childless (70.3%), and educated to the level of a bachelor’s degree (82.3%). Most had less than ten years of work experience (52.1%) and earned a monthly income of 4,000–8,000 yuan (53.8%). The frequency of night shifts exceeded once per month for most nurses (74.5%) as well, with over half having encountered patient deaths in the past year (52.1%). Additionally, 64.2% of nurses reported having received death education and 75.0% reported engaging with related books, films, or online information, etc.

Fig. 2 presents the correlation matrix heatmap illustrating the relationships among death anxiety, death reflection, and resilience. The results show significant correlations between all variables

Latent profile analysis results

For our LPA we started with two profiles initially and gradually increased the number of profiles to find the most suitable model. The results and fit of different numbers of profiles are presented in Table 2. The three-profile model was found to be the best choice for several reasons. First, it had lower AIC, BIC, and aBIC than the two-profile model; second, it had higher entropy than the four-profile model. Third, the three-category results were more concise and comparable to previous studies. Therefore, we settled on the three-profile model.

Figure 3 displays the latent profile distribution and proportions of the chosen three-profile model. The largest group, named as ‘Anxious Reflectors,’ consists of nurses with high levels of both death anxiety and death reflection (Profile 3). The ‘Anxious’ profile, characterized by higher death anxiety and lower death reflection, accounts for the smallest proportion (Profile 2). Lastly, the ‘Calm Reflectors’ profile, representing nurses with higher death reflection and lower death anxiety, forms the second largest group (Profile 1)

Predictors of latent profiles of death awareness

Initially, our univariate analysis of nurses with different basic characteristics revealed that age, parental status, educational level, years of service, number of night shifts, monthly income, and reading death education-related information and resilience were statistically significant across different death awareness profiles (Table 1). To further examine group differences in resilience, we conducted Bonferroni-Dunn post-hoc tests (see Appendix

Table 1 Demographic characteristics of nurses according to different profiles ($n = 2,882$)

	Profile 1 ($n = 55$) n (%)	Profile 2 ($n = 139$) n (%)	Profile 3 ($n = 2,688$) n (%)	Overall ($N = 2882$) n (%)	P
Gender					
Male	6 (10.9)	5 (3.6)	122 (4.5)	133 (4.6)	0.070
Female	49 (89.1)	134 (96.4)	2566 (95.5)	2749 (95.4)	
Age [M (P_{25} , P_{75})]	34 (27, 41)	31 (27, 37)	32 (28, 37)	32 (28, 37)	0.034
Parental Status					
Yes	18 (32.7)	55 (39.6)	783 (29.7)	856 (29.7)	0.028
No	37 (67.3)	84 (60.4)	1,905 (70.9)	2,026 (70.3)	
Education level					
Associate's degree or below	5 (9.1)	42 (30.2)	463 (17.2)	510 (17.7)	<0.001
Bachelor's degree or above	50 (90.9)	97 (69.8)	2,225 (82.2)	2,372 (82.3)	
Working in the emergency room or intensive care unit					
Yes	8 (14.5)	12 (8.6)	266 (9.9)	286 (9.9)	0.455
No	47 (85.5)	127 (91.4)	2,422 (90.1)	2,596 (90.1)	
Years of service [M (P_{25} , P_{75})]	13 (6, 20)	9 (5, 14)	10 (6, 15)	10 (6, 15)	0.035
Number of night shifts per month					
0	22 (40.0)	39 (28.1)	672 (25.0)	733 (25.4)	0.022
1–4	19 (34.5)	40 (28.8)	1,014 (37.7)	1073 (37.2)	
≥ 5	14 (25.5)	60 (43.2)	1,002 (37.3)	1,076 (37.3)	
Monthly income					
<4,000	7 (12.7)	46 (33.1)	632 (23.5)	685 (23.8)	0.003
4,000–8,000	29 (52.7)	74 (53.2)	1,447 (53.8)	1,550 (53.8)	
>8,000	19 (34.5)	19 (13.7)	609 (22.7)	647 (22.4)	
Experience with patient deaths in the past year					
Yes	24 (43.6)	67 (48.2)	1,410 (52.5)	1,501 (52.1)	0.278
No	31 (56.4)	72 (51.8)	1,278 (47.5)	1,381 (47.9)	
Participation in death education training or learning					
Yes	25 (45.5)	48 (34.5)	959 (35.7)	1,032 (35.8)	0.310
No	30 (54.5)	91 (65.5)	1,729 (64.3)	1,850 (64.2)	
Read death education-related information					
Yes	50 (90.9)	83 (59.7)	2,028 (75.4)	2,161 (75.0)	<0.001
No	5 (9.1)	56 (40.3)	660 (24.6)	721 (25.0)	
Resilience [M (P_{25} , P_{75})]	34 (30, 37)	18 (10, 25)	22 (19, 28)	22 (18, 28)	<0.001

