



## Original article

## Examining the Predictors of Turnover Behavior in Newly Employed Certified Nurse Aides: A Prospective Cohort Study

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## ABSTRACT

**Background:** The turnover rate of nurse aides in Taiwan is high. However, the predictors of turnover behavior in the newly employed are still unclear.

**Objective:** To examine the predictors of turnover behavior in newly employed licensed nurse aides.

**Methods:** A longitudinal study design was used and subjects were newly employed certified nurse aides from a nurse aid training association in Taiwan. A total of five questionnaire surveys were conducted. The questionnaire was mainly used to collect information on turnover behavior, personal socioeconomic background, workplace psychosocial hazards, worker health hazards, and musculoskeletal disorders.

**Results:** A total of 300 participants were recruited in the study. Cox regression analysis results showed that short working experience (hazard ratio [HR] = 0.21,  $p < 0.01$ ), work as non-home nurse aides (HR = 0.58,  $p = 0.01$ ), low monthly salary (HR = 0.68,  $p < 0.01$ ), high work mental load (HR = 1.01,  $p = 0.01$ ), low workplace justice (HR = 0.97,  $p < 0.01$ ), high workplace violence (HR = 1.60,  $p < 0.01$ ), high burnout (HR = 1.01,  $p = 0.04$ ), poor mental health (HR = 1.06,  $p = 0.04$ ), and high total number of musculoskeletal disorder sites (HR = 1.08,  $p = 0.01$ ) contribute to a higher risk of turnover.

**Conclusion:** The results indicated that employment period, work as a home nurse aide, monthly salary, work mental load, workplace justice, workplace violence, work-related burnout, mental health, and total number of musculoskeletal disorder sites are predictors of turnover behavior in newly employed certified nurse aides.

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## 1. Introduction

The elderly population of Taiwan is rapidly growing, leading to an increase in long-term care burden, and nurse aide (care worker) workers' needs have become a topic of urgent consideration. However, nurse aides have poor social image, low wages, and low work value affirmation, resulting in difficulty in worker recruitment, unwillingness of newly trained employees to enter the workplace, and high turnover rate [1]. The constant loss of nurse aides has resulted in care-giving work becoming a social problem that is difficult to solve [2]. Furthermore, the high turnover rate of nurse aides not only causes patients to be unable to obtain continuous care and have difficulty in forming trusting relationships but is also detrimental to the promotion of the job market and

long-term care policies for nurse aides [3]. Therefore, the turnover behavior in nurse aides has become an important social issue.

Although previous studies have highlighted the influencing factors of turnover behavior in nurse aides, some factors still lack an empirical basis. In this study, we compiled potential influencing factors found in the relevant literature or proposed by experts, which were classified as follows: personal socioeconomic background [4,5], workplace psychosocial hazards [2], worker health hazards [6,7], and musculoskeletal disorders [8,9]. These four factors are separately described below. With regard to factors related to personal socioeconomic background, a higher ratio of subjects of the female gender [3], those who were married [10], those who were aged between 40 and 50 years [11], those who had an education level of senior high school [12], those with a long working

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experience [13], and the main family breadwinners [14] were retained.

Workplace psychosocial hazards refer to psychological and social hazards caused by work design and management as well as society and organizational structure [15]. These include work control and burden, supervisor support, co-worker support, job security, workplace justice, workplace violence, and work-family conflicts [15,16]. In the long-term care industry, nurse aides have low autonomy, high physical and mental burden, low wages, long working hours, and poor welfare, are required to complete tasks within a limited time frame, and often encounter workplace violence such as physical assault, and sexual harassment, which affects the retention willingness [4,5]. However, retention willingness can be increased if support is given by the supervisor or co-workers and work-family balance is achieved [2,17].