Abbreviations: Profile 1: Calm Reflectors; Profile 2: The Anxious; Profile 3: Anxious Reflectors

2). Profile 1 exhibited significantly higher resilience compared to Profile 2 ($Z = 10.890$, $p < 0.001$) and Profile 3 ($Z = 9.088$, $p < 0.001$). Additionally, Profile 2 demonstrated significantly lower resilience than Profile 3 ($Z = -5.711$, $p < 0.001$). Fig. 4 presents a radar chart comparing the mean scores of death anxiety, death reflection, and resilience across the three death awareness profiles.

In the second phase, the three distinctive profiles were incorporated as independent variables in a multivariate regression analysis, with profile 3 as the reference. This analysis revealed that resilience, education, years of service, parental status, and reading death education-related information were predictive of the death awareness profile (Fig. 5). (We use Forest Plots to illustrate the odds ratios (ORs) and confidence intervals (CIs) for these predictors. The results in tabular form can be found in Appendix 3). Specifically, nurses with higher resilience

were inclined to be the 'Calm Reflectors' (profile 1), followed by 'Anxious Reflectors' (profile 3), as opposed to the 'The Anxious' (OR = 1.238, 95% CI: 1.181–1.297; OR = 0.920, 95% CI: 0.895–0.945). Longer work experience also inclined nurses toward being 'Calm Reflectors' (profile 1) rather than 'Anxious Reflectors' (profile 3) (OR = 1.127, 95% CI: 1.011–1.256). Nurses without children were more likely to fall into the 'The Anxious' profile (profile 2) compared to those with children (OR = 1.672, 95% CI: 1.057–2.643). Regarding education, nurses with qualifications below a bachelor's degree were more prone to end up with the 'The Anxious' (profile 2) than those with higher education (OR = 1.642, 95% CI: 1.105–2.440). Moreover, nurses who had not read death education-related information were more likely to be categorized as 'Anxious Reflectors' than 'Calm Reflectors' (OR = 0.379, 95% CI: 0.146–0.982), and they also had a higher



Fig. 2 Correlation-matrix-based Heatmap. Abbreviations: * $P < 0.05$; ** $P < 0.01$

Table 2 Model fit comparisons across 2- to 6-profile LPA solutions ($n = 2,882$)

Model	K	Log(L)	AIC	BIC	aBIC	Entropy	LMR	BLRT
2-profile	7	-21,130.739	42,275.477	42,317.241	42,294.999	0.934	<0.001	<0.001
3-profile	10	-21,098.645	42,217.289	42,276.952	42,245.178	0.907	<0.001	<0.001
4-profile	13	-21,098.645	42,153.267	42,230.828	42,189.523	0.804	<0.001	<0.001
5-profile	16	-20,993.573	42,019.146	42,114.606	42,063.769	0.847	<0.001	<0.001
6-profile	19	-20,832.115	41,702.230	41,815.588	41,755.218	0.902	<0.001	<0.001

Abbreviations: k, Number of free parameters; Log(L), Log-likelihood value; AIC, Akaike information criterion; BIC, Bayesian information criteria; aBIC, adjusted Bayesian information criteria; LMR, Lo–Mendell–Rubin test; BLRT, bootstrap likelihood ratio test

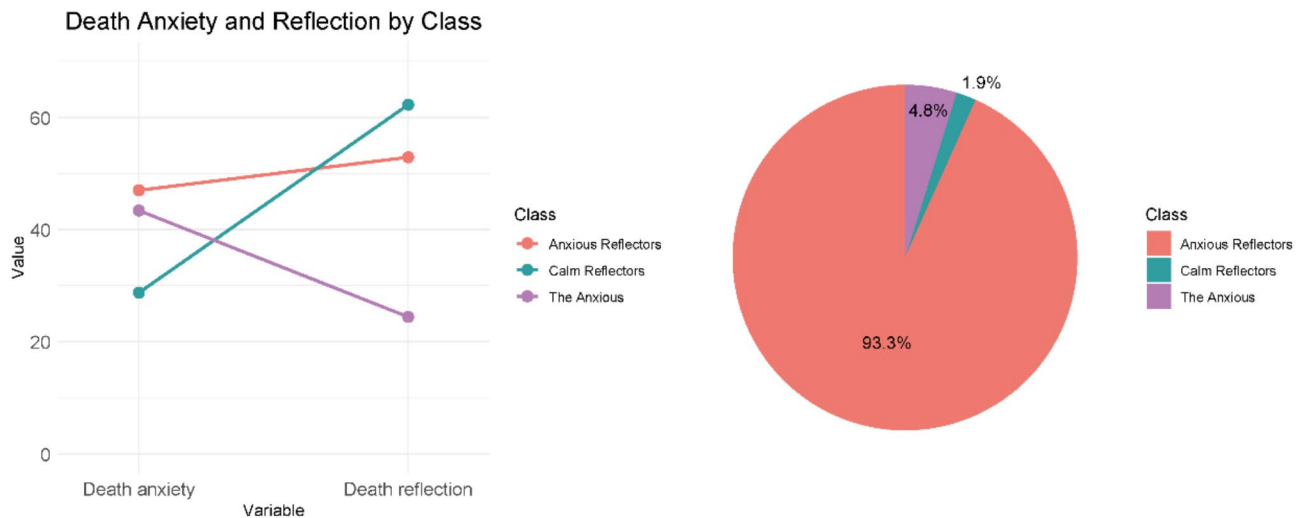


Fig. 3 Latent profile distribution and proportions among nurses

tendency to be grouped with ‘The Anxious’ rather than ‘Anxious Reflectors’ (OR = 1.768, 95% CI: 1.231–2.540)

Discussion

In this study, we employed LPA to explore the current status of death awareness among nurses. Differing from traditional variable-centered analysis methods, LPA focuses on individual patterns and profiles, making it more suitable for understanding complex behaviors and health conditions. By categorizing nurses based on their death anxiety and death reflection, we identified three distinct profiles: Anxious Reflectors, Calm Reflectors, and The Anxious. The majority of our sampled nurses were classified as Anxious Reflectors, differing from the findings of Zhong [4], where the most-observed profile in their employee sample was Calm Reflectors, followed by Anxious Reflectors, and The Disengaged. The Disengaged profile represented individuals with low death anxiety and low death reflection, and this was not observed in our study. This might be because of nurses’ frequent and recurrent exposure to death [11] and engaging more with the concept of death [42] leading to heightened death awareness. In our sample, Anxious Reflectors constituted the vast majority (93%), partially confirming the views of Zhong and Grant that when individuals are repeatedly exposed to death, death anxiety and death reflection usually coexist [4, 5]. However, our findings did not corroborate the view that death reflection becomes a more common form of death awareness under continuous exposure to mortality cues. This might be due to the influence of traditional Chinese culture, where discussion of death is considered a taboo and death education is not fully developed [11]. A lack of specific understanding of death can thus lead to death anxiety when faced with mortality cues [3, 43]. This cultural context might also clarify why Zhong’s study did not identify a profile with

high death anxiety and low death reflection, a finding that emerged in our research

We also observed a significant association between resilience and nurses’ death awareness: nurses with higher resilience tended to exhibit more death reflection, and those with lower resilience showed more death anxiety, aligning with previous research findings [30, 44]. Nurses’ experiences of caring for critically ill patients or facing patient mortality directly can heighten their death awareness [5], especially during pandemics when the increased number of deaths and fear of personal infection significantly amplify their psychological stress [45]. Faced with constant reminders of death in their professional lives, nurses with higher psychological resilience are better able to manage this stress [46] and subsequently exhibit different death awareness [27]. Although this correlation was evident in our results, the exact mechanisms through which psychological resilience influences death awareness remain unclear. Future research could explore the cognitive processes and evaluations that nurses might experience in response to mortality cues. Examining whether nurses with stronger resilience can positively assess these cues, thereby effectively mitigating the adverse emotions brought on by death and consequently forming distinct death awareness and psychological outcomes is one avenue of potential future study

When analyzing the sociodemographic, work-related, and death education factors that influence nurses’ death awareness profiles, we found that nurses with longer years of service and active engagement in death education-related information tended to be Calm Reflectors. In contrast, those with less education, without children, and without active engagement were more prone to become members of The Anxious. According to the relationship between cognition and death awareness, abstract cognition about death leads to death anxiety, and concrete