Additionally, worker health hazard factors refer to the negative effects of work on mental health; these include work-related burnout, over-commitment, and mental health [18]. The work of nurse aides is intense and cumbersome, requires a high degree of emotional input, and involves opportunities to face dying patients. Therefore, nurse aides are prone to workplace burnout [19]. Due to the definitions of social roles and ethics, nurse aides must present proactive, willing, and tireless work behavior in the workplace to meet societal expectations. Therefore, they often suffer from over-commitment [19]. Moreover, nurse aides must handle the emotional responses of patients and their family members, resulting in an immense psychological burden that affects their mental health and causes them to be unwilling to continue working [6,7,12,20].

With regard to musculoskeletal risk factors, nurse aides need to stand for long periods of time, leading to high lower limb burden. They also need to perform many repetitive, physically demanding actions such as turning, reaching, climbing, and bending [21,22]. Therefore, they are prone to back pain, musculoskeletal strain, knee sprain, calf soreness, and shoulder discomfort. This causes them to be physically weak and in a state of chronic inflammation or even permanent disability [9]. A previous study has pointed out that repetitive musculoskeletal injury often causes nurse aides to take sick leaves or even promotes turnover intention [22].

The statistical results obtained from the Taiwan Ministry of Health and Welfare indicate that only about 30% of nurse aides, approximately 30,000 people, who completed training and obtained a nurse aide license, were working in long-term care services [23,24]. This means that 70% of nurse aides were not employed in the long-term care industry, and the annual workforce of nurse aides is estimated to have a shortage of 4–5,000 people [23,24]. The retention rate of newly employed certified nurse aides after entering the long-term care industry is also not high, as the turnover rate is 30% to 50% [25,26]. However, past studies were mostly cross-sectional studies, which examined the turnover behavior of nurse aides or only studied the effects of one risk factor (such as personal socioeconomic background or musculoskeletal disorder) on turnover behavior. Therefore, our understanding of factors that affect turnover behavior in nurse aides is still unclear, which does not help us reduce the turnover rate in nurse aides. In summary, the objective of this study is to examine which variables (including socioeconomic background, workplace psychosocial hazards, worker health hazards, and musculoskeletal disorders) are predictors of turnover behavior in newly employed certified nurse aides.

## 2. Methods

### 2.1. Study design and participants

This study employed a longitudinal questionnaire survey. It was reviewed and approved by the Jen Ai Hospital Human Research

Ethics Committee (JAH HREC-110-5), and a nurse aide training association in central Taiwan served as the recruitment site. The association regularly offers training courses to help people obtain a certification as a nurse aide. Through the association, our research team was able to approach potential participants for the study. During each round of training courses, we described the study to the participants and obtained their written consent. This study was first carried out from March to April 2021. After that, follow-up questionnaire surveys were carried out once every three months until April 2022. Every participant underwent five surveys (in 12 months). Fig. 1 shows the study procedure. The recruitment criteria were as follows: (1) must be aged 20 years and above, (2) must have completed nurse aide training within three months and obtained a graduation certificate and a long-term care card, and (3) must have worked as a nurse aide after obtaining the long-term care card. Subjects with significant physical disability, psychiatric symptoms, or an inability to complete or understand the Chinese questionnaire were excluded.

In this study, G-Power 3.1.9 was used for sample size estimation with  $\alpha$  set to 0.05, power of 0.8, and effect size  $f^2$  of 0.15. The number of subjects required was calculated to be 139. A total of 320 subjects were recruited by convenience sampling in this study, but 6 were unable to complete the questionnaire and 14 were excluded because they were unwilling to participate in the study. Therefore, 300 subjects finally participated in this study.

### 2.2. Questionnaire

A structured questionnaire was used to collect data through the five surveys. The questionnaire had four sections: the first section was on the personal socioeconomic background of the study subjects and included questions on gender, age, education level, nationality, marital status, whether the subject is a home nurse aide, service site, whether the subject is the breadwinner of the family, salary, dominant hand, smoking habit, whether aids were used during work, body mass index, and weekly exercise frequency.

Section 2 was used to survey workplace psychosocial hazards of the study subjects. The Chinese version of the “Job Content Questionnaire,” developed by Yawen Cheng [15,16], was used. The contents include work control (nine questions), work mental load (seven questions), work physical load (one question), supervisor support (four questions), co-worker support (four questions), lack of job security (six questions), workplace justice (seven questions), workplace violence (four questions), and family-work balance (five questions) for a total of nine scales. Except for the questions under workplace violence, which had yes or no answers, the four-point Likert scale was used for the other scales. The score range for each scale was 0–100. The higher the score, the greater the work control, work mental load, work physical load, supervisor support, co-worker support, lack of job security, workplace justice, workplace violence, and work-family conflict. Additionally, the Cronbach's  $\alpha$  coefficient of the workplace psychosocial hazards scale in five surveys of the study subjects ranged from 0.86 to 0.91.

Section 3 was related to worker health hazards and included work-related burnout, over-commitment, and mental health. Three scales in the Copenhagen Burnout Inventory, namely personal burnout (five questions), work-related burnout (five questions), and client-related burnout (six questions) were used to assess work-related burnout. The over-commitment scale (five questions) in the effort-reward imbalance work stress model [27] of the German sociologist Siegrist was used to assess over-commitment. The five-item simplified health scale developed by Ming-Been [28] was used to assess mental health. The five-point Likert scale was used for all questions. After the scores of the first four subscales were summed up, weighted standardization was performed. The