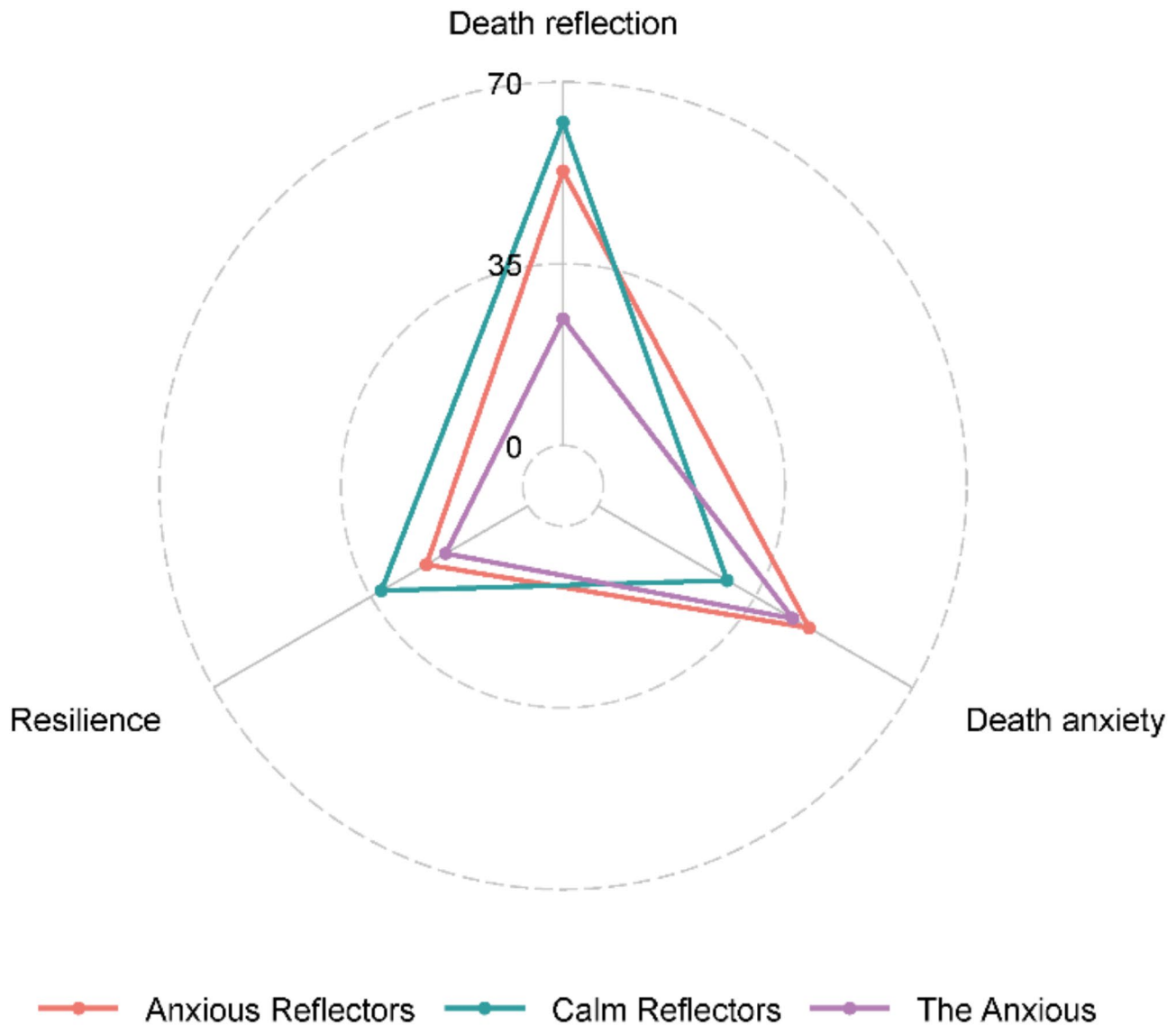


Fig. 4 Radar chart of death anxiety, death reflection, and resilience across three profiles

cognition leads to death reflection [3]. We speculate that more experienced nurses, due to age and repeated exposure to death, tend towards a cognitive, calm state of death awareness [17]. Higher education and exposure to death-related knowledge facilitate this cognitive process [12].