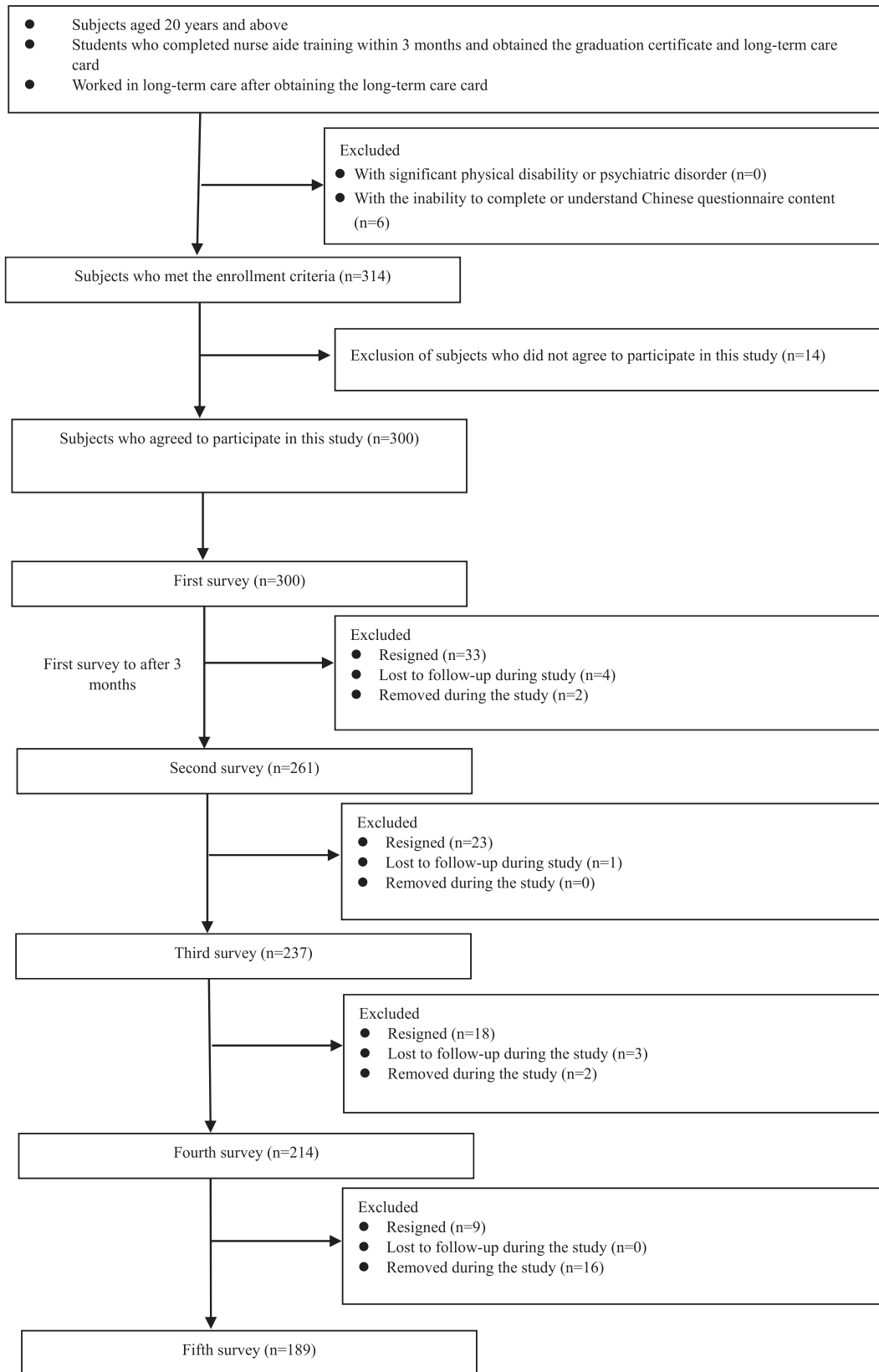


Fig. 1. Study procedure.

score range was 0–100. The higher the standardized score, the greater the personal burnout, work-related burnout, client-related burnout, and over-commitment. The total score of the simplified health questionnaire ranged from 0 to 20 points. The higher the score, the poorer the mental health. Additionally, the Cronbach's  $\alpha$  coefficients of the worker health hazard scale and simplified health scale of the study subjects in five surveys were 0.91–0.94 and 0.84–0.88, respectively.

Section 4 was about musculoskeletal disorders, and the standardized Nordic questionnaire for the analysis of musculoskeletal symptoms developed by Kurorinka et al. [29] was used. The questionnaire included 15 body sites, namely the neck, left shoulder, right shoulder, upper back, lower back, left elbow/forearm, right elbow/forearm, left hand/wrist, right hand/wrist, left buttock/thigh, right buttock/thigh, left knee, right knee, left ankle/foot, and right ankle/foot. The subjects were asked whether fatigue, soreness, numbness, and pricking sensation in these 15 sites lasting more than two weeks were present in the past year. A human figure was used for the subject to indicate the degree of injury at the site of discomfort. At every site, the subject could select no pain (0) to severe pain (5). The scale was used to understand the distribution of patients with musculoskeletal disorders and pain severity. The number of sites with discomfort was summed up and presented as the total number of sites with musculoskeletal disorders. The score ranged from 0 to 15. The higher the score, the greater the number of sites with musculoskeletal disorders.

### 2.3. Data analysis

SPSS 22.0 for mac (IBM Corp., Armonk, NY) was used for data analysis in this study. Descriptive analysis was used to present the personal socioeconomic background, workplace psychosocial hazards, worker health hazards, musculoskeletal disorders, and turnover behavior in nurse aides within the first year of employment. Following that, Cox regression analysis of time-dependent covariates was used to examine factors that can significantly predict turnover behavior in nurse aides. First, Cox regression analysis of time-dependent covariates of turnover behavior was carried out on each of the four sections—personal socioeconomic background, workplace psychosocial hazards, worker health hazards, and musculoskeletal disorders (including various subscales) individually. The  $P$  value in the significance test was set as  $< 0.05$  for preliminary identification of significant factors of turnover behavior in the four aforementioned sections. After that, all significant factors were used for one-time Cox regression analysis of time-dependent covariates with  $p < 0.05$  in the significance test to identify the predictors of turnover behavior in newly employed certified nurse aides.

## 3. Results

### 3.1. Socioeconomic background of the participants

Table 1 shows the personal socioeconomic background (baseline) of the 300 recruited study subjects: there were more women (83.3%) than men. The mean age was 44.54 years. Most subjects had an education level of senior high school/vocational school (55%) and were mainly Taiwanese citizens (67.8). Most subjects were married (74.7%). 43.3% of the subjects were home nurse aides, and most worked in special municipalities (67.7%). In addition, Appendix 1 shows the descriptive statistics of workplace psychosocial hazards, worker health hazards, and total number of musculoskeletal disorder sites.

**Table 1**  
Personal socioeconomic background of study subjects

Variable	Newly employed ( $N = 300$ )	
	$N$ (mean)	Percentage (standard deviation)
Gender		
Male	50	16.7%
Female	250	83.3%
Age	44.54	(9.15)
Education level		
Junior high school and below	66	22%
Senior high school/vocational school	165	55%
Junior college or university	67	22.3%
Graduate school	2	0.7%
Nationality		
Foreigner	97	32.2%
Taiwanese	203	67.7%
Marital status		
Single	76	25.3%
Married	224	74.7%
Home nurse aide		
Non-home nurse aide	170	56.7%
Home nurse aide	130	43.3%
Service region		
Non-special municipality	112	37.3%
Special municipality	188	62.7%
Family breadwinner		
No	93	31%
Yes	207	69%
Salary (10,000 NTD)	2.36	(0.95)
Dominant hand		
Right hand	263	87.7%
Left hand	37	12.3%
Smoking status		
No	241	80.3%
Yes	59	19.7%
Use of aid during work		
No	214	71.3%
Yes	86	28.7%
BMI	22.95	(5.52)
Exercise frequency		
Rarely	147	49%
Occasional	128	42.7%
>1 times/week	25	8.3%

BMI, Body mass index; NTD, New Taiwan Dollar.

### 3.2. Turnover behavior within one year of new employment

Table 2 shows the number of people and percentages in the first year of employment. The baseline number of newly employed subjects was 300. After three months, the number of employed subjects was 261, the number of subjects who resigned was 33, the number of subjects who were lost to follow-up was four, and the number of subjects who were removed was two. After six months, the number of employed subjects was 237, the number of subjects who resigned was 23, and the number of subjects who were lost to follow-up was one. After nine months, the number of employed subjects was 214, the number of subjects who resigned was 18, the number of subjects who were lost to follow-up was three, and the number of subjects who were removed was two. After one year, the number of employed subjects was 189, the number of subjects who resigned was 9, and the number of subjects who were removed was 16. The reasons for removal were as follows: the study subject

**Table 2**  
Number of people and percentages in the first year of employment

Employment period	Newly employed (N = 300)		3 months (n = 300)		6 months (n = 300)		9 months (n = 300)		1 year (n = 300)	
	n	Percentage	n	Percentage	n	Percentage	n	Percentage	n	Percentage
Employed	300	100.00%	261	87.00%	237	79.00%	214	71.33%	189	63.00%
Resigned	0	0%	33	11.00%	23	7.67%	18	6.00%	9	3.00%
Lost to follow-up	0	0%	4	1.33%	1	0.33%	3	1.00%	0	0.00%
Removed	0	0%	2	0.67%	0	0%	2	0.67%	16	5.33%

switched to another position, such as administrative management or home care supervisor, or started their own business.

### 3.3. Predictors of turnover behavior

The results (Table 3) demonstrated that employment period, work as a home nurse aide, monthly salary, work mental load, workplace justice, workplace violence, work-related burnout, mental health, and total number of musculoskeletal disorder sites are significant predictors of turnover behavior in newly employed certified nurse aides. The risk of turnover was higher in study subjects with a shorter employment period (hazard ratio [HR] = 0.21, 95% confidence interval [CI] = 0.13 to 0.34,  $p < 0.01$ ), not working as a home nurse aide (HR = 0.58, 95% CI = 0.37 to 0.90,  $p = 0.01$ ), lower monthly salary (HR = 0.68, 95% CI = 0.53 to 0.88,  $p < 0.01$ ), higher work mental load (HR = 1.01, 95% CI = 1.00 to 1.02,  $p = 0.01$ ), lower workplace justice (HR = 0.97, 95% CI = 0.95 to 0.98,  $p < 0.01$ ), higher workplace violence (HR = 1.60, 95% CI = 1.25 to 2.05,  $p < 0.01$ ), higher work-related burnout (HR = 1.01, 95% CI = 1.00 to 1.03,  $p = 0.04$ ), poorer mental health (HR = 1.06, 95% CI = 1.01 to 1.14,  $p = 0.04$ ), and higher total number of musculoskeletal disorder sites (HR = 1.08, 95% CI = 1.02 to 1.16,  $p = 0.01$ ).