In addition, research shows that close family relationships can significantly alleviate death anxiety [47], resulting in more positive death perceptions among nurses with children [48]. Our results showed that working in the emergency room or intensive care unit did not affect nurses' death awareness profiles, differing from previous findings [31, 49] possibly due to our study's person-centered methodology and inclusion of death reflection [50]. Furthermore, previous research has shown that death education helps reduce death anxiety and promote

a proper understanding of death [12, 33, 49]. Although our results show that participation in death education training did not affect nurses' death awareness profiles, reading death education-related books, films, or online information did significantly predict them. This may be attributed to the slow progress of death education in China due to the aforementioned cultural factors [51] and the prevailing method of one-way teaching [52] being insufficient to affect death cognition. Effective death education requires personal experiences and internalization for deeper understanding [53]. Beyond formal training, we assert that personal exploration of death-related knowledge can also fulfill the objectives of death education, thus remaining a significant factor in shaping nurses' death awareness profiles.

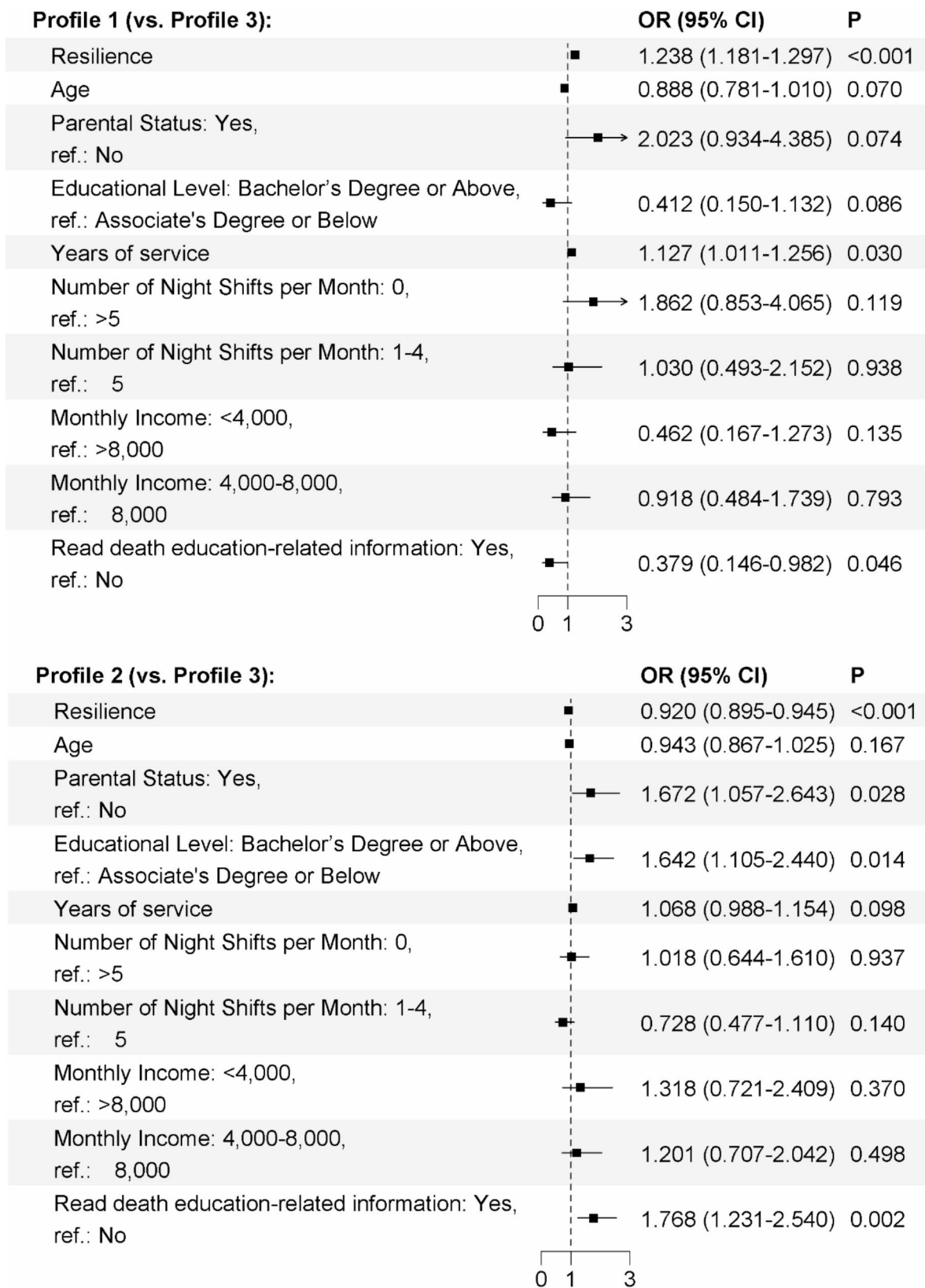


Fig. 5 Forest plot for predictors of death awareness profiles ($n = 2,882$)

Implication

The findings of this study provide practical guidance for improving nursing practice. First, the study revealed no significant association between nurses' participation in death education and their death awareness profiles, while reading death-related content showed a significant impact. This suggests the need to enhance the effectiveness of death education programs. Approaches such as using constructivist learning theory [54] or designing death education programs rooted in local cultural contexts [55] may be effective. Additionally, previous research emphasizes that death education must be sustained over time to meaningfully improve nurses' understanding of death [56].