## 4. Discussion

The objective of this study is to investigate the predictors of turnover behavior among newly employed certified nurse aides. The results indicate that the turnover risk is lower among certified nurse aides with longer working experience, working as home

nurse aides, high monthly salary, low work mental load, high workplace justice, low workplace violence, low work-related burnout, good mental health, and lower total number of musculoskeletal disorder sites. As this study is one of the few longitudinal studies investigating the predictive factors of turnover behavior among newly employed certified nurse aides, the findings may contribute to reducing the turnover rate among these care workers.

This study found that the relative risk of turnover is decreased as employment period (working experience) increases. A survey by the Taiwan Ministry of Health and Welfare demonstrated that only 45% of newly employed nurse aides worked for more than one month, showing a high turnover rate [1]. Another study pointed out that the first three months is a retention threshold for newly employed staff [30]. However, if the nurse aides can exceed the retention threshold and their familiarity with the job increases, they will experience growth in their new job and integrate into a professional role in the long-term care industry and turnover behavior will decrease as employment period increases [26,31,32].

Additionally, this study found that the nurse aides providing home-based services had a lower risk of turnover. In other words, the risk of turnover in home services was lower than that in institutions, nursing homes, and daycare centers. Currently, the home care policy is an important core service in Taiwan's long-term care plan. At the same time, it is one of the long-term care methods that can be tailored to the patient [33]. Furthermore, the Taiwanese government has actively enacted laws to improve the welfare and salary of home nurse aides, which increased the social position and income of home nurse aides in Taiwan and attracted significant attention. Therefore, turnover risk may be decreased [34].

Furthermore, this study found that turnover risk was lower when monthly salary was higher, which is in alignment with previous studies [35–37]. Obtaining a salary required for living is the most basic evaluation criterion for every job. Additionally, nurse aides can select qualified and law-abiding long-term care centers to work after obtaining professional licenses [14] and sign reasonable service contracts. Therefore, the turnover risk is lower if newly employed certified nurse aides obtain higher salary.

This study showed that the higher the work mental load, the greater the turnover risk. Previous studies [30] also indicated that newly employed staff are usually not familiar with skills and have not established interpersonal relationships with their co-workers. Therefore, they have to shoulder excessive work mental load, which tends to cause emotional exhaustion, resulting in physical and psychological discomfort, causing health hazards or diseases, or even leading to poor care quality in patients, and increase in dangerous events and lawsuits, thereby causing turnover in nurse aides. Therefore, reducing the work mental load in the workplace can decrease the turnover risk in newly employed certified nurse aides.

Turnover risk was lower if perceived workplace justice was higher. A study [38,39] indicated that perception of low workplace justice has a significant correlation with negative emotions, sleep disorders, psychological sadness, and poor self-evaluated health.

**Table 3**  
Significant predictors of turnover behavior

Variable	$\beta$	SE	HR (95% CI)	$p$
Employment period	-1.56	0.24	0.21 (0.13, 0.34)	<0.01 <sup>‡</sup>
Nationality (Foreigner vs. Taiwanese)	-0.48	0.25	0.62 (0.38, 1.01)	0.06
Home nurse aide (Yes vs. No)	-0.55	0.22	0.58 (0.37, 0.90)	0.01 <sup>‡</sup>
Monthly salary	-0.38	0.13	0.68 (0.53, 0.88)	<0.01 <sup>‡</sup>
Dominant hand (Right vs. Left)	-0.50	0.28	0.61 (0.35, 1.06)	0.08
Smoking (Yes vs. No)	0.19	0.24	1.20 (0.76, 1.92)	0.43
Special municipality (Yes vs. No)	-0.33	0.22	0.72 (0.47, 1.10)	0.13
Use of aid during work (Yes vs. No)	0.41	0.24	1.50 (0.95, 2.39)	0.08
BMI	0.00	0.02	1.00 (0.97, 1.03)	0.99
Work mental load	0.02	0.01	1.01 (1.00, 1.02)	0.01 <sup>‡</sup>
Workplace justice	-0.03	0.01	0.97 (0.95, 0.98)	<0.01 <sup>‡</sup>
Workplace violence	0.47	0.13	1.60 (1.25, 2.05)	<0.01 <sup>‡</sup>
Work-related burnout	0.01	0.01	1.01 (1.00, 1.03)	0.04 <sup>†</sup>
Simplified health scale	0.06	0.03	1.06 (1.01, 1.15)	0.04 <sup>†</sup>
Musculoskeletal disorders	0.08	0.03	1.08 (1.02, 1.16)	0.01 <sup>‡</sup>

\* Examining the effects of variable on turnover risk in nurse aides,  $\beta$ , original regression coefficient; SE, standard error; HR, hazard ratio; CI, confidence interval; BMI, Body mass index.

<sup>†</sup>  $p < 0.05$ .

<sup>‡</sup>  $p < 0.01$ .



Hence, workplace justice can greatly affect the physical and mental health of workers. Therefore, long-term care institutions that value workplace justice will pay attention to nurse aide salary and welfare, promotion opportunities, and whether resource allocation is fair, and supervisors will consider the viewpoints of nurse aides and handle relevant matters with a rational, fair, and open attitude, which will help nurse aides feel understood and respected and naturally decrease their turnover risk.

Moreover, this study showed that turnover risk was higher if the workplace violence was greater. A study highlighted that nurse aides constitute a group that is susceptible to workplace violence as they encounter more opportunities for physical contact with patients in the course of their work and are, therefore, prone to sexual harassment and physical violence [34]. Victims of workplace violence tend to have more physical discomfort and poorer physical and mental health than ordinary workers, including anxiety, depression, anger, stress, and sleep disorders. Severe workplace violence can lead to post-traumatic stress disorder, which can cause them to be unable to continue working. Workplace violence can increase business losses and lead to loss of important customers and employees in work organizations [40]. Therefore, a work environment with high workplace violence may cause more nurse aides to resign.

This study found that higher work-related burnout leads to increased turnover risk. Work-related burnout is a state of physical and mental exhaustion caused by high work load and long working hours. Long-term work-related burnout not only affects work performance but can also impact patient care quality and be detrimental to the rights of patients. In more severe cases, work-related burnout can affect the physical and mental health of nurse aides or even lead to death from overwork [41]. Therefore, work-related burnout is a key factor that causes nurse aide turnover.

The poorer the mental health of the participants, the higher the turnover risk. The mental health status of an individual not only indicates whether an individual is free from physiological or psychological disorders but also includes suitable emotional and cognitive coordination and a good social adjustment capacity [42]. However, negative behavioral symptoms tend to occur when there are mental health problems. Poor mental health in newly employed nurse aides may affect care quality and lead to injuries and errors, ultimately leading to turnover [34].

The higher the number of sites with musculoskeletal disorders, the higher the turnover risk. Many studies pointed out that musculoskeletal disorders constitute one of the major occupational injuries. Musculoskeletal disorders not only affect physical and mental health, work performance, and quality of life and increase medical costs and social cost, but they can also decrease work competency and cause turnover [43–45]. Previous studies [8,9,46] also pointed out that musculoskeletal disorders are one of the main factors of turnover in nurse aides. Caring for patients requires the execution of many repetitive actions, and excessive force exertion or improper posture may lead to musculoskeletal soreness and fatigue. Long-term accumulation of these symptoms will cause local pain or even loss of limb function in nurse aides, causing them to be unable to continue working.