Second, the study highlights the importance of providing diverse death education resources, regularly organizing seminars or workshops, and encouraging self-directed learning among nurses. These initiatives can help create an environment where nurses can actively engage with death-related content and develop a balanced understanding of death. Lastly, this study recommends integrating resilience training as a complementary intervention to death education. Incorporating strategies to enhance resilience into death-related training programs can help nurses better manage the psychological challenges of dealing with death in their professional roles [57]. These combined efforts can ultimately improve nursing practice and the quality of care provided to patients.

Limitations and directions for future research

The results of this study should be understood in the context of the following limitations. First, our study employed a cross-sectional design, which limits the ability to infer causal relationships between variables such as death awareness and resilience. Although cross-sectional data provide information at a specific point in time, they cannot reveal the dynamic relationship between variables over time. Therefore, future research should use longitudinal study designs to understand better the development and causal relationships between death awareness and resilience. Additionally, this study relied on online data collection, which, despite reasonable precautions, may introduce potential biases and reduce the reliability of responses. Second, data collection began in September, 2023, a period subsequent to China's full reopening after COVID-19. Nonetheless, the enduring impact of COVID-19 on nurses' death awareness and resilience may persist, particularly among nurses involved in front-line treatment efforts who likely faced more immediate and intense death exposure.

Third, this study did not examine how nurses' death awareness impacted their work behaviors, performance, and well-being. Investigating how death awareness

influences nurses' professional lives and mental health is a crucial area of research that can help to facilitate the development of more effective mental health and career strategies that can enhance nursing quality and job satisfaction. Finally, our study sample was limited to nurses from general and specialist hospitals and did not include nurses from community and nursing homes. Nurses in different healthcare settings may have different death awareness and different impacts on their professional life and attitudes toward hospice care [15]. Therefore, future research should expand the sample range to include a more diverse range of medical environments, enabling a more comprehensive understanding of nurses' death awareness in different contexts and its repercussions for their professional duties.

Conclusion

In this study we used LPA to consider two types of death awareness in nurses: death anxiety and death reflection. We identified three distinct profiles of death awareness: Calm Reflectors, Anxious Reflectors, and The Anxious and found that factors such as whether nurses had children, years of service, educational level, death education, and resilience could predict these death awareness profiles. This research thus provides a renewed understanding of death awareness in this unique professional group and contributes significantly to future interventions that target nurses' experiences with death. We advocate for additional research to explore the impact and consequences of death awareness in other professions with substantial death exposure as well. Future research into the interplay and possible delayed relationships between death anxiety, death reflection, and resilience are also encouraged as this line of research promises to open new avenues for death education and mental health education strategies.

Abbreviations

aBIC	Sample size adjusted Bayesian information criterion
AIC	Akaike information criterion
BIC	Bayesian information criterion
BLRT	Bootstrap likelihood ratio test
COVID-19	Coronavirus disease 2019
CT-DAS	Chinese version of Templer's Death Anxiety Scale
CD-RISC-10	10-item Connor-davidson resilience scale
DRS	The death reflection scale
LPA	Latent profile analysis
Log(L)	Log-likelihood value
LMR	Lo-Mendell-Rubin test

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s40359-025-02501-w>.

Supplementary Material 1

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Author contributions

HLZ and JP provided funding support, designed the study and interpreted the data and reviewed the manuscript. ZMQ designed the study, wrote the draft and performed the data analysis. YTH wrote the draft. XKZ analyzed and interpreted the data and edited the manuscript. SYS advised and supervised the study and wrote the draft. All authors read and approved the final manuscript.

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Data availability

The datasets used and/or analysed during the current study are available from the corresponding author (zhanghuilin3477@csu.edu.cn) on reasonable request.

Declarations

Ethics approval and consent to participate

Sampling and data collection procedures were in accordance with the Declaration of Helsinki and were approved by the the Second Xiangya Hospital of Central South University Ethics Committee (Approval number: LYF20230107). All participants provided their electronic signatures on the informed consent form and sent it electronically via email or WeChat.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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