#### 4.1. Limitations

This study has a few limitations: (1) a nurse aide training association in central Taiwan served as the recruitment site in this study, and this limitation should be considered while generalizing the study results. (2) After completing the first stage of data collection in this study, COVID-19 resulted in an increase in the national pandemic alert, which caused some nurse aides to be

suspended from work or unemployed. Therefore, the study results may be affected by the COVID-19 pandemic, resulting in an amplification effect or reverse trend changes [47,48]. (3) This study was only conducted once every three months, and five surveys were carried out in one year. We recommend that the survey period and frequency be increased in future studies. (4) This study used self-completed questionnaire surveys to collect data. The study participants could have answered questions based on societal expectations when completing the questionnaire. This study also involved workplace violence, supervisor support, and personal background data, which are sensitive topics. Therefore, there is a possibility that the full picture of workplaces cannot be obtained from the results. Additionally, there are many factors that could affect turnover behavior in nurse aides, such as the relationship with the patient, activities of daily living of the patient, and dementia, which were not considered in this study. (5) This study was only carried out with currently and newly employed certified nurse aides, and the healthy worker effect may be present in the sample. This includes staff who could not continue working due to workplace psychosocial hazards, worker health hazards, and musculoskeletal disorders or those who resigned due to family reasons or other diseases. Therefore, the at-risk status of newly employed certified nurse aides may be underestimated.

## 5. Conclusion

The study results found that employment period, working as a home nurse aide, monthly salary, work mental load, workplace justice, workplace violence, work-related burnout, mental health, and total number of musculoskeletal disorder sites are significant predictors of turnover behavior in newly employed certified nurse aides. In other words, the turnover risk of newly employed certified nurse aides with longer working experience, working as a home nurse aide, high monthly salary, low work mental load, high workplace justice, low workplace violence, low work-related burnout, good mental health, and lower total number of musculoskeletal disorder sites was lower.

### Data accessibility statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

### Ethical approval

This study was approved by the Jen Ai Hospital Human Research Ethics Committee (JAH HREC-110-5).

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### Conflicts of interest

The authors declare that they have no conflict of interest.

### Acknowledgments

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## Appendix

## Appendix 1

Descriptive statistics of workplace psychosocial hazards, worker health hazards, and total number of musculoskeletal disorder sites

Employment period	Newly employed (n = 300)		3 months (n = 261)		6 months (n = 237)		9 months (n = 214)		1 year (n = 189)	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Workplace psychosocial hazard										
Work control	49.32	12.88	43.39	14.64	44.80	15.63	48.53	15.50	51.81	15.07
Work mental load	67.43	10.74	62.78	15.44	62.40	15.91	62.13	14.41	60.19	12.18
Work physical load	76.75	16.07	72.13	21.18	73.52	21.04	74.88	19.15	73.54	18.80
Supervisor support	68.77	14.01	65.25	16.74	67.46	16.20	71.93	14.93	74.34	15.04
Co-worker support	74.52	14.43	72.41	16.69	74.08	15.86	76.90	15.26	78.57	15.46
Lack of job security	61.79	10.26	64.66	15.31	60.90	15.42	54.32	15.85	51.79	15.88
Workplace justice	69.29	12.81	65.78	15.43	67.89	15.15	72.66	14.30	76.06	13.19
Workplace violence	0.33	0.66	0.33	0.61	0.24	0.57	0.14	0.48	0.08	0.36
Work-family conflict	62.69	14.33	53.38	16.79	54.16	17.61	53.44	17.20	52.08	16.44
Worker health hazard										
Personal burnout	36.32	16.63	32.20	17.72	31.79	17.83	29.56	17.22	26.38	14.65
Work-related burnout	36.42	18.67	31.38	20.61	30.02	20.96	25.61	19.93	22.14	16.46
Client-related burnout	35.49	18.51	28.69	21.26	27.18	20.36	25.47	18.44	22.22	15.83
Over-commitment	38.37	17.34	36.67	18.30	33.52	17.37	29.60	15.65	28.44	15.59
Simplified health scale	3.37	3.38	3.32	3.18	2.73	2.86	2.09	2.35	1.90	2.33
Musculoskeletal disorders	4.95	3.88	3.65	3.76	3.97	3.88	4.70	3.98	4.71	3.71

